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Effect of Lengthening the School Day on Mother's Labor Supply

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Abstract

This article examines how a policy oriented toward a specific group within the population can have collateral effects on the economic decisions of other groups. In 1996, the Chilean government approved the extension of the school day from half- to full-day school. This article exploits the quasi-experimental nature of the reform's implementation by time, municipality, and age targeting of the program in order to examine how the maternal labor supply is affected by the childcare subsidy implicit in the lengthening of the school day. Using data from the Chilean socioeconomic household survey and administrative data from the Ministry of Education for 1990–2011, the authors estimate that, on average, there is a 5 percent increase in labor participation and employment rates of single mothers with eligible children (between 8 and 13 years old) with no younger children, who are the group that would be mainly affected by the policy. No significant labor supply responses are detected among others mothers with eligible children.

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Despite progress in recent decades to bring gender equality in the labor market, women continue to bear a heavier burden when it comes to balancing work and family. Affordable and good-quality childcare services may improve the reconciliation of paid work and household commitments and thus foster female labor market participation and gender fairness. Unfortunately, the relationship between extra childcare and female labor opportunities in the market is not well established. Indeed, although there is extensive literature that studies the relationship between childcare and female labor participation, the evidence presents a mixed picture of the net.

On the other hand, most of the literature that studies the effect of the expansion of childcare availability on mothers' labor supplies focuses on studying the effects on mothers with preschool-aged children. However, there is a lack of evidence focusing on the effects of increasing the length of the school day on mother labor supply. This article analyzes the effect of the extension of the school day on mother's labor participation in Chile.

In most developed countries, the school day of public education is highly compatible with the workday of women.[1] These countries show high levels of female labor participation and employment rates (Adser 2005). In contrast, in developing countries the school day is, in most

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1. See, e.g., France and Sweden.

cases, not compatible with the nine-to-six workdays. In fact, most of the school systems in developing countries work on a half-day basis.[2]

Female labor participation has experienced significant growth in Chile. The rate of female participation increased from 35 percent in 1990 to 49 percent in 2011 (in women from 15 to 65 years old). However, the situation of women in the Chilean labor market is still poor, particularly for women with lower income levels. Women who belong to the poorest 20 percent of the country's population present a participation rate of 32 percent , while those from 20 percent of the wealthiest households achieve rates of 67 percent.[3] Female labor participation in Chile has been relatively late and is one of the lowest in Latin America in spite of the comparatively high levels of education that Chilean women achieve.[4]

There are important reasons to study determinants of female labor supply in a developing country. First, the access of women into the labor market should have positive effects for the most vulnerable families as it represents a new source of income for these households and thus could lead to a reduction in poverty (Ganuza et al. 2001). Second, despite the fact that greater opportunities have emerged for women, there are still significant gaps between the participation of men and women in all areas and discriminatory cultural patterns persist (Antecol 2003; Araújo and Scalon 2005; Contreras and Plaza 2010).

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2. However, there are various initiatives that promote the implementation of the full school day. In Latin America, Chile, Argentina, Uruguay, and Venezuela has promoted different policies to expand the school day.
3. Chilean Socio-Economic Characterization Survey (CASEN) 1990–2011.
4. According to ECLAC statistics on gender, education, and training for women (2007), economically active women (15 and over) in urban areas in Chile have an average of 11.6 years of schooling, placing them second in South America behind Argentina, which presents an average of 11.8 years. The average years of schooling for women living in rural areas of Chile is 9.3, placing the country first in South America for education levels of rural women.

Previous studies have found variables that affect female participation, such as age and educational level, status as head of household, no labor income, and number and age of children (Jaumotte 2005). The empirical evidence shows that the number and ages of children are the most important variables that influence the likelihood of women's labor force participation. Furthermore, evidence has identified additional, cultural, factors such as the level of machismo and conservativeness, labor market-related factors such as lower salaries for women and rigidity, as well as institutional factors such as a lack of childcare.

There are two main topics in the literature of the effects of childcare on labor incentives. The first focuses on the relationships among the cost of childcare, female labor supply, and government subsidies (Del Boca 2002; Del Boca and Vuri 2006; Blau and Currie 2007; Lundin, Mörk, and Öckert 2008; Wrohlich 2011). Most of these studies show a small effect of childcare government subsidies on female participation and high impact on the likelihood of utilizing formal childcare. The second stems from the study of natural experiments, which provides a better framework for analyzing how greater availability of childcare can affect employment decisions of women with preschoolers (Gelbach 2002; Berlinki et al 2007; Lefebvre and Merrigan 2008; Cascio 2009; Goux and Maurin 2010; Berlinki et al 2011; Havnes and Mogstad 2011). Most of these studies suggest a positive effect on participation rates given greater availability of childcare.[5] We follow this second approach.

The increase in free time as a result of longer school day may impact the allocation of time changing employment decisions or parental time investment.[6] This article focus on the

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5. In Chile, Encina and Martinez (2009) and Medrano (2009) have studied the effect of the increasing day care centers on labor participation in Chile, finding that it does not induce any change on participation for low-income women.
6. Almuedo-Dorantes and Sevilla (2011), have studied the impact of low-skilled immigration, through lower prices for commercial childcare, on parental investment. The authors find that low-skilled immigration to the United States has contributed to substantial reductions in the time allocated to basic childcare by college-educated mothers of non-

effect of the extension of the school day, for example, increased availability of childcare for younger school-aged children, on mother's labor participation, employment, and hours worked per week.

In 1996, the Chilean government announced the implementation of the Full School Day program (FSD) as part of a series of measures designed to improve the quality and equality of education in the country. This reform affected students in third through twelfth grades, for example, children between 8 and 17 years of age. Previous to the reform, the school day was two shifts, students attending either in the morning or the afternoon. The implementation of the reform changed the educational structure so the schools must work on basis of one "shift."[7] In general, before the extension of the school day, the students began classes around 8 a.m. in the morning to 1 p.m. in the afternoon. After the reform students must to remain at school until 4:00, decreasing the mothers' time allocated to childcare in 3 hours per day.

But does this extension of the school day raise maternal labor supply? Which mothers respond? The work decision is ultimately about how to allocate time between paid work, unpaid work, and childcare.[8] An increase in the time that children spent at school may change mothers' choices, as they may spend fewer hours caring for children. However, this will also depend on preferences regarding leisure and consumption. In other words, the effect of the extension of school day on labor supply is therefore neither a substitution elasticity nor an income elasticity but rather a combination of the two (Gelbach 2002). The size (and sign) of the effect relies on the

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school-aged children. However, these mothers have not reduced the time allocated to more stimulating educational and recreational activities with their Children.

7. Before the reform, many schools, elementary and secondary, provided two or even three half-day shifts, morning, afternoon, and evening.

8. Gimenez-Nadal and Sevilla (2012) have studied the allocation of time in other context than in the context of labor supply.

relative magnitude of these elasticities and preexisting distribution of hours, which may differ across time and space.

