

How does maternal labor supply respond to changes in children's school schedule?

Working paper

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Abstract

This study analyzes mother labor supply response to the expansion of free public child care for all children between the age of 2 and 11. Exploiting regional and time variation in the implementation of the program, it provides diff-in-diff estimates of its impact on mother employment decisions. It represents the first attempt to study an intervention that affects children in such a large age-range. Furthermore, detailed information on the take-up rate of alternative child care subsidies allows to identify if mothers react by simply substituting one form of care for another.

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Introduction

In the 2009 French Time Use Survey, almost 10% of women, against 3% of men, declared that they never work on Wednesday. This percentage increases till 18% for women with two children. Since 2008 to 2013, French children aged between 2 and 11 stayed in school four days a week for a total of 24 hours of classes. On Wednesday, children were supposed to stay at home. To what extent does the structure of the school schedule influence women decisions to work? And why is this important? In January 2013 the French government approved a reform that restructured the weekly schedule of classes in kindergarten and elementary school. Following the suggestions of several chronobiologists, in order to lighten the daily workload of children, this intervention reduced the length of the instruction time per day; added an extra half-day of classes in order to maintain invariant the total amount of weekly teaching hours; and aimed at compensating the shortening of each school day with the introduction of optional extra-curriculum activities, possibly without any additional cost for families.

This reform represents a 100% child care subsidy targeted at all children aged between 2 and 11. As such, it might affect mother labor supply along different margins. Let us first consider those mothers who were not working prior to this intervention, and those who were working less than the total amount of hours children can now spend in school. After the reform, leisure becomes more costly in terms of consumption for these women. This substitution effect could induce them to work more. Secondly, there are those mothers who were already working more than the total time children spend in school now. These face both a substitution and an income effect. The impact of the reform on this group is particularly ambiguous. Finally, those mothers who were working full-time before the reform experience only an income effect. For each hour worked, this implicit child care subsidy allows them to enjoy both more consumption and leisure. Crucially, the reaction of all affected mothers depends on the perceived quality of the extra-curriculum activities the reform introduced; given that attendance is not compulsory, mothers can decide to take their children at home. This might be the case, for instance, if they believe children benefit more from spending time with them, than in school. Moreover, mothers might not react to the intervention if they were already eligible for different sources of child care subsidies. Finally, we can expect an heterogeneous impact by marital status, level of education, and number of children.

To identify all these effects we will exploit the differential timing in the introduction of

the reform across municipalities. Its actual implementation, including the financing of the extra-curriculum activities, falls under the responsibility of municipalities (*communes*); the majority of them decided to allocate the extra half-day to Wednesday morning, while a few opted for Saturday morning. Crucially, the reform was implemented gradually. In September 2013 only 4,000 municipalities, the 20% of the total, introduced the new schedule; the rest postponed its adoption to the Fall of 2014.

Two identification assumptions have to be satisfied in our setting, in order for this diff-in-diff identification strategy to be valid. Firstly, absent the reform, the evolution of mother labor supply should have been then same in those municipalities that adopted the new school schedule in 2013 and in those that opted for 2014. Moreover, it has to be proven that the different timing in the adoption of the intervention is not dictated by previous dynamics in women labor market status.

Our contribution is threefold. First of all, we add to the literature on the impact of the availability of child care on mother labor supply. Several articles look at women employment responses to the expansion of pre-school child care, or to a reduction of its costs (Fitzpatrick [2012]; Cascio [2009]; Baker, Gruber & Milligan [2008]; Gelbach [2002]). In general, it is assumed that, as children grow, it becomes easier for their mothers to manage work and family. However, there is little evidence that this is the case (Contreras, Sepúlveda & Cabrera [2010]). The French reform extends the provision of public child care for all 2 to 11 year-old children. This allows us to identify how mothers with children of different ages react to this sort of intervention. As far as we know, no previous study has attempted to do the same.

Secondly, our conclusions will be relevant for the literature on the part-time penalty (Aaronson & French [2004]; Booth & van Ours [2008]; Fernández-Kranz & Rodríguez-Planas [2011]). According to this strand of research, part-time work usually involves lower wages, less secure employment, and a less stimulating work content. Moreover, it reduces opportunities for career advancements. In the 2009 French Time Use Survey, 45% of women declared that they were working part-time to look after their children or other family members. The 2013 reform of the school schedule allows these women to increase their working hours during the additional time children spend in school. Therefore, it is particularly interesting to study how this group of women react to the reform. Finally, our study aims at contributing to the

ongoing debate on the effect of mother employment on children cognitive and non cognitive development, and how this depends on the quality of alternative forms of childcare (Blau & Currie [2010]; Carneiro, Loken & Salvanes [2011]; Dustmann & Schönberg [2012]). Studying how the 2013 French reform affected mother labor supply decisions is fundamental to proceed in this direction.

