



DEPARTAMENTO DE ECONOMÍA

SDT 306

# Public Day Care and Female Labor Force Participation: Evidence from Chile.

**Autores:** Patricia Medrano

Santiago, diciembre 2009

La serie de Documentos de Trabajo (SDT) del Departamento de Economía de la Universidad de Chile en versión PDF puede descargarse en la dirección electrónica [www.econ.uchile.cl/SDT](http://www.econ.uchile.cl/SDT) . Para contactar al editor ejecutivo de SDT remitirse a [sdt@econ.uchile.cl](mailto:sdt@econ.uchile.cl)

# Public day care and Female Labor Force Participation: Evidence from Chile

Patricia Medrano\*

December, 2009<sup>†</sup>

## Abstract

Public day care centers in Chile have increased in 240% between 2005 and 2007. This paper uses this huge increase in public day care supply for infants of poor families to analyze its impact on Female Labor Force Participation. The magnitude of the expansion is used as a quasi-natural experiment, where different geographic areas and income groups were affected differently. Using mean differences I find a positive effect on Labor Force Participation of 2.6-10 percentage points which coincides with previous findings for Chile and the local policy common sense. After controlling for observable individual and family characteristics I don't find any significant effect for the eligible mothers. As a robustness check I also use alternative outcome measures like employment and hours of work and I am not able to find a positive statistically significant effect. Therefore, I conclude that it is not possible yet to infer that this policy has had this desired effect.

Key words: Female Labor Force, Child Care, Fertility and Labor Supply.  
JEL classifications: J13, J22, O12 and H42.

---

\*Centro de Microdatos, Department of Economics, Universidad de Chile. I thank the financing provided by the Iniciativa Científica Milenio to Centro de Microdatos, Project P07S-023-F

<sup>†</sup>I would like to thank David Bravo, Claudia Martínez, Esteban Puentes, Tomas Rau, Jaime Ruiz-Tagle for their comments in the Milenium Seminar. This paper is part of my dissertation "Three Essays on Social Effects of Public Policies in Emerging Countries" guided by Kevin Lang, Claudia Olivetti and Daniele Paserman. The usual disclaimers applies.

# 1 Introduction

Chile is one of the Latin American countries with better educational coverage: primary school is almost universal (94%) and secondary school reaches a coverage of 81%. Efforts in this area have been focused in quality, access to secondary education and lately coverage of preschool education.

Chilean data from 2006 (Source: CASEN, 2006.<sup>1</sup>) show that only 6 percent of infants (two years or less) attend a nursery and 26.5 percent of children between two and three years attend a day care. These low average attainment rates are also very unequal through income levels, reaching, for example, only 3% in the first income quintile among infants. In this context, the Chilean government set itself the goal of providing an integrated protection system for early childhood (Sistema de Protección Integral de la Infancia). The main objective is to provide equal development opportunities to all infants. Therefore the main focus of infant policies has been the complementarities between different public policies like health, schooling and community services.

As soon as the Bachelet administration took office, it organized a “Presidential Advisory Council for Infant Policies”. The premise is that every child is born with the same capabilities, but there is a strong effect of the socioeconomic environment on the physical and neurological development during the first eight years of life. Therefore, the Council’s proposal included many policies directed to protect infant development and equalize learning conditions. One of the effects of this Council’s work has been to considerably increase the public child care supply for the poorest households. The main objective is to provide equal opportunities to children, starting at a very early age. This increase is done either by direct administration of new facilities, or by public financing of private suppliers. Between 2005 and 2007, there has been an increase of 240 percent in the number of day care centers.<sup>2</sup> The commitment is to increase nursery spots by 70,000 and toddlers by 43,000 between March 2006 and December 2009. Considering nursery spots were numbered at 14,400 in 2005, it will imply a 486% expansion (by December 2007, there were 44,600 infant spots implying a 200% expansion). Hence, there is a public policy that sharply increases the number of spots available for poor preschool children in a scale that has never been seen in Chile.

Even though the policy was implemented mainly due to the concern about the children’s development conditions, this paper focuses on the potential impact in the labor market. Chile has particularly low female labor participation even for its level of development. Female labor force participation currently reaches 43% and is known to be an important factor in reproducing poverty. I want to measure the potential impact this policy could have on the labor market. Using data from the national household survey (CASEN) we observe that there has been a steady increase in the female labor participation over time. However, it still remains at low levels in comparison with other Latin American countries. On average, we are at a similar level than Costa Rica and Mexico, and well below the rest of the region.

Nonetheless, the low female participation rates hide striking differences depending on the poverty level, education and household composition. Low income females have a participation rate of 33 percent. On the other hand, high income females have European level participation rates, reaching 72 percent. Additionally, almost 50 percent of poor females that do not work, mention the care of their children as the primary reason. Hence we could expect to find a positive impact on the working status of women affected by the policy, although as previously explained, the policy was designed with the objective of child development. If I find a positive impact of public day cares it could lead to additional policy recommendations related to the labor market and would give additional support to a continuing expansion of the program.

Therefore, the main purpose of this study is to analyze the impact of this substantial increase in public child care supply on the labor force participation of poor females with children, as has

---

<sup>1</sup>I thank the Ministry of Planning of Chile for the access to this data.

<sup>2</sup>By the end of 2005, there were 708 public day care centers. During 2006, the government opened 800 new day care centers and during 2007, 900 additional centers for poor children (lowest 2 quintile of income distribution).

been found in international literature. This paper adds to the literature that explores the female labor supply effects of expansions in subsidy programs for toddlers and preschoolers. For instance, Baker, Gruber, and Milligan (2005) find a positive impact on the maternal labor force as a result of the expansion in the public day care subsidy program in Quebec. Similarly, Schlosser (2006) finds a positive impact of the public preschool expansion in Israel. Berlinski and Galliani (2007) look at the effect of a large expansion on pre-primary school facilities in Argentina for children aged 3-5 between 1994 and 2000, and also find a positive impact on maternal employment.

Even though, this question has been previously addressed by different authors, the huge expansion of the public day care supply in Chile, motivated by a policy decision directly on child health issues and supported politically by the election of a female president, gives us the advantages of a *quasi*-natural experiment to examine this question. It is specially interesting to analyze this expansion because it affects infants between 0 and 2 years of age, where cultural and health factors may be more restrictive. In my preferred specification I find no effect on Female Labor Force Participation (LFP). Despite previous evidence, the results do not show a labor force expansion due to this policy. Considering all the new vacancies are being used and there are still an important fraction of children on waiting lists, we might be in presence of a substitution of child care arrangements. There is also the possibility that cultural and religious principles among poor households in Chile make this country particularly inelastic to this type of policy. As Contreras and Plaza (2004) establish, there is a strong negative relation between cultural values of the head of household and spouse, and their disposition with respect to female labor participation and child care arrangements. Unfortunately I will only be able to test the substitution of day care arrangement hypothesis with the next national household survey (November 2009).

The remainder of the paper is organized as follows. Section 2 reviews the research done on the effects of child care policies upon female labor force participation. Section 3, describes the existing public day care providers, and the expansion policy, as well as the application and selection criteria, used in the public centers. Section 4 describes the data set used, presents the main descriptive statistics for the analysis, and also presents the main characteristics of public day care users. It also describes the child care availability indicators constructed for this study. Section 5 describes the empirical strategies used to estimate the impact on female labor force participation and explains the alternative robustness checks used in this paper. Section 6 presents the main results with the whole sample, and the alternative robustness check. Finally, Section 7 summarizes the main findings.

## 2 The Literature of Child Care and Labor Force Participation

There has been a wide literature studying the determinants of Female Labor Force Participation (LFP). In relation to the effect of young children on the labor supply decision, there are three different types of studies. The first group includes the child care cost as one more determinant in the labor supply decision and extracts the marginal effect. A second group simulates the impact of different public policies considering the elasticities obtained from the first type of studies. The last group of studies evaluates the impact of actual policies being implemented. In some cases the policy considers a public subsidy for private arrangement of child care, and in other cases the policy consists of direct public supply. This essay would be classified in this last group with an attempt to measure the impact of the Chilean expansion in public supply of day care for infants.

The first group of studies look at the child care cost as a determinant of female labor supply. Blau and Currie (2004) have a good survey of studies that estimate the female labor supply elasticity with respect to child care prices. Amazingly, this estimation varies between -0.36 and 0.06. However most of the studies included in this review do not take into account the public provision of day care. Using a tabulation from the panel of the Survey of Income and Program Participation (SIPP, Spring 1999) they find that three quarters of employed mothers use some type of child

care arrangement for children between 0 and 4 years, compared with a third of non-employed women. Even though children of non-employed females attend non-parental care less hours per week (16-20 hours vs. 35 hours) it is still an important amount of time. This is consistent with a U-shape pattern with respect to income found in child care attendance, meaning poor and rich families are more likely to use day care, than middle income households. Additionally they have an interesting review of the potential effect of increased non-parental care on ameliorating early disadvantage children.

