

An Evaluation of A Pronatal Subsidy Program in Korea: A Quasi-Experimental Approach[†]

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Abstract: This paper evaluates the overall effects of a pronatal subsidy program, the Basic Subsidy Program (BSP), in Korea. As the Total Fertility Rate(TFR) declines as low as 1.08 in 2005, several pronatal programs are urgently enlarged and newly introduced. One such program is the BSP for families with infants cared for in private day care centers. The subsidies mainly aim to improve the quality and the accessibility of child care, and encourage mothers' labor supply by providing lump-sum subsidy per child to the private day care centers. I show overall effects of this subsidy by taking advantage of a quasi-experimental environment where only the families with the infants(0~2 years) compared to the toddlers(3~5 years) that use private care centers rather than other types of facilities are subsidized. The findings show that the subsidies have some positive effects on quality characteristics at the subsidized facilities. However, the increase in per child input is far less than per child subsidy, which implies low effectiveness of the program. In addition, the subsidy is found to have little impact on households with young children.

JEL codes: H2, J1

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I. Introduction

The two main objectives of providing subsidies for child care are to help mothers balance work and family and to provide care environment that is favorable to children's development. Each country develops its own system of achieving these policy goals. For example, child care is provided directly by the government in traditional welfare states such as Sweden. In an economy where high taxes on wage income like Sweden, public child care has played important roles in inducing high female labor supply and equitable child care.¹ On the other hand, in the countries where private child care is developed such as the US or UK, subsidies are mostly provided to low income families to make up for the market failure such as credit constraints, and regulations are imposed on the service providers.²

Meanwhile, Korea's child care system is in between these in the sense that the private child care market is widely developed, but the policy goals pursue a universal coverage of public provision of daycare centers and public finance for child care.³ As the policymakers idealize child care system in traditional welfare states, universal child care funded by the government is often emphasized in the current child care area in Korea.

A drastic decline in fertility rates in Korea whose Total Fertility Rate (TFR) is 1.08 as of 2005 further justifies greater allocation of government budget to the area of child care. A sudden dropout from the labor market of women in their early 30s shown in Figure I also calls for government intervention to reduce the burden of child bearing and rearing. This 'M' shape pattern has been persistent, although the low points narrow as the age at first marriage increases and births from women in their late 20s decreases over time. As

¹See, Bergstrom and Blomquist (1996) for theoretical background of the political economy of subsidized day care which shows rationales for public provision of day care depending on tax rates on wages.

²For example, state governments in the US impose licenses and regulations on child care providers including child-staff ratio and group sizes. Child care providers in the UK is also under the supervision of the Office for Standards in Education, Children's Services and Skills(Ofsted).

³The long term plan for population policy is included in the '*Saeromaji 2010*', which addresses the low fertility issue in Korea.

population ageing mostly due to the decline in fertility rates becomes a central issue that attracts policymakers' attention, and the main problem of population ageing is the lack of labor force, the support to child care to encourage women's labor supply is even highly emphasized.⁴ Thus, subsidies for child care has become a highly prioritized policy.

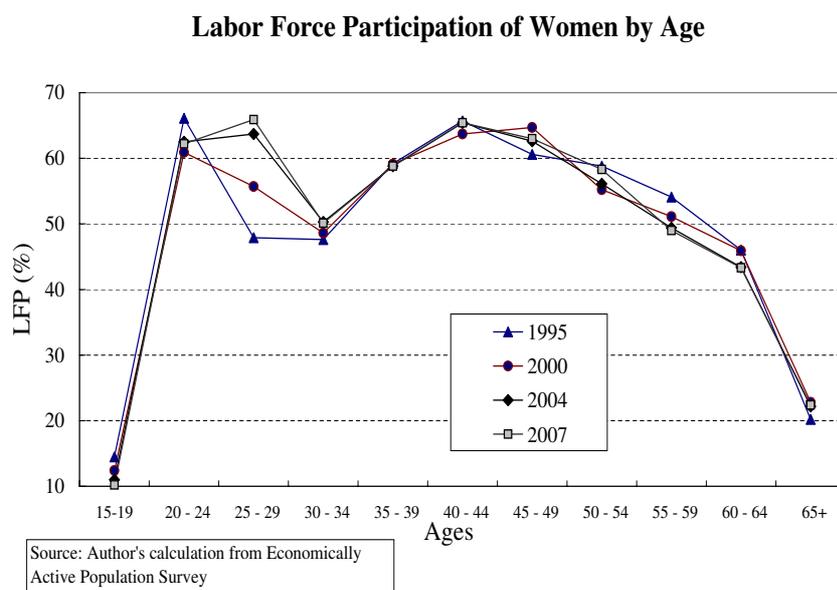


FIGURE I: M-SHAPED PATTERN OF WOMEN'S LABOR FORCE PARTICIPATION

According to the survey of women with children under age six,⁵ about 71% of women have labor market career disruptions after marriage. Among those who experience career disruption, about 68% report that it is due to child care reasons.⁶ Among those who drop out from labor market because of child care reasons, 68% answer that they quit their jobs upon becoming pregnant. Also, when asked about difficulties relating to child care, working mothers answered that both child care and household chores at the same time are

⁴See Cho (2006a) for policy alternatives for increasing both fertility and labor supply of women.

⁵The figures cited here come from the survey conducted by KDI in 2007 that is used for this study. Detailed description on the survey and the data used, follows below.

