Effects of a Universal Childcare Subsidy on Mothers' Time Allocation[†]

By YOUNG WOOK LEE[*]

This paper examines the effects of a universal childcare subsidy on childcare decisions and mothers' employment by using Korea's policy reform of 2012, which provided a full childcare subsidy to all children aged 0 to 2. I find that the introduction of a universal childcare subsidy increased the use of childcare centers by children aged 0-2, which led to less maternal care compared to that provided to children aged 3-4. However, the expanded subsidy had little effect on mothers' labor supply. Moreover, the policy effects vary by individual and household characteristics. The effects of the expanded subsidy are mainly found in low-income households and less educated mothers. Highly educated mothers and high-income households are likely to focus more on the quality of childcare service. These results imply that a simple reduction in childcare costs would bring only limited effects on mothers' time allocation behavior; thus, more attention should be paid to improving the quality of childcare services.

Key Word: Universal childcare, Childcare subsidy, Quality of care,
　　　　　　Mothers' time allocation
JEL Code: J13, J21, J22, I28

I. Introduction

Universal childcare programs are ongoing topics of discussion in Korea. The Korean government started to provide a full subsidy for full-day center-based care to all families with children aged 0-2 and 5, regardless of their income and/or employment status, in 2012 and expanded it to all households with children aged 0-5 in 2013. This universal childcare program was introduced in Korea's context of low fertility and low female labor force participation rate. Korea has one of the

lowest fertility rates in the world.[1] Also, the female employment rate remains low relative to other OECD countries, and the labor supply of mothers with young children is particularly low.

As a means of solving these problems, a full subsidy for the use of childcare centers has been widely advocated. A childcare subsidy could encourage households to use childcare centers, thus removing some of the childcare burden for women, who have most responsibility for raising children in Korea. However, a lower childcare cost does not necessarily lead to changes in mothers' decisions regarding employment and childcare arrangements, as the decision-making process is affected by various factors instead of only childcare prices.

In this paper, I examine the effects of a universal childcare program on childcare arrangements and mothers' employment by using the policy reform of 2012, which provided a full childcare subsidy to all children aged 0 to 2. In particular, I analyze mothers' time allocation between paid work and childcare. In many economic models, time is usually divided into market work and leisure time, but for mothers, substantial amounts of non-market time are used for childcare. Looking into mothers' time allocation behavior for childcare as well as market work helps to understand policy effects on mother's time use comprehensively. In addition, I study the possibility that the impacts of the full subsidy are heterogeneous across households and mothers. Previous studies of childcare subsidies focused primarily on mean effects, but the policy effects of financial support may differ according to household income distributions and other characteristics.

This paper finds that the introduction of the universal childcare program increased the use of childcare centers by children aged 0-2, which led to less maternal care compared to children aged 3-4. However, I find little effect of the expanded subsidy on mothers' labor supply. Moreover, the policy effects vary significantly by individual and household characteristics. For less-educated women and for low-income households, center-based care has replaced care by parents, but this result is not found among highly educated women and high-income households. This finding suggests that the degree of substitutability between maternal care and center-based care differs according to individual and household characteristics.

To understand the heterogeneous policy effects, I also examine the demand for quality of childcare. Using a questionnaire about willingness to pay for the quality of childcare center, I find that willingness to pay is higher with mothers who are more educated and have higher household incomes. The results imply that the demand for childcare service varies according to individual and household characteristics, possibly leading to different responses to childcare policy changes.

The empirical results have important policy implications. First, the effects of the expanded subsidy are mainly on low-income households and less educated mothers. In the sense, the full subsidy for full-day center-based care that covers high-income households would not be cost-effective compared to the large fiscal burden incurred by the government to cover all income classes. The funds for the subsidy program ultimately come from an increase in the tax burden, which lowers

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[1]Korea's average births between 2010 and 2015 are estimated as 1.3 per year, which is the third lowest in the world (UNFPA 2014).

economic efficiency (Havnes and Mogstad 2011). Moreover, highly educated mothers and high-income households are likely to focus more on the quality of childcare service. Thus, a simple reduction in childcare costs would have only limited effects on mothers' decisions regarding their time use and childcare arrangements.

The remainder of this paper is organized as follows. Section II explains the childcare subsidy policy of Korea and predicts the effect of the subsidy on mothers' time allocation behavior and childcare arrangements. Section III presents the empirical model, and Section IV describes the data. Section V shows the results of the estimation and Section VI concludes the paper.

II. Literature Review

A large literature examines the effect of childcare prices on female labor supply decisions. The estimates of the degrees of childcare price elasticity on employment range from 0.04 to –1.26 in the literature (Blau and Currie 2007). Because childcare arrangements and prices are closely correlated with mothers' employment decisions, exclusion restrictions need to be applied to estimate childcare prices. Without appropriate exclusion restrictions, the estimates could be biased (Baker *et al.* 2008; Blau and Currie 2007; Havnes and Mogstad 2011).

Instead, more recent studies use natural experiments that exploit exogenous childcare policy changes. Baker *et al.* (2008) analyze the introduction of a childcare subsidy in Quebec and find a large and positive impact on the labor supply of mothers with children aged 1-5 years. Gelbach (2002) and Berlinski and Galiani (2007) show that the introduction of public kindergarten or pre-primary education increases female labor supply in the United States and Argentina, respectively. On the other hand, Havnes and Mogstad (2011) find that the expansion of subsidized childcare in Norway has little effect on the maternal labor supply and instead crowds out informal care arrangements. Additionally, Lundin *et al.* (2008) study a reduction in childcare costs due to the introduction of a maximum price in Sweden and find no effect on the female labor supply.

These studies using policy changes find that a reduction in childcare prices leads to an increase in childcare center usage but a decrease in informal care usage. However, the findings about policy effects on mothers' employment vary across studies that examine policy changes in different countries. This may have resulted because each country has different childcare culture and labor market conditions that together affect decisions on mothers' labor supply and childcare arrangements.

Beyond focusing on labor supply decisions, Kimmel and Connelly (2007) study mothers' time allocation decisions by categorizing time into market work, childcare, home work, and leisure. They find that maternal care time increases with childcare prices and mothers' wage rates.

In Korea's studies of childcare and female labor supply, the findings differ substantially, too. Choi (2011) examines the effects of the means-tested childcare subsidy of 2007, finding a negative effect on married female labor supply rates. Huh and Suk (2011) also show a negative impact of the means-tested childcare subsidy on female employment and argue that more forms of support for working

mothers are needed in childcare subsidy policies. On the other hand, Kim and Hong (2013) use the 2009 National Childcare Survey and find a positive effect of the childcare subsidy on female labor supply.