The second group of studies uses available data and estimations to simulate the possible effects of alternative public policies. For example, Bordón (2007) uses the traditional Chilean household survey, CASEN, to characterize the determinants of female labor supply. She restricts the sample to heads of households between 25 and 39 years of age. Considering the total number of children and a question about who takes care of the children, she is able to construct a measure of available day care facilities. Considering a probit estimates, she predicts that under the event of doubling the day care supply, female labor force participation would increase by 5.7 percentage points (13%). This is a very significant effect considering the low participation rates Chile exhibits (43.3% in 2006). Using a specially designed survey directed toward measuring the potential use of day care facilities, Bravo, Contreras, and Puentes (2008) simulate the impact of extending day care benefits to children of all dependent employees. They separately estimate the participation and wage equations and combine these results with family preferences obtained from the special survey. They find that a subsidy of approximately 100 US Dollars with a co-payment of 35 Dollars, would increase female labor force participation by 15-20 percentage points. This is a large effect.

The third group of papers that study the impact of day care on Labor Force Participation analyzes the impact of actual policies. For example, Cascio (2006) analyzes the effect of the introduction of subsidized kindergarten in public schools on maternal labor supply. She uses the variation over time and across state in the United States of America to identify the effect. She is able to document a large positive effect for single women whose youngest child is at least 5 years old. For every ten spots created, three single mothers entered the labor force. There appear to be no effect on single mothers with younger children or married women. Schlosser (2006) takes advantage of the introduction of a free public preschool program in Israel. The author finds an expected sharp increase in the attendance of children at the preschool facilities and also a significant positive effect on the labor supply of the more educated mothers. An additional advantage is that the policy change was introduced in different towns at different times, which allows her to have *control towns*. It is important to consider that this program affects children of 3 and 4 years, where there might be less social resistance to enroll the children. With a similar methodology, Berlinski and Galliani (2007) measure the impact of the expansion of pre-school facilities on attendance and maternal employment in Argentina, finding similar results.

On the other hand, Gelbach (2002) uses the quarter of birth of the children as an instrument of the year they are allowed to attend public schools. Once they are able to attend a public school for free, it reduces the cost of working for their mothers since they would be able to work without paying for day care. He also finds significant effects on mothers' labor supply.

An alternative strategy has been developed in the context of limited public day care subsidies. In this case it is possible to compare the behavior of mothers that were able to join the program with the behavior of those on the waiting lists. For example, Berger and Black (1992) use data from the Kentucky subsidies programs, and find a positive impact on hours worked as well as on the quality of the day care used.

Baker, Gruber, and Milligan (2005) also analyze the impact of the expansion in child care subsidies in Louisville and Kentucky. Using a sample of enrolled families and mothers on the waiting list, they find a positive impact on the likelihood of single mother's employment and care quality. However they find little impact on hours worked. Considering the characteristics of the comparison group they isolate the subsidy effect from other possible effects like the sign-up and

waiting list effect. They additionally find a positive effect on child care quality for mothers of children in the program.

Similarly Duflo (2001) uses a huge school construction program as a measure of new facilities for children to measure the long-run impact on their total years of schooling and their labor market wage after finishing school. In this case the policy change is for children over 5 years and she also finds significant positive effects.

The diverse results documented in the literature make it even more important to use the opportunity given by the Chilean policy change to analyze the potential impact on Labor Force Participation. As mentioned before, it is possible that I do not find any effect because there might be substitution between informal and formal day care arrangements, that I am not able to observe yet. This may be because there is a strong cultural resistance as mentioned by Contreras and Plaza (2004), or because the socio-demographics of Chile have high levels of income inequality extremely correlated with inequality in educational achievement. Hence, I may be observing a version of the result found by Schlosser (2006) for Israel and Berlinski and Galliani (2007) for Argentina (which is a country with an older tradition of education across strata).

### 3 The Public Day Care Policy

In Chile we have two public providers of Day Care. In 1970, the Frei administration created the “Junta Nacional de Jardines Infantiles” (National Council of Child Care, JUNJI) which is a public institution in charge of planning, creating, promoting and controlling the appropriate operation of day care centers. Their mission is to provide quality nursery, infant and toddler care to poor and vulnerable children. For that purpose they can directly manage the day care centers or delegate the administration to non-profit organizations. This institution provide services nationwide and therefore has a national management team and regional directors.

Curiously, there is another public provider which is the non-profit organization “Fundación INTEGRA” that was created in 1990, as part of the first lady’s initiatives during the Aylwin administration. As of today, it has a national council deciding their policies. Similar to JUNJI its mission is to provide quality education to infants up to 5 years of age.

Both institutions have the explicit focus of providing quality day care and not remaining as a simple custody place for children. Although, presumably there are some underlying historical political reasons for the existence of two institutions, for my purpose there does not seem to be any relevant difference.

#### 3.1 Expansion Policy

As mentioned before, the Bachelete administration decided to strongly expand the number of day care facilities and their capabilities. The commitment implies more than doubling the number of centers available over a three-year time period.

The expansion policy has varied slightly over years. The ability to decide where to increase day care facilities the first period was limited by the ability to adjust the existing budget. We need to remember that the new administration took office in March 2006, when the fiscal year budget, with its items, was already decided and approved by the congress the previous year. Nonetheless, during 2006, JUNJI increased by 320 the number of classrooms for infants between 0 and 2 years. INTEGRA, made a similar number of new classrooms available. This first expansion was made mostly by refurbishing old classrooms that were used by Pre-Kinder and Kinder children, since these levels are now offered in school buildings. Therefore an important part was the reconversion of existing facilities. Additionally, they made use of already-approved local funds at the county

level to build some new facilities and to buy the required equipment. The allocation of new facilities was therefore given by this resource constraint.

By the end of 2006, both institutions worked together at the national level to analyze the distribution of the new facilities for 2007. The expansion should cover 25,000 new vacancies, 20,000 of them for infants from 0 to 2 years and the remaining 5,000 for toddlers starting at 2 years up to 3 years 11 months.

For this purpose, they worked on setting up a unified data set containing information, at the national, regional and county level, about:

- number of children younger than 3 years and 11 months;
- number of children in the lowest to income quintile and by poverty status;
- coverage taking into account only the formal provision of day care (The support provided to family day care facilities will not be taken into account for this purpose, since this program has not been expanded); and
- shortage computed as the difference between poor children in the first income quintiles and coverage offered by both institutions, measured as absolute value and percentages.

Finally, they combined three indicators of scarcity into an index [with their corresponding weight]:

- shortage of spots for the first two income quintiles [0.8];
  - shortage of spots considering poverty status [0.17]; and
  - Human Development Index computed by the United Nations [0.03].
- all of them ranging between 0 and 1.

Considering this information they constructed a *Priority Index* to distribute the assigned spots across regions.

With this criteria, the Metropolitan Region (Santiago), was actually the one with more shortage and therefore over 8,000 of the 20,000 new spots for infants and 2,000 of the 5,000 spots for toddlers were assigned in the capital. Taking into account the income levels, the coverage for infant care declared by these institutions is 12 percent at the national level.

By the end of 2007, the professionals of both institutions agreed to improve the indicators of the previous year, using a new data set available: the Survey about Health and Life Quality applied by the Ministry of Health during 2006. The advantage of taking into account this survey is that it inquires about the potential demand for day care. It shows that two thirds of poor females (non-users) would not send their infants to day care even if it would be available. Therefore, the potential shortage of day care is reduced to a third. This is an important distinction since the promise is to make day care available to everyone who wants to use it, but there will not be mandatory attendance. Hence, to have full coverage for infants they estimate a shortage of 48,000 spots. Once again the Metropolitan Region had the highest shortage and therefore received 5,600 of the 16,000 spots assigned.

Once the expansion policy has been determined at the national level, assigning the number of spots and classrooms to be constructed in each region, the local authorities within each region decide where to construct them. In this process they are limited by the availability of public land and their ability to sign agreements to delegate the administration of new centers to non-profit organizations.

For the 2009 process, they are geo-coding the centers and therefore trying to build the new ones where there is higher potential demand.