Thus, following Card and Krueger (1992) and Dufflo (2001), our empirical strategy uses the variation across municipalities and time in the implementation of the full school day reform to predict labor supply among mothers of 8 through 13 year-old children in a difference-in difference (DD) framework. Also, following Bryan and Sevilla (2007) we split the sample between single and married mother to analyze if there are differential effects across marital status.[9] The reform affects children between 8 and17 years old. However, we consider a smaller, younger group, because older children are less likely to need childcare. On the other hand, following Cascio (2009) and Havnes and Mogstad (2011), among others, in a second stage we use other mothers, who are not treated to construct comparison groups. To minimize bias, we limit the comparison group to mothers with children slightly younger than the group of interest. These triple-difference (DDD) models remove potential bias from municipality-specific shocks to labor supply share by mothers with children around the same age. These biases could include things like a change in the generosity of community welfare benefits.[10] The source of exogenous variation is the level of implementation of the reform at the municipal level, measured as share of schools with FSD and available places at the municipal level.[11] The key assumption is that the implementation of the reform did not affect the demands placed on the schools. In other words, it

9. Bryan and Sevilla (2007) have studied the differential impacts of housework across marital status for
women.
10. It is important to note that the reform's installation has not been homogenous. Section V presents a more complete analysis of how this phenomenon could impact our results.
11. See sub-section *Research Strategy* in section III for more details.

is assumed that the FSD implementation process did not provide an incentive for mothers to choose schools that implemented the reform earlier.[12]

The data are drawn from the Chilean Socio-Economic Characterization Survey (CASEN) and administrative information from the Ministry of Education from 1990 and 2011. The results indicate that the introduction of FSD had a significant and positive impact on labor participation for single mothers without younger children. We estimate that 5 percent of single mothers without younger children entered the work force because of the implementation of FSD. This relatively small effect may be explained by the fact the new school day is not totally compatible with working hours. No significant labor supply responses are detected among other mothers with eligible children.

The implementation of the reform was gradual and heterogeneous in terms of timing and areas affected. Different regions and municipalities were integrated at different points in time and with varying levels of implementation intensity. Given that the resources assigned in the implementation of FSD mainly benefited at-risk municipalities and those with lower levels of female labor participation, our results may underestimate the true impact of FSD on female labor supply. On the other hand, the selection of school may be related to unobserved correlates of maternal labor supply-demand of childcare.[13]

Even though the reform was to be implemented based on educational considerations (exogenous to job market considerations), its introduction was not random. Following Kruger and Berthelon (2011), we estimate the determinants of the implementation of FSD.[14] The results

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12. See section IV for more details.
13. However, Elacqua, Schneider, and Buckley (2006) and Gallego and Hernando (2008) show that there is not any evidence suggesting a greater demand for schools with FSD.
14. The authors study the impact of full school days on adolescent pregnancy rates in Chile.

suggest a positive relationship between the vulnerability of the municipality and the installation of the reform. In other words, if our results are biased, they have a lower bound than the true value of the impact of FSD on the female labor supply.

I.   THE FULL SCHOOL DAY PROGRAM

The Chilean government has implemented two major reforms that affect the educational system's design. The first was introduced in 1981 and included decentralizing the educational system by transferring the administration of public schools from the Ministry of Education to Municipal Authorities. It also included a nationwide voucher system for both publicly and privately administered schools, introducing a uniform demand-side subsidy in which parents are free to choose among the schools in the market.[15]

As a result, the educational system in Chile shifted to three kinds of administrative alternatives: public establishments funded by the student subsidy provided by the state and under municipal administration; private subsidized establishments funded by the student subsidy and administered by the private sector; and private fee-paying establishments funded and administered by the private sector. The creation of voucher schools led to a dynamic education sector that underwent fast growth in the supply of schools.

The second major reform took place in 1996 when the Chilean government announced a set of new initiatives designed to improve educational quality. The measure that had the greatest impact on the school system was the implementation of FSD. This program consisted of

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15. The reform led to a sharp redistribution of the educational system, benefitting the private subsidized sector. In fact, the percentage of students in private subsidized schools increased from 15 percent in 1981 to 47 percent in 2005.

extending the number of classroom hours by 30 percent annually without lengthening the school year.[16] The change involved a significant increase in the number of hours at school. Additionally, it set a longer time of recess and lunch. As a result, the students are now required to remain on school until 4:00 p.m. (Under the previous system the students remain in school until 1:00 p.m.).

Prior to the reform, many schools had a double school day that is two shifts of students, one in the morning and another in the afternoon. The execution of the FSD program meant that those schools transitioned to a single school day format.

The objectives of this program were to improve student learning and increase equality in education. They were described as follows: "To contribute to the improvement of the quality of education and provide equal learning opportunities to the boys, girls and adolescents throughout the country by significantly increasing teaching time in order to better develop the new curricular framework."[17]

More time at school could positively affect learning, the technical work of teachers, and the management of each school. In fact, Bellei (2009) analyzes the effects of the increase in the length of the school day on academic performance in Chile and finds a small, positive, and significant effect on academic performance in both language and mathematics tests. On the other hand, FSD allowed for services to be provided to high-risk populations by increasing opportunities for learning and significantly expanding the amount of time allotted for schoolwork for all students in government-subsidized schools. Kruger and Berthelon (2011) analyze the effect of the increased length of the school day on adolescent pregnancy rates in

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16. The school year is divided into semesters. The first semester runs from the end of February or early March to July. Following a two-week winter break school resumes and lasts until late November or early December, followed by summer vacations.
17. The program was approved through Law No. 19,532.

Chile and find that increasing the amount of time that students spend in school diminishes the likelihood of adolescent pregnancy by reducing risky sexual behavior.

The FSD format has been incorporated gradually since 1997. According to official statistics from the Ministry of Education, 80 percent of primary schools, or some 6,834 institutions, had joined the system by 2011 (figure 1).[18] The increase of the school day involved adding 232 hours per year for third to sixth graders, 144 hours annually for seventh to eighth graders, 261 for ninth and tenth graders, and 174 for students in their last two years of high school. In addition, as a consequence of the increase in lecture hours, schools had to allocate additional time for lunch. This may imply a positive income effect for those families. Therefore, the effective time of children at schools increased from 8 a.m. through 1 p.m.; to 8 a.m. through 4 p.m.. However, the program's implementation was gradual. Restrictions linked to operational considerations and infrastructure meant that the incorporation of schools into the program was not instantaneous or homogenous.

