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Do reduced child care prices make parents work more?

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Do reduced child care prices make parents work more? ^{*}

by

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Abstract

This paper exploits exogenous variation in the price of child care stemming from a major child care price reform, to estimate the effects of child care costs on parents' labour supply. The reform introduced a cap on the price that local governments could charge parents, and lead to considerable reductions in the price of child care depending on family type and region. Since the price is determined by a handful of observed characteristics, we are able to match households that are similar in all relevant aspects, but experienced quite different price changes due to the reform. Our difference-in-differences regression matching estimates are very precise, but mostly close to zero.

Keywords: Labour supply, price of child care, difference-in-differences regression matching

JEL-codes: J21, J13

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Table of contents

1	Introduction	3
2	Earlier studies	5
3	Publicly provided child care in Sweden	7
4	Econometric method.....	11
5	Data.....	14
5.1	Definitions and descriptive analysis	14
5.2	Construction of the matched sample	17
5.3	Graphs.....	18
6	Results	32
6.1	Model specification	36
6.2	Sensitivity analysis	40
6.3	Heterogeneous effects.....	44
7	Conclusions	48
	References.....	50

1 Introduction

Subsidized child care has typically been used as a way of increasing labour force participation among low-income mothers. For example, subsidized child care was one of the components in the major welfare reform implemented in the US during the 1990s. In Europe, the supply of subsidized child care as well as the level of female labour supply varies tremendously. The Nordic countries (excluding Finland) have a well developed child care system with high enrolment rates; over 60 percent of 3-year-olds and more than 70 percent of 5-year-olds are enrolled in child care centres. The female labour supply in these countries is also high from an international perspective (OECD, 2001). The question is, of course, whether this is a cause or an effect of the developed child care system.

There is a large literature investigating the link between parents' (i.e. mothers') labour supply and the cost for child care; see Anderson & Levine (2002) and Blau & Currie (2004) for two surveys. The major problem with the existing studies is that information on the true price of child care is typically not available. Therefore, most earlier studies have used predicted values from a sample of households that pay for care. This approach provides a price measure for the entire sample, but requires an exclusion restriction to identify the effect of the price of child care on labour supply (i.e. there must exist some variable that explains the price of child care but not labour supply). The instruments used have (in the best cases) been factors that vary across regions, such as the local area cost of child care and the average wages of child care workers. As argued by, e.g. Baker *et al* (2005) the validity of these instruments is questionable, since they might be correlated with the state of the local economy and the area wages.¹ Therefore, several recent studies (e.g. Baker *et al*, 2005; Schlosser, 2005; Berlinski & Galiani, 2004; and Cascio 2006) exploit time and regional variation in the access and/or price of child care, due to child care regulations or child care reforms, to estimate the effects of the price of child care on maternal labour supply. The major weakness of these difference-in-differences evi-

¹ Two studies that avoid this problem are Berger & Black (1992) and Gelbach (2002).

dence is that regions that experienced different changes in the access or the price of child care might not always be comparable.

This paper exploits exogenous variation in the price of child care stemming from a major child care reform in Sweden, to estimate the effects of child care costs on parents' labour supply. Before the reform, local governments were allowed to set the price of child care freely. Typically, the price varied with respect to the number of children in different ages and to household income, leading to substantial variation in the price of child care both between and within municipalities.² In 2002 there was a major child care price reform, which introduced a cap on the price that local governments could charge parents.³ This made all municipalities impose more or less the same price structure, where prices varied by type of household in a similar way. The reform led to considerable reductions in the price of child care, depending on the area of living and the type of household. Since the type of household is defined by a handful of observed characteristics, we are able to match households that are similar in all relevant aspects, but that experienced quite different price changes due to the reform. We exploit this variation to estimate the effect of the price of child care on labour supply in a difference-in-differences regression matching framework. Since we are able to compare households that are identical with respect to all the child care prices determinants, we hope to overcome some of the problems in the earlier difference-in-differences literature. In addition, we investigate the effects of child care prices on *fathers'* labour supply as well as mothers'. Looking at males is important in the Swedish context, since two months of parental leave are reserved for fathers and most fathers take some parental leave.