⁶Other reasons include disadvantages at work due to pregnancy and births, personal reluctance to work, opposition from families and health problems.

most demanding (34.9%), there is few reliable child care choices (27.8%), and monetary costs of child care are heavy burden (21.3%). Given this statistics, if child care subsidies could improve accessibility to quality care and reduce monetary costs of child care, the career disruption of women can be greatly reduced.

For these purposes, the new subsidy program for child care was considered taking into account the current market situation. Child care market in Korea is such that the majority of families use private day care centers due to the limited provision of subsidized public care centers.⁷ Public day care centers whose labor costs are funded by the government are able to maintain good quality.⁸ The quality of private day care centers, on the other hand, are generally lower than that of the public counterparts mainly due to the price cap. Despite the price cap imposed on private day care centers, the fees are more expensive in private than in public day care centers.

Addressing this asymmetry of public and private day care centers in the price and quality of care, the ‘Basic Subsidy Program (BSP)’ was introduced in 2006 to families whose children are cared for by private daycare centers. This paper evaluates the effects of the BSP. Quantifying the effects of subsidies on outcomes such as maternal labor supply, children’s developmental outcomes, and quality of care have long been studied in this field of economics. Some studies investigate the association of child care costs and female labor supply. Examples include Heckman (1974), Michalopoulos, Robins, and Garfinkle (1992), Kimmel (1998), and Ribar (1995) which theoretically and empirically illustrated the negative effects of child care costs on female labor supply. These studies imply that

⁷The marginal tax rates on wages in Korea ranges from 8% to 35%. However, due to the various tax exemption rules, the average tax rate on labor income is 3% as of year 2005, which is the lowest among the OECD countries. When the tax wedge is counted instead of tax rates on labor income, Korea’s tax burden is the lowest among the OECD countries. Partly due to the low tax rates, and low spending in the area of welfare, the public provision of child care is very limited. For detailed information on tax burden among OECD countries, refer to OECD (2006).

⁸Public day care centers include non-profit corporation and legal private entity as well as public, state, municipality based day care centers whose operation is supported by government funding.

helping with child care costs could increase maternal labor supply. Using Korean data, consistent results were found. Kim and Won (2004) have shown that child care costs are a barrier to maternal labor supply. Other studies quantify the link between child care, parental employment, and children's outcomes. Blau and Grossberg (1992), Ruhm(2004), and Taylor et al. (2004) are included to name a few.

In line with the literature in this field, this study quantifies the effects of the BSP. The BSP is introduced to the families with infants first and then it is planned to be subsequently extended to those with toddlers.⁹ In addition, the subsidies are provided only to the private day care centers and nursery homes, excluding public day care centers and other private care facilities. This quasi-experimental environment enables this evaluation. *The National Survey of Child Care and Education* and the *National Household Survey on Child Care* in 2004 serve as data sets for pre-program. The Data Analysis Unit at Korea Development Institute constructs equivalent data sets for post-program information. The difference in difference (d-in-d) and the difference in difference in difference (d-in-d-in-d) approaches are used to estimate the effects. The findings show that the subsidies have improved teachers' welfare in day care centers which may lead to an increase in quality. However, female labor supply and price of care from households' perspectives are rarely affected by the BSP.

This paper is organized as follows. The next section provides a description of the structure of child care market, the design of subsidy scheme, and the policy objectives of the BSP. Section III, then presents the data used and discusses the empirical strategies. Section IV summarizes the results and policy implications. Finally, Section V concludes this study.

⁹Throughout this study, infants refer to children from 0 to 2 years old, and toddlers refer to children from 3 to 5 years old.

II. Background

A. Structure of child care market

The structure of child care market is presented in Figure II. Child care facilities known as day care centers take care of children ages from 0 to 5. These centers have legal responsibility to care for children for a whole day. Public day care centers, private day care centers, and nursery homes are included in this category.¹⁰ These facilities are under the supervision of the Ministry of Family. Kindergartens legally available only to children ages of 3 to 5 are categorized as educational facilities, and are supervised by the Ministry of Education. They normally care for children part time. Other private tutoring facilities include various forms of educational arrangements which are open to various age groups. They include private institutions that teach music, play, and martial arts. They sometimes specialize in teaching foreign languages and are called ‘English Kindergartens.’ The hours and price of care from these institutions greatly vary since there is little regulation for them. Those who do not use care facilities depend on their relatives, maids, and nannies as well as parental care for child care.

Among these care facilities, public day care centers and public kindergartens benefit from government support for their labor costs including wages for principals, teachers, and cookeries. Since most of the child care costs come from the labor costs, the subsidized facilities afford to charge low price for parents. However, only less than 20 percent of children who use care facilities are cared for by public facilities due to the limited supply of public care. Although there is excess demand for public care, there exists little guidelines for priority and it is usually on the first-come-first-serve basis. Only very limited number of children from legally low income families, single parent and parentless families, and

¹⁰Nursery homes are small-scale private day care centers whose maximum capacity is less than or equal to 20 children.

adopted children are given the first priority to use public care. Thus the function of public day care centers has little difference from that of private day care centers. For this reason, it is argued that subsidizing public day care centers excluding only private day care centers is unfair.