Operational costs are financed through a 30% increase in government subsidies[19] while infrastructure-related costs are financed through the "capital contribution" subsidy, which it assigned to schools by the government through competition.[20] Schools that did not have a full school day prior to 1998 can apply for support to acquire the infrastructure necessary to

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18. The Ministry of Education projected that FSD would be universal in municipal schools by 2007 and in private subsidized schools by 2010. However, the process of incorporating municipal schools into the system did not end in 2007, which led to the extension of the period through 2010. The law requires that publicly funded schools created after 1997 begin operations with a full school day.
19. This contribution is received once the Ministry of Education approves the implementation of FSD in the school.
20. In order to apply for this subsidy, the school must participate in a capital contribution competition held by Ministry of Education, which normally takes place twice a year. Each school is evaluated on the basis of socioeconomic vulnerability and the funds required for each student to join the program. Each component is assigned a score and the projects with the highest scores are funded.

incorporate FSD. Schools created after 1998 can apply as long as there is a lack of schools in their region. Public schools can also receive subsidies from regional or municipal governments.

The program was not introduced randomly. The first schools to change to the FSD format were rural and smaller institutions that already had a single schedule. As such, increased investment in infrastructure was not required. Furthermore, resources were focused on schools with populations of students who were at a greater socioeconomic risk.

Table 1 describes the FSD implementation process between 1998 and 2011 in the country's 13 administrative regions.[21] In 1998, the regions with the highest rates of incorporation were IX and XI, with a percentage of FSD schools of 73% and 79%, respectively. In 2011, the regions with the highest rates were IX regions which reached 88% and 92% enrollment, respectively, which still represented the highest rates in the country.[22]

FSD schools in the Metropolitan Region were 17% in 1998, which was the lowest rate in the country. Only 7% of the schools in the Metropolitan Region are of the rural type, which was first addressed by the reform. In contrast, 68% and 38% of the schools in the IX and XI regions are rural.[23] Finally, only six municipalities had not incorporated FSD by 1998. The last to

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21. Chile was divided into 13 regions, which are the country's first-level administrative division. Each region is headed by an intendant, appointed by the President, and an indirectly-elected body known as regional board. Regions are divided into provinces (second-level administrative division), each headed by a governor (gobernador), appointed by the President. There are 54 provinces, in total. Provinces are further divided into municipalities (third and lowest level administrative division), which are governed by mayor.
22. This percentage is based on total enrollment in the region.
23. Ministry of Education 1998–2011.

incorporate was the municipality of Rauco, which introduced FSD in 2004.[24] It is important to note that all municipalities were participating in FSD by 2006.

II. DATA: SOURCE SAMPLE AND SUMMARY STATISTICS

To estimate the relationship between full day school reform and maternal labor supply we use data from Chile's National Socio-Economic Characterization Survey (CASEN) for the period 1990–2011. We also use administrative data on enrollment and school compiled by the Ministry of Education for 1998–2011. CASEN is a representative survey at the national, regional, and urban-rural levels. It has been happened every two or three years since 1987 and provides important data on health, education, housing, income, labor market, and demographic variables at the household level.

This study considers women between the ages of 25 and 55 since they present the greatest likelihood of being the mothers of 8–13 year-olds. Following Gelbach (2002), we estimate separate models for a mother of an 8–13 year-old with and without younger children. Mothers who have both an 8–13 year-old and a younger child must find childcare for the younger child (even if the older child is in FSD), so throughout the article we split the samples according to whether the woman's 8–13 year-olds is her youngest child. We also split the sample by marital status, so we can differentiate the effects of the FSD on married and single mothers. Mothers were classified as single if listed as head of household or as the primary individual in a subfamily.[25]

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24. The last municipalities to join the program were Sierra Gorda, Rinconada, Isla de Pascua, Olivar, Rauco, and Penco. *Source*: Ministry of Education 1998–2011.
25. We also estimate the results using the marital status reported by women. The results are quite similar and are available from the authors upon request.

Figures 2 and 3 presents respectively mothers' labor participation and employment rate by age of the youngest child. As was expected, the higher labor participation is for mothers whose youngest child is 14 to 15 years old (dashed line). Meanwhile, the lowest labor participation is for the group of mothers whose youngest child is 0 to 5 years old (dotted line). All the groups increased participation and employment. This can be explained by the increase in education levels of women in Chile, the increased in the access to childcare institutions for children in preschool age, among others.

Table 2, panel A, reports summary statistics for single and married mothers of 8–13 year-olds without younger children. Along all the labor outcomes- labor participation, employment, and hours worked- the typical single mother consistently supplies more labor than her married counterpart. However, there were large increases in labor supply for married mothers over the sample period. The gain in employment was particularly large in 2000. The econometric models described below allow us to test whether any of this gain was response to FSD implementation. Table 2, panel B, shows that married mothers with children between 8 and 13 years old and with younger children experienced similar gains in employment and hours over the same 20-year period, though their employment levels were lower in each year, arguably due to the presence of younger children. Generally, the ages and quantity of other children may affect labor supply decisions.

Table 2 also shows trends based on the number of children in different age groups and in other maternal demographic characteristics. Because these trends may underlie rising female labor supply (Blau 1998), our models control for maternal observables. Demographic characteristics of single mothers whose youngest child is 8–13 years old differ from similar married mothers. Single mothers show more years of schooling, lower levels of poverty, lower

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average age, and have a lower number of children. Additionally, they are more likely to live in urban areas and have an older woman in their households.

<center>III.   RESEARCH STRATEGY AND FINDINGS</center>

<center>*Research Strategy*</center>

To examine how mothers' behavior is affected by exposure to FSD, we first estimate a model that is similar to the conventional difference in difference (DD) specification:

$$y_{ijt} = \alpha + \theta FSD_{jt} + \beta X_{ijt} + \mu M_{jt} + \gamma_j + \tau_t + \varepsilon_{ijt}, \tag{1}$$

where y_{ijt} represents labor participation, employment or hours for mother i in municipality j in year t; X_{ijt} is the vector of maternal characteristics, including age, age squared, schooling, number of children by age, marital status, no labor income, and dummy variables for rural areas, poverty and whether there is another adult woman in the household; M_{jt} is the vector of time-varying municipal characteristics; γ_j represents municipality fixed effect and τ_t is the time fixed effect.

FSD_{jt} is the policy variable described above. We use two different but closely related measures of FSD to estimate equation (1). First, we include the proportion of primary schools in the municipality that offer full-day schooling during a given year, while our second measure is the share of total primary enrollment at the municipal-level that is under full-day schooling. The parameter of interest in model 1 is θ, which measures the effects of the reform on mothers' labor supply and will be identified by ordinary least square (OLS) regression.

Our second approach is to estimate a triple difference (DDD) model on a sample that includes treated and nontreated mothers:

$$y_{ijt} = \alpha + \theta_1 FSD_{jt} * mother_i + \theta_2 FSD_{jt} + \theta_3 mother_i + \beta X_{ijt} + \mu M_{jt} + \gamma_j + \tau_t + \varepsilon_{ijt} \, , \quad (2)$$

where $mother_i$ is an indicator for whether mother i has an 8–13 year-old child (enrolled in third to eighth grade of primary education). The coefficient $FSD_{jt} * mother_i$ is the difference in model 1 coefficient on FSD_{jt} between the treatment and comparison group. We limit the comparison group to mothers with children slightly younger, that is, mothers whose youngest child are 6–7 years old.[26] In the next section, we show the results of the models presented above, by dividing the samples into single mothers and married mothers. We control by time and municipality fixed effect, maternal characteristics (described above) and standard errors are clustered at municipality level.