The paper proceeds as follows. The first section gives a detailed description of the French primary school system and how this has been affected by the 2013 reform. The second paragraph reviews the literature related to this work. The third section describes the data. The identification strategy and main results are discussed in the fourth paragraph; the fifth paragraph is dedicated to robustness checks. The last section concludes.

1 The French primary school system

The French educational system is divided into three stages: elementary education, for children aged 6-11; secondary education - in turn divided into middle school (*collège*) and high school (*lycée*) - that terminates with the *baccalauréat*, normally taken at the age of 18. With this diploma pupils could access tertiary education. Education is compulsory since the age of 6 till 16. However, parents could send their children to public pre-kindergarten (*école pré-maternelle*) already when they are 2, or to kindergarten (*école maternelle*) at the age of 3. By now, 23% of 2 years old children and 95% of children aged 3 to 5 attend this pre-school stage. With the "*Loi d'orientation sur l'éducation*" or Jospin Law of 1989, primary school has been divided into three cycles. The first one, which comprises the first two years of nursery school is called "cycle of first learning"; the last year of kindergarten together with the first two years of elementary school form the "cycle of fundamental learning"; finally the last three years of elementary school constitute the "cycle of in-depth learning". Importantly, public primary schools are financed by municipalities. The private sector comprises mainly religious schools. With respect to the structure of the school calendar, France has always been one of the countries with the longest period of holidays, longest number of hours per year, and longest school day. Since the introduction of compulsory primary education in 1882 (*Loi Ferry*) until the end of the 1960s, children spent five full days at school, with a break on Thursday and Sunday, for a total of 30 hours per week. In 1969, Saturday afternoon was abolished, the break in the middle of the week was advanced from Thursday to Wednesday, and two hours of

physical activities were added to the school week. However, it is only with the development of the chronobiology in the 1980s that an intense debate on the optimal structure of the school schedule spread out. Experts of this discipline pointed out that children needed more frequent holidays and a shorter day at school. As a consequence, the Jospin Law restructured the school year in 36 weeks over 5 periods, and reduced by one hour the weekly schedule. Moreover, in 1991, a ministerial decree gave the possibilities to municipalities to adopt a 4-days schedule. Only a few chose this possibility. In 1995 it is the Ministry of education that relaunches this option by selecting a pool of pilot schools to experiment the 4-days school week. From that moment, several municipalities started to consider this option. Finally, in 2008, under an harsh debate, the 4-days schedule is extended to all primary schools in France and weekly hours are reduced from 26 to 24. Nonetheless, in 2013, under the pression of chronobiologists, the Minister of Education reintroduced the 4.5-days school week. In particular, with the 2013 reform, the school day is shorten by 45 minutes; in order to maintain invariant the total amount of weekly hours, an half-day is added, mainly on Wednesday morning, and exceptionally on Saturday; and municipalities are invited to provide free extra-curriculum activities for children, for a total of three weekly hours; these should compensate for the reduction in the daily instruction time. Importantly, municipalities are given the possibility to implement the new schedule either in the year 2013-14 or in 2014-15. 20% of them chose to do it in 2013; the rest adopts the new system only in 2014. The introduction of extra-curriculum activities seems to be the main reason why most of the municipalities decided to postpone the introduction of the reform. In particular, the recruitment of entertainers for these activities, the practical organization of the activities, and their financing represent the main difficulties municipalities have to face. Crucially for our identification strategy, the timing of the adoption should not be related to female employment conditions, as we will further discuss below.

2 Literature

The literature on this topic focuses mainly on pre-school child care (Fitzpatrick [2012], [2010]; Cascio [2009]; Baker, Gruber & Milligan [2008]; Gelbach [2002]). Fitzpatrick [2010] studies the introduction of pre-universal kindergarten for 4-year old children in Georgia, Oklahoma and Florida. Exploiting year and birthday based eligibility cutoffs, she uses a regression discontinuity strategy to estimate the effect of this program on mother labor supply, with respect to other existing forms of pre-school child care. Overall, mothers of 4 year-old children do not

seem to respond to this intervention, with the exception of women residing in rural areas of Georgia. Cascio [2009] looks at the increase in the supply of seats for five-year-old children in American public schools from the mid-1960s to the late 1970s. This child care expansion results from the introduction, by a number of states, of grants for school districts offering kindergarten programs. Cascio exploits the time and regional variation of these interventions, together with its age-targeting nature, to identify their impact on mother labor supply through a triple difference strategy. Her findings show that the expansion of public pre-school child care affected only single mothers with no younger children. All other groups of women reacted more by substituting public kindergarten for private schooling.