To the best of my knowledge, there are two studies which examine exogenous childcare policy changes in the Korean context. Cho (2007) uses the introduction of a basic subsidy for private childcare centers in 2006 and finds an increase in the use of private childcare centers but little effect on mothers' labor supply rates. Because the basic subsidy was provided directly to centers and not households with children and given that it rarely changed the price of childcare center usage, any analysis of the policy effect on mothers' labor supply decisions is limited. Byun and Heo (2014) examine the expansion of the childcare subsidy for low-income and middle-income households between 2004 and 2009 using the Korean Time Use Survey. They find positive but overall minor effects on working hours and negative effects on maternal care time. Due to the limitation of the dataset, i.e., no observation of the age of each child, they compare households with preschool-aged children to those with school-aged children, including high school students.

In my paper, I examine the introduction of the full childcare subsidy in 2012 given to all children aged 0-2 for a comparison with children aged 3-4. As a robustness check, I limit the sample to children aged 2 and 3 in order to compare children at more similar development stages.

III. Background

A. *Childcare Subsidy Policy*

The childcare subsidy has expanded its coverage gradually from low-income households to those at all income levels. In 2007, the subsidy targeted relatively low-income households under the urban worker's average monthly income and the subsidy amounts decreased in household incomes. The income level for subsidy eligibility increased to the lowest 70% in 2010, and a full subsidy was given to eligible households. In 2012, the full childcare subsidy was provided to households with children aged 0-2 and 5 regardless of their income and/or wealth (Table 1).

TABLE 1—POLICY CHANGES REGARDING THE CHILDCARE SUBSIDY

	Children aged 0-2	Children aged 3-4	Children aged 5
2007	Means-tested subsidy; for households whose income is at or less than the urban worker's monthly average		Full subsidy to households whose income is at or less than an urban worker's monthly average
2010	Full subsidy to households whose income is in the lowest 70% bracket		Full subsidy to households whose income is in the lowest 70% bracket
2012	Full subsidy to all households	Full subsidy to households whose income is in the lowest 70% bracket	Full subsidy to all households
2013	Full subsidy to all households		

Note: Recognized income is equal to the sum of the household's monthly income plus converted monthly income from its holdings such as land, housing, financial assets, vehicles, and other assets.

Source: Ministry of Health and Welfare (Various years), *Guideline for Childcare Policy*.
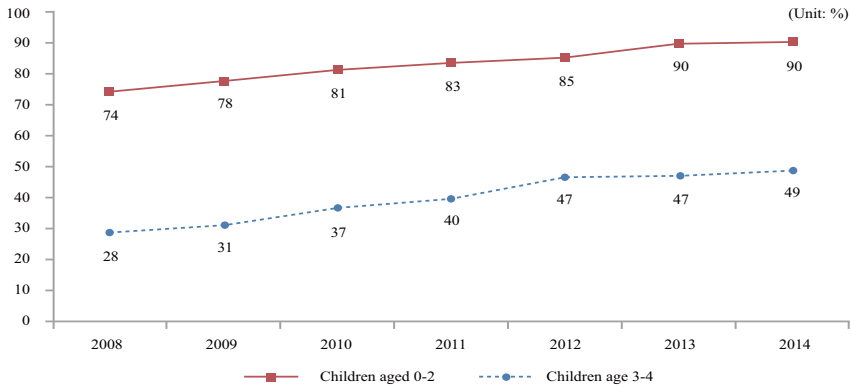
FIGURE 1. USAGE RATE OF CENTER-BASED CARE

Source: Ministry of Health and Welfare (Various years), *Childcare Statistics*; Statistics Korea (Various years), *Vital Statistics Survey*

TABLE 2—CHILDCARE SUBSIDY AMOUNTS OF 2012

Child Age	Subsidy Amount (KRW)
0	394,000
1	347,000
2	286,000
3	197,000
4	177,000
5	177,000

Note: USD 1 = KRW 1,130

Source: Ministry of Health and Welfare (2012), *Guideline for Childcare Policy*

Figure 1 shows that the use of childcare centers has increased, particularly for children aged 0 to 2, who were cared for at home before. As the full subsidy was provided to all households regardless of income with children aged 0 to 2 in 2012, the usage rate of childcare centers increased from 31% to 47% for children aged 0 to 2 between 2009 and 2012. On the other hand, for children aged 3 to 4, the usage rate of center-based care increased by 7%p during the same period from 2009 to 2012. For children aged 3 to 4, the full subsidy was provided to the lowest 70% in 2012 and not to all income classes. Moreover, even if the full subsidy is given to both children aged 0 to 2 and 3 to 4, the subsidy benefits are much larger for younger children. As shown in Table 2, the range of the full subsidy for children aged 0 to 2 is from KRW 394,000 to KRW 286,000 per month, while the subsidy amount for children aged 3 to 4 is from KRW 197,000 to KRW 177,000.

Starting in 2013, children aged 3-4 are entitled to the full subsidy as well, which means that all households with young children aged 0-5 are eligible for the childcare subsidy.[2] Accordingly, the usage rate of childcare centers increased by 5%p for children aged 3 to 4 for 2013, whereas the rate for children aged 0 to 2 remained the same.

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[2]The childcare program provided for children aged 3 to 5 is called the "Nuri program."

While coverage for the full subsidy has been expanded to all income households, there has been much policy debate about a universal childcare subsidy. The federal budget for childcare and early childhood education more than doubled from KRW 294 billion in 2009 to nearly KRW 800 billion in 2013 (Yun *et al.* 2013). The subsidy expansion triggered disputes about the financial burden between the central and local governments. Moreover, there is criticism that the subsidy expansion leads to excess demand on the centers, which causes more trouble for working mothers who desperately need center-based care for their children. Also, the usage escalation intensified concerns about the management of childcare facilities and their quality.

B. *Theoretical Framework*

In this section, I present a theoretical model which is used to investigate factors that affect mothers' time allocation and childcare arrangements. Usually, in many economic models, time is divided into market work and leisure time, but for mothers, substantial amounts of non-market time are used for childcare. In addition, mothers' labor force participation decisions are made in conjunction with childcare arrangements. In this sense, I assume that a mother allocates her time to market work, leisure, and childcare in the model, which is extended based on James-Burdumy (2005).

The mothers' total time (T) consists of market work time (T_h), childcare time (T_c), and leisure (T_l).

(1) $$T = T_l + T_h + T_c$$

A mother maximizes her utility that is derived from consumption (C), leisure (T_l), and the quality of her child (Q).