Using Care Facilities		
Day Care Centers (Ages 0~5)	Kindergartens (Ages 3~5)	Private Tutoring Facilities
public daycare centers	public kinder	culture centers
private daycare centers (nursery homes)		private kinder
Ministry of Family	Ministry of Education	
Not Using Care Facilities		
maternal care		
grand parents/relatives		
nannies, maids, babysitters		

FIGURE II: THE STRUCTURE OF CHILDCARE MARKET

Even though the private day care centers do not receive government’s financial support, they face some restrictions. The price cap is imposed because day care centers are legally recognized as non-profit individuals or organizations. The profit-corporations are not allowed to enter child care market. This price cap and non-profit aspect are considered to limit the scope of innovative activities of private day care centers. Some private day care centers charge additional fees for extracurricular activities or snacks to make ends meet while maintaining price no higher than the price cap. Others provide low quality service and charge even lower fees than the price cap to gain price competitiveness. Thus it is generally thought that the private daycare centers are more expensive and have less

quality than the public counterparts. Given that the private daycare centers face the price cap even though the function of public and private day care centers do not differ much, and the majority of children who use non-mother care facilities are cared for by private day care centers, the introduction of subsidies to the private day care centers has been insisted.

B. Design of the BSP

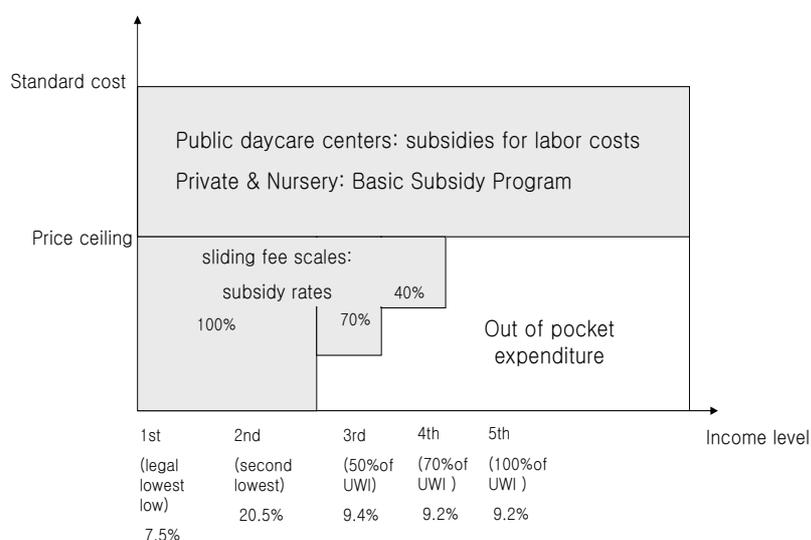
Considering such current child care market situation where the supervision of facilities is dichotomous and the quality of private day care centers is lower than any other facilities, and that there is an imperative need to increase birth rates, the BSP was introduced. After a long period of disputes on the scope and amount of subsidies, it is decided that only private day care centers excluding other forms of care facilities receive the benefits of subsidies. The subsidies are applied only to infants first and planned to be extended to toddlers in the near future.¹¹ The subsidies are given to the service providers instead of families, but the provision is dependent on the number of infants in each facility.

In terms of the amount of subsidies, the equity to the subsidies between public and private day care centers is considered. The subsidy scheme is illustrated in Figure III. Given the standard costs of child care and education (standard costs hereinafter),¹² the BSP is set as the difference of the standard cost of child and the price cap. The price cap of the private daycare centers is set at the fee of public daycare centers. The newly introduced BSP is per child subsidies, while the existing subsidies to the public specifically cover the costs of labor. The existing sliding fee scales is maintained to help low income families with child care, and the rate is specified as the percentage of the price cap. For

¹¹In case toddlers are subject to subsidies, whether the subsidies should be also provided to kindergartens that operate only part time is still be disputed. Other forms of care and educational arrangements also claim for partial benefits of subsidies.

¹²The standard costs of child care and education are defined as the average expenses to maintain a decent childcare environment. The standard costs vary with the age of children, but do not differ by region or facility characteristics.

example, the monthly standard costs for 0 year old infant is about \$650, the price cap which is normally what parents pay is about \$360, and the subsidy is \$290. Since the subsidy rate for a child from 50% of UWI families is 70%, the parents of this child pays 30% of \$360.¹³



*UWI: Urban Workers' Income

FIGURE III: THE DESIGN OF CHILD CARE SUBSIDIES

The amount of BSP subsidies varies with the age of children and so does the standard costs and the price cap. However, it does not vary between the regions, working status of the mother, or income level of the families. Even the children from families of the highest income group whose mother is a housewife can benefit from the BSP subsidies as long as they are cared for by private day care centers. This aspect of the BSP is highly criticized because the main objectives of subsidizing child care should be to help mothers balance

¹³As of year 2006, about 47% of children whose family income is less than 100% of UWI(Urban Workers' average Income) are subject to the sliding fee scales.

family and work, and to provide equitable opportunity of child care to the needy families. However, the policymakers recognize that the main objective of the BSP is to improve the quality of private day care centers without removing the price cap.

They impose four prerequisites to receive the BSP subsidies. First, all teachers in day care centers should participate in four major insurances, including national pension, national health insurance, employment insurance, and industrial accident insurance. Second, all the teachers' compensation should be as high as the minimum wage. Third, the revenue and expenses of day care centers should be reported via *e*-finance system. Fourth, the staff-child ratio should be maintained at, 1:3, 1:5, 1:7 for 0, 1, 2 year old children, respectively. Although the prerequisites to receive the subsidies from providers' side are imposed, the eligibility criteria is not imposed from users' side.