## 3.2 Application and Selection Criteria

Since 2006, the application to any government program by a family requires a *Social Protection Score Card* (Ficha de Protección Social, FPS). In order to obtain this score, a member of the family needs to ask for the initial interview in their local county. A social worker will visit the house and perform a structured interview. She registers all the household members, their age, health problems, educational level, employment status, monthly incomes of the last year, and the housing characteristics. Afterwards, all this information is registered in a national database that assigns a score. The advantage of this procedure is that it does not only consider special health needs and actual family incomes but also their ability to generate income in the future (as proxied by education levels).

Starting in September of each year, there is a period of advertising the existing day care facilities. The centers inform about the application dates, the time schedule and the requirements. The application for the upcoming year is open during the months of November and December. To apply, the person in charge of the child has to fill out a form that inquires about the data of the child and the person in charge, and then the person proceeds to an interview with the social worker to detect specific risk situations, providing some documents like birth certificate, Social Protection Score, employment or study certificate, etc.<sup>3</sup> The information about family composition, household characteristics and income is summarized in the Social Protection Score.

Even though the public day cares are theoretically open to any child, the scarcity of vacancies forces them to use certain selection criteria. The instrument they have used has varied over years, however, the basic criteria is having less than 11,734 points in the *Social Protection Score Card* (which is highly correlated with the first two income quintiles). For all the families that meet the score criteria, the additional criteria used are:

- children belonging to vulnerable families measured as belonging to the *Chile Solidario*<sup>4</sup> program;
- children of the day care workers;
- children whose mother is head of household;
- children whose mother works, studies or is searching employment;
- children whose mother is an adolescent;
- children of native ethnic families; and
- children that do not have an adult to look after them during the day.

These data are managed at the local level and families with higher scores get priority to use the available spots. The selection process finishes the third week of January and the results are published the last week of January.

Once the child has been accepted, the mother or person in charge has to declare the schedule requirements and confirm the enrollment of the child. They are allowed to apply for a time extension if the mother or person in charge works. However, the time extension is not guaranteed and single mothers might need to complement the public day care with other types of arrangements if they want to work. Most day care hours are from 8:30 AM to 3:30 PM, while most employment hours are from 9:00 AM to 6:00 PM. It is very important to keep in mind these schedule discrepancies since they could be a cause for the absence of results that I document. To confirm enrollment they have until the last week of March. During the rest of the year the day care director may contact families on the waiting list if they have a new vacancy.

---

<sup>3</sup>In previous years information about family members and income was also provided. However, with the new database of the Social Protection Score Card the application form has been simplified.

<sup>4</sup>Chile Solidario is a Social Protection Program implemented by the Lagos Administration to help families living in extreme poverty to receive public support in terms of subsidies and preferential access to government programs.



## 4 Data and Stylized Facts

I obtain the data about the public day care centers from the public providers JUNJI and INTEGRA. From those institution I was able to obtain the list of day care available by December of 2005, 2006 and 2007, with their addresses and the number of spots each one of them offered for infants between 3 months and 2 years.

Additionally, I use the National household survey (CASEN) to characterize female behavior in the Chilean labor market. This specially sheds light on the participation rates by income levels and the most common child care provider.

Finally, I require employment data at some point before the policy was implemented and thereafter. Given we are still in an expansive period, I take the last available employment data. This requirement precludes me from using the national household survey (CASEN) or the Social Protection Survey (EPS) from 2006. Therefore the best option is to use the Employment and Unemployment Survey (2003-2008) for Greater Santiago for June of each year. It has a sample size of 3,000 households with almost 10,000 individuals each time.

### 4.1 Characteristics of Eligible Families

A well know stylized fact is that participation rates are lower among low income families. However, the differences are more important among women than men in Chile. Table 1 shows that the average Labor Force Participation for females is 43.3% and for male is 72.7% in 2006. The female participation monotonically increases with income from 27.6% in the first quintile to 60% in the highest quintile. While high-income women more than double the participation rate of low-income women, among men the difference is around 28%.

Table 1: Participation rates by gender and income quintile

	Quantile 1	Quantile 2	Quantile 3	Quantile 4	Quantile 5	Total
Female LFP	27.6%	35.9%	43.4%	51.7%	60.0%	43.3%
Male LFP	60.9%	70.4%	74.4%	77.9%	79.5%	72.7%

Source: National Household Survey, CASEN 2006.

When the non-working women are asked about the main reason, almost 50% of them report the care of the children and over 26% reports household duties (see Table 2). Almost 10% are still studying and around 5% are not interested in working. However, when I compare the reasons across income levels, the most striking differences appear for *Do not have child care* and *Not interested in working*. This last factor is considerably smaller among poor families. Not having child care is the most prominent reason not to work, reaching almost 50% of the responses. Therefore, I could expect an effect on labor supply of providing free public day care to low income families.

Table 2: Main reason not to work for women by income quintile

	Quantile 1	Quantile 2	Quantile 3	Quantile 4	Quantile 5	Total
Do not have child care	47.7%	52.4%	47.4%	54.2%	35.2%	48.7%
Household work	30.4%	23.8%	26.2%	24.5%	24.2%	26.8%
Student	9.3%	10.0%	13.8%	5.4%	11.3%	9.8%
Not interested in working	2.9%	5.0%	5.0%	7.6%	15.2%	5.3%
Other reason	9.7%	8.8%	7.6%	8.3%	14.2%	9.4%

Source: National Household Survey, CASEN 2006.

Additionally, I observe that low income families not only have lower education level, but also average a higher number of young children and lower day care attendance. On average 6.1% of

infants attend nursery and 26.3% of toddlers attend day care (see Table 3). This is more striking for low income infants, where we observe that only 3% of them attend a formal nursery compared to a 13% among high income families.

Table 3: Family characteristics by income quintile

	Quantile 1	Quantile 2	Quantile 3	Quantile 4	Quantile 5	Total
Nursery (0-2 years)	3.0%	6.3%	5.1%	8.0%	13.1%	6.1%
Child Care (2-4 years)	23.6%	19.8%	29.2%	29.3%	39.1%	26.3%
Number of children under 2	2.01	1.86	1.69	1.61	1.45	1.75
Average Schooling	7.80	8.65	9.32	10.39	12.51	9.63
HH monthly Labor Income	256	531	786	1,225	3,346	1,128

Source: National Household Survey, CASEN 2006.

As a first step, I will look at the different patterns of infant-related statistics and compare the behavior along income levels. I will also look with more detail at who is actually using the centers. Considering 99% of women with children under 2 years are less than 45 years old, I will focus the analysis on the 15-45 age group.

As we can see in Table 4 Chilean families report that the mother is the main care provider, followed by grandparents, other relatives and day care (72.6%; 12.7%; 4.4% and 4.6%). However, the mother's role appears to be more relevant among the poorest families, where the mother is the main care provider in 82.7% of the cases. It appears, according to this survey that day care is the main source of care provision for only 4.6% of the infants. However, if we inquire about the fraction that attends formal day care we observe that almost 6% of the infants attend day care. This varies from a 3% in the lowest income quintiles to 13% among high income families. This is much higher than what is reported as the main care provider, which is an interesting discrepancy, consistent with widespread part-time day care attendance (that, as I have speculated above, may be behind my results).

Table 4: Main care provider by income quintile

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
Mother	82.7%	76.8%	67.7%	64.8%	54.3%	72.6%
Father	0.8%	0.6%	1.2%	0.7%	1.3%	0.9%
Grandfather/Grandmother	9.4%	13.0%	17.3%	14.3%	12.1%	12.7%
Other Relatives	2.5%	4.0%	4.9%	3.5%	2.2%	4.4%
Nanny	0.1%	0.2%	1.3%	4.6%	13.8%	2.6%
Day Care	2.9%	3.2%	3.2%	7.1%	11.1%	4.6%

Source: National Household Survey, CASEN 2006.

Finally, I want to learn more about the mothers of infants that attend public day care. We observe that users of public day care have lower average income and education. For instance, 75% of public day care mothers have, at most, a high school education, while over 75% of mothers of other day care centers have, at least, a high school education.

Table 5: Mothers between 15-45 years old of children attending day care

	INTEGRA	JUNJI	Other Day Care
Average Schooling	11.00	11.39	13.85
Average Annual Labor Income	4,401	5,,447	9,598
Average Family Labor Income	7,585	9,490	22,288
Average Quintiles	2.69	2.62	3.74

Source: National Household Survey, CASEN 2006.

While public day care users average an annual labor income of 4,900 dollars, users of other day cares almost double that income (see Table 5). Similarly, considering family labor income we observe that non-public users more than double the average income. However, we need to consider that the explicit policy of providing public day care only to the poorest families (first two quintiles) has not been fully respected. This might be due to income under-reporting in order to obtain social benefits, or to endogeneity: once they get the children into day care they are able to work and increase personal and household income. There might also be misreporting in the JUNJI case, because this institution also certifies private care providers.