(2) $$maxU=U\left(Q,\ C,\ T_l\right)$$

To enhance the child's quality, she can invest time and market goods for childcare. As time inputs, she can spend her own time with her child, or arrange childcare by others such as childcare centers and other caregivers. Then, the child's total time (T_{kid}) is spent with mother (T_c), with other individuals including relatives and nannies (T_f), or in a childcare center (T_p).

(3) $$T_{kid}=T_c+T_p+T_f$$

The child's quality is affected by both the quantity and quality of each time input. In a child-quality production function, the child's quality is determined by the maternal care time (T_c) and its quality (Q_c), center-based care time (T_p) and its quality (Q_p), informal care time by other individuals other than parents (T_f) and its quality (Q_f), and market goods (M). The product term of the quantity and quality of

each care time is the input of the child-quality production function, as expressed in Equation (4). The functional form suggests that as a time input is used more, its quality influences the child's quality more. Moreover, even if the child is cared for by different care providers for the same amount of time, the effect of each time input on the child's development would differ according to the quality of the care.

$$(4) \qquad Q = Q\left(T_c \cdot Q_c, T_p \cdot Q_p, T_f \cdot Q_f, M\right)$$

The budget constraint is as follows,

$$(5) \qquad C + P_p \cdot T_p + P_f \cdot T_f + M = wT_h + N,$$

where w denotes the wage rate of the mother, and P_p and P_f are the prices per hour for center-based care and for informal care by other individuals, respectively. N is other household income excluding mother's earned income. Because I focus on mothers' time allocation behavior, other household incomes, including the husband's income, are assumed to be given in the model.

The mother maximizes her utility with respect to the above budget and time constraints. The demand function for each type of care time can be expressed with the prices and qualities of the care time inputs, the mother's wage, and other household income.

$$(6) \qquad T_i = f_i\left(P_p, P_f, w, Q_p, Q_f, Q_c, N\right), \qquad i = c, p, f$$

Using first-order conditions of the above maximization problem, the following equation is derived:

$$(7) \qquad \frac{\partial Q / \partial T_c}{\partial Q / \partial T_p} = \frac{Q_p}{Q_c} \cdot \frac{w}{P_p}$$

Childcare policies can affect mothers' time allocation and childcare arrangements by influencing the price of center-based care (P_p) and its quality (Q_p). Suppose that a policy change reduces the price of care at a childcare center (P_p). Holding other variables constant, in order to maximize her utility, the derivative of the child quality function $Q(\cdot)$ with respect to maternal care time ($\partial Q/\partial T_c$) must increase or the derivative with respect to center-based care time ($\partial Q/\partial T_p$) must decrease. Under the assumption that the child-quality production function is concave,[3] this can be satisfied if the maternal care time decreases or the center-based care time increases. The degree of substitution between maternal care and center-based care is affected by the ratio of the center-based care quality to the maternal care quality (Q_p/Q_c), as shown in Equation (7). When the center-based care quality (Q_p) is

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[3]The assumption that the production function is concave implies the diminishing marginal product that additional output produced due to one more unit of input decreases as the amount of input increases.

higher and the quality of maternal care (Q_c) is lower, the mother is more likely to replace her maternal care with center-based care.

This simple theoretical model predicts that if the quality of maternal direct care is much better than that of center-based care, the degree of substitution between maternal care and center-based care would be low. In other words, the time spent in maternal care is unlikely to be replaced by center-based care if a child's quality can be more enhanced by the time investment of mothers. Moreover, if parents find it difficult to trust the quality of center care services or to find accurate information regarding the quality level, the rate of substitution would not be high or substitution would not even occur at all, even if the cost becomes low.

IV. Empirical Specification

To estimate the effects of the childcare subsidy expansion, I examine the policy reform which provided a full subsidy for the use of childcare centers to children aged 0-2. I apply a difference-in-difference (DD) approach by comparing children aged 0 to 2 and children aged 3 to 4 before and after the expansion of the childcare subsidy in 2012.

I use children aged 0 to 2 as a treatment group and children aged 3 to 4 as a comparison group. Children aged 0 to 2 are more likely to be affected by the subsidy expansion in two dimensions: eligibility and benefit amounts. Under the policy reform of 2012, only children aged 0 to 2 were eligible for a universal childcare subsidy regardless of household income. Moreover, the full subsidy amounts differed for children 0-2 years old and those 3-4 years old. The subsidy benefits for children aged 0-2 were larger than those for children aged 3-4, as shown in Table 2. Thus, except for households under 120% of the poverty line, who were already eligible for the full subsidy under the means-tested subsidy scheme before the reform, the subsidy expansion was greater for children aged 0 to 2 compared to children aged 3 to 4.

I use a DD framework with the following form,

$$(8) \qquad\qquad y = \alpha_1 T_{2012} + \alpha_2 K_{0-2} + \alpha_3 \left(T_{2012} \times K_{0-2} \right) + X\beta + \in,$$

where y is the outcome variable of interest. T_{2012} is a dummy variable equal to 1 if the year is 2012 and 0 otherwise. K_{0-2} indicates whether a child's age is between 0 and 2. $(T_{2012} \times K_{0-2})$ is an interaction term between T_{2012} and K_{0-2}, and the parameter α_3 reflects the policy effect of the universal childcare subsidy. X is a vector of the variables of mothers' individual and household characteristics. I control for mothers' age and education and for fathers' education. I also control for other household incomes (excluding mothers' earned income), the number of children under age 5, and the numbers of adults and children in the household. I include local unemployment rates and local childcare center supply rates. Year and area dummies are also incorporated.

The identification strategy could raise several concerns. First, children aged 0-2 and 3-4 could have a substantial difference in their development, which could

affect decisions regarding the type of care and the mothers' time allocation. For example, mothers tend to take care of younger children by themselves, but they are more likely to use center-based care for older children. The effect of the childcare subsidy on center-based care use and on mothers' time use for children aged 0-2 could therefore be underestimated compared to children aged 3-4. In this sense, any interpretation of empirical results needs to be made cautiously. To address this concern, I conduct robust checks by comparing children aged 2 and 3, whose ages are much closer.

Another issue is that both the treatment group and the comparison group were affected by the subsidy expansion between 2009 and 2012. In 2009, households with incomes below the urban worker's monthly average income received the means-tested subsidy. In 2012, the full subsidy was provided to households at all income levels with children aged 0 to 2, while for households with children aged 3 to 4, households in the lowest 70% income bracket were eligible for the subsidy. Although children aged 3 to 4 were also affected by the subsidy expansion, they were affected less than children aged 0 to 2 in terms of both the subsidy amounts and benefit coverage. In the estimation, I assess whether the reduction in costs for center-based care use is much larger for children aged 0-2 than that for children aged 3-4.