We find that parental labour supply does not seem to depend on child care prices; our difference-in-differences regression matching estimates are very precisely estimated, but the point estimates are close to zero. In a few cases,

² Gustafsson & Stafford (1992) exploit this cross-sectional variation in the price of child care for two parent households with one pre-school aged child. The child care prices for these families differ with respect to household income and municipality. However, since earnings potential is closely related to labour supply and since the differences in the price-structures across municipalities might reflect differences in labour supply, one might worry that the cross-sectional variation in the price of child care is not exogenous.

³ It was voluntary to introduce the new price structure, but since municipalities were compensated for the loss in revenues all but two municipalities did.

especially for male employment, we find statistically significant effects. However, these effects are not of any economic significance. We can rule out that the child care price elasticity with respect to labour supply is greater than 0.02 for both females and males.

The paper is organized as follows: In the next section we present some earlier empirical evidence. Then, we provide some institutional background information about subsidized child care in Sweden, as well as a description of the child care price reform that we will exploit to identify the effects. In section 4, we discuss our empirical approach, and in section 5 we present the data. The results from the empirical analysis follow in section 6. Finally, section 7 concludes.

2 Earlier studies

Economic theory gives a clear prediction regarding the effects of reduced child care prices on labour force participation. A reduction in the child care price will increase the probability that the wage – net of child care costs – will exceed the individual's reservation wage, and, thus, make it more likely that (s)he choose to participate in the labour force. When it comes to hours worked, given labour force participation, economic theory cannot determine whether these are likely to increase or decrease when child care prices fall. On the one hand, the income effect makes individuals work less when child care prices are reduced, but on the other hand, the substitution effect works in the other direction given that the price is income dependent. Hence, it is an empirical question whether reductions in child care prices will make parents work less or more hours. Below, we will present earlier empirical evidence from the most reliable studies available on the effects of the price of child care on labour supply.

Berger & Black (1992) use US data and compare mothers receiving child care subsidies with those on the waiting list for such subsidies. Using a regression-discontinuity-like approach, they create treatment and control groups that are similar in all relevant aspects. However, the treatment group receives subsidies whereas the control group does not. They find positive effects of child care subsidies on female labour force participation (subsidized mothers have approximately 12 % higher probability of being employed), but no effects on hours worked.

Gelbach (2002) investigates the effect of public school enrolment for five-year olds (kindergarten) on mothers' labour supply in the US. Since parents may choose to hold back their children one year or to enrol them in private schools, and since this choice probably is correlated with factors determining labour supply, public school enrolment might be endogenous. Gelbach exploits the fact that a child's date of birth decides when (s)he is eligible for kindergarten, and instrument school enrolment with five-year-old's quarter of birth. He finds that both single and married mothers with a five-year old – but with no younger child – increase their labour supply (6–24 % for single mothers and 6–15 % for married mothers) due to public schooling. For mothers with younger children, no effects are found, which is reasonable since they still need to arrange child care for them.

Cascio (2006) also analyses labour supply effects of school enrolment, but exploits the fact that different states introduced public kindergarten at different times. Her difference-in-differences estimates point at large effects on single mothers' labour force participation, given that they had no child younger than five; for every ten children enrolled in public school, three mothers entered the labour force. She finds no effects for single mothers who have a five-year-old and younger children or for married mothers (the latter finding contradicts the Gelbach results).

Two other quasi-experiments studies of the effects of introducing free preschool gradually across the country are Schlosser (2005) and Berlinski & Galiani (2004). Schlosser investigates the effects of the 1999-introduction of free public preschool for children aged 3 and 4 on Arab mothers' labour supply in Israel. She finds that mothers' labour supply increased sharply (7 %) and that the increase was largest for more educated mothers. Berlinski & Galiani study the expansion of preschool for children aged 3–5 in Argentina, and exploit the variation in treatment intensity across regions and cohorts to identify the effects on maternal labour supply. They find that the programme had a positive and statistically significant effect on mothers' employment.