## 4.2 Employment Survey Descriptive Statistics

To perform the estimations, employment data were required at some point before the policy was implemented and thereafter. Given we are still in an expansive period, I take the last available period of employment data. This requirement precludes me from using the national household survey (CASEN) or the Social Protection Survey (EPS) from 2006, since there is still no survey wave after the reform started. Therefore my best option is to use the Employment and Unemployment Survey (2003-2008) for Greater Santiago.

The Employment and Unemployment Survey for Greater Santiago has been taken by the Department of Economics of the University of Chile since 1957, and has been financed by the Central Bank of Chile.<sup>5</sup> It is the oldest consistent survey in Chile and one of the oldest in Latin America. It is taken quarterly with an approximate sample size of 3,000 households with almost 10,000 individuals. The objective is to be able to compute the number and fractions of the population that belong to the labor force by age, gender, economic activity and income. Additionally it inquires about the characteristics of the labor force that has not been able to find employment.

The survey has a very simple questionnaire asking about family members, their relation with the head of household, age, schooling employment status, house rental and sources of income.<sup>6</sup> The employment section allows us to distinguish between workers searching for a job the first time, unemployed, and those working without payment. They also mention the main reasons for not searching a job. Unfortunately, child care is not a tabulated answer. Since the survey was designed in the 1950's, it is very unlikely that this was a major issue back then.

The Employment Survey will allow us to observe the trends that the female labor force participation has had over the last years. For example, even though aggregate female labor force has been increasing over time, the behavior has been heterogenous among different age groups, family compositions, etc.

Table 6: Labor Force Participation by gender

Year	2003	2004	2005	2006	2007	2008
Women	53.63%	52.70%	55.83%	56.76%	55.02%	56.95%
Men	78.30%	78.29%	79.07%	76.83%	76.64%	77.66%

Source: Employment Survey of Greater Santiago

From Table 6, we can observe that male labor force participation has been more or less stable around 78% over the 5-year period. However, female labor force participation is much lower, even though it has increased around three percentage points over the last five years (from 53.63% to 56.95%). The numbers are consistently higher than with the National Survey, since it considers only Greater Santiago, and also there are differences in phrasing of the employment questions.

<sup>5</sup>I thank the Central Bank of Chile for the access to this data.

<sup>6</sup>Income modules are only available in March and June each year.

### 4.3 Child Care Data

The list of day care available by December of 2005, 2006 and 2007, with the number of spots each one of them offered for infants between 3 months and 2 years, is obtained from the public providers JUNJI and INTEGRA.<sup>7</sup> As we can see in Table 7 there was an important expansion in centers and spots offered for infants between 2005 and 2006, and it has continued during 2007, consistent with the policy change described in Section 3.

Table 7: Evolution of day care centers and spots in the Metropolitan Region

	JUNJI		INTEGRA		TOTAL	
	Number of centers	Spots	Number of centers	Spots	Number of centers	Spots
2005	96	3,420	36	1,186	132	4,606
2006	136	4,989	89	2,353	225	7,342
2007	168	6,085	112	3,061	280	9,146

Source: Public Day Care Providers

Sample restricted to 34 counties in the Metropolitan Area

In order to better understand the magnitude of the day care expansion, I computed the number of spots with respect to the number of eligible children. As we can see in Table 8, more than 50% of the children belong to the lowest two income quintiles. In particular, the number of infants in the Metropolitan Region is 157,000 of which 78,000 are in the lowest two income quintiles. Even though the public supply of day cares more than doubled in the last three years, the coverage increased from 6.5% in 2004 to 12.8% in 2007, considering all the eligible infants in the Metropolitan Region. When I restrict it to Greater Santiago it increases to 13.8%.<sup>8</sup> Therefore it still remains at a very low level. Table A.1 shows that there is a high dispersion in coverage across counties, going from 6% to over 70% in different counties (Lo Espejo and Providencia respectively).

Table 8: Number of children by income level in the Metropolitan Region

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
Less than 2 years	35,398	43,244	26,453	27,195	25,435	157,725
Percentage	22.4%	27.4%	16.8%	17.2%	16.1%	100.0%

Source: National Household Survey, CASEN 2006

Sample restricted to the Metropolitan Region

### 4.4 Child Care Availability Indicators

The public day care expansion policy might have an impact on a mother's participation if it actually makes free day care available and therefore reduces the reservation wage. Availability should not only be defined by the existence of open spots, but also by whether parents can actually use them. Hence, we should consider a free public day care is available if it is either close to the mother's home or to her work. If it is far from both places, it is almost like it is not available. However, over 90% of the children attending a day care do so in their home county.<sup>9</sup>

<sup>7</sup>I thank INTEGRA and JUNJI for the access to this data.

<sup>8</sup>The number of centers and spots at the county level are in Table A.1. It also shows the coverage at the county level considering as eligible families, those belonging to the first two income quintiles.

<sup>9</sup>Even though there is no formal restriction to the day care center for which the mothers can apply, there is an implicit policy to accept only application forms from the home county. This information was obtained from the interview with the social worker of the Metropolitan Regional Office. The only exception is Providencia, a high income county where there opened one day care center, given the high concentration of commerce.

Considering the characteristics of the available data, I need to construct a measure of day care availability that allows me to proxy for the real distance. Since I am still not able to relate the household address to the day care, I will use the county as the reference unit (Santiago is divided into 34 counties called comunas). I will compute two alternative measures: the total number of spots for infants in each county relative to the number of eligible infants; and the number of centers relative to the county area. To do so I also use data from the Ministry of Housing about county extension, in order to have a proxy of dispersion of the centers.<sup>10</sup> Therefore, we have:

- $Spots_j = \frac{\sum_{i=1}^{n_j} Spot_i}{EligibleInfants_j}$  where  $n_j$  is the total number of centers in county  $j$
- $Centerperkm_j = \frac{\sum_{i=1}^{n_j} Centers_i}{km_j^2}$

Consistent with the day care data presented before, the Availability Indicators are increasing over time, reaching an average coverage of 17% in the restricted sample, as we can see in Table 9.

Table 9: Distribution of Child Care Availability Indicators

Year	Spots per eligible infant		Centers per km2	
	Mean	Std Dev	Mean	Std Dev
2005	8.73%	0.07	22.06%	0.19
2006	13.45%	0.08	37.04%	0.29
2007	16.99%	0.10	46.98%	0.35

Source: Author's calculations based on Public Day Care data.

In Table A.2 we have the details of eligible infants relative to total infants in each of the 34 counties of the Metropolitan Area. The concentration of eligible children varies between 8.1% and 76.8% (Las Condes and El Bosque, respectively).

## 5 Empirical Strategy

This paper studies the Labor Force Participation effects of the expansion in public day care provisions in Chile. I use the traditional reduced-form estimation of labor supply derived from the maximization of a utility function  $U(c, l)$  increasing in consumption and leisure, subject to the budget constraints: a) Consumption cannot exceed non-labor income,  $y_{NL}$ , and labor income,  $wh$ , less child care cost,  $ph$ , [ $c = y_{NL} + (w - p)h$ ]; b) Hours of work,  $h$ , plus leisure,  $l$ , cannot exceed total time,  $T$  [ $T = l + h$ ]. In the case of public provision of day care, the net wage increases from  $w - p$  to  $w$  for the amount of hours in which free care is provided. Therefore the intuition tells us that the mother's reservation wage goes down and she might be more willing to work.

However, from a theoretical point of view, we can distinguish three cases:

- Mothers that were not working previous to the policy, would face a substitution effect therefore making it more attractive to work;
- Mothers that were working full time (more hours than those provided by the free day care) face an income effect causing a reduction in the amount of hours offered in the labor market; and
- Mothers that were working part time (less hours than those provided by the free day care) face both income and substitution effects. Hence there is no clear prediction about the total effect on labor supply

<sup>10</sup>I thank the Ministry of Housing of Chile for the access to this data.

A first approach to estimate the impact of the child care expansion is to look at the labor market behavior of the women that could be affected by this policy. However, their behavior could also be determined by other factors affecting the national economy or by their individual preferences. Therefore, I will take a difference-in-difference approach looking at their change in behavior between 2003 and 2008, relative to a group of women that should not be affected by the policy.

The treatment group is defined by the target of the policy: women in the first two quintiles with children at most 2 years old. The control group is defined as women with young children in the higher income quintiles. As mentioned before, the periods taken into consideration to look at the labor force participation are June 2003-2005 and June 2007-2008.