Apart from the subsidy programs, the Inspection and Certification process started in 2006. This is similar to the NAEYC accreditation process in the US.¹⁴ While the NAEYC accreditation covers any early childhood program including day care centers, preschools and kindergartens, before- and after- school programs, the Inspection and Certification process covers day care centers only. As NAEYC accreditation, this process requires intensive assessment of seven areas including structural characteristics, child care environment, curriculum, interaction between teachers and children, interaction between facilities and communities, and safety, nutrition and health. Although this certification process began in 2006 when the BSP was introduced and the effects of the BSP are compounded, the process takes at least nine months and only less than 10% of the total day care centers have passed this process when this study is conducted. So, in examining the effects of the BSP, the Inspection and Certification would not be likely to be a compounding factor. It is often argued that in order to improve the quality of day care centers the subsidies

¹⁴NAEYC stands for the National Association of Education for Young Children. For more information on NAEYC accreditation, refer to Hotz and Xiao (2005).

should be provided only to those facilities that are certified.

C. Policy goals of the BSP

Child care subsidies mainly aim to help mothers to balance work and family and to promote children's development through quality care. However, due to the complicated and distorted child care market structure in Korea, the BSP has specific policy goals that may not be mutually compatible. The policy goals that policymakers recognize are as follows. First, the quality of private day care centers where the majority of children are cared for should be improved. Second, even though the quality improves, the price should not increase in order to reduce the burden of households. Third, by improving quality without increasing the price, the BSP aims to increase the usage of private day care centers and vitalize the market. Finally, the increase in accessibility of quality care should induce more labor force participation of women with young children.

There are two issues regarding the policy goals and design of the BSP. Some of the policy goals are not properly set and difficult to be obtained by the BSP with current design. First, the BSP aims to improve the quality of private day care centers by subsidizing while maintaining the price cap. This gives little incentive to service providers in improving their quality. Although the BSP imposes prerequisites to improve quality, recognizing this problem, subsidization alone is limited in inducing quality improvement. Second, it is tautology that the goal of subsidy is to reduce financial burden. The goal is to provide equal opportunity to disadvantaged families by targeting low income families rather than equal transfers to all income groups. Third, it is not clear why an increase in the usage of non-mother care for infants is the policy goal. It is generally considered that maternal care is important for infants. Finally, child care subsidies alone may not be effective in inducing women's labor supply unless there is additional incentive. Currently even non-working mothers can claim the benefits of the subsidies and the BSP provides

little incentive to mothers with infants to participate in the labor market.

III. Data and Empirical Framework

A. Data and Descriptive Analysis

To examine whether the BSP achieve the policy goals, I take advantage of a quasi-experiment environment where the BSP is introduced only to the families with infants cared for by private daycare centers and nursery homes. To take this approach, the pre- and post-program data sets are needed. For the pre-program data, I use the *National Survey of Child Care and Education* for providers' data and *National Household Survey on Child Care* for households' data conducted in the year 2004. The providers' data collect information on child care facilities. The nationally representative sample of providers report detailed information on their facilities. They include information on teachers and principals such as their education, certificate, wages, and benefits, curriculum and physical environment. The household survey collects the nationally representative sample from the families with children below the age of 13. It includes demographic and social characteristics, and detailed information on child care and education. In particular, this data set includes whether children use any non-mother care, if so what type of child care facilities are used, and how much parents are satisfied with the care quality.

To obtain a post-program data set, equivalent data sets from providers and households' side are constructed in 2007, respectively(2007 KDI provider and household surveys hereinafter).¹⁵ The 2007 provider survey randomly selects nationally representative sample of each type of day care centers.

The 2007 household data set collects the nationally representative sample of families with children under age six. Due to the concerns of oversampling housewives when the

¹⁵The Data Analysis Unit at the Korea Development Institute conducts surveys, collects data, and constructs relevant variables for the analysis.

surveys are conducted by visits, a web-based survey is used instead. According to the Ministry of Information and Technology (2007), more than 90% of the people in their 20s to 40s upon which age groups the majority of the sample would fall currently use the Internet. However, to resolve possible bias problem due to the web-based design, *2005 Census* is referred to match regional distribution of households with children under age six, and the demographic characteristics of mothers in sampling. In addition, based on the *2006 National Households Survey*, individuals are weighted to match income and educational distribution of these mothers.

The panel A of Table 1 presents the representativeness by comparing the population and the sample of day care centers. The panel B also shows that how the sample collected in 2007 is matched to the nationally representative sample. Having confirmed that both data sets constructed in 2007 are representative, I use both 2004 and 2007 data sets to examine the effects of the BSP.

Summary statistics on the demographic and economic characteristics of the households are presented in Table 4. The sample mothers' age distribution is similar, but their educational attainment has overall improved between 2004 and 2007. The non-mother income that is the household income less mother's labor earnings is denoted in real dollars of the year 2004.¹⁶ It is noted that the labor force participation of the sample mothers has improved from 31.8% in 2004 to 38.9% in 2007, and the proportion of full time workers among the participants increased from 73.6% in 2004 to 78.1%. However, the hours of work have largely declined possibly due to the spread of the reduction in legal working hours and 5 days of work system.¹⁷ Although working hours of working mothers have decreased, the overall payment for child care has increased over time. Total monthly fee

¹⁶The exchange rate is such that 1 dollar = 946 won.

¹⁷The 5 days of work system started in 2002 from bankers. As the law passed in 2003 that mandates 5 days of work system step by step, firms with more than 1,000 workers are first subject to this regulation in 2004. Then it is extended to firms with more than 300 workers in 2005, 100 workers in 2006, and 50 workers in 2007. It is scheduled to be extended to firms with more than 20 workers in 2008.

is the monthly payment to care facilities when they use non-mother care facilities, and total monthly expenditure is the total amount the households spend for child care and education.¹⁸ Given the amount of non-mother income, the expenditure on child care and education seems high and increases faster than the increase in income.