Finally, Baker *et al* (2005) investigate a Canadian reform implemented in Quebec 1997.⁴ The aim of the reform was to provide child care spaces to all

⁴ This reform is also studied by Lefevbre & Merrigan (2005a, b).

children aged 0–4 at a parental contribution of \$ 5 per day and child.⁵ Comparing maternal labour supply in Quebec with maternal labour supply in the rest of Canada, they find a highly significant effect of reduced child care prices on female employment with a measured elasticity of 0.24.

The major shortcoming of the available difference-in-differences evidence is that regions with different changes in the access to or the price of child care might not be otherwise comparable. In particular, one might worry that households in regions with large changes in the access to or the price of child care differ in unobserved ways from households in other regions. If these differences are related to labour supply decisions, the estimates might be biased.

3 Publicly provided child care in Sweden

Since 1995 local governments in Sweden are obliged by law to supply child care to children with parents that either work or are full-time students,⁶ within three to four months from parents' request.⁷ *Table 1* shows that most children aged 1–5 attend publicly subsidized child care and that non-subsidized private alternatives are rare.⁸

⁵ The Quebec-reform is similar to the Swedish reform in that a cap on the price was introduced. It differs from the Swedish reform in that prices became independent of income.

⁶ Besides child care, Swedish local governments are responsible for supplying primary and secondary education, care for the elderly, individual and family care, infrastructure, as well as some cultural activities. The main revenue source is a proportional income tax that the municipalities are free to set. Tax revenues constitute about 60–70 percent of total current revenues. The rest is made up by user fees and central government grants, where 15–20 percent of total revenues consist of grants. Grants are typically of unconditional lump sum type and are used both for transferring funds from the central to the local level and for an ambitious equalisation program.

⁷ The Swedish National Agency for Education (2001a)

⁸ Blau & Currie (2004) note that most earlier studies do not account for the existence of unpaid child care options, something that might lead to biased estimates. However, since the use of unpaid child care in Sweden is rare this is unlikely to affect the estimates.

Table 1 Type of care for children aged 1–5, percent

	1999	2002
Subsidized care (municipal preschool or family day care homes)	76	85
Non-subsidized care (relatives, au-pair, etc)	3	2
At home with parent	18	13
Other	3	1

Source: The Swedish National Agency for Education (2001b, 2004)

Until 2002 the municipalities were free to set their own child care prices, as long as the prices were “reasonable”. According to Government bill 93/94:11, “prices are not allowed to be so high that parents, for economic reasons, restrain from letting their children attend an activity that the children would do well from attending”. This definition clearly gives room for wide interpretations, and consequently prices differed considerably between municipalities, both with respect to level and construction. In 2002, an option for the municipalities to impose a cap (stipulated by the government) on the price was introduced. If municipalities chose to implement this cap they were granted extra state fund to cover the loss in revenues. In 2002, all but two municipalities imposed the price cap and in 2003 the two remaining municipalities followed.

The child care price reform consisted of two parts. First, the price of child care was determined as a fixed rate of the household income. The percentage rates differed with respect to the number and age of the children, with higher per-child prices the fewer children in public child care and the younger the child.⁹ Second, a cap on the price was introduced so that municipalities could only charge parents the fixed share of their household income up to SEK 38,000. Thereafter, the price of child care was constant.

In January 2003, the price cap was accompanied by an obligation for all municipalities to supply 525 hours a year of child care for all children age 4–5 years free of charge. In all, these changes made the average cost for full-time child care decrease from 6 % to 2.5 % percent of the pre-tax household in-

⁹ The fixed per-child percentage rates differed between 1–3 % of household income, and the maximum rate was 6 % for those with three children aged 1–5. The fourth child in care was free of charge.

come.¹⁰ Finally, the reform also involved an obligation for all municipalities to supply at least 3 hours a day or 15 hours a week of child care for children whose parents were unemployed (implemented in July 2001) or on parental leave (implemented in January 2002).

The main purpose of the 2001–03-reform was to increase the supply of child care, thereby giving all children access to the pedagogical activities supplied by day care centres, improving the economic conditions for families with children, and facilitating parents' labour force participation. *Figure 1* shows that when the cap was implemented in 2002, the share of children attending child care increased from an already high level. Wikström (2007) shows that the increased attendance rates after the reform are mostly driven by higher attendance rates for children to unemployed parents (+18 %) and for children whose parents are on parental leave (+22 %).