		Targeted Quintiles 1 and 2	Not Targeted Quintiles 3-5
Before	2003-2005	$LFP_T^{Before}$	$LFP_{NT}^{Before}$
After	2007-2008	$LFP_T^{After}$	$LFP_{NT}^{After}$

Therefore, a first estimator would be:

$$DD = (LFP_T^{After} - LFP_T^{Before}) - (LFP_{NT}^{After} - LFP_{NT}^{Before}) \quad (1)$$

Following Donald and Lang (May 2007), I will use their two-step estimator to compute the appropriate t-statistics and correctly test if there has been a change in female LFP after the day care expansion started. To do so, the first step regression is:

$$LFP_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 E_{it} D2004_{it} + \alpha_3 E_{it} D2005_{it} + \alpha_4 E_{it} D2007_{it} + \alpha_5 E_{it} D2008_{it} \quad (2)$$

$$+ \beta_1 D2004_{ict} + \beta_2 D2005_{ict} + \beta_3 D2007_{ict} + \beta_3 D2008_{ict} + \varepsilon_{it}$$

where  $i$  denotes individuals and  $t$  denotes time.  $LFP_{it}$  is the indicator of Labor Force Participation of women  $i$  in year  $t$ ;  $E_{it}$  is a dummy variable showing whether women  $i$  meets the eligibility criteria; and  $D200X_{it}$  are dummy variables for each year in the sample (except 2003).

The coefficient  $\alpha_1$  is capturing the 2003 differential on LFP for eligible women. To recover any other year differential, I need to add  $\alpha_1$  and the corresponding  $\alpha$  of the interaction between eligibility and desired year dummy. For example,  $Diff_{2005} = \alpha_1 + \alpha_3$  can be recovered.

For the second step the year differential is regressed on a constant and a post-reform dummy:

$$Diff_t = \theta_0 + \theta_1 Post + \varepsilon \quad (3)$$

and the significance of the  $\theta_1$  coefficient is tested.

An additional limitation of this approach is the inability to control for personal characteristics that may affect the labor market participation. Hence, an improvement on the simple difference-in-difference estimator is to include other observable characteristics that may be influencing the decision to enter the labor market.

Therefore the estimating equation becomes :

$$LFP_{it} = X'_{it}\beta + \alpha_1 E_{it} + E_{it}DYear_{it}\alpha_2 + DYear_{it}\alpha_3 + \varepsilon_{it} \quad (4)$$

where  $i$  denotes individuals and  $t$  denotes time.  $LFP_{it}$  is the indicator of Labor Force Participation of women  $i$  in year  $t$ ;  $X_{ict}$  is a vector of the women characteristics like, age, age square,

years of schooling, cohabitant status, number of children between 2 and 6 years of age, non-labor income and number of other female adults in the household;  $E_{it}$  is a dummy variable showing if women  $i$  meets the eligibility criteria; and  $DYcar_{it}$  are dummy variables for each year in the sample (except 2003).

A second approach is to use a standard Labor Force Participation (LFP) equation, and include the increase in public child care supply availability at the county level as an additional regressor.

Therefore the estimating equation is :

$$LFP_{ict} = X'_{ict}\beta + \alpha_0 D_{ict} + \alpha_1 D_{ict} Poor_{ict} + \alpha_2 Poor_{ict} + \eta_t + \varepsilon_{ict} \quad (5)$$

where  $i$  denotes individuals,  $c$  denotes counties and  $t$  denotes time.  $LFP_{ict}$  is the indicator of Labor Force Participation of women  $i$  in county  $c$  and year  $t$ ;  $X_{ict}$  is a vector of the women characteristics like, age, age square, years of schooling, cohabitant status, number of children between 2 and 6 years of age, non-labor income and number of other female adults in the household;  $D_{ict}$  is the availability of infant care, measured as the number of day care centers per squared kilometer in the county or the number of spots available over the number of eligible infants in a given county;  $Poor_{ict}$  is an indicator of eligibility for the program, in this case belonging to the lowest two income quintiles. The *quasi* experiment I am using is the exogenous variation in the number of day care centers, given by the governmental policy. Considering I am using repeated cross-sectional data, I additionally control for time dummies,  $\eta_t$  and cluster at the county level. Finally,  $\varepsilon_{ict}$  represents the error term.

The parameter of interest is  $\alpha_1$ , which gives us the change in Labor Force Participation for eligible women who faced the change in public day care availability.

## 6 Results

### 6.1 Mean Differences

As seen in section 4.1, Female Labor Force Participation rate is very low in the Chilean economy. These statistics are even more striking among low income females. Looking at aggregate data for Greater Santiago, we observe that the participation rate of poor women (Quintiles 1 and 2) averaged 18.35% in 2002-2005, whereas the same figure was 57.98% for Quintiles 3-5. Comparing the average before the public day care expansion (2003-2005) to after the expansion (2007-2008) we see that it increases by 13 percentage points for eligible females compared to a rise of 6.63 percentage points among wealthier women.

Table 10: Female LFP by income level in Greater Santiago

Year	Quintiles 1-2	Quintiles 3-5
<b>2003-2005</b>	18.35%	57.98%
<b>2007-2008</b>	31.42%	64.61%
<b>Delta</b>	13.07%	6.63%

Source: Employment and Unemployment Survey

Even though the percentage-point difference is almost double among eligible women, I do not have statistical power to reject the null hypothesis of equality. Therefore it cannot be established that there was an additional increase in the lower-income level women.

However, a better indicator of the effect I am looking for is the trend of labor participation among women with young children (0-2 years old). In order to test my hypothesis, I compute the

average Labor Force Participation considering a different specification of the treatment group. In all cases I consider the period 2003-2005 as pre-reform and 2007-2008 post-reform. In the first case, I consider the formal definition of eligible families as those belonging to the first two income quintiles. Thereafter, I use the definition of poverty line and schooling level, and finally I split the sample by children's age.

Table 11: Difference in difference estimates

Eligibility	Mean Difference
Quintiles 1 and 2	6.44%
Quintiles 1 to 3	5.56%
Below poverty line	2.62%
Primary education	2.70%
Children's age	2.19%

Source: Employment and Unemployment Survey

As can be seen in Table 11, there appears to be a positive impact on Labor Force Participation. However, the magnitude of that impact fluctuates depending on the definition of the treatment group used. With the formal eligibility criteria I find an increase of 6.44%. Considering the descriptive statistics presented in subsection 4.1, I expanded the treatment group to mothers belonging to Quintiles 1 to 3, which slightly reduces the impact obtained with the formal definition of eligibility (from 6.44% to 5.46%). If I define the treatment groups by schooling level, I find a 2.7% increase, and with the children's age definition it reaches 2.19%.

However, even after performing the two-step procedure proposed by Donald and Lang (May 2007), no significant differences are established in LFP between eligible and non-eligible women. The second stage parameters of the post-reform dummy with their corresponding standard errors are reported in Table 12.

Table 12: Estimates on Post Reform dummy variables

Eligibility	Post Reform
Quintiles 1 and 2	-0.02 ( 0.16)
Quintiles 1 to 3	-0.01 (0.17)
Below Poverty line	-0.08 (0.14)
Primary education	-0.17 (0.21)
Children's age	0.01 (.04)

Standard errors in parentheses  
 \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Once mother's characteristics are included as an additional control, the estimated differences-in-differences estimators become smaller, as reported in Table 13. When the eligibility criteria are defined by poverty line, the estimate even becomes negative. However, none of the estimated differences appear to be significant even after the two-stage procedure described before.

However, I need to be cautious with this analysis, because the sample size of the employment survey does not allow us to look at more specific groups that could behave more homogeneously.



Table 13: Difference in difference estimates with control variables

Eligibility	Mean Difference
Quintiles 1 and 2	4.429%
Quintiles 1 to 3	1.569%
Below Poverty line	-1.067%
Primary education	-0.001%
Children's age	0.464%

Source: Employment and Unemployment Survey

Therefore, I will move on the multivariate regression approach that considers county-level variation in the availability of public day cares, as described in Section 5.

## 6.2 Effects on Labor Force Participation

Table 14 shows the descriptive statistics of the main variables used in the sample: mothers of children, at most, two years old. Consistent with the characteristics of day care users presented in Section 4.1, eligible mothers tend to have lower educational levels than non-eligible ones: 94% of them reach high school, while almost 50% of non-eligible continue studying after high school. The eligible women are also slightly younger and a higher fraction of them appears as head of household. On the remaining variables there does not appear any important difference between both groups.