Baker, Gruber & Milligan [2008] consider the the Quebec Family Policy, that extended public pre-school child care in the Canadian province of Quebec in the late 1990s. This intervention offered full-time kindergarten to all 5-year-olds in 1997 and the provision of child care at an out-of-pocket price of \$5.00 per day to all 4-year-olds. The \$5.00 per day policy was extended to all 3-year-olds in 1998, all 2-year-olds in 1999, and finally all children aged less than 2 in 2000. The study identifies, among others outcomes, the labor supply response of married mothers in Quebec, by comparing them to mothers of the other Canadian regions, through a diff-in-diff strategy. The estimates indicate that employment rose by 7.7 percentage points in Quebec, or about 14.5 percent of the baseline. Finally, Gelbach [2002] uses the USA 1980 Census data to estimate the effect of public school enrollment for a woman's five-year-old on measures of labor supply and public assistance receipt. To deal with the endogeneity of kindergarten enrollment, Gelbach uses five-year-old's quarter of birth variables as instruments for this variable. According to his estimates, free public schooling for five-year-old children has the highest impact for single women whose youngest child is eligible to attend it, resulting in an increase in labor-supply measures between 6-24 percent (with the lowest effect on employment and the highest impact on labor income), and a reduction in public assistance receipt of 10 percent. This implicit child care subsidy has no effect for single mothers with both a five-year-old and a younger child; and it increases labor supply measure by 6-15 percent among married mothers of five-year-olds, irrespective to whether the woman also has a child younger than five.

Next, only Contreras et al. [2010] consider an expansion of the school schedule in elementary school. The authors exploit the differential timing in the introduction of this intervention across Chilean regions, to conduct a diff-in-diff analysis on its impact on mother labor supply.

In contrast with the literature on pre-school child care, their results show a positive and significant effect on labor participation and female employment, and a negative and statistically significant effect on the number of hours worked.

The responses identified so far by the literature might have been limited by the age-targeting component of all these interventions. Our setting allows us to understand how mothers react when child care availability increases for all their children at the same time. Potentially, we might expect to find a larger reaction in this case. Moreover, some interventions considered by the literature take place either far back in time - Cascio [2009] and Gelbach [2002] - or in a developing country - Contreras et al. [2010]; Schlosser [2005] and Berlinsky & Galliani [2004] not described here. If mother response to child care expansion is non linear, that is depends on the initial participation rate in the labor market, the conclusions of these studies might not be extendable to the context of today's female labor market in a developed country. Our study provides an analysis for this case. Finally, a relative small, but totally subsidized expansion of free public child care might trigger a larger reaction than the provision of child care at small but non-zero prices. Importantly, as highlighted by Fitzpatrick [2010], in all the contexts analyzed - our included - mother response crucially depends on the perceived quality of the new child care option, relative to the other available means - which comprise mothers' own care. Moreover, mothers could simply substitute one form of care for another previously available. Detailed information on family use of child care subsidies through time and municipalities will allow us to understand if this is the case in our setting.

3 Data description

Our study relies on the use of several databases. Firstly, we use the French Labor Force Survey (*Enquête Emploi en continu*) between 2011 and 2014, with precise locations of respondents. Data collection is quarterly, and the survey is conducted continuously, every week of every quarter¹.

In order to reconstruct school schedule and time of implementation of the reform for each school of each cities, we use the *EnrySCO* database. This is an administrative data set from the French Ministry of Education. For each school, it provides an exhaustive description of

¹Definition of the National Institute of Statistics and Economics studies (INSEE), www.insee.fr

school schedule. For each day, it indicates the time at which pupils enter and leave school. Data collection took place in Fall 2014.

Because the organization of extra-curricular activities falls under the responsibility of municipalities, we plan to use the *CNAF-AMF* survey. This survey has been conducted by the National Family Allowance Office (CNAF) and the Association of French Mayors (AMF) between May 9 and June 12, 2014. The survey was sent to all municipalities in order to collect information on the implementation of the extra-curricular activities (*nouvelles activités périscolaires NAP*), whether they did implement the reform in 2013 or not. 6,619 cities replied to the survey, which represents 28% of municipalities with a public school. Among them, 1,370 cities had implemented the reform in 2013, and 5,249 in 2014.