Findings

Table 3 reports the results using the first measure of FSD (share of primary schools in the municipalities that offer FSD). The second column of table 3 shows the estimates of θ (DD model) for mothers whose youngest child was between 8 and 13 years old at the time of the survey. For single mothers (panel A), the extension of the school day is associated with a significant a positive effect in labor participation, and employment. Thus, it is found that the extension of the school day is associated with a 4 percentage point increase in labor participation, 6 percentage point increase in employment, that is, a 5 percentage increase in employment in labor participation (0.04/0.74≈0.06), 8 percentage increase in employment (0.06/0.70≈0.08),

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26. The reform affects children between 8 and 17 years old.

when we compare with pre-initiative means.[27] We also find a negative effect on hours worked last week. A possible explanation for these last results is that women increase their participation in part-time jobs that are compatible with the extension of the school day.[28]

For married mothers (column 2, panel B of table 3), we do not find any significant effects. This could be explained because married women have greater household commitments that may reduce the amount of effort available for market work or may be the outcome of intra-household choices. These results are consistent with those of Bryan and Sevilla (2007). The authors argue that marriage is characterized by the presence of specialization and economies of scale that not only change the actual time devoted to housework but also the type of housework activities that may affect de productivity in the labor market. Married individuals might also be constrained in the time of housework (and other activities) because of the need to synchronize leisure activities with the spouse. The authors find a negative effect of housework on wages for married female workers, but not for single workers or married male workers. Then, the differential effect across marital status suggests that the factor behind the relationship between housework and wages are the type and timing of housework activities as much as the actual time devoted to housework. Similar findings emerge for married mothers of children between 8 and 13 years old who also have younger children, as shown in column 5 of table 3. In general, we do not find any effects for mothers who have both an 8–13 year-old and a younger child (panels A and B, column 6). This may be explained because these mothers must find childcare for younger child, limiting participation in the labor market.

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27. We compare with pre-initiative means, in order examine the increase of means after the reform taking as a base the pre-initiative means.
28. Available data do not contain information on part-time jobs.

The conventional DD estimates can be biased to the true causal effect of the implementation of FDS, if there are economic fluctuations specific to the treatment group that are not fully accounted for. On the other hand, if the treated municipalities also initiated other policies affecting maternal labor supply, the DD estimator may also be biased. We address this concern by estimating equation (2). In this DDD estimation we use mothers with slightly younger children as a control group. Thus, we can control for time-varying effects specific to the treatment areas, correcting for sources of bias mentioned above.

The third column of table 3, panel A, presents the estimate comparing our treatment group with the control group for single mothers whose youngest children is 6–7 years old.[29] The results indicate that when we compare with mothers whose youngest children are just outside that age group, there is an increase of 4 percentage points in labor participation and employment.[30] In others words, there is a 5 percent increase in labor participation and employment rate as a result of FSD implementation. Again, we find a negative effect on hours worked last week.

Table 4 reports the effects of FSD implementation using the second measure of FSD, the share of total primary enrollment at the municipal-level that is under FSD (children between 8 and 13 years old). Using the second measure, we do not find any effects using DD strategy, but we do using DDD estimation. We find that when we compare with single mothers with children 6–7 years old, there is an increase in the labor participation and employment rate of single mothers of 4 percentage points (table 4, panel A, column 3, rows a and b).

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29. Figures A.4 and A.5 show the evolution of the municipality average of female labor participation and employment rate of single mothers of 8–13 year-olds and six to seven with no younger children.
30. When we add interactions between the FSD and a large set of pre-reform municipality characteristics the results remains stable. The estimations are available from the authors upon request.

Thus, we find effects of the FSD implementation on single mothers whose youngest child is between 8 and 13 years old.[31] These results are consistent with those of Havnes and Mogstad (2011), Ludin et al. (2008), and Cascio (2009), in finding nearly no effects on the labor supply among married mothers as a result of the increased access to (or lower prices of) childcare.

ROBUSTNESS: SPECIFICATION CHECKS

The correct identification of the effect of FSD on mothers' labor outcomes can be limited by various potential sources of bias. This section examines whether the FSD implementation was in fact exogenous and discusses the results of several additional robustness checks.

School Choice

The key assumption behind specification (2) is that the reform's implementation did not affect the demand for schools. That is, mothers did not tend to choose schools that implemented the reform earlier.[32] Elacqua, Schneider, and Buckley (2006) show that the main reason for choosing a school is its proximity or parents' place of work or home. Additionally, Gallego and Hernando (2008) conclude that there is no evidence to suggest a greater demand for schools with FSD. Thus, we can conclude that the supply of schools with FSD at the municipal level is exogenous to mother's decision to participate in the labor force.[33] In this sense, parameter θ

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31. We also divide the sample between poor and nonpoor households. We found a positive and significant effect in labor participation and employment rate for nonpoor single women with no younger children. Also we find a negative and significant effect of FSD on hours worked last week, i.e., similar results that in the entire sample. On the other hand, for the poor sample, we find no significant parameter related to the group that would be mainly affected by the extension of the school day, i.e., women with no younger children. These results are available upon request.

32. As was noted in section III, the Chilean education system allows parents to choose their children's school.

33. As we stated in the previous sections, FSD was installed in order to improve student learning and achieve greater educational equity, not to increase mothers' labor participation.

represents the effect of mother's exposure to the full school day in their municipality on the decision to participate in the job market.

The mechanism of assigning public resources for financing FSD and the characteristics of the municipality could bias the estimates. As has been discussed in previous sections, the implementation of the reform was not random. The Ministry of Education focused on the most vulnerable schools located in municipalities with relatively poor populations. In other words, if the schools located in municipalities with a low socio-economic level received priority in funding for installing FSD and presented low levels of female labor participation, the coefficient estimated by FSD underestimates the true effect.

Following Kruger and Berthelon (2009), we examine the presence of this potential bias. The share of primary school that offer FSD and the share of total primary enrollment under FSD at the municipal-level are modeled for a set of characteristics at the municipal level. The goal is to model the criteria utilized by the Ministry of Education to assign funding for FSD. Specifically:

$$FSD_{jt} = \varphi + \rho L_{it} + \phi T_t + e_{jt}, \tag{3}$$

where L_{it} is the vector that includes municipal level characteristics such as illiteracy, poverty, and unemployment. This estimate also includes dichotomous variables by year to control for the trend of the reform's implementation. Table A.5 in the appendix presents the results of equation (3). Column (1) shows the results of the estimation of equation (3) controlling for year and fixed effect by municipality using the share of schools with FSD. The results indicate that

municipalities with greater female labor participation present lower level of schools ascribed to FSD, that is, there is a negative correlation between female labor participation and the implementation of FSD.