Table 14: Descriptive Statistics for women with children at most two years

Variable	Total		Eligible		Non-Eligible	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Schooling	10.39	4.85	8.22	4.56	11.36	4.92
dPrimary	0.16	0.36	0.26	0.44	0.12	0.33
dHigh School	0.60	0.49	0.68	0.47	0.53	0.50
Age	29.96	7.05	29.15	7.31	30.63	6.54
N° of children	2.31	1.18	2.36	1.15	2.23	1.20
Cohabitant	0.87	0.34	0.87	0.33	0.89	0.31
Head of HH	0.07	0.25	0.08	0.27	0.05	0.22
Other female adults	1.16	0.43	1.10	0.38	1.16	0.44
LFP	0.48	0.50	0.28	0.45	0.48	0.50
N° obs	942		465		238	

Source: Employment and Unemployment Survey, 2003-2008

Sample: Women between 15 and 45 years old with children at most two years old

Eligible defined as belonging to income Quintiles 1 or 2

Non-Eligible defined as belonging to income Quintiles 4 or 5

The baseline case defines eligibility by income quintiles. I estimate the effect for the complete period and for different pairs of years. Table 15 shows the estimated parameters considering the whole time period in columns (1) and (2) and only one year before (2005) and one year after (2008) the policy change started in columns (3) and (4). Consistent with previous estimations I find a positive effect of the mother's age on their occupational status that is decreasing over time. Similarly, being the head of household increases the probability of work, while being married decreases it by a considerable amount. In relation to my variables of interest I observe that a higher availability of day care, measured either by the relative number of spots (in columns

(1) and (3)) or by the number of centers (columns (3) and (4)) has a positive impact on LFP. However, the interactive term that reflects the impact of the policy on eligible families appears to be negative for the first indicator and not significant for the second one when I consider the whole period. Therefore, following this eligibility criteria I find no statistically significant positive effect. Consistent with the descriptive statistics, belonging to the lowest two income quintiles (Poor) reduces the probability of participation.

In order to verify the possibility of an impact considering alternative definitions of the treatment group, I split the sample by educational level. I define mothers with only primary education as the treatment group, and mothers with higher education as the control group. I continue restricting the sample to mothers with children at most two years of age. The coefficients of the interest parameters are reported in Table 16. Similar to the income eligibility criteria, there is a positive effect of the level of day care availability; however, I do not find any additional effect for the treatment group.<sup>11</sup>

Table 15: Regression estimates on Female LFP, by income eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
Age	0.08 (0.02)***	0.08 (0.02)***	0.10 (0.03)***	0.10 (0.03)***
Age squared	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)**	-0.00 (0.00)***
Schooling	0.00 (0.00)	0.01 (0.00)*	0.00 (0.01)	0.01 (0.01)
Head of HH	0.36 (0.05)***	0.36 (0.05)***	0.33 (0.07)***	0.32 (0.07)***
Any children 2-6 years	0.01 (0.03)	0.01 (0.03)	-0.03 (0.05)	-0.04 (0.05)
Cohabitant==1	-0.13 (0.06)**	-0.13 (0.06)**	-0.19 (0.10)*	-0.19 (0.10)*
NLY	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)*	-0.00 (0.00)
Other female adults in HH	0.07 (0.04)*	0.07 (0.04)*	0.06 (0.08)	0.04 (0.09)
N° Spots/N° of infants	0.40 (0.21)*		0.98 (0.30)***	
<b>Spots*Poor</b>	<b>-0.57</b> (0.24)**		<b>-1.20</b> (0.42)***	
Poor	-0.25 (0.04)***	-0.29 (0.04)***	-0.18 (0.08)**	-0.26 (0.09)***
N° Centers per KM2		0.10 (0.09)		0.19 (0.13)
<b>Center per KM*Poor</b>		<b>-0.09</b> (0.11)		<b>-0.20</b> (0.19)
Observations	1,517	1,517	529	529

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

I perform an alternative experiment considering the poor mothers with children at most two years old as the treatment group, and poor mothers of children 4 and 5 years old as the control

<sup>11</sup>The complete regressions are presented in Table A.4.

group. As we see in Table 17, there is no significant effect either.

Table 16: Regression estimates on Female LFP, by schooling eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
N° Spots/N° of infants	0.38		0.60	
	(0.15)***		(0.29)**	
<b>Spots*Primary</b>	<b>0.70</b>		<b>0.65</b>	
	(0.65)		(0.90)	
N° Centers per KM2		-0.06		-0.01
		(0.07)		(0.10)
<b>Center per KM*Primary</b>		<b>0.06</b>		<b>0.04</b>
		(0.14)		(0.25)
Observations	1,517	1,517	529	529

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 17: Regression estimates on Female LFP, by children's age eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
N° Spots/N° of infants	0.16		0.66	
	(0.27)		(0.39)*	
<b>N° Spots/N° of infants*Children2</b>	<b>-0.34</b>		<b>-0.95</b>	
	(0.33)		(0.43)**	
N° Centers per KM2		-0.10		-0.22
		(0.09)		(0.11)**
<b>Center per KM*Children2</b>		<b>0.08</b>		<b>0.16</b>
		(0.10)		(0.18)
Observations	1,573	1,573	614	614

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

This could imply either that the impact is too low to be captured with this survey or that there is really no elasticity to the availability of public day care supply. As mentioned before this is consistent with alternative hypotheses. For example, it could be that the same mothers were working before and after the policy change, and with this extra availability they are able to substitute part of the day care arrangements they were using before. Another alternative explanation is that even though new day care facilities are available, the mothers are not working because of some cultural factors or because the time schedules are not compatible with their work alternatives.

### 6.3 Effects on Labor Supply

An alternative labor market outcome that has been documented in the literature are the effects on employment. Even if I do not find an effect on LFP but do find one on employment, it would imply that no extra women entered the labor force due to this policy, but that they were able to accept a job. Following this approach, I report the probit results on employment. As we can see in Table 18, there is no significant effect on the treatment group.

Table 18: Regression estimates on Female Employment, by income eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
N° Spots/N° of infants	0.33		0.88	
	(0.16)**		(0.28)***	
<b>Spots*Poor</b>	<b>-0.20</b>		<b>-0.94</b>	
	(0.29)		(0.37)**	
N° Centers per KM2		0.02		0.13
		(0.08)		(0.14)
<b>Center per KM*Poor</b>		<b>-0.05</b>		<b>-0.08</b>
		(0.09)		(0.16)
Observations	1,517	1,517	529	529

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

I also estimated the effect on employment for the alternative definitions of treatment groups. Tables A.6 and A.7 show that I do not find any additional effect for the alternative definitions of treatment groups (schooling and children's age).

## 6.4 Effects on Hours Worked

Given I was not able to find any effect on employment I will test if there might be an impact on hours worked by the already working mothers. To do so, I run an OLS regression of the hours worked on the same set of characteristics used in the previous subsection.

Table 19: Regression estimates on Hours Worked, by income eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
N° Spots/N° of infants	46.44		109.25	
	(21.59)**		(45.71)**	
<b>Spots*Poor</b>	<b>-85.39</b>		<b>-153.26</b>	
	(40.11)**		(66.08)**	
N° Centers per KM2		8.00		9.99
		(16.74)		(33.76)
<b>Center per KM*Poor</b>		<b>-16.07</b>		<b>-27.63</b>
		(20.07)		(38.09)
Observations	1,517	1,517	529	529
R-squared	0.316	0.311	0.269	0.259

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Even though my estimates have large standard errors, there appears to be a negative impact on the hours worked. This might be evidence in favor of an income effect among working mothers, who can save spending on child care arrangements once the public day cares become available. As we can see in Table 19, the negative effect is only significant with the indicator of number of spots relative to eligible children (columns (1) and (3)).

Finally, I run the same regression considering the schooling level as the eligibility criteria and as reported in Table A.9, and I do not find any significant effect.

## 7 Conclusions

This paper uses data of the Chilean public day care centers with their corresponding number of vacancies to estimate the effect this policy has on female labor force participation. Using the difference-in-difference approach for *quasi* natural experiments, I find a positive effect on Labor Force Participation of poor women to be 2.6-10 percent increase in the labor force of poor families. However, once I control for observable family and individual characteristics, I no longer find a significant effect on the labor force participation, employment or hours of work of eligible women. I perform robustness checks by looking at different eligibility criteria considering the mothers' schooling level and the age of their children. I additionally look at the possible impact of alternative labor outcomes as occupational status and hours worked, and I am not able to find a positive significant effect. I conclude that it is not possible yet to infer that this policy has had the desired side effect.