Next, the child care arrangement is presented in Table 3. The usage of care facilities has greatly increased over time. While the majority of infants were cared at home in 2004, 48.2% of infants use care facilities in 2007. Almost all toddlers use at least one care facilities. Looking into the type of care facilities, among those toddlers who use care facilities 27.7% in 2004 and 35.1% in 2007 attend kindergartens. However, due to the legal limitation few infants are cared for in kindergartens. Meanwhile, 13.0% in 2004 and 11.0% of infants in 2007 cared by facilities use nursery homes, although the usage of nursery homes among toddlers is very low. As widely recognized, kindergartens specialize in toddlers' early education, while nursery homes specialize in infants' care. Even though the number of other types of care and education facilities that specialize in cognitive development through play, foreign language education, or musical instrument lessons increase, the proportion of children who use these types of facilities as their main care providers decreases. It appears that these types of facilities serve as secondary providers of care and education mainly for toddlers.

According to the Ministry of Family (2007), the number of child care facilities increased. In particular, since the BSP was introduced in 2006, the number of nursery homes has greatly increased. Among the newly opened facilities, nursery homes and private daycare centers account for 60% and 33%, respectively. Namely, 93% of newly opened facilities are subject to the BSP subsidies. Due to the affluent subsidies and resulting increase in the number of these facilities, it is expected that the usage of care facilities among infants would greatly increase. It seems that this is what is observed

¹⁸These numbers are also in 2004 real dollars.

from Table 3.

B. Empirical Strategy

To examine the effects of the BSP subsidies on the families, I exploit the quasi-experimental aspect of the program. Since the subsidies are provided only to infants while toddlers are excluded from the benefits, and to the private day care centers while public day care centers and other types of care facilities are excluded, I take advantage of this partial introduction of the subsidies. The repeated cross sectional data sets are used for the comparisons between outcomes in 2004 for pre-program and in 2007 for post-program. This strategy is illustrated in Figure IV. The program introduction is denoted as X and the outcomes of each period and group is denoted as O_i .

		before		after	difference
Treatment (private)	infants	O_1	X	O_3	$O_3 - O_1$
	toddlers	O_2		O_4	$O_4 - O_2$
difference		$O_1 - O_2$		$O_3 - O_4$	d-in-d
Control (public, other types)	infants	O_5		O_7	$O_7 - O_5$
	toddlers	O_6		O_8	$O_8 - O_6$
difference		$O_5 - O_6$		$O_7 - O_8$	d-in-d
					d-in-d-in-d

FIGURE IV: A QUASI-EXPERIMENT ENVIRONMENT OF THE BSP

Since families with infants in treatment group alone experience the program, the changes in outcomes of this group over time, $O_3 - O_1$, reflect the effects of the BSP. Given that there might be group specific changes over time within infants, the changes in outcomes of control group $O_7 - O_5$ are subtracted. Then this becomes a d-in-d estimate, $(O_3 - O_1) - (O_7 - O_5)$ that reflects the effects of the BSP. However, when there are systematic differences in outcomes of interest between the treatment and control group,

the d-in-d estimate is compounded with these unobserved differences. To tease out the effects of the BSP, the equivalent d-in-d estimate obtained from the toddlers' group, $(O_4 - O_2) - (O_8 - O_6)$, is counted. Then $[(O_3 - O_1) - (O_7 - O_5)] - [(O_4 - O_2) - (O_8 - O_6)]$ becomes the d-in-d-in-d estimate that captures the net effects of the BSP.

When providers' data set is used, the type of child care and the year after introduction are used to capture the effects of the BSP. In this case, I consider the following equations,

(1)

$$y_{it} = X'_{it}\beta + \alpha_1 D_{07} + \alpha_2 Private + \alpha_3 Nursery + \alpha_4 D_{07} + \alpha_5 Private \cdot D_{07} + \alpha_6 Nursery \cdot D_{07} + \mu_{it},$$

where i represents an individual facility and t denotes time. *Private* and *Nursery* indicate private day care centers and nursery homes, respectively, and D_{07} indicates the year 2007. Considering that the BSP takes effect on private day care centers and nursery homes in 2007, the interactions of the type of care and D_{07} reflects the effects. Thus α_5 and α_6 are the d-in-d estimate of the BSP on private day care centers and nursery homes, respectively.

When the households' data set is used, each individual households differ by the presence of infants. Given that the households with infants alone are affected by the BSP, it is possible to take account of this difference between infants and toddlers. Then the d-in-d-in-d estimate considers the outcome difference between infants and toddlers, across each type of care facilities and over time. The equation that measures these estimates reads

(2)
$$y_{ijt} = X'_{ijt}\beta + \alpha_1 D_{07} + \alpha_2 Infant + \alpha_3 Private + \alpha_4 Infant \cdot D_{07}$$

$$+\alpha_5 Private \cdot D_{07} + \alpha_6 Private \cdot Infant \cdot D_{07} + \epsilon_{ijt},$$

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where i and j represent an individual household and childcare facility respectively, and t is time. As above, *Infant* indicates the households with infants, *Private* indicates the usage of private daycare centers and nursery homes, and D_{07} indicates the year 2007.¹⁹ The comparison groups then are those households with toddlers without infants, those who use other types of care facilities including public daycare centers, kindergartens, and other private facilities, and the households in 2004. X_{ijt} includes the individual characteristics including mothers' age and education, local characteristics including region, and household characteristics including non-mother income.²⁰ The effect of the BSP subsidies on the outcomes is reflected in α_6 , which is the d-in-d-in-d estimate.