Figure 2 shows the female and male employment over the period 1976–2004. The fraction of females employed is high during the whole period, and since the middle of the 1990s, it is only slightly lower than the male counterpart. Looking at the years 2002–05, i.e. the period after the child care reform took place; we see a decreasing trend in both male and female employment. The question is whether the fraction employed fell differently for households with different reductions in child care prices. We will attempt to answer this question in the empirical analysis.

Contrary to earlier studies, we will study the labour supply effects of child care prices for both mothers and fathers. In Sweden, both parents are entitled to generous income support when staying home with young children. In total they are entitled to thirteen months of parental leave at a replacement rate of 80 %. However, two months of this period are reserved for fathers¹¹. Eriksson (2005) shows that in 2002, fathers with children younger than 17 months on average stayed home in 37 days. 82 % of all fathers took some time off to be home with their children before the child turned eight years. About 10 % of fathers took more than 100 days of parental leave (Ekberg et al., 2004).

¹⁰ The average cost for full-time child care decreased from 9.7 % to 4 % of after-tax income.

¹¹ See Ekberg *et al.*, 2004; and Eriksson, 2005 for a description of the parental leave system in Sweden and for studies of the effects of the “daddy-month” on mothers' and fathers' parental leave.

Table 3. We have grouped the municipalities with respect to the average change in the child care price 2001–03, and compared the one-thirds of the municipalities with the biggest and the smallest reduction in the child care prices. In the top panel we calculate the change in child care prices between 2001 and 2003 for the two groups. For example, the hourly price on child care was 10.3 SEK higher in 2001 than in 2003 for the municipalities with the biggest reduction, whereas the reduction was 5.2 SEK in the municipalities with the smallest reduction. The difference-in-differences estimate for child care prices is thus given by the difference of these numbers, i.e. -0.51 (in 10s SEK).

In panel B/C we calculate the corresponding changes in the fraction of females/males employed. The fraction employed fell for both groups of municipalities between 2001 and 2003. In the municipalities with the biggest price reduction, the fraction females employed was marginally lower in 2003 than in 2001 (it fell from 0.7073 to 0.7055). In the municipalities with the smallest reductions in child care prices, the fraction females employed fell from 0.7019 to 0.6939. The difference-in-differences estimate for female employment is hence 0.0061. The corresponding estimate for males is 0.0037.

Finally, we compare the difference-in-differences estimate for child care prices with the difference-in-differences estimate for fraction employed. This produces the Wald-estimates of the effects of child care prices on employment presented at the bottom of panels B and C. For females we find an estimate of -0.0119, and for males -0.0072. Hence, when child care prices increase 10 SEK the share of females employed decrease with 1.2 percentage units. None of the estimates are however statistically significant from zero. *Table 4* presents the corresponding analysis for the share of full-time. The differences in the price of child care between the groups of municipalities are replicated from *Table 3*. In both municipality groups, the share of full-time increases slightly for women.³⁰ However, the difference for females in municipalities with the biggest reduction in the price of child care is slightly bigger than for females in the other municipalities. This generates a difference-in-differences estimate of 0.0021. The Wald-estimate of the effect of child care price on the share of full-time is, thus, -0.0041, indicating that an increase with 10 SEK decreases the average

³⁰ This is contrary to the overall tendency of a lower share of full-time in the entire sample (see *Table 2*). It is females in the remaining 1/3 of municipalities that is experiencing a slight reduction in the share of full-time.

