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Exploring the effects of the school levels reform on access and its *quality*: The Education Federal Law of Argentina^{*}

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Abstract

Over the last decade, Argentina embarked on a broad education reform, the Federal Education Law (LFE), being their main objective to expand access to basic education, mainly, by a new organization of the schooling level structure with the extension of mandatory schooling from 7 to 10 years. The provinces reactions were heterogeneous. We try to evaluate the relationship among the LFE and access and its quality. We found that LFE provinces tend to a bigger access probability induced in a bigger retention of individuals with smaller achievements and a bigger promotion for the youngest cohorts. To identify the effect of its implementing we compute FGLS panel data estimates with fixed effects for province and year. In all case we found a positive and significant effect of the LFE on access (0.04 and 0.013 for an additional year) and its quality. Also we found a positive sign but of unclear magnitude for the implementation on quality but when we estimate the effect of intensity the value of coefficient is more stable, around 0.02 or 0.03.

Key words: education reform, impact evaluation, education access, access quality

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I. Introduction

Over the last decade, Argentina embarked on a broad education reform. The Education Federal Law (LFE) (N° 24.195), passed in 1993, implied a dramatic change in the educational system. The main objective of the Federal Law was to expand access to basic education.

The main aspect of this reform consisted in a new organization of the schooling level structure and contents, and the extension of mandatory schooling from 7 to 10 years. The implementation of the Federal Law took place gradually from 1996 to 2000, but as it also involved a redefinition of the responsibilities and attributes between the federal government and the provinces¹. For this fact, the sequence and characteristics of the process differed across provinces.

Today, fifteen years later, the National Ministry of Education is promoting a counter-reform. The first step into this new reform was the passed of the Law of Educational Financing at the beginning of 2006. At this time, the project of a New Law of Education is being discussed at the National Congress. This law proposes back to the old level schooling structure, based on the perception that the LFE has been negative in terms of learning outcomes and the schooling paths, probably associated to the multiplicity of systems (levels, contents, etc) that arise from the LFE implementation process. Yet, except from a few studies, all of them focused on academic achievement, there has not been an integral evaluation of the impact of the reform on other education outcomes.

For all this, and for the lack of studies², it is relevant to evaluate the outcomes of a previous schooling level organization reform as it was LFE in the access conditions. In particular, we are interested in analyzing whether the implementation of the LFE modified the access conditions and the quality of this access, one of its dimensions being the schooling paths conditions (Crosta (2007), World Bank (2005)).

¹ This condition emerges from a previous reform of decentralization of the system administration from the central level to province level. See Galiani and Schargrotsky (2002) for a description of this process.

² For the Argentina only Galiani and Schargrotsky (2002) evaluate the effect of the reforms on schooling organization regards its effects on education quality measured by test score.

In particular we try to evaluate if: do exist differences in the schooling system performance across provinces according to the LFE implementation? Which have been the effects of the LFE on *access* and the *quality of that access*? To answer this questions we use microdata from two national survey for years 1997 and 2001 with similar sample framework. To make the impact evaluation analysis we construct a panel of provinces with access indicators from this data

The organization of the paper is as follows. Section 2 present the previous research on education reform and a general review of some quantitative research for the Argentinean case. The next section presents the Federal Law and describes its implementation. In Section 4 we discuss the methodology applied and its results. The last section summarizes the results.

II. Literature review: reform type and education outcomes

Pari pasu with the growth in the literature about evaluation program impact, “many developing countries have embarked on large education reforms” Tiongson (2005). Various types of reform has been implemented which can be evaluated from alternative views, either from the point of view of the system or of the individuals choice³.

The first type include reforms on expenditure (reallocation between levels or geographic areas), financing (user fees, community financing, vouchers scheme) and management and institutions (decentralization, level reorganization). These are conducted with two different objectives: trying to improve access conditions or in the search of quality and efficiency.

For example, Glewwe et al (2002) evaluate a program that provides prizes to teachers in schools with good records of exams and low drop out rates and find that this type of programs can not results in higher long term learning. Angrist et al (2002) also evaluate a vouchers program also based in academia performance and progression and find that the program beneficiaries were substantially more likely to graduate from high school.