IV. Results

This section summarizes the effects of BSP and discusses its implications. From providers' perspective, the effects of BSP on teachers' welfare, curriculum and educational environment, and child-staff ratios are examined. From households' perspective, maternal labor supply, child care arrangement, child care costs, and satisfaction with child care are measured.

A. Providers' Side

Teachers' Welfare: Since one of the goals of BSP is to improve the quality of care and it is highly correlated with the welfare of teachers, the prerequisites include teachers' wages and insurances policies. Thus, I first examine teachers' wages and the effects of BSP. Teachers' average wage is around \$890 per month.²¹ From 2004 to 2007, their

¹⁹When the providers' data are used, the number of nursery homes is large and private day care centers and nursery homes are separately examines. However, when the households' data are used, given that the proportion of households that use nursery homes are very small, nursery homes are examined as a part of private day care centers.

²⁰Non-mother income is defined as household's total income excluding mothers' labor earnings.

²¹The exchange rate is 1 USD=1,000 KRW.

real wages increase by 2.6%. Those who have certificates of child education and long work experience, and who work at large facilities receive higher wages. When teachers' experience and certificates are controlled, their educational background has little impact on their wages. On average, the wages at private day care centers and nursery homes are lower than those of public day care centers. The findings show that the BSP significantly increases the wages of teachers by 3.9% who work at nursery homes where most of the children cared for are infants.

Given that the hours worked reflect the intensity of labor, the effects of BSP on hours worked are investigated. Whether they have over-time payment, continued education on a regular basis, supplementary teacher program, and financial difficulty in the facility are asked and examined. The findings show that these miscellaneous items improve over time, although they also show the discrepancy between private and public day care centers. The BSP has little effect on these welfare related variables.

Curriculum and Educational Environment: Although there are no explicit prerequisites to improve the curriculum or educational environment, subsidies enable the providers to improve them. Whether the facility has extracurricular activities including sports or music lessons, and child and staff safety training is investigated. The findings show that the nursery homes have improved with these after the introduction of BSP. It appears that the nursery homes emphasize educational aspects than simple care after the subsidy is provided. Physical environment, safety, and sanitation items are examined as well, but the BSP is found to have little impact on them.

Child-staff ratio: The infants-teacher ratio is also investigated. Observing the ratios is prerequisite for the subsidy. The number of infants per teacher in private day care centers and nursery homes is higher than that of the public day care centers. Over time it declines by 0.67 child per teacher. The BSP further reduces the number by 0.71 at nursery homes. As a result, child-staff ratio in nursery homes in 2007 is better than the

public day care centers.

B. Households' Side

Child care arrangement: Since the BSP aims to improve the quality of infant care without raising the price, the subsidies are likely to induce the usage of care facilities. As mentioned above, the increase in the number of nursery homes and private day care centers would have increased the accessibility of families to the care facilities. Compared to the highschool graduates, those who obtain junior college or college and above education, are more likely to use other types of facilities; Increase in non-mother income increases the likelihood of using other types of facilities as well, but reduces the usage of day care centers especially the private day care centers and nursery homes. Given that the private day care centers and nursery homes have had lower quality, the negative correlation between non-mother income and the usage of these types of arrangement makes sense. As the youngest child in the household grows older, the use of care facilities increases. Those who are aware of government subsidies are more likely to use the subsidized care facilities. In year 2007, there is a notable increase in overall usage of care facilities. Infants are less likely to use care facilities. The findings show that the BSP greatly increases the usage of private daycare centers and nursery homes, while there is little effect on the usage of the other types of arrangements.

Maternal labor supply: One of the most important policy objectives when subsidizing child care is to make it easier for mothers to reconcile work and family. Previous studies anticipated that helping with child care would increase maternal labor supply, noting that time and monetary costs of child care is a main barrier to work (Cho 2006; Kim and Won 2004). In particular, recall that many women have answered that the reason for not working is due to child care responsibilities and the reason for not using care facilities is because they do not trust care facilities. So improving the care quality without increasing

the price should encourage maternal labor supply. However, in an environment where the labor market is not flexible in the sense that the entry and exit of women into the labor market is not easy and few part time work is available, subsidizing child care without providing further incentives to work might not lead to an increase in maternal labor supply.

Many countries require labor force participation or equivalent activities including job search and training as prerequisite for receiving subsidies for child care. Even the traditional welfare states that emphasize universal public child care provide opportunities to use public facilities only to working mothers. Childcare subsidies, in the countries where workfare is emphasized, are provided to low income families contingent upon their effort to work. However, the BSP like other child care subsidies in Korea does not impose any requirement to induce maternal labor supply. Thus, it is expected that the BSP might have little impact on increasing women's labor supply even though it significantly increases infants' use of care facilities.

The findings are consistent with previous research. Women's education significantly increases labor supply. In particular, women with college and above education are more likely to work full time and longer hours than the other groups; the increase in non-mother income significantly reduces the likelihood of working both part- and full time, and working hours. It shows that the women tend to be a secondary earner, whose labor supply is highly dependent on household income. The higher the number of adults and the lower the number of children in the household, and the older the age of the youngest child, mothers are more likely to increase labor supply. Compared to the year 2004, maternal labor supply has increased in 2007. The labor supply is higher for those women whose children are cared in daycare centers and nursery homes than the other counterparts. Since the daycare centers and nursery homes are legally required to provide care service for 12 hours a day, it is easier for working mothers to leave children in these facilities. The

maternal labor supply is hardly affected by the subsidies because non-working mothers can take advantage of the subsidies, and increasing number of women use day care centers regardless of their labor market status.