On the other hand, column 2 in the same table presents the results using FSD enrollment as a dependent variable. The results indicate that municipalities with greater poverty rates present a greater level of enrollment ascribed to FSD. The results show a positive correlation between the poverty rate and the implementation of the reform. The evidence based on equation (3) suggests that the administrative criterion of directing FSD funds to higher-risk municipalities has been effective. That is, these results indicate that our estimates probably understate the true impact of FSD on female labor participation, and that the results of the lineal estimate represent a level that is lower than the true effect of FSD on mother labor participation.

Time Trend

In our DD approach we identify the childcare effects from the assumption of a common time trend in maternal employment between treatment and comparison municipalities, in the absence of the school day expansion. A concern is therefore that the estimated effects may reflect differential time trend. To investigate this, in the model DD describe above (just for period between 1990 and 2009) we include in the same regression the variables "Actual FSD" and "Future FSD" (Share 2011). If we find that the share in the future does no matter, then we can reject that "Actual FSD" and "Future FSD" are different. Thus, we can reject pre-trends.

Table A.6 in the appendix reports the placebo reform effect described above, on the sample of head of family mothers and single mothers whose youngest child is between 8 and 13 years old in 1990. If there were differential secular time trends in the treatment and comparison

municipalities in the pre-reform period, then the estimated effect of the "Future FSD" should be significantly different from zero. By contrast, the estimated placebo reform effect is insignificant.

Does the Extension of School Day Predict Labor Supply in Nontreated Groups?

Another placebo reform to identify if there are time trends in maternal labor supply is to estimate the effect of FSD on groups that should be not affected by the reform. To analyze this, we estimate the effect of a placebo reform on mothers whose youngest child is 6 to 7 years old. Table A.7 in the appendix reports the placebo reform effect on the sample of single mothers with her youngest child being between 8 and 13 years old. Again, if there were differential secular time trends in mother labor supply, then the estimated effect of the placebo reform should be significantly different from zero. However, the results indicate that the FSD reform did not affect this group.

IV.   CONCLUDING REMARKS

This article examines how a policy oriented towards a specific group within the population can have collateral effects on the economic decisions of other groups. In 1996, Chile began to introduce the Full School Day system, significantly increasing the hours spent in school. The purpose of this study is to examine how greater availability of childcare via a longer school day impacts women's decisions to participate in the labor market.

The gradual implementation of the reform over time and in different regions of the country is exploited by this study. A DD and a DDD strategy are used to obtain the causal effect of exposure to the reform. The results show a positive and significant effect of the

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implementation of FSD on single mothers' access to the job market. The results suggest that increasing the amount of time that children spend in school provides single mothers with more opportunities to access labor market because they need to dedicate less time to childcare. In fact, we estimate that 5 percent of single mothers without younger children entered the work force as a consequence of the implementation of FSD. The result is small, which could be explained because the extension of the school day provision only increased until 4 p.m. Thus, to increase the labor force more, is necessary to increase the school day to be compatible with the working hours of mothers.

We also find a negative and significant impact in hours worked per week. A possible explanation for these results is that the increased length of the school day decreases women's spending on alternative childcare, thus increasing their disposable income and decreasing the amount of hours that they are required to dedicate to the labor market. Another possible explanation is that women are choosing part time jobs that are compatible with the extension of the school day.

Thus, one important results, is that mothers are mostly constrained when they have younger children. This result is especially interesting because the provision of FDS in 1st and 2nd grade is not mandated by the reform, and it suggests that increasing access to FDS in these early levels would have the strongest impact on fostering female labor force participation. Therefore, our results suggest that authorities should prioritize expansion in those two grade levels.

On the other hand, it is important to note that, while this educational reform is exogenous to individuals' decisions in the labor market, its implementation was not random. The Ministry

of Education focused on the most vulnerable schools in municipalities with relatively poor populations. The reform's implementation was meant to give priority to these schools. In Chile, these municipalities are those with the lowest levels of female labor participation. As a result of the design of the reform's implementation, our estimates probably underestimate the true impact of FSD on female labor participation. These results should thus be interpreted as understating the true effect of the Full School Day on mothers' labor participation.

In conclusion, in this article we find that lengthening the school day has a positive and significant effect on single mothers' labor supply with no younger children. This result is remarkably interesting because the adequacy of this policy both strengthens the benefits mother enjoy from their participation in the labor market and improve the economic well-being of families. In addition, these results are subject to a number of interpretations that highlight the importance of future work in this area: for example, the need to give priority to greater availability of childcare for young children and the complementary of FDS with these policies.

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Figure 1. Number of Half-Day and Full Primary Schools
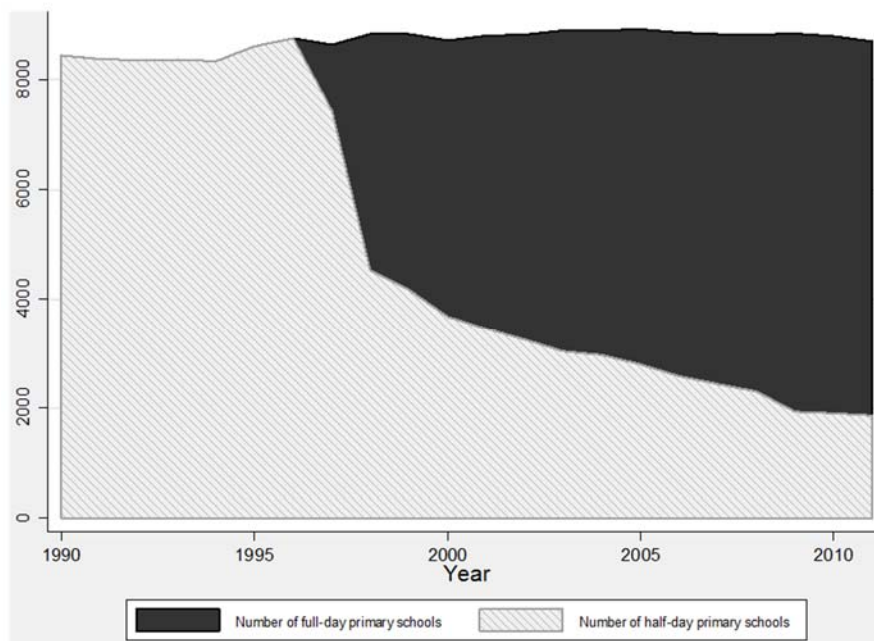
Source: Authors' estimates based on administrative data from the Ministry of education.