This could imply either that the impact is too low to be captured with this survey, or that there is really no elasticity to the availability of public day care supply. As mentioned before, this is consistent with alternative hypotheses. For example, it could be that the same mothers were working before and after the policy change, and with this extra availability they are able to substitute part of the day care arrangements they were using before. They might even be reducing the hours of work given the income effect of free public day care. An alternative explanation is that even though new day care facilities are available, the mothers are not working because of cultural factors, or because the time schedules of these day care facilities are not compatible with their work alternatives.

## References

- Baker, Michael, Jonathan Gruber, and Kevin Milligan, 2005, Universal childcare, maternal labor supply and family well-being, *NBER Working Paper* 11832, 1–62.
- Berger, Marc, and Dan Black, 1992, Child care subsidies, quality of care and the labor supply of low-income single mothers, *Review of Economic Statistics* 79 (1), 125–135.
- Berlinski, Samuel, and Sebastian Galliani, 2007, The effect of a large expansion of pre-primary school facilities on preschool attendance and maternal employment, *Labor Economics* 14, 665–680.
- Blau, David, and Janet Currie, 2004, Preschool, day care and afterschool care: Who’s minding the kids?, *NBER Working Paper* 10670, 1–126.
- Bordón, Paola, 2007, El efecto de los jardines infantiles en la oferta laboral femenina. análisis del caso chileno, *Working Paper*, CEA.
- Bravo, David, Dante Contreras, and Esteban Puentes, 2008, Female labor supply and child care supply in chile, *Department of Economics, University of Chile* mimeo.
- Cascio, Elizabeth, 2006, Public preschool and maternal labor supply: Evidence from the introduction of kindergartens into american public schools, *NBER Working Paper* 12179, 1–45.
- Contreras, Dante, and Gonzalo Plaza, 2004, Participación femenina en el mercado laboral chileno. ¿cuánto importan los factores culturales?, *Department of Economics, University of Chile* mimeo, 1–20.
- Donald, Stephen, and Kevin Lang, May 2007, Inference with difference-in-difference and other panel data, *The review of Economics and Statistics* 89(2), 221–233.
- Duflo, Esther, 2001, Schooling and labor market consequences of school construction in indonesia: Evidence from an unusual policy experiment, *American Economic Review* 91 (4), 795–813.
- Gelbach, Jonah, 2002, Public schooling for young children and maternal labor supply, *American Economic Review* 92 (1), 307–322.
- Schlosser, Analia, 2006, Public preeschool and the labor supply of arab mothers: Evidence from a natural experiment, .

## 8 Appendix

Table A.1: Evolution of Public Day Care Centers and Spots

County	2005		2006		2007		Elegible Population	Coverage Rate
	Centers	Spots	Centers	Spots	Centers	Spots		
Ñuñoa	3	136	6	199	7	226	604	37.42%
La Reina	2	76	2	90	2	90	450	20.00%
Penalolén	8	261	9	370	17	631	2,408	26.20%
Macul	4	160	6	214	7	278	842	33.02%
Pedro Aguirre Cerda	3	87	6	140	8	192	1,170	16.41%
San Miguel	0	0	1	18	2	39	441	8.84%
San Joaquín	4	96	9	202	10	230	1,493	15.41%
La Granja	7	194	10	271	12	348	1,875	18.56%
San Ramón	3	100	6	176	8	275	2,471	11.13%
La Cisterna	0	0	0	0	2	56	783	7.15%
Lo Espejo	3	81	5	116	7	156	2,538	6.15%
El Bosque	4	160	8	308	8	326	2,376	13.72%
La Pintana	9	366	14	488	16	493	3,796	12.99%
San Bernardo	4	153	8	253	9	316	3,258	9.70%
Cerro Navia	5	197	8	277	9	326	2,759	11.82%
Pudahuel	4	141	7	250	7	299	2,734	10.94%
Lo Prado	4	160	4	160	5	193	1,146	16.84%
Cerrillos	1	28	3	104	3	104	676	15.38%
Maipú	5	160	8	268	9	311	8,394	3.71%
Renca	7	225	12	402	14	467	2,206	21.17%
Independencia	1	18	1	18	1	17	683	2.49%
Recoleta	7	288	9	339	10	418	1,051	39.77%
Huechuraba	6	230	9	317	10	355	1,595	22.26%
Quilicura	3	85	5	164	6	188	2,053	9.16%
Conchalí	5	196	6	233	8	277	921	30.08%
Providencia	0	0	1	36	1	42	54	77.78%
Las Condes	4	128	4	166	5	182	356	51.12%
Vitacura	0	0	0	0	1	27	351	7.69%
Lo Barnechea	2	92	2	107	2	104	939	11.08%
Santiago	0	0	6	120	13	245	987	24.82%
Quinta Normal	2	74	4	139	4	135	1,513	8.92%
Estación Central	3	114	7	198	12	344	1,051	32.73%
La Florida	6	188	15	432	16	505	2,661	18.98%
Puente Alto	13	412	24	767	29	951	9,629	9.88%
Total	132	4,606	225	7,342	280	9,146	66,264	13.80%

Source: Author's calculation based on the Nation Household Survey, CASEN

Table A.2: Children 0 - 2 years old in 2006, by county

County	Total	Eligible	Rate
Ñuñoa	2,818	604	21.4%
La Reina	1,927	450	23.4%
Penalolén	4,720	2,408	51.0%
Macul	2,269	842	37.1%
Pedro Aguirre Cerda	1,961	1,170	59.7%
San Miguel	1,421	441	31.0%
San Joaquín	2,267	1,493	65.9%
La Granja	2,853	1,875	65.7%
San Ramón	3,785	2,471	65.3%
La Cisterna	1,815	783	43.1%
Lo Espejo	3,583	2,538	70.8%
El Bosque	3,092	2,376	76.8%
La Pintana	4,956	3,796	76.6%
San Bernardo	7,088	3,258	46.0%
Cerro Navia	4,254	2,759	64.9%
Pudahuel	5,036	2,734	54.3%
Lo Prado	2,913	1,146	39.3%
Cerrillos	992	676	68.1%
Maipú	17,700	8,394	47.4%
Renca	3,558	2,206	62.0%
Independencia	1,812	683	37.7%
Recoleta	2,738	1,051	38.4%
Huechuraba	2,292	1,595	69.6%
Quilicura	4,457	2,053	46.1%
Conchalí	2,605	921	35.4%
Providencia	570	54	9.5%
Las Condes	4,388	356	8.1%
Vitacura	2,412	351	14.6%
Lo Barnechea	1,949	939	48.2%
Santiago	5,150	987	19.2%
Quinta Normal	2,322	1,513	65.2%
Estación Central	2,388	1,051	44.0%
La Florida	9,354	2,661	28.4%
Puente Alto	16,933	9,629	56.9%
Total	138,378	66,264	TOTAL

Source: Author's calculation based on the Nation Household Survey, CASEN



Table A.3: Estimated coefficients on Female LFP, by schooling eligibility criteria

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
Age	0.09 (0.02)***	0.09 (0.02)***	0.11 (0.03)***	0.12 (0.03)***
Age squared	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***
Head of HH	0.31 (0.05)***	0.30 (0.05)***	0.27 (0.07)***	0.27 (0.07)***
Any children 2-6 years	-0.01 (0.03)	-0.01 (0.03)	-0.05 (0.05)	-0.05 (0.05)
Cohabitant==1	-0.14 (0.06)**	-0.14 (0.06)**	-0.17 (0.11)	-0.17 (0.11)
NLY	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Other female adults in HH	0.09 (0.04)**	0.09 (0.04)**	0.08 (0.08)	0.06 (0.08)
N° Spots/N° of infants	0.38 (0.15)***		0.60 (0.29)**	
<b>Spots*Primary</b>	<b>0.70</b> (0.65)		<b>0.65</b> (0.90)	
Primary Schooling	-0.19 (0.07)***	-0.14 (0.04)***	-0.13 (0.15)	-0.06 (0.11)
N° Centers per KM2		-0.06 (0.07)		-0.01 (0.10)
<b>Center per KM*Primary</b>		<b>0.06</b> (0.14)		<b>0.04</b> (0.25)
Observations	1,517	1,517	529	529

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table A.4: Estimated coefficients on Female LFP, by children's age eligibility criteria