We plan to use the National Family Allowance Office dataset of recipients of childcare subsidies. The reform could indeed affect the take-up rates of two important subsidies: the CLCA² (early childhood parental leave) and the CMG³ (childcare supplement). The CLCA is dedicated to parents of a child under 3, with 530,000 recipients, for a global cost of 2.1 billion euros⁴.

Finally, as discussed before, we carried out preliminary work using the French Time Use Survey from 2009, to study the impact of family composition on the likelihood of women working on a Wednesday.

4 Empirical strategy and results

With this study we want to identify the impact of a change in the school schedule for children aged 2-11 on their mother labor supply. In particular we will look at how mothers adjust their behavior at the extensive margin, by considering the probability to participate in the labor market and to be employed; and at their reaction at the intensive margin, by analyzing changes in hours worked. Using the 2012-2013 waves of the FLFS, together with the information on the different timing in the adoption of the reform across municipalities, we will estimate the following regression:

²*Congé de libre choix d'activité*

³*Complément mode de garde*

⁴*Fiche Eclairage* from the report of Audit Board on Social Security (June 2013), www.securite-sociale.fr

$$Y_{imt} = \alpha_m + \gamma_t + \beta T_{mt} + \pi X_{imt} + u_{imt}$$

Here i stands for each interviewed woman with at least one 2-11 year-old child, m for the municipality of residence, and t for the wave in which the woman is interviewed. Y_{imt} represents the outcome considered, alternatively a dummy equal to 1 if the woman belongs to the active population, a dummy equal to 1 if the woman is employed, or the number of hours that she declares working. α_m accounts for differences across municipalities in mother labor supply that do not vary over the period considered (such as social attitude towards women work); γ_t captures any employment shock that hit all women interviewed in the same wave t . The vector X_{imt} includes all the individual variables that affect women's labor supply decisions. These include age, age squared, level of education, number and ages of children, and her marital status. T_{mt} is the main variable of interest. In our main specification it will be a dummy equal to 1 for those women interviewed in the last quarter of 2013, and residing in a municipality that introduced the reform in 2013. Since we control for municipality and time fixed effects, the effect of the change in the school schedule is identified by the change in mother labor supply across waves in treated municipalities in 2013, relative to the dynamics of mother labor supply in those municipalities that introduced the reform only in 2014. β will then capture the intention-to-treat effect of the reform, as we estimate its reduced-form impact on all mothers, and not only on those that profited from the new school schedule. Finally, in all specifications, standard errors will be clustered at the municipality level to account for any correlation of the outcomes of women residing in the same municipality.

Section to be completed with the results

5 Robustness checks

The diff-in-diff estimates capture the impact of the change in the school schedule on mother labor supply only if two assumptions are satisfied in our setting. First of all, we need to assume that, absent the reform, the evolution of mother labor supply would have been the same in those municipalities that adopted the new school schedule in 2013 and in those that opted for 2014. There is no direct way to test for this assumption. Moreover, municipalities from treated and control groups are different in terms of population size (Table 8) and political majority (Table 10). However, comparing the trends in women employment behavior in treated

and control municipalities, prior to the introduction of the reform, could be informative in this respect. Figure 1 shows the percentage of active women (panel A), and the fraction of employed ones (panel B), in the 25-54 age-range, in treated (blue line) and control municipalities (red line), as reported in the Population census of 2006 and 2011. As we can see, the lines are clearly parallel, suggesting that women residing in municipalities that postponed the introduction of the reform to 2014, are a plausible comparison group for those living in the 2013 treated municipalities. The second crucial condition for our identification to be valid is that the different timing in the adoption of the intervention should not be dictated by previous dynamics in women labor market status. To check that this assumption is satisfied, we can implement the following strategy. If the decision of municipalities to adopt the reform in 2013, rather than 2014, was really exogenous with respect to mother labor supply dynamics, one would expect maternal employment not to diverge between treated and control municipalities prior to September 2013. To test this hypothesis, we can re-estimate our model by including a dummy that is equal to one in treated municipalities before June 2013. This allows for some anticipation effects that should take place at most in the previous summer. The coefficient on this variable should measure the effect of the intervention on the employment of treated mothers before it is put in place. Hence, it should indicate if the timing of the introduction of the reform was endogenous. To further check that β is picking exclusively the impact of the reform, we can also estimate its effect on mothers whose youngest child is at least 12 years old. If our identification strategy was correct, this group of mothers should not be affected by the change in primary school schedule. Finally, it is important to acknowledge that so far, β will potentially capture any shocks specific to the treated municipalities that took place at the same time as the reform. We can attempt to control for these municipality-specific economic conditions by adding the municipality-quarter-specific prime-age male unemployment rate. Their coefficients should at least isolate the effect of any factor influencing the labor market in 2013 treated municipality in each specific wave of the FLFS.