Figure 2. Maternal Labor Participation Rates by Age of Youngest Child
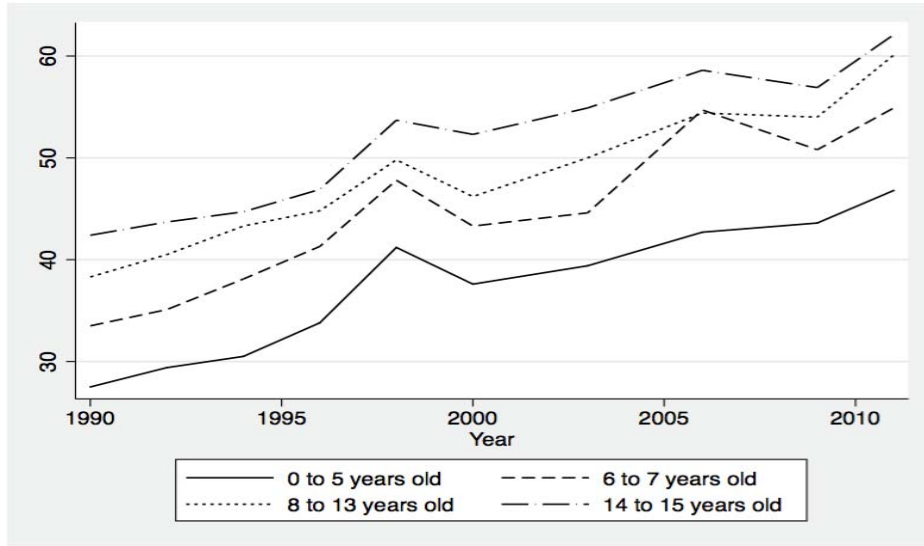
Source: Authors' estimates bases on CASEN 1990-2011.

Figure 3. Maternal Employment Rates by Age of Youngest Child
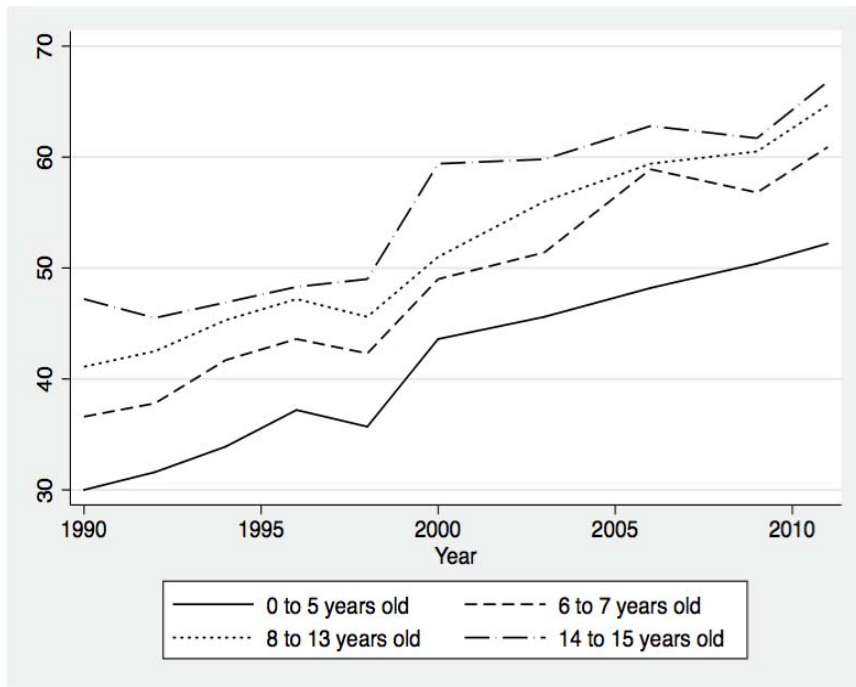
Source: Authors' estimates bases on CASEN 1990–2011.

Table 1. Proportion of FSD Schools (%) by Administrative Region, 1998–2011

Region	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
I	2	47	46	50	57	50	52	52	56	56	60	61	71	71	71
II	2	42	44	53	58	52	55	59	67	67	63	64	62	64	64
III	53	62	61	68	68	67	70	72	70	75	79	84	80	80	83
IV	2	53	57	60	64	59	64	62	69	72	74	76	82	82	82
V	12	32	39	42	47	53	57	60	61	63	67	68	71	74	74
VI	2	39	43	48	55	59	62	64	68	71	73	75	79	78	77
VII	3	50	55	58	59	65	68	70	72	73	75	77	80	80	81
VIII	4	41	47	50	51	56	61	62	63	64	66	67	73	72	72
IX	8	73	76	81	85	84	82	84	85	84	85	86	88	89	88
X	40	79	80	84	84	86	86	87	87	88	88	89	92	92	92
XI	9	64	65	70	77	71	79	81	79	83	88	87	76	75	76
XII	11	33	48	53	62	45	49	49	59	61	64	62	60	64	61
RM	19	24	28	37	41	44	50	49	51	57	60	62	69	70	70
Average	13	49	53	58	62	61	64	65	68	70	72	74	76	76	76

Note: The table includes the proportions of primary schools in each of Chile's administrative regions that had

implemented the FDS program in at least one of its grade levels. RM=Santiago metropolitan region.

Source: Authors' estimates using Ministry of Education FSD database.

Table 2. Mothers' Characteristics of 8- to 13-Year-Olds with and without Younger Children, by Marital Status.

1990–2011

	Single mothers					
	A.			B.		
	No younger children			With younger children		
	1990	2000	2011	1990	2000	2011
Labor outcomes						
Labor participation	0.68	0.78	0.79	0.56	0.64	0.68
	(0.47)	(0.42)	(0.41)	(0.50)	(0.48)	(0.47)
Worked last week	0.63	0.70	0.75	0.52	0.55	0.63
	(0.48)	(0.46)	(0.43)	(0.50)	(0.50)	(0.48)
Hours last week	50.75	45.55	40.00	43.04	44.56	34.54
	(17.16)	(16.04)	(15.29)	(19.87)	(18.26)	(16.09)
Background						
Schooling	8.54	10.51	11.12	7.67	9.97	11.01
	(4.35)	(4.12)	(3.48)	(3.98)	(3.57)	(3.05)
Poor	0.48	0.22	0.21	0.73	0.44	0.41
	(0.50)	(0.42)	(0.41)	(0.44)	(0.50)	(0.49)
Age	39.40	39.34	40.37	33.40	34.01	34.45
	(7.06)	(6.57)	(7.21)	(5.84)	(5.12)	(5.64)
Number of children 8 to 13	1.08	1.09	1.07	1.28	1.26	1.16
	(0.52)	(0.53)	(0.49)	(0.54)	(0.53)	(0.39)
Number of children 14 to 17	0.48	0.39	0.38	0.26	0.28	0.24
	(0.71)	(0.63)	(0.58)	(0.56)	(0.51)	(0.48)
Urban	0.89	0.91	0.91	0.84	0.89	0.91
	(0.31)	(0.29)	(0.28)	(0.36)	(0.32)	(0.28)
Other adult female in the household	0.57	0.60	0.75	0.59	0.51	0.67
	(0.50)	(0.49)	(0.43)	(0.49)	(0.50)	(0.47)
Number of people working at household	1.43	1.54	1.54	1.25	1.39	1.39
	(1.13)	(1.05)	(1.05)	(1.08)	(1.09)	(1.08)
	Married mothers					
	No younger children			With younger children		
Labor outcomes						
Labor participation	0.32	0.43	0.51	0.25	0.34	0.41
	(0.46)	(0.49)	(0.50)	(0.43)	(0.47)	(0.49)
Worked last week	0.30	0.39	0.48	0.24	0.30	0.37
	(0.46)	(0.49)	(0.50)	(0.42)	(0.46)	(0.48)
Hours last week	46.36	42.01	39.06	44.09	41.94	37.13
	(17.00)	(17.33)	(15.23)	(19.49)	(18.30)	(16.70)
Background						
Schooling	8.28	9.91	10.70	9.10	10.39	11.21
	(4.20)	(3.89)	(3.67)	(3.89)	(3.50)	(3.35)
Poor	0.38	0.19	0.11	0.54	0.32	0.23
	(0.49)	(0.40)	(0.32)	(0.50)	(0.47)	(0.42)
Age	40.49	40.60	42.22	33.50	34.72	35.17
	(6.49)	(6.21)	(6.60)	(5.10)	(4.95)	(5.48)
Number of children 8 to 13	1.24	1.15	1.07	1.35	1.27	1.16