Child care costs: The price of private daycare centers and nursery homes which was subject to the price cap was generally higher than the fees of public daycare centers. However, with the introduction of BSP, the price cap of the private and nursery homes is lowered to the equivalent level to the fee of public day care centers. Three measures to capture the costs of child care are used. The first one is the monthly fee that each household regularly pays for each child. The second one is the total monthly fee that includes additional costs including fees for textbooks, bus, snacks, and special activities on top of the monthly fee. The third one is total monthly expenditure on child care that includes fees paid to child care facilities, and individual costs paid to nannies and tutors.

Throughout all measures, a child in public daycare centers, compared to the counterpart in other type of private facilities, pays lower fees by 17.6% to 21.8%. This shows that not only fees for public daycare centers are lower, but also additional payment to the facilities are lower for public. The effect of the BSP on child care costs is that the overall payment to private day care centers and nursery homes in 2007 has slightly decreased. However, the BSP hardly affects the total expenditure of families with infants. Although the price cap is still enforced, the increasing number of facilities report that they charge more than the price cap, and they impose extra fees. Thus, the BSP subsidies are found to have little impact on reducing the costs of care.

Satisfaction: In the survey, there are series of questions that ask mother's satisfaction with child care. The items included are principal, teachers, environment, tools, costs, health, nutrition, safety, curriculum, parental participation, and parental counseling. Overall satisfaction improves over time. However, the BSP effect on satisfaction is little. The increased usage of less desperate mothers due to the subsidy program may

have reduced their overall appreciation of child care service.

Table 4 summarizes the effects of BSP on outcomes from providers and households' sides. A noteworthy impact is that due to the prerequisites, there are some improvement in teachers' welfare and quality of care. The impact from households' side is little. Simple calculation using the average number of infants, amount of subsidy per child, and input costs to improve the quality of care shows that out of \$107 of subsidy, only about half is used for observing the prerequisites. This low measure of improvement questions the effectiveness of the program.

V. Conclusion

The low fertility rate in Korea seems to justify almost any kind of program as long as it is pronatal. The design and policy goals of the program are often overlooked. Although child care subsidies usually have distinct policy objectives such as increasing maternal labor supply, and making care service more affordable and suited to children's cognitive development, the design of the BSP is not so effective to achieve these aspects. As a result, the findings suggest that the BSP hardly increases maternal labor supply and has little impact on reducing child care costs, although there has been some improvement in quality. The impact of the BSP on the fertility which is currently limited due to the short period of the program is investigating with further research.

Given the findings, I present a few policy suggestions. Since the BSP targets private daycare centers and nursery homes just because their quality is lower and price is higher than the public counterparts, the fundamental cause of this discrepancy should be addressed. First, the public daycare centers should serve the disadvantaged groups first rather than competing with private facilities. If public daycare centers prioritize serving children from low income, broken, and single parent families, providing subsidies to public

prior to private can be justified. Second, the regulations such as price cap and non-profit requirement that prevent the development of child care market should be removed or alleviated. At the same time, however, other regulations such as setting quality standards and certifying staffs should be implemented and settled.

To encourage maternal labor supply, the design of the BSP can be modified to provide more incentives to work. Higher subsidy rates for women who work or engage in equivalent activities can be an option. Given that the child care costs hardly change despite the subsidies, providing subsidies to the families instead of facilities so that the families obtain more choices in selecting care facilities may help. This is likely to induce more active competition among care facilities, which encourages innovative ideas in the private care market to reduce costs and improve quality.

REFERENCES

- Bergstrom, Ted and Sören Blomquist (1996), "The Political Economy of Subsidized Day Care," *European Journal of Political Economy*, 12, pp. 443-57.
- Blau, David (1997), "The Production of Quality in Child Care Centers," *Journal of Human Resources*, 32(2), pp. 354-387.
- Blau, David (1999), "The Effect of Child Care Characteristics on Child Development," *Journal of Human Resources*, 34(4), pp. 786-822.
- Blau, David and Alison Hagy(1998), "The Demand for Quality in Child Care," *Journal of Political Economy*, 106(1), pp. 104-46.
- Blau, David and Naci Mocan(2002), "The Supply of Quality in Child Care Centers," *Review of Economics and Statistics*, 84(3), pp. 483-96.
- Blau, Francine and Adam Grossberg (1992), "Maternal Labor Supply and Children's Cognitive Development," *Review of Economics and Statistics*, 74(3), pp. 474-81.
- Cho, ByungKoo, Yoonyoung Cho, and Jungho Kim (2007), "Theoretical Foundation and Empirical Evaluation of Pronatal Programs," *KDI Research Monograph* , Korea Development Institute Press.
- Cho, Yoonyoung (2006a), "An Analysis of Fertility and Labor Supply: Implications for Family Policies," *KDI Policy Study* , 2006-01.
- Currie, Janet and Matthew Neidell (2007), "Getting Inside the "Black Box" of Head Start Quality: What Matters and What Doesn't," *Economics of Education Review*, 26(1).
- Garces, Eliana, Duncan Thomas, and Janet Currie (2002), "Longer Term Effects of Head Start," *American Economic Review*, 92(4), pp. 999-1012.
- Heckman, James (1974), "The Effect of Child-Care Programs on Women's Work Effort," *Journal of Political Economy*, 82(2), pp. S136-S163.
- Hotz, Joseph and Mo Xiao (2005), "The Impact of Minimum Quality Standards on Firm