Table 3 Municipality level difference-in-differences estimates: Fraction employed

	Reduction in child care price 2001–03 in the municipality		
	1/3 biggest	1/3 smallest	Difference
Panel A: Hourly child care price (10s SEK)			
Year 2003	0.6730 (0.0041)	0.6669 (0.0043)	0.0061 (0.0059)
Year 2001	1.7073 (0.0199)	1.1870 (0.0185)	0.5202 (0.0272)
Difference	-1.0342 (0.0200)	-0.5201 (0.0185)	-0.5141 (0.0272)
Panel B: Fraction employed, women			
Year 2003	0.7055 (0.0044)	0.6939 (0.0046)	0.0116 (0.0064)
Year 2001	0.7073 (0.0045)	0.7019 (0.0048)	0.0055 (0.0066)
Difference	-0.0018 (0.0023)	-0.0080 (0.0037)	0.0061 (0.0043)
Wald estimate of child care price on employment, women			
-0.0119 (0.0083)			
Panel C: Fraction employed, men			
Year 2003	0.8488 (0.0045)	0.8382 (0.0061)	0.0106 (0.0076)
Year 2001	0.8528 (0.0044)	0.8458 (0.0062)	0.0069 (0.0076)
Difference	-0.0040 (0.0016)	-0.0077 (0.0021)	0.0037 (0.0026)
Wald estimate of child care price on employment, men			
-0.0072 (0.0051)			

Notes: Heteroscedasticity robust standard errors clustered on municipality within parentheses. The municipalities are grouped based on their average reduction in child care prices 2001–03. The observations are weighted with the number of two-parent households with children in the municipality.

Each estimate comes from a separate regression. In the top panel we present the results for females and in the bottom panel for males. The first estimate shows the effect on the probability to be employed (Employment), and the second estimate shows the effect on how much the individual works given that (s)he is employed (Share of full-time).

In column (1) we estimate a simple OLS model for the full sample, controlling for municipality and time fixed effects only. These naïve estimates show a strong correlation between the price of child care and labour supply, especially for women. As argued above, however, many of the child care price determinants might be directly related to labour supply. Hence, these simple estimates cannot be given a causal interpretation. Therefore, in the rest of the table, we will attempt to control for the direct effects of the child care price determinants.

In column (2) we add simple controls for the household characteristics that are used to calculate the child care prices.³¹ This model corresponds to equation (1) in Section 4. Adding the price determinant controls, leads to dramatic changes in the estimated labour supply effects of the price of child care. The estimate for female employment, for instance, is reduced by more than 90 percent. For men, the estimated effect changes sign. The estimates, thus, seem very sensitive for adding controls of the child care price determinants. One might, thus, worry that these simple controls are too restrictive to purge the estimates from any direct effects of the child care price determinants on labour supply. Therefore, we will use the most flexible specification available; fixed effects for all possible combinations of values and variables in the price of child care function. This is analogous to exact matching where we match households that are identical with respect to the child care price determinants, but that experienced different changes in the price of child care due to the reform. Since we are able to find matches for 82 percent of the households only, column (3) re-estimate the model in column (2) with the smaller sample. This leads to minor reductions in some of the estimates, probably since this eliminates some of the more extreme observations.

In column (4) we add the household type fixed effects to the model. Thus, we compare households that are identical with respect to the price determinant

³¹ The model includes dummy variables for the number of children, dummy variables for the age of the youngest child, linear controls for the age of the older children and a fifth order polynomial of predicted household income.

vide the sample according to the age of the households' youngest child and re-estimate our model. Results from these estimations are given in *Table 10* where the first column restates the baseline estimates from column (5) in *Table 5*. Column (2) presents the results for households with the youngest child aged 1–3, column (3) for households with youngest child aged 4–5, and the last column for households with the youngest child aged 6–9.³² We find that some of the estimates vary somewhat. For example, there is a negative statistically significant price effect on the share of full-time for females with the youngest child aged 6–9 years. For these women, an increase in child care prices with 10 SEK decreases the share of fulltime with 1.15 percentage points. The effect is also significantly lower than for females in households with the youngest child being 4–5 years (but not for households with even younger children). The effect for male employment is primarily driven by males with the youngest child aged 4–5 year. However, this effect is not statistically different from the effects for males with the youngest child in other age intervals.³³

³² The reason for dividing the age groups this way is that it follows the price-structure; children aged 4–5 are entitled to 15 hours free of charge pre-school in 2003, and children older than 6 attend out of school care only.

³³ We have also estimated the models for households with only one child. These estimations bring nothing new to the picture and have therefore been excluded from the text. They are, however, available upon request.

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