Section to be completed with the robustness checks

6 Conclusion

With this study, we analyse the impact of a change in children school schedule on mother labor supply. We considered an intervention that affected children from the age of 2 to 11. As far as we know, this is the first attempt to study how mothers react to a program that involves children in such a large age-range. Furthermore, detailed information on the take-up rate of alternative child care subsidies from the National Family Allowance Office dataset of recipients of childcare subsidies (*CNAF*) will allow us to identify if mothers react by simply substituting one form of care for another. For this reason, this work represents a crucial contribution to the literature on the determinants of mother employment incentives.

To be completed

As a next step, to fully understand the impact of this reform, we aim at analyzing how it affected children cognitive and non cognitive development. Any effect encountered will definitely depend on mother response to the intervention. Therefore, the present work represents a crucial contribution in this direction.

Tables and Figures

Table 1: **Work on Wednesday according to gender**

Gender	Work on Wednesday			Total
	Usually	Occasionally	Never	
Men	4,105 94.63%	114 2.62%	119 2.75%	4,338 100.00%
Women	3,508 82.93%	319 7.55%	403 9.52%	4,230 100.00%
Total	7,613	433	522	8,568

Sample: Time Use Survey 2009. All.

9.52% of women declare that they never work on Wednesday,
7.55% occasionally work on Wednesday,
and 82.93% usually work on Wednesday.

Table 2: **Reasons of part-time work**

What is the main reason why you work part-time?	Men	Women	Total
Imposed by employers while hiring	35.38%	26.10%	27.13%
Imposed by employers while full-time	1.97%	1.29%	1.35%
Other professional activity, education	6.30%	3.14%	3.49%
Health	19.07%	5.20%	6.75%
Taking care of the children or other family members	5.30%	45.12%	40.70%
Free time	21.79%	11.86%	12.97%
Domestic work	-	0.87%	0.78%
Other reason	10.29%	6.41%	6.84%
Total	100.00%	100.00%	100.00%

Sample: Time use survey 2009, sample of part-time workers.

45.12% of women and 5.30% of men declare that they do so to take care of their children
or other family members.

Table 3: **Work on Wednesday by number of children**

# of children	Work on Wednesday			
	Freq. / Percent.			
	Usually	Occasionally	Never	Total
0	1,843 91%	80 4%	99 5%	2,022 100%
1	930 85%	78 7%	86 8%	1,094 100%
2	626 68%	124 13%	170 18%	919 100%
3	200 68%	47 16%	46 16%	292 100%
4	26 65%	2 4%	13 31%	40 100%
5	3 51%	0 1%	3 48%	6 100%
6	3 85%	0 15%	0 0%	3 100%
9	0 0%	0 0%	0 100%	0 100%
Total	3,630 83%	330 8%	417 10%	4,377 100%

Sample: Time Use Survey 2009. Women.

85% of women who have 1 child work usually on Wednesday,

7% work occasionally, and 8% never work on Wednesday.

68% of women who have 2 children work usually on Wednesday,

13% work occasionally, and 18% never work on Wednesday.

Table 4: **Number of children under 3 and between 3 and 6 living in the household**

		Number of children between 3 and 6				
		0	1	2	3	Total
Number of children under 3	0	15,692	1,303	97	6	17,099
		91.77%	7.62%	0.57%	0.04%	100.00%
	1	881	430	39	0	1,349
		65.25%	31.86%	2.90%	0.00%	100.00%
	2	42	11	0	0	54
		79.10%	20.90%	0.00%	0.00%	100.00%
	3	1	0	0	0	0
		100.00%	0.00%	0.00%	0.00%	100.00%
Total		16,615	1,745	136	6	18,502
		89.30%	9.72%	0.95%	0.03%	100.00%

Sample: Time Use Survey 2009. All.

Table 5: **Number of children living in the household**

# of children	Frequency	Percent
0	99	23.86
1	86	20.58
2	170	40.79
3	46	10.93
4	13	3.03
5	3	0.69
9	0	0.12
Total	417	100.00

Sample: Time Use Survey 2009.