In particular, low- and middle-income households in the comparison group were affected by the subsidy expansion. Thus, the benefit gap from the expanded subsidy between the treatment and comparison groups is greater as household's incomes are higher. For this reason, the empirical results pertaining to the effects of the universal childcare program may be underestimated for low-income households. However, this does not necessarily imply that the mean effects of empirical results are driven by high-income groups. I address this concern by examining heterogeneous impacts of the expanded subsidy across income groups.

V. Data

I use data from the National Childcare Survey (NCCS), which is conducted every three years to collect data from households with young children and childcare facilities. The dataset contains information on individual and household characteristics and the mode of childcare used for each child. I employ the 2009 and 2012 datasets. The sample period between 2009 and 2012 covers the subsidy expansion to all income households with children aged 0 to 2.

The main outcome variable is mothers' time use for paid work and childcare. The survey includes information about who takes care of a child at each hour for 24 hours. Using this information, I calculate how long parents take care of their child between 7am and 10pm. It is not possible to compare maternal care times directly, as the 2009 dataset does not distinguish childcare by the father and the mother. In Korea, however, most parental childcare is done by mothers. According to the 2012 dataset, which separates care time according to the father and mother, maternal care time is 8.1 hours a day, while the parents' total care time is 8.6 hours. Thus, this paper focuses on mothers' time allocation and their individual

characteristics. As another outcome variable, I use care hours by other individuals other than parents in order to analyze which type of care is replaced in response to the subsidy expansion.

The sample is restricted to households in which parents cohabit with their child excluding children with disabilities or diseases. I focus on the youngest child in a family to separate treatment and control groups, as the youngest child affects the mother's time allocation most. The final sample consists of 4,062 mother-child combinations.

Table 3 shows the changes in costs for the use of center-based care from 2009 to 2012. The monthly regular tuition fee fell sharply from KRW 153,000 in 2009 to KRW 3,000 in 2012, when the full subsidy for children aged 0-2 was initiated. Total childcare costs with other expenses plummeted from KRW 195,000 to KRW 48,000. On the other hand, the childcare costs for children aged 3-4 did not fall as sharply as those for children aged 0-2 show, as the universal subsidy did not cover them until 2012.

TABLE 3—CHANGES IN COSTS FOR CENTER-BASED CARE

(UNIT: KRW 1,000)

	Total costs for the use of childcare centers	Monthly tuition fee	Other expenses (including extra activities, learning materials, meals)
Age 0-2			
2009	195	153	38
2012	48	3	43
Age 3-4			
2009	250	167	77
2012	201	102	95

Note: As of the real amount in 2012.

Source: Ministry of Health and Welfare (2009, 2012), *National Childcare Survey*

TABLE 4— DESCRIPTIVE STATISTICS

Households with a child aged 0-2	2009 (observations: 1,466)		2012 (observations: 1,457)	
	Mean	SD	Mean	SD
Mothers' age	32.00	4.02	32.69	3.75
Mothers' education: higher than high school	0.38	0.48	0.46	0.50
Father's education: higher than high school	0.46	0.50	0.53	0.50
Number of children aged 0-2	1.12	0.32	1.13	0.35
Number of children aged 3-5	0.30	0.49	0.31	0.49
Number of preschoolers	1.63	0.68	1.63	0.67
Number of school-aged children	0.26	0.59	0.22	0.52
Number of adults	2.23	0.61	2.16	0.53
Local unemployment rate	3.46	0.85	2.84	0.83
Local childcare center supply rate	54.17	8.47	65.41	9.65
Usage rate of childcare centers	0.28	0.45	0.44	0.50
Mothers' labor force participation rate	0.24	0.42	0.25	0.44
Mothers' weekly working hours	10.96	19.76	10.42	18.21
Weekday's parental childcare hours	11.12	4.88	10.44	4.54

(*CONTINUED*)

TABLE 4— DESCRIPTIVE STATISTICS *(CONTINUED)*

Households with a child aged 3-4	2009 (observations: 581)		2012 (observations: 563)	
	Mean	SD	Mean	SD
Mothers' age	34.79	3.81	35.82	3.72
Mothers' education: higher than high school	0.34	0.47	0.42	0.49
Father's education: higher than high school	0.47	0.50	0.51	0.50
Number of children aged 0-2	0.00	0.00	0.00	0.00
Number of children aged 3-5	1.17	0.37	1.16	0.37
Number of preschoolers	1.77	0.62	1.73	0.59
Number of school-aged children	0.69	0.68	0.66	0.67
Number of adults	2.22	0.61	2.16	0.49
Local unemployment rate	3.40	0.90	2.88	0.85
Local childcare center supply rate	54.67	8.69	65.11	9.65
Usage rate of childcare centers	0.93	0.25	0.97	0.17
Mothers' labor force participation rate	0.40	0.49	0.39	0.49
Mothers' weekly working hours	18.23	22.88	16.54	20.82
Weekday parental childcare hours	7.01	3.08	6.86	2.40

Table 4 shows the descriptive statistics of the variables used for children aged 0-2 and 3-4 in 2009 and 2012. Mothers whose youngest children are aged 0-2 are younger than mothers with the youngest children aged 3-4. For children aged 3-4, mothers' working hours are longer and maternal care hours are shorter. Two notable changes between 2009 and 2012 is that the childcare center usage rate by children aged 0-2 increases from 28% to 44% while parents' care hours decrease.[4]

VI. Empirical Results

A. *Overall Effects of the Full Childcare Subsidy*

Table 5 shows the DD estimates for various outcome variables. In columns (1) and (2), I run DD regressions of the costs of childcare centers and the use of these centers, respectively, to check for the direct effect of the universal childcare subsidy on children aged 0 to 2 compared with children aged 3 to 4. The monthly cost for the use of childcare centers for children aged 0-2 is KRW 106,000 lower than that for children aged 3-4 in 2012 compared to the difference in 2009. This decline in the cost is a direct result of the universal childcare subsidy, confirming that the policy change lowered household spending on center-based care for children aged 0 to 2. Accordingly, the usage rate of childcare centers increases by 12.3%p for children aged 0 to 2 compared to those aged 3 to 4.

Columns (3) and (4) present the effects of the full subsidy on the mothers' labor supply. For both labor force participation and working hours, the estimates are not statistically significant. On the other hand, in column (5), the maternal care time

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[4]The childcare center usage rates by children aged 3-4 in Table 4 are higher than those in Figure 1. This difference in usage rates primarily stems from different definitions of childcare centers. The childcare centers defined in Table 4 include those for academic or religious purposes, but this is not the case for Figure 1.