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
Age	0.04 (0.02)**	0.04 (0.02)**	0.06 (0.03)**	0.06 (0.03)*
Age squared	-0.00 (0.00)**	-0.00 (0.00)**	-0.00 (0.00)*	-0.00 (0.00)*
Schooling	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)	0.00 (0.01)
Head of HH	0.46 (0.04)***	0.46 (0.04)***	0.38 (0.08)***	0.39 (0.07)***
Children at most 2 years	-0.06 (0.05)	-0.12 (0.04)***	0.06 (0.08)	-0.11 (0.07)
Any children 2-6 years	0.06 (0.04)	0.06 (0.04)	0.06 (0.06)	0.07 (0.06)
Cohabitant==1	-0.09 (0.05)	-0.08 (0.05)	-0.05 (0.09)	-0.04 (0.09)
NLY	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***
Other female adults in HH	0.07 (0.04)*	0.07 (0.04)*	0.15 (0.08)*	0.15 (0.08)*
N° Spots/N° of infants	0.16 (0.27)		0.66 (0.39)*	
N° Spots/N° of infants*Children2	-0.34 (0.33)		-0.95 (0.43)**	
N° Centers per KM2		-0.10 (0.09)		-0.22 (0.11)**
Center per KM*Children2		0.08 (0.10)		0.16 (0.18)
Observations	1,573	1,573	614	614

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table A.5: Regression estimates on Female Employment, by income eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
Age	0.09 (0.02)***	0.09 (0.02)***	0.11 (0.03)***	0.11 (0.03)***
Age squared	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***
Schooling	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)	0.00 (0.01)
Head of HH	0.29 (0.06)***	0.29 (0.06)***	0.18 (0.08)**	0.18 (0.08)**
Any children 2-6 years	-0.00 (0.03)	-0.00 (0.03)	-0.01 (0.05)	-0.02 (0.05)
Cohabitant==1	-0.18 (0.06)***	-0.18 (0.06)***	-0.22 (0.10)**	-0.22 (0.10)**
NLY	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)*	-0.00 (0.00)
Other female adults in HH	0.02 (0.03)	0.02 (0.03)	0.02 (0.05)	0.01 (0.05)
N° Spots/N° of infants	0.33 (0.16)**		0.88 (0.28)***	
<b>Spots*Poor</b>	<b>-0.20</b> (0.29)		<b>-0.94</b> (0.37)**	
Poor	-0.35 (0.04)***	-0.36 (0.04)***	-0.22 (0.06)***	-0.31 (0.07)***
N° Centers per KM2		0.02 (0.08)		0.13 (0.14)
<b>Center per KM*Poor</b>		<b>-0.05</b> (0.09)		<b>-0.08</b> (0.16)
Observations	1,517	1,517	529	529

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table A.6: Regression estimates on Female Employment, by schooling eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
Age	0.10 (0.02)***	0.10 (0.02)***	0.12 (0.03)***	0.12 (0.03)***
Age squared	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***
Schooling				
Head of HH	0.21 (0.06)***	0.21 (0.06)***	0.13 (0.08)*	0.13 (0.08)*
Any children 2-6 years	-0.02 (0.03)	-0.02 (0.03)	-0.03 (0.05)	-0.03 (0.05)
Cohabitant==1	-0.19 (0.06)***	-0.19 (0.06)***	-0.19 (0.11)*	-0.20 (0.11)*
NLY	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
Other female adults in HH	0.05 (0.04)	0.05 (0.04)	0.04 (0.05)	0.03 (0.05)
N° Spots/N° of infants	0.42 (0.16)***		0.58 (0.28)**	
<b>Spots*Primary</b>	<b>0.82</b> (0.71)		<b>1.02</b> (0.86)	
Primary Schooling	-0.21 (0.07)***	-0.17 (0.05)***	-0.18 (0.14)	-0.10 (0.10)
N° Centers per KM2		-0.14 (0.07)*		-0.01 (0.10)
<b>Center per KM*Primary</b>		<b>0.15</b> (0.15)		<b>0.13</b> (0.26)
Observations	1,517	1,517	529	529

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table A.7: Regression estimates on Female Employment, by children's age

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
Age	0.05 (0.02)***	0.05 (0.02)***	0.09 (0.03)***	0.09 (0.03)***
Age squared	-0.00 (0.00)***	-0.00 (0.00)**	-0.00 (0.00)**	-0.00 (0.00)**
Schooling	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.01)	-0.00 (0.01)
Head of HH	0.37 (0.05)***	0.38 (0.05)***	0.23 (0.08)***	0.24 (0.08)***
Children at most 2 years	-0.07 (0.05)	-0.09 (0.03)***	0.08 (0.07)	-0.06 (0.05)
Any Children 2-6 years	0.03 (0.04)	0.03 (0.04)	0.06 (0.06)	0.07 (0.06)
Cohabitant==1	-0.14 (0.06)**	-0.14 (0.06)**	-0.19 (0.09)**	-0.18 (0.09)**
NLY	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***
Other female adults in HH	0.01 (0.03)	0.01 (0.03)	0.04 (0.05)	0.05 (0.06)
N° Spots/N° of infants	0.23 (0.23)		0.44 (0.36)	
<b>Spots*Children2</b>	<b>-0.10</b> (0.40)		<b>-0.59</b> (0.36)*	
N° Centers per KM2		-0.09 (0.08)		-0.21 (0.09)**
<b>Center per KM*Children2</b>		<b>0.05</b> (0.09)		<b>0.20</b> (0.12)
Observations	1573	1573	614	614

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table A.8: Regression estimates on Hours Worked, by income eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
Age	2.83 (1.63)*	3.01 (1.65)*	9.43 (4.31)**	10.25 (4.40)**
Age squared	-0.04 (0.03)	-0.04 (0.03)	-0.12 (0.07)	-0.13 (0.07)*
Schooling	-0.07 (0.27)	0.06 (0.23)	-0.29 (0.93)	0.03 (0.82)
Head of HH	-1.42 (4.73)	-0.72 (4.85)	3.67 (10.78)	4.55 (11.50)
Children at most 2 years	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Any children 2-6 years	-0.21 (3.06)	-0.30 (3.07)	0.99 (9.13)	-0.37 (9.12)
Cohabitant==1	-9.53 (7.09)	-9.60 (7.21)	-36.03 (19.15)*	-35.91 (19.46)*
NLY	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Other female adults in HH	1.53 (3.49)	1.07 (3.68)	3.09 (7.57)	0.76 (8.58)
N° Spots/N° of infants	46.44 (21.59)**		109.25 (45.71)**	
<b>Spots*Poor</b>	<b>-85.39</b> (40.11)**		<b>-153.26</b> (66.08)**	
Poor	2.25 (4.10)	-2.80 (4.59)	-5.70 (10.52)	-16.03 (10.60)
N° Centers per KM2		8.00 (16.74)		9.99 (33.76)
<b>Center per KM*Poor</b>		<b>-16.07</b> (20.07)		<b>-27.63</b> (38.09)
Constant	-46.12 (21.34)**	-46.29 (21.95)**	-74.44 (52.48)	-77.57 (54.33)
Observations	1,517	1,517	529	529
R-squared	0.316	0.311	0.269	0.259

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table A.9: Regression estimates on Hours Worked, by schooling eligibility

	Whole Sample		Years 2005 and 2008	
	(1)	(2)	(3)	(4)
Age	3.22 (1.56)**	3.44 (1.60)**	10.36 (3.98)**	11.48 (4.14)***
Age squared	-0.04 (0.03)	-0.05 (0.03)	-0.13 (0.07)*	-0.15 (0.07)**
Head of HH	-2.03 (4.66)	-1.86 (4.79)	0.88 (11.36)	1.18 (11.82)
Children at most 2 years	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Any children 2-6 years	-0.52 (3.08)	-0.71 (3.02)	-0.11 (9.63)	-1.83 (9.15)
Cohabitant==1	-10.15 (7.15)	-10.26 (7.20)	-35.48 (19.48)*	-35.47 (19.51)*
NLY	0.00 (0.00)*	0.00 (0.00)*	0.00 (0.00)	0.00 (0.00)*
Other female adults in HH	1.63 (3.73)	1.49 (3.78)	3.70 (7.97)	2.13 (8.30)
N° Spots/N° of infants	28.83 (14.88)*		67.85 (33.30)**	
Spots*Primary	-28.74 (40.06)		-34.90 (99.72)	
<b>Primary Schooling</b>	<b>2.39</b> (4.08)	<b>-2.35</b> (4.17)	<b>2.30</b> (14.83)	<b>-2.10</b> (12.73)
N° Centers per KM2		-3.98 (9.52)		-10.09 (20.78)
<b>Center per KM*Primary</b>		<b>5.79</b> (16.19)		<b>2.52</b> (41.08)
Constant	-52.93 (20.64)**	-52.55 (21.54)**	-166.65 (52.45)***	-171.61 (55.03)***
Observations	1,517	1,517	529	529
R-squared	0.309	0.307	0.249	0.244

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%