	(0.67)	(0.61)	(0.55)	(0.60)	(0.52)	(0.38)
Number of children 14 to 17	0.70	0.58	0.45	0.30	0.26	0.21
	(0.79)	(0.67)	(0.60)	(0.58)	(0.51)	(0.45)
Urban	0.84	0.86	0.85	0.83	0.86	0.84
	(0.37)	(0.35)	(0.36)	(0.38)	(0.35)	(0.37)
Other adult female in the household	0.35	0.31	1.00	0.19	0.19	1.00
	(0.48)	(0.46)	(0.00)	(0.39)	(0.40)	(0.00)
Number of people working at household	1.65	1.62	1.78	1.38	1.43	1.56
	(0.96)	(0.88)	(0.88)	(0.76)	(0.78)	(0.84)

Source: Underlying data are from the Chilean socio-economic household survey (CASEN) and administrative data

from the Ministry of Education for 1990–2011.

Table 3. Effect of Extension of School Day in Maternal Labor Supply, Single and Married Mothers of 8–13 year-olds, without and with Younger Children (FSD Proportion of School)

	No younger children		Coefficient on share (FSD)*Mother 8–13 (model 2) comparison group	With younger children		Coefficient on share (FSD)*Mother 8–13 (model 2) comparison group
	Pre-initiative mean (1996)	Coefficient on share model 1	(Has) 6–7 year old	Pre-initiative mean (1996)	Coefficient on share model 1	(Has) 6–7 year old
	1	2	3	5	6	7
A. Single women						
a. Labor participation (=1)	0.74	0.04	0.04	0.68	0.03	-0.01
	(0.44)	(0.03)*	(0.01)***	(0.47)	(0.04)	(0.02)
b. Worked last week(=1)	0.70	0.06	0.04	0.62	0.01	-0.02
	(0.46)	(0.03)**	(0.02)**	(0.49)	(0.03)	(0.02)
c. Hours last week	44.45	-0.80	-1.61	44.17	-0.89	-0.66
	(15.96)	(1.43)	(0.79)**	(16.90)	(1.85)	(0.86)
B. Married women						
a. Labor participation (=1)	0.38	0.00	-0.01	0.30	-0.02	-0.02
	(0.49)	(0.02)	(0.01)	(0.46)	(0.01)	(0.01)**
b. Worked last week (=1)	0.36	0.00	0.00	0.28	-0.01	-0.01
	(0.48)	(0.01)	(0.01)	(0.45)	(0.01)	(0.01
c. Hours last week	43.39	1.14	-0.06	43.05	-2.35	-0.1
	(18.15)	(1.09)	(0.69)	(18.53)	(1.37)*	(0.76)
Controls						
Municipality fixed effects		Yes	Yes		Yes	Yes
Time fixed effect		Yes	Yes		Yes	Yes

Notes: Each entry in panels A–B, rows a–c, columns 2–5 represents a coefficient from a different regression. All the

regression include municipality fixed effects, year fixed effects, a vector of maternal background, and a vector of

municipality characteristics. All the regressions control for cluster by municipality, and standard error are consistent

for heteroskedasticity and error correlation within municipalities over time.

*** $p < .01$ ** $p < .05$ * $p < .1$

Source: Underlying data are from the Chilean socioeconomic household survey (CASEN) and administrative data

from the Ministry of Education for 1990–2011.

Table 4. Effect of Extension of School Day in Maternal Labor Supply, Single and Married mothers of 8–13 year olds, without and with Younger Children (FSD Proportion of Enrollment)

|	No younger children			With younger children		
			Coefficient on share (FSD)*Mother 8–13 (model 2) comparison group			Coefficient on share (FSD)*Mother 8–13 (model 2) comparison group
	Pre-initiative mean (1996)	Coefficient on share model 1	(Has) 6–7 year old	Pre-initiative mean (1996)	Coefficient on share model 1	(Has) 6–7 year old
	1	2	3	5	6	7
A. Single women						
a. Labor participation (=1)	0.74	0.01	0.04	0.68	0.05	0.00
	(0.44)	(0.02)	(0.02)**	(0.47)	(0.03)	(0.02)
b. Worked last week (=1)	0.70	0.04	0.03	0.62	0.02	-0.02
	(0.46)	(0.02)	(0.02)**	(0.49)	(0.03)	(0.02)
c. Hours last week	44.45	-1.31	-1.37	44.17	0.66	-0.98
	(15.96)	(1.25)	(0.82)*	(16.90)	(1.73)	(0.91)
B. Married women						
a. Labor participation (=1)	0.38	-0.02	-0.01	0.30	0.00	-0.01
	(0.49)	(0.01)	(0.01)	(0.46)	(0.01)	(0.01)
b. Worked last week (=1)	0.36	-0.02	-0.01	0.28	0.00	-0.01
	(0.48)	(0.01)	(0.01)	(0.45)	(0.01)	(0.01)
c. Hours last week	43.39	1.13	0.10	43.05	-1.05	-0.5
	(18.15)	(1.08)	(0.73)	(18.53)	(1.30)	(0.85)
Controls						
Municipality fixed effects		Yes	Yes		Yes	Yes
Time fixed effect		Yes	Yes		Yes	Yes

Notes: Each entry in panels A–B, rows a–c, columns 2–5 represents a coefficient from a different regression. All the regression include municipality fixed effects, year fixed effects, a vector of maternal background, and a vector of municipality characteristics. All the regressions control for cluster by municipality, and standard error are consistent for heteroskedasticity and error correlation within municipalities over time.