Galiani and Schargrotsky (2002) consider the case of secondary schools decentralization⁴ and find that the effect on quality is positive but conditional to good fiscal

³ For a review of impact evaluation for education case see Tiongson (2005), Webbink, D (2005) and Kremer (2003).

⁴ In this paper an extensive review of this type of reform are considered

management. Fiske (1996) is other case of evaluation of the quality effect of decentralization, in this case for the effect of community managed schools.

These papers mainly evaluate the effects on education conditions using tests score as indicator of education outcomes. A study that also tries to evaluate as much the access as their quality, besides the exams, is Paes de Barros and Mendonca (1998). They evaluate three types of reform: school financial autonomy, school boards and decentralized director appointment in Brazil. They use as measure of education outcomes the rate of overage, the rate of drop out and test scores. They find that the financial autonomy and school boards have a relevant effect on access and drop out.

Other, type of reform which also can be relevant for the case that we want to consider is the school construction. Dufflo (2001) evaluate this case for Indonesia and find that this program has a significant effect on years of education. This result is very important because it is very probable that the reformation of levels requires certain additional infrastructure for its implementation.

Note that all cases find a relationship between treatment and outcome. This can be due to the reality conditions but also can be the results of some methodology drawbacks which derive in inconsistent and sub-estimated standard errors for impact coefficient (Bertrand et all (2005))

To conclude I wanted to highlight that there are other types of politics or programs whose objective is to increase school participation. Kremer (2003) discuss some of them which range from cash transfers to school meals and other in kind transfers (as text book, uniforms).

Many studies for Argentina have applied quantitative techniques to analyze the disparities –at one point of time- in the schooling outcomes between poor and rich students and schools, most of them in terms of academic achievement (test score) from the National Evaluation System (ONE). Llach y Schumacher (2004) uses this database to do a diagnosis of the primary education system in Argentina from the point of view of social equity in terms of academic results. They found that schools attended by the poorer children have less physical, human and social capital than the schools attended by non-poor children. At the same time, even though socioeconomic status is the main determinant of academic results, the characteristics of the school also play a relevant role.

Based on the same data, Cervini (2003, 2004) analyzed the effects of attending public or private schools on cognitive achievement (Mathematics and Language) and on non-cognitive outcomes (attitudes toward Mathematics and educational and success expectations) of students in the last grade of the secondary education in Argentina, by using multilevel analysis.

Some previous studies, as Gasparini (1998) or Sosa and Marchionni (1999) also use non lineal probability models to evaluate the determinants of access based on microdata from usual surveys in Argentina (EPH). However, these studies are focused in evaluate what are the individual characteristics which determine school access.

Yet, neither of these papers attempts to evaluate the effects of educational reforms. As far as we know, the only attempt to do this is Galiani and Schargrodsky (2002). In that paper they evaluate the effect of the secondary schooling decentralization reform taken in 1992 on education quality by using a panel data for aggregate data at the provincial level. They found that, on average, decentralization improved the performance of public school students in test scores. They also assess whether the effect of decentralization depends on province characteristics and found that the higher the provincial fiscal deficits, the smaller the positive impact of decentralization.

This way this document covers a double gap in the research: it evaluates the effects of a reform and it uses a basic measure of educational outcome that the literature of impact evaluation has not considered.

III. The school level reform of Argentina: The Education Federal Law

The Education Federal Law replaced the old system of seven years of mandatory primary school and five (or six) years of secondary school, by a nine-year uniform cycle of General Basic Education –EGB- and a three or four year specialized cycle (Polimodal). Preschool and EGB were made mandatory. The new structure of the system introduced by the Federal Law consisted in three levels: Initial education, which includes early childhood education for 3 to 4 years old children and preschool, for 5 years old children; General Basic Education (EGB), which is organized in three levels with three year-old duration each one, –EGB1, EGB2, EGB3-, for 6-14 years old children; and Polimodal, which consists in three or four levels, for 15 to 17-18 years old children.