TABLE 5—MAIN RESULTS

	(1) Costs for childcare center	(2) Use of childcare center	(3) Labor force participation	(4) Weekly working hours	(5) Daily parental care hours	(6) Daily informal care hours
2012	-46.462***	0.019	0.019	-0.123	-0.175	-0.214
	(13.693)	(0.027)	(0.039)	(1.690)	(0.281)	(0.195)
Child aged 0-2	-32.771*	-0.358***	-0.020	-1.009	1.841***	0.670***
	(18.175)	(0.032)	(0.034)	(1.487)	(0.328)	(0.248)
2012×Child aged 0-2	-106.065***	0.123***	0.015	1.094	-0.566**	-0.196
	(12.748)	(0.022)	(0.033)	(1.431)	(0.235)	(0.171)
Observations	2,132	4,062	4,062	4,062	4,062	4,062
R-squared	0.380	0.334	0.082	0.083	0.191	0.079

Note: This table reports the coefficient estimates from separate regressions of different dependent variables across columns. The list of control variables used is in Section IV. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors are in parentheses.

decreases by 0.566 hours for children aged 0-2 compared to that for children aged 3-4. If the average 0.566 hour reduction comes from the 12.3%p increase in center-based care usage, the estimates imply that the use of childcare centers leads to a drop in parents' care time by 4.6 hours (=0.566/0.123) a day. Overall, the reduced costs for center-based care through the universal childcare subsidy led to higher childcare center usage and less care by parents themselves for children aged 0-2. However, the labor supply of mothers displays no significant increase in response to the policy change.

B. *Heterogeneous Effects of the Full Childcare Subsidy*

Table 6 shows the effects of the subsidized childcare across mothers' individual and household characteristics.[5] The subjects of the analysis are categorized according to household income, the mothers' education level, and the mothers' employment status, respectively.

In Panel A in Table 6, the sample is split into four sub-samples by household income level: high, mid-high, mid-low, and low-income groups. First, I check the direct results of the full childcare subsidy on childcare costs by income group. The benefit changes from the expanded subsidy are greater as the household income increases. Thus, the results show that the decrease in childcare costs is greater for households with higher incomes – as expected. For the lowest income group, there is no statistically significant decrease in childcare costs, as households with children under age 5 below 120% of the poverty line were already eligible for the full subsidy before the reform. The monthly income level of the low-income sub-sample is less than KRW 1,390,000 per month, which is between 120% of the poverty lines for households with three members (KRW 1,230,000) and four members (KRW 1,510,000). For this low-income group, there is no change in subsidy benefits before and after the policy reform for both children aged 0 to 2

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[5]Tables A1 and A2 in the Appendix show descriptive statistics for mothers' working hours and parental care hours across subgroups.

TABLE 6— SUBSAMPLE ESTIMATION RESULTS I

	(1) Costs for childcare center	(2) Use of childcare center	(3) Labor force participation	(4) Weekly working hours	(5) Daily parental care hours	(6) Daily informal care hours
Panel A. Household income						
(1) High	-241.678***	0.158***	-0.054	-3.042	0.493	-1.249**
	(33.633)	(0.047)	(0.061)	(2.677)	(0.508)	(0.507)
(2) Mid-high	-149.108***	0.177***	0.012	0.487	-0.866*	-0.363
	(22.133)	(0.042)	(0.063)	(2.726)	(0.467)	(0.333)
(3) Mid-low	-37.402*	0.151***	0.019	2.445	-1.118***	-0.026
	(19.125)	(0.044)	(0.060)	(2.601)	(0.418)	(0.237)
(4) Low	-22.741	-0.008	0.021	1.367	0.042	0.160
	(14.996)	(0.043)	(0.055)	(2.357)	(0.398)	(0.165)
Panel B. Mothers' education level						
(1) Higher than	-164.596***	0.134***	0.014	0.961	-0.149	-0.483
high school	(25.568)	(0.037)	(0.054)	(2.281)	(0.412)	(0.327)
(2) High school	-58.608***	0.114***	0.012	1.053	-0.679**	-0.111
graduate or less	(13.120)	(0.027)	(0.041)	(1.861)	(0.286)	(0.189)
Panel C. Mothers' employment status						
(1) Working	-137.674***	0.205***			0.107	-1.583***
	(21.410)	(0.036)			(0.297)	(0.426)
(2) Not working	-76.651***	0.072***			-0.360	0.031
	(14.981)	(0.028)			(0.222)	(0.100)

Note: This table reports the DD coefficient estimates from separate regressions of different dependent variables across columns. The list of control variables used is in Section IV. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors are in parentheses.

and those aged 3 to 4. Thus, for the lowest income group, there are no effects of the 2012 policy reform on other outcome variables as well.

As discussed in Section IV, the reduction of childcare costs from the universal childcare subsidy is larger for high-income households than for low-income households. However, the effect of the universal childcare subsidy on center usage is similarly large across all income groups except for the lowest income group. Childcare center usage increases by 15.1%p for the mid-low group, 17.7%p for the mid-high group, and 15.8%p for the high-income group. Furthermore, maternal care time decreases more as household incomes are lower, except for the lowest income group. The parental care time for children aged 0 to 2 compared to children aged 3 to 4 decreases by 1.118 hours in the mid-low-income group. For high-income households, however, the DD estimate is positive and not statistically significant.

Because the reduction in childcare costs is less for lower income households, the effects of the full subsidy are likely to be underestimated for low-income households. However, the results show that the decrease in maternal care hours is much larger for lower income households. This implies that the overall negative mean effect on parental care time in Table 5 is largely driven by low-income households rather than high-income households, even if high-income households

experience a larger reduction in their childcare costs.

Instead, for the high-income group, the informal care time by other individuals is reduced by 1.249 hours. This suggests that the informal care by individual caregivers such as relatives and nannies is replaced by center-based care for high-income households. Regarding the labor supply, I find no statistically significant results across all income groups.

In Panel B of Table 6, I separate the sample by mothers' education levels, i.e., whether they are higher than high school graduates or not. The reduction in childcare costs is greater for the higher education group. Both the high- and low-education groups increase their use of center-based care in response to the universal childcare subsidy. The rate of center usage by children aged 0-2 increases by 13.4%p compared to that for children aged 3-4 for highly educated mothers and by 11.4%p for less educated mothers.