Women who never work on Wednesday.

More than half of women who never work on Wednesday have at least two children.

Table 6: **Half-days off**

Half-days	Mean	Std. Dev.
<i>N=59,310</i>		
Monday morning off	0	0
Monday afternoon off	.006	.075
Tuesday morning off	0	0
Tuesday afternoon off	.019	.138
Wednesday morning off	.02	.139
Thursday morning off	0	0
Thursday afternoon off	.03	.172
Friday morning off	0	0
Friday afternoon off	.074	.261
Saturday morning off	.98	.139

Sample: Enrysko database. All schools.

7.4% of the school schedule include Friday afternoon off.

Table 7: **Multiple school schedule**

Multiple school timing within the same school	Freq.	Perc.
No	57,464	96.90
Yes	1,837	3.10
Total	59,301	100.00

Sample: Enrysko database. All schools.

96.90% of schools have single school schedule

Table 8: **Population size - municipalities**

Population size	Mean (Std. Dev.)
<i>Reform in 2013</i>	
<i>N = 3,920</i>	
More than 50,000 inhabitants	.01 (.09)
Less than 2,000 inhabitants	.75 (.44)
<i>Reform in 2014</i>	
<i>N = 19,025</i>	
More than 50,000 inhabitants	0 (.07)
Less than 2,000 inhabitants	.79 (.41)
Sample: Census 2006-2011. All municipalities. 1% of municipalities which implemented the reform in 2013 have more than 50,000 inhabitants.	

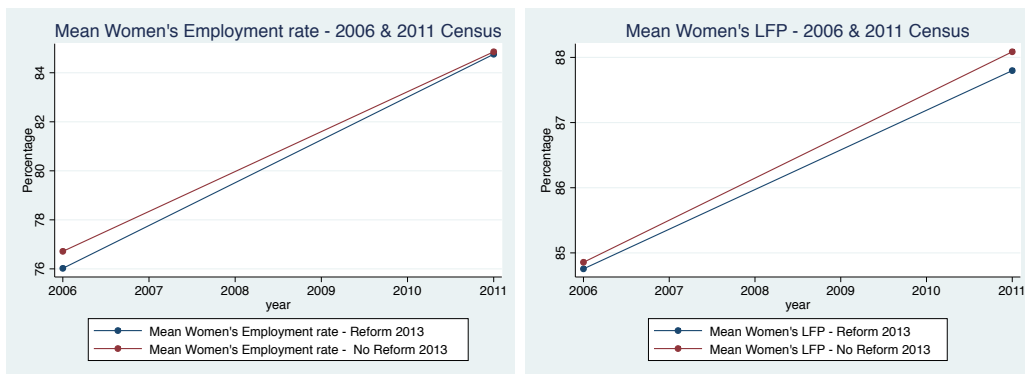
Table 9: **Labor Force participation and Employment rate**

Variables	Mean	Std. Dev.	Min	Max
<i>Reform in 2014</i>				
<i>N = 3,918 in 2006 ; 3,920 in 2011</i>				
Labor Force participation of Women 2006	84.76	6.09	48.28	100
Labor Force participation of Women 2011	87.8	5.59	50	100
Employment rate of Women 2006	76.02	8.11	34.48	96.77
Employment rate of Women 2011	78.96	7.79	40.08	100
<i>Reform in 2014</i>				
<i>N = 19,025</i>				
Labor Force participation of Women 2006	84.78	6.13	30.33	100
Labor Force participation of Women 2011	88.02	5.54	36.23	100
Employment rate of Women 2006	76.61	8.11	23.53	100
Employment rate of Women 2011	79.85	7.58	30.43	100
Sample: Census 2006-2011 The mean labor force participation rate in 2011 in the group of municipalities which implemented the reform in 2013 was 87.8%. It was 88.02% in the group of municipalities which implemented the reform in 2014.				

Table 10: Municipal elections results 2008 and groups of municipalities

Variable	Mean	Std. Dev.
<i>Reform in 2013,</i> <i>N=607</i>		
Left Majority	.8	.4
<i>Reform in 2014,</i> <i>N=2009</i>		
Left Majority	.43	.49
Sample: Municipal elections 2008 results (first and second rounds) and Enryesco database. Cities over 3,500 inhabitants with a public school. 80% of municipalities which implemented the reform in 2013 were left-wing in 2008.		

Figure 1: Mean Women's Labor force participation and Employment rate - Reform passed in 2013



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