At the same time, another law introduced relevant changes in the educational system. The Decentralization Law passed in 1991 (N° 24.049) transferred the provision, administration and financing of secondary schools from the federal to the provincial governments⁵. By 1994, less than 3% of public secondary school students studied in schools that remained under federal administration -technical schools and schools belonging to national universities, security forces or other autarchic units (Galiani et al, 2002). In this way, all students are potentially subject to the effects of LFE and the province are who decide their implementation, or not, and with which modality.

From the beginning the application of the reformation is gradual because the most remarkable change in organization affects the children from 12 to 14 years. In this way, as the time goes the new system expand to higher levels. In the first column of Table I we can see that only two provinces (Buenos Aires and Cordoba) implement the reform since 1996. Since then each year a new province applies the reform until the year 2000, in which the last province (Mendoza) does it. At this time, only two provinces (Rio Negro and Ciudad Autónoma de Buenos Aires) do not apply, almost in some degree, the reform.

However, not all provinces follow a full implementation policy. In fact, five provinces (Chaco, Jujuy, Mendoza, Neuquen y Salta) at year 2001 are still in the phase of pilots or partial implementation, see column (ii). This strategy was usual since 9 provinces (Catamarca, Chaco, Chubut, Jujuy, La Rioja, Mendoza, Neuquén, Salta y Tierra del Fuego) begin with this modality, column (iii).

The following column (iv) show the intensity with which the treatment was applied. *Years since implementation* was constructed based on column (i) and taking as reference the year 2001. We can see that two provinces are under treatment for 5 years, five provinces for 4 years, seven provinces for 3 years and the remain three for 2 years.

In the last column is showed the total gross enrollment in secondary school for the year 1996. Nearly 75% of it belong to province which fully implement the LFE. Also note that the most important provincial system, corresponding to Buenos Aires, represent the 37.3% of the total enrollment and 49.5% of the all students in LFE provinces.

⁵ The decentralization of primary and preschools had already took place between 1961 and 1978

In synthesis, the reform is applied in a significant way but not wholly. This fact allows a bigger precision in the identification of its effects. The variables LFE and Year_LFE, which we will use in the quantitative analysis, reflect the treatment and its intensity. The first one is a binary variable that identifies with 1 the individuals that reside in provinces that have completely implemented the LFE and with 0 otherwise, column (ii) of Table I. The other, Year_LFE, identifies the number of years since the generalization of LFE in each province, column (vi) of Table I.

Table I

The process of LFE implementation

Provinces	Year of implementation (i)	Full implementation (ii)	Modality of implementation (iii)	Years since implementation (iv)	% of enrollment (v)
CABA		No	No	0	9.02
Buenos aires	1996	Yes	U	5	37.28
Catamarca	1999	Yes	P	2	0.95
Cordoba	1996	Yes	U	5	8.82
Corrientes	1997	Yes	U	4	2.42
Chaco	1997	No	P	0	2.53
Chubut	1999	Yes	P	2	1.29
Entre Ríos	1997	Yes	U	4	3.16
Formosa	1998	Yes	U	3	1.29
Jujuy	1998	No	P	0	2.19
La Pampa	1997	Yes	U	4	0.74
La Rioja	1999	Yes	P	2	0.80
Mendoza	2000	No	P	0	4.17
Misiones	1998	Yes	U	3	2.14
Neuquén	1998	No	P	0	1.51
Río Negro		No	No	0	1.60
Salta	1998	No	P	0	3.59
San Juan	1997	Yes	U	4	1.61
San Luis	1998	Yes	U	3	0.94
Santa Cruz	1998	Yes	U	3	0.60
Santa Fe	1997	Yes	U	4	8.08
Santiago del Estero	1998	Yes	U	3	1.80
Tucumán	1998	Yes	U	3	3.19
Tierra del Fuego	1998	Yes	P	3	0.29

Note

In modality of implementation (column (iii)), No=No implementation, U=generalized implementation, P=gradual implementation