Similar to the results in Panel A, although the low-education group experiences less of a reduction in their childcare costs, the maternal care time for this group decreases more than it does for the high-education group. The parental care time for children aged 0 to 2 is reduced by 0.679 hours in the low-education group. For the high-education group, however, the DD estimate is not statistically significant and its magnitude is smaller.

In Panel C in Table 6, the sample is divided according to mothers' employment status.[6] Both working and non-working mothers increase their use of center-based care. Working mothers increase childcare center usage by 20.5%p and non-working mothers do so by 7.2%p. For working mothers, center-based care replaces informal care by other individuals such as relatives and nannies, while maternal care time is replaced by the use of childcare centers for non-working mothers.

Because mothers' earned incomes are included in household incomes, households with working mothers are more likely to be classified into the high- and middle-income groups. To address this concern, I divide the sample first by mothers' employment status and split the sub-samples by household incomes again. Table 7 shows results from the sample split by the two criteria of mothers' employment status and household income.

For both working and non-working mothers, the reduced costs of the use of childcare centers are larger as household incomes increase. Also, there is little effect of the policy change on mothers' time use and childcare center usage in the lowest income group, as they were likely to have been eligible previously for the full subsidy before the introduction of the universal childcare subsidy.

In the sample of working mothers, the use of center-based care increases in response to the subsidy expansion and instead, informal care time decreases across all household income levels except for the lowest income group. There is little change on maternal care time for working mothers.

For non-working mothers, on the other hand, the effect of the universal childcare subsidy on center usage is larger for households with lower incomes. As for less-educated, low-income households with non-working mothers, the expanded subsidy

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[6]If more mothers participate in the labor force in response to the childcare subsidy expansion, the estimates on the center-based care use and mother's time use could be overestimated for the working mother sample. However, if the subsidy expansion does not affect mother's labor force participation decisions significantly, as in the main results of Table 5, this concern about overestimation is not severe.

TABLE 7—SUBSAMPLE ESTIMATION RESULTS II

	(1) Costs for childcare center	(2) Use of childcare center	(3) Daily parental care hours	(4) Daily informal care hours
Working:				
(1) High income	-247.290***	0.266***	-0.002	-1.595**
	(45.141)	(0.060)	(0.424)	(0.730)
(2) Mid-high income	-84.634***	0.196***	0.333	-1.871**
	(28.074)	(0.069)	(0.592)	(0.773)
(3) Mid-low income	-59.720*	0.185**	-0.374	-1.589*
	(34.032)	(0.092)	(0.761)	(0.907)
(4) Low income	-11.151	0.070	-0.717	0.378
	(38.817)	(0.106)	(0.937)	(0.854)
Not working:				
(1) High income	-225.090***	0.084	-0.220	-0.006
	(56.175)	(0.074)	(0.562)	(0.373)
(2) Mid-high income	-187.092***	0.111*	-0.627	0.063
	(34.854)	(0.058)	(0.451)	(0.195)
(3) Mid-low income	-28.075	0.113**	-0.869**	0.219
	(22.482)	(0.053)	(0.439)	(0.210)
(4) Low income	-17.685	-0.032	0.448	-0.045
	(15.875)	(0.049)	(0.401)	(0.132)

Note: This table reports the DD coefficient estimates from separate regressions of different dependent variables across columns. The list of control variables used is in Section IV. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors are in parentheses.

substantially increases the use of a childcare center and lowers direct care hours by parents. In contrast, for the highest income group, the increase in childcare center usage by children aged 0-2 compared to that by children aged 3-4 is smaller and not statistically significant. Moreover, there is little change in parents' direct care hours for the high-income group.

C. Robustness Checks

In the main DD specification, children aged 0-2 are the treatment group, which was affected by the universal childcare subsidy, while children aged 3-4 are the comparison group. However, these treatment and comparison groups could be substantially different in terms of the child's development stage, which leads to different decisions regarding the mothers' time allocation behavior. To address this concern, I conduct robust checks by comparing children aged 2 and 3, who are more likely to be at a similar development stage. Given that children up to age 2 were eligible for the 2012 universal childcare subsidy, the policy effects are different for children aged at and above 2.

Also, the analysis with the sample restricted to children aged 2 and 3 can address concerns over the effects of other policy changes during the sample period. A home childcare allowance was introduced for low-income households with children aged less than 36 months during the sample period, and maternal leave benefits were expanded in 2011. These policy changes could affect decisions on childcare and mothers' time allocation, especially for households with younger children. With

TABLE 8—ROBUSTNESS CHECKS – SAMPLE RESTRICTED TO CHILDREN AGED 2 AND 3

	(1) Costs for childcare center	(2) Use of childcare center	(3) Labor force participation	(4) Weekly working hours	(5) Daily parental care hours	(6) Daily informal care hours
Panel A. Overall	-83.196***	0.190***	0.064	2.969	-1.187***	-0.121
	(17.355)	(0.039)	(0.056)	(2.441)	(0.384)	(0.263)
Panel B. Household income						
(1) High	-186.247***	0.277***	0.056	-0.816	-0.268	-1.388*
	(51.677)	(0.087)	(0.103)	(4.459)	(0.831)	(0.792)
(2) Mid-high	-134.942***	0.202**	0.049	1.852	-1.309	-0.344
	(34.164)	(0.083)	(0.115)	(5.249)	(0.822)	(0.570)
(3) Mid-low	-52.966*	0.289***	0.045	5.063	-2.417***	0.206
	(27.930)	(0.079)	(0.101)	(4.457)	(0.711)	(0.360)
(4) Low	-10.835	0.019	-0.017	-0.373	0.130	0.154
	(20.295)	(0.077)	(0.097)	(4.150)	(0.653)	(0.261)
Panel C. Mothers' education level						
(1) Higher than	-120.901***	0.203***	0.097	3.668	-1.019	-0.206
High school	(35.149)	(0.068)	(0.090)	(3.735)	(0.667)	(0.493)
(2) High school	-56.304***	0.163***	0.028	2.080	-1.075**	-0.072
graduate or less	(17.891)	(0.049)	(0.072)	(3.338)	(0.480)	(0.305)

Note: This table reports the DD coefficient estimates from separate regressions of different dependent variables across columns. The list of control variables used is in Section IV. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors are in parentheses.

these policy changes, the effects of a universal childcare subsidy may be underestimated because the other policy changes could motivate mothers with young children to increase their own care hours and decrease the use of childcare centers. The analysis restricted to children aged 2 and 3 helps to control for the effects of other policy changes because other policies most affect mothers with children aged 0 or 1. In the sample, only one mother with a child aged 2 (1.4%) received home childcare allowance benefits, and no mothers with children aged above 2 did so. Regarding maternal leave, five mothers with children aged 2 (4.7%) used maternal leave, and two mothers with children aged 3 (1.9%) did so in 2012.