*** $p < .01$ ** $p < .05$ * $p < .1$

Source: Underlying data are from the Chilean socioeconomic household survey (CASEN) and administrative data from the Ministry of Education for 1990–2011.

Figure A.4. Municipality Average of Female Labor Participation of Single Mothers of 8–13 year-olds and 6–7 year-olds, Younger Children
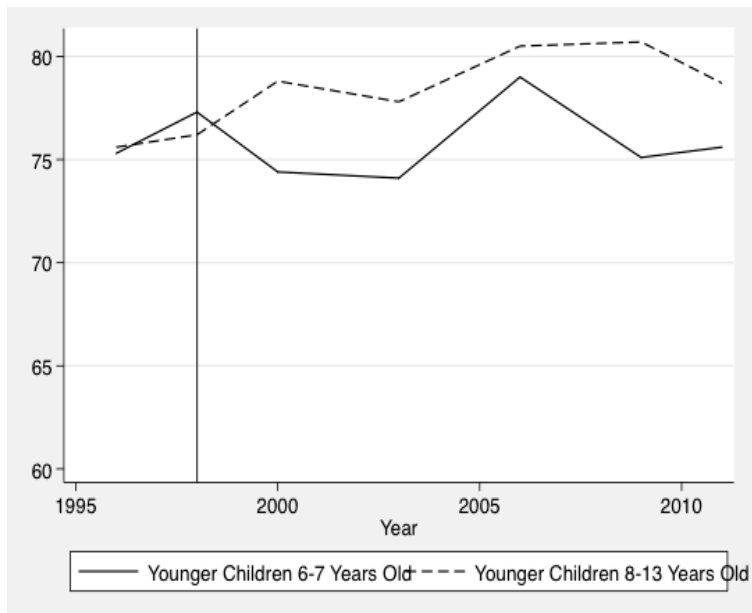
Source: Underlying data are from the Chilean socioeconomic household survey (CASEN) and administrative data from the Ministry of Education for 1990–2011.

Figure A.5. Municipality Average of Employment Rate of Single Mothers of 8–13 year-olds and

6–7 years-olds, Younger Children

Source: Underlying data are from the Chilean socio-economic household survey (CASEN) and

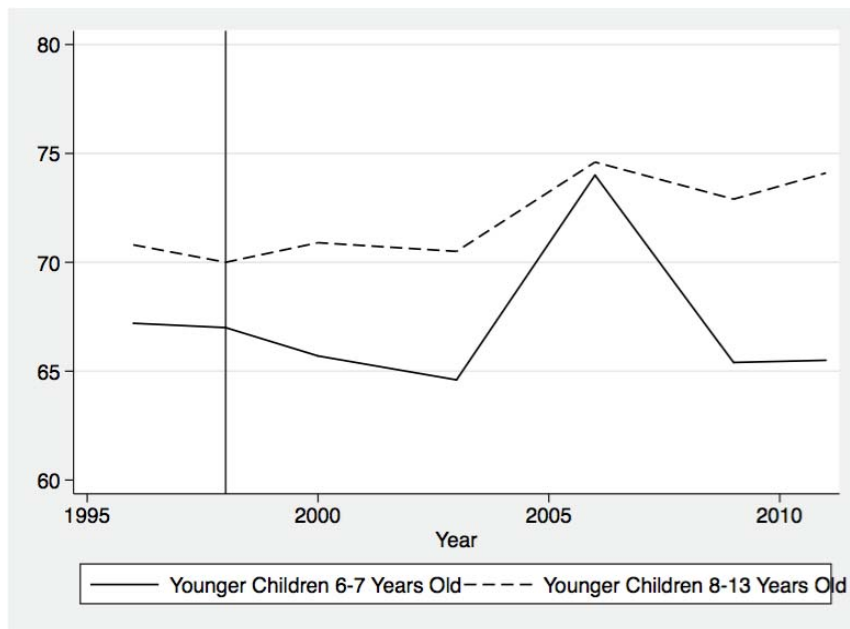administrative data from the Ministry of Education for 1990–2011.

Table A.5. Determinants of Full Day Schooling Reform Implementation

Variables	FSD schools	FSD enrollment
Municipality female labor participation	-0.24	-0.14
	(0.07)***	(0.07)
Municipality poverty rate	0.05	0.13
	(0.05)	(0.05)*
Municipality literacy rate	-0.17	-0.1
	(0.11)	(0.15)
Urban	0.01	0.01
	(0.03)	(0.03)
Constant	0.09	0.02
	(0.03)***	(0.04)
Observations	2665	2665
Number of municipalities	336	336
R-squared	0.87	0.81
Controls		
Municipality fixed effect	Yes	Yes
Time fixed effect	Yes	Yes

*** $p < .01$ ** $p < .05$ * $p < .1$

Source: Underlying data are from the Chilean socioeconomic household survey (CASEN) and administrative data

from the Ministry of Education for 1990–2011.

Table A.6. Time Trend

	Single mother	
	Coefficient on share model 1	
	FSD schools	FSD enrollment
No younger children		
Labor participation		
Actual FSD	0.07	0.04
	(0.02)***	(0.02)**
Future FSD	0.03	0.03
	(0.03)	(0.02)
Worked last week		
Actual FSD	0.08	0.05
	(0.02)***	(0.02)***
Future FSD	0.00	0.03
	(0.03)	(0.02)
Hours last week		
Actual FSD	-0.79	0.11
	(1.13)	(0.97)
Future FSD	-0.10	-0.70
	(1.33)	(1.21)

*** $p < .01$ ** $p < .05$ * $p < .1$ *Source:* Underlying data are from the Chilean socioeconomic household survey

(CASEN) and administrative data from the Ministry of Education for 1990–2011.

Table A.7. Does the Extension of School Day Predict Labor Supply in Nontreated Groups? Single Mothers

	FSD schools		FSD enrollment	
	Coefficient on share model 1		Coefficient on share model 1	
	(Has) 0–5 year-old	(Has) 6–7 year-old	(Has) 0–5 year-old	(Has) 6–7 year-old
A. Single women				
a. Labor participation (=1)	-0.01	-0.03	0.01	-0.02
	(0.03)	(0.07)	(0.03)	(0.06)
b. Worked last week(=1)	0.02	0.01	0.03	-0.01
	(0.03)	(0.06)	(0.03)	(0.06)
c. Hours last week	-0.66	4.49	-1.83	4.3
	(1.48)	(2.99)	(1.36)	(2.71)
Controls Municipality fixed effects	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes

Notes: Each entry in panels A–B, rows a–c, columns 2–5 represents a coefficient from a different regression. All the regression include municipality fixed effects, year fixed effects, a vector of maternal background, and a vector of municipality characteristics. All the regressions control for cluster by municipality, and standard error are consistent for heteroskedasticity and error correlation within municipalities over time.

*** $p < .01$ ** $p < .05$ * $p < .1$ *Source:* Underlying data are from the Chilean socio-economic household survey (CASEN) and administrative data from the Ministry of Education for 1990–2011.