- Entry, Exit and Production Quality: The Case of The Child Care Market,” NBER Working paper #11873.
- Kim, Hyunsook and Jonghak Won (2004), “Fiscal Policies and Female Labor Supply: Implications of Child Care Costs,” Korea Institute of Public Finance.
- Kimmel, Jean (1998), “Child Care Costs as a Barrier to Employment for Single and Married Mothers,” *Review of Economics and Statistics*, 80(2), pp. 287-299.
- Michalopoulos, Chales, Philip Robins, and Irwin Garfinkle (1992), “A Structural Model of Labor Supply and Child Care Demand,” *Journal of Human Resources*, 27(1), pp. 166-203.
- Ministry of Family (2007), *Statistics on Care Facilities*.
- Ministry of Information and Technology (2007), *Review of Informatization in Korea*.
- OECD (2006), *OECD Tax Database*.
- Powell, Irene, and James Cosgrove (1992), “Quality and Cost in Early Childhood Education,” *Journal of Human Resources*, 27(3), pp. 472-84.
- Ribar, David (1995), “A Structural Model of Child Care and the Labor Supply of Married Women,” *Journal of Labor Economics*, 13(3), pp. 558-597.
- Ruhm, Christopher (2004), “Parental Employment and Child Cognitive Development,” *Journal of Human Resources*, 39(1), pp. 155-92.
- Taylor, Beck, Eric Dearing, and Kathleen McCartney (2004), “Incomes and Outcomes in Early Childhood,” *Journal of Human Resources*, 39(4), pp. 980-1007.
- Walker, James (1991), “Public Policy and the Supply of Child Care Services,” in *The Economics of Child Care* (Ed. David Blau), Russell Sage Foundation: New York, 1991, pp.51-77.

Table 1: SAMPLE COMPARISON

A. Type of Day Care Centers							
Type		All	Public day care centers			Private day care centers	
			National	Corporate	Non-corp	Private(Individual)	Nursery
Popu- lation	num.	27,792	1,585	1,617	896	12,772	11,922
	%	100	5.5	5.6	3.1	44.4	41.4
Sample	num.	1,000	51	59	42	433	415
	%	100	5.1	5.9	4.2	43.3	41.5

B. Characteristics of Households		
Families with Children under Six		
Variables	2006 National Household Survey	2007 KDI Household Survey
Mothers' Age	32.8	31.8
Mothers' Education		
High school graduates	52.4	51.5
Junior college	20.4	20.6
College and above	27.2	27.9
Mothers' LFP	33.3	34.8
Num. of Total Children	1.76	1.71
Num. of Children 0~5	1.27	1.27

†2006 National Household Survey is publicly available from the National Statistics Office (NSO).

Table 2: SUMMARY STATISTICS OF THE SAMPLE

Variables	Mean (S.D.)				Variables	Mean (S.D.)			
	2004		2007			2004		2007	
Mothers' Age	32.3	(4.1)	31.8	(4.3)	Unemploy- ment rate	3.23	(0.67)	3.18	(0.72)
Mothers' Education					Mothers' Labor Supply				
High school	0.576	(0.493)	0.515	(0.492)	LFP	0.318	(0.466)	0.389	(0.525)
Junior college	0.212	(0.410)	0.206	(0.379)	Hours of work [†]	48.05	(16.72)	39.50	(15.68)
College+	0.212	(0.410)	0.279	(0.441)	Full time [†]	0.736	(0.441)	0.781	(0.437)
Non-mother Income	\$ 2,420	(1,273)	\$ 2,650	(1,367)	Infant	0.534	(0.499)	0.605	(0.526)
Num. of adults	2.19	(0.64)	2.32	(0.81)	Know about subsidy	0.656	(0.475)	0.840	(0.394)
Num. of children	1.80	(0.67)	1.71	(0.93)	Total monthly fee ^{††}	\$ 196	(104)	\$ 282	(177)
Age of the youngest	2.38	(1.70)	2.05	(1.81)	Total monthly expenditure ^{††}	\$ 281	(217)	\$ 404	(354)

† The weekly hours of work and the proportion of full time workers are calculated among the labor market participants.

†† The monthly fee and expenditure are calculated among the families with positive payment.

Table 3: USAGE OF NON-MOTHER CARE FOR INFANTS AND TODDLERS

			2004			2007		
			Infants (0~2)	Toddlers (3~5)	Total	Infants (0~2)	Toddlers (3~5)	Total
Proportion of Non-mother Care			14.1	82.5	51.9	48.2	96.5	72.4
Type	day care centers	public	18.9	17.0	17.2	18.4	22.3	21.0
		private	39.6	33.1	33.9	37.5	29.9	32.4
	other types	nursery homes	13.0	1.1	2.5	11.0	1.0	4.3
		kinder others	1.2	27.7	24.4	3.7	35.1	24.7
			27.2	21.2	21.9	29.4	11.8	17.6

†The proportion ratio is calculated as the number of children in each facilities among those who use non-mother care.

Table 4: SUMMARY OF THE BSP EFFECTS

BSP Effects	
Providers Side	
Teachers wages	Increase by 3.9%
Teachers 4 major insurances	Increase from 24.1% to 95.9%
Child-staff ratio	Improve by 0.71 child per teacher
Quality improvement expenses per child	54 USD per month
Subsidy amount per child	107 USD per month
Households Side	
Child care arrangement	Increase in private day care centers and nursery homes
Maternal labor supply	Little impact
Child care costs	Slightly reduced
Satisfaction	Little impact