Table 8 presents the estimation results with the sample restricted to children aged 2 and 3. In Panel A, I run the DD regression by comparing children aged 2 with children aged 3 before and after the policy change. The estimation results are quite similar to the main results from the full sample. Costs for the use of childcare centers decrease by KRW 83,000 and center usage increases by 19%p for children aged 2 compared to children aged 3. In columns (3) and (4), the effect of the full subsidy on the mothers' labor supply is not statistically significant. However, parents' care hours drop by 1.187 hours for children aged 2 relative to children aged 3.

In Panel B, the sample is divided by household income level. Similar to the main results from the full sample, the reduced cost to use childcare centers is greater as household incomes increase, and the decrease in the cost is not statistically significant in the lowest income group. Childcare center usage increases by more

TABLE 9—ROBUSTNESS CHECKS – ESTIMATION RESULTS ACROSS CHILDREN'S AGES

Dependent variable:	(1) Age 0	(2) Age 1	(3) Age 2	(4) $H_0: \alpha_3(Age0)$ $=\alpha_3(Age1)$	(5) $H_0: \alpha_3(Age1)$ $=\alpha_3(Age2)$
Use of childcare center	0.045*** (0.033)	0.297*** (0.033)	0.219*** (0.035)	[0.0]***	[0.077]*
Labor force participation	-0.006 (0.035)	0.063 (0.041)	0.061 (0.047)	[0.055]*	[0.962]
Daily parental care hours	0.143 (0.282)	-1.898*** (0.341)	-1.345*** (0.334)	[0.0]***	[0.191]

Note: This table reports the DD coefficient estimates from separate regressions of different dependent variables across rows in columns (1), (2), and (3). Columns (4) and (5) report p-values for the hypothesis that the DD coefficient estimates are the same across children's ages. The list of control variables used is in Section IV. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors are in parentheses.

than 20%p across all income levels, except for the lowest income group. Regarding the mothers' labor supply, the coefficients of labor force participation and working hours are greater than those in the main results in Table 6 but are still not statistically significant. Similarly to the main results, parents' care hours are reduced more for lower income households, except for the lowest income group. The decrease in maternal care hours is the largest in the mid-low-income group.

In Panel C which splits the sample by mothers' education level, as in the main findings of Table 6, both education groups increase their use of center-based care, but the maternal care time decrease is statistically significant only in the less educated group.

Table 9 shows the effects of the childcare subsidy across children's ages. In the analysis, while the control group is still children aged 3 to 4, the treatment group is children aged 0, 1, and 2 in columns (1), (2), and (3), respectively. To check whether the treatment group shows heterogeneous responses across children's ages, I test the hypothesis that the policy effects are identical between children of different ages in columns (4) and (5). Column (4) shows that children aged 0 are quite different from children of different ages in the treatment group. The increase in the use of childcare centers is much smaller for children aged 0 and parental care hours do not decrease in response to the subsidy expansion. In column (5), on the other hand, children aged 1 and 2 show similar responses to the policy changes. The labor supply of mothers and parental care hours do not show significant differences between children aged 1 and 2. The increase in the use of childcare centers is greater for children aged 1 than that of children aged 2, but the difference is statistically significant only at the 10% level.

Lastly, I check whether the findings of this paper stem from different time trends in mothers' time allocation and childcare arrangements across children's ages. Ideally, we can think of a placebo test to compare children aged 3 and 4 under the assumption that both age groups are not affected by the policy reform. This assumption, however, is not valid, as children aged 3 and 4 were also affected by the subsidy expansion, and because the subsidy amounts differed between the two groups. Nonetheless, it is still meaningful to compare the two groups to assess whether they were similar in other aspects.

TABLE 10—ROBUSTNESS CHECKS – SAMPLE RESTRICTED TO CHILDREN AGED 3 AND 4

	(1) Use of childcare center	(2) Labor force participation	(3) Weekly working hours	(4) Daily parental care hours	(5) Daily informal care hours
2012×Child aged 3	0.058**	-0.003	0.171	-0.291	-0.114
	(0.024)	(0.058)	(2.532)	(0.311)	(0.228)

Note: This table reports the DD coefficient estimates from separate regressions of different dependent variables across columns. The list of control variables used is in Section IV. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors are in parentheses.

As shown in Table 2, the subsidy benefits were larger for children aged 3 than those for children aged 4 for households in the lowest 70% income bracket. Accordingly, Table 10 shows that the increase in childcare center usage rates is greater for children aged 3 compared to children aged 4. For mothers' time allocation, however, the labor supply of mothers and parental care hours do not show any significant differences between children aged 3 and 4 before and after the policy change. Although the analyses is limited, the results indicate that the two age groups show similar patterns in terms of the mothers' labor supply and parental care hours, except for childcare center usage rates, which were likely to be affected by the policy change.

D. *Price and Quality of Childcare Service*

The above DD results show that the effects of the universal childcare subsidy vary according to mothers' individual and household characteristics. Overall, the reduction in childcare costs from the universal childcare subsidy leads to an increase in the use of center-based care and a decrease in maternal care. Especially for less educated and lower income households, parental care is replaced by center-based care. However, such a result is not observed among highly educated and higher income households.

The theoretical model in Section III explains the mothers' decision-making process regarding her investment in her child's quality. A mother would spend her own time caring for her child or would use center-based care. This decision could be affected by the quality of care and the price of the care service. If the quality of mother's direct care is much better than that of center-based care for her child's quality improvement, the degree of substitution between maternal care and center-based care would be low in spite of the reduced cost to use childcare centers. In other words, the demand for quality in childcare service may differ across households, thus affecting mothers' time allocation behavior.

To assess the possibility of different levels of demand for care quality across individual and household characteristics, I examine willingness to pay for the quality of center-based care. The NCCS contains a question which, "How much more would you pay for center-based care with better quality?" Based on the answers to this question, I can calculate willingness to pay for better quality care, i.e., the maximum amount that parents are willing to pay for the quality of childcare.

TABLE 11— ANALYSIS OF THE WILLINGNESS TO PAY FOR THE QUALITY OF CARE

	Coefficient	(SE)
Household incomes (log)	0.146***	(0.036)
Education	0.312**	(0.125)
Age	-0.015	(0.014)
Child's age (reference group: Age 0)		
Age 1	-8.029***	(0.520)
Age 2	-2.818***	(0.278)
Age 3	-1.031***	(0.188)
Age 4	0.118	(0.095)
Age 5	0.257***	(0.083)
Spouse's education	0.283**	(0.123)
Number of children aged 0-2	-0.504**	(0.202)
Number of children aged 3-5	-1.013***	(0.224)
Year: 2012	-0.853***	(0.134)
Observations	4,035	

Note: This table reports the marginal effects of coefficient estimates of the Tobit model. The list of control variables used is in Section VI. D. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. Standard errors (SE) are clustered at the household-mother level and are robust to heteroskedasticity.

Table 11 presents the estimation results for the demand for childcare quality. As a dependent variable, I use the total maximum willingness to pay for the care quality. Because willingness to pay is observed only if the value is higher than 0, I employ a Tobit model for this estimation. As explanatory variables, I use mothers' individual characteristic variables, in this case their education and age, and the household's variables of income, spouse's education, the number of children, the number of adults, and dummies for child ages. I also control for year, area, local childcare center supply rates, and the type of childcare center currently used.

In this analysis, the sample contains all children aged 0-5 who use childcare centers. I use standard errors clustered at the household-mother level to control for cases in which a mother has several children in her household.

The results show that households with higher incomes are willing to pay more for the quality of childcare centers. A 1% increase in household income leads to a 0.15% increase in the maximum willingness to pay for the quality care. Also, the education level of the mother affects their willingness to pay for quality when household incomes are controlled. Highly educated mothers' willingness to pay is higher than that of less educated mothers by 31%.

The estimation results suggest that the demand for quality of childcare differs according to the mothers' education levels and household incomes. Households with higher incomes and mothers with more education are willing to pay more for better quality care. Those households may be less responsive to a reduction of the costs incurred to use childcare centers if the quality of care is not guaranteed or satisfactory. This is consistent with main results pertaining to the effects of the universal childcare subsidy, which showed that for low-income households and less educated mothers, the use of center-based care replaces childcare by parents, whereas this is not the case for highly educated mothers and high-income households.

VII. Conclusions

This paper examines the effects of Korea's childcare subsidy reform that provided a full subsidy for full-day center-based care to all households with children aged 0 to 2 regardless of their income and/or employment status in 2012. The results show that the introduction of the universal childcare subsidy increased the use of center-based care by children aged 0-2 as compared to children aged 3-4 while also decreasing maternal care hours. However, there is little effect of the full subsidy on mothers' labor supply. I also find that the effects of the expanded subsidy are highly heterogeneous according to mothers' education and household income levels. The substitution of center-based care by maternal care is found for less-educated mothers and low-income households, but this result is not found among highly educated mothers and high-income households. Rather, highly educated and high-income households are found to have a higher level of demand for quality care service.

According to the Infant Care Act, the expansion of the childcare subsidy was intended to support early childhood development and promote labor force participation of women, who are the primary caregivers in Korea. These policy objectives serve as important criteria for evaluating the effectiveness of the subsidy program. The results of this paper suggest that the effectiveness of financial childcare support varies according to household characteristics. Under the current subsidy, all households with young children can receive the full subsidy for *full-day (12 hours a day)* center-based care regardless of their incomes. However, the effects of the subsidy expansion are mainly on low-income households. The full subsidy for full-day center-based care that covers high-income households would not be cost-effective compared to the large fiscal burden incurred to cover all income classes.

The findings of this paper also imply that financial childcare support alone is not sufficient to affect the time allocation behavior of mothers. In order to influence mothers' time allocation behavior, especially the employment of highly educated women which has been stagnant, the quality of childcare services needs to improve. Focusing on the quality of care would help ease parents' concerns and enhance women's participation in the labor market. Above all, a confirmed quality level of childcare services is of great importance in that the first goal of childcare policy is to develop children's capabilities at the earliest stage of their development.

This paper focuses on short-run effects of the childcare subsidy expansion immediately after the policy changed. Under different policy settings, however, women's decisions regarding their human capital investments and labor market participation may change over time, leading to a change in mothers' time allocation behavior which differs from the findings here (Havnes and Mogstad 2011). Moreover, another limitation of this paper is that the effects of the expanded subsidy on child development are not considered. Previous papers show that human capital investments in the early stages of development have long-run impacts on health, educational attainment, and other adult outcomes (Currie and Almond 2011). In this sense, to evaluate the effectiveness of the childcare subsidy, the long-term effects on child development should be studied concurrently.

APPENDIX

TABLE A1— MEANS OF MOTHERS' WEEKLY WORKING HOURS ACROSS SUBGROUPS

		2009	2012	Differences (2012-2009)
A. Mothers' education				
a. higher than high school:	Age 0-2	13.70	11.81	-1.88
	Age 3-4	20.84	16.99	-3.85
b. high school graduate or less:	Age 0-2	9.31	9.24	-0.06
	Age 3-4	16.87	16.22	-0.65
B. Household's income				
a. high income:	Age 0-2	17.78	17.10	-0.68
	Age 3-4	22.86	21.41	-1.46
b. low income:	Age 0-2	5.19	4.45	-0.73
	Age 3-4	13.19	10.83	-2.35
C. Mothers' employment status				
a. working:				
a-1. high income:	Age 0-2	42.24	39.29	-2.96
	Age 3-4	41.98	39.92	-2.06
a-2. low income:	Age 0-2	42.31	36.88	-5.42
	Age 3-4	42.14	36.44	-5.70

TABLE A2— MEANS OF PARENTS' DAILY CARE HOURS ACROSS SUBGROUPS

		2009	2012	Differences (2012-2009)
A. Mothers' education				
a. higher than high school:	Age 0-2	10.63	10.15	-0.48
	Age 3-4	7.08	6.95	-0.13
b. high school graduate or less:	Age 0-2	11.48	10.68	-0.79
	Age 3-4	6.97	6.79	-0.17
B. Household's income				
a. high income:	Age 0-2	9.82	9.23	-0.59
	Age 3-4	6.60	6.54	-0.07
b. low income:	Age 0-2	12.29	11.52	-0.78
	Age 3-4	7.44	7.23	-0.21
C. Mothers' employment status				
a. working:				
a-1. high income:	Age 0-2	4.42	4.94	0.53
	Age 3-4	4.58	4.95	0.38
a-2. low income:	Age 0-2	5.75	6.01	0.27
	Age 3-4	5.45	5.92	0.47
b. not working:				
b-1. high income:	Age 0-2	13.74	12.53	-1.21
	Age 3-4	9.03	8.37	-0.66
b-2. low income:	Age 0-2	13.17	12.26	-0.91
	Age 3-4	8.35	7.79	-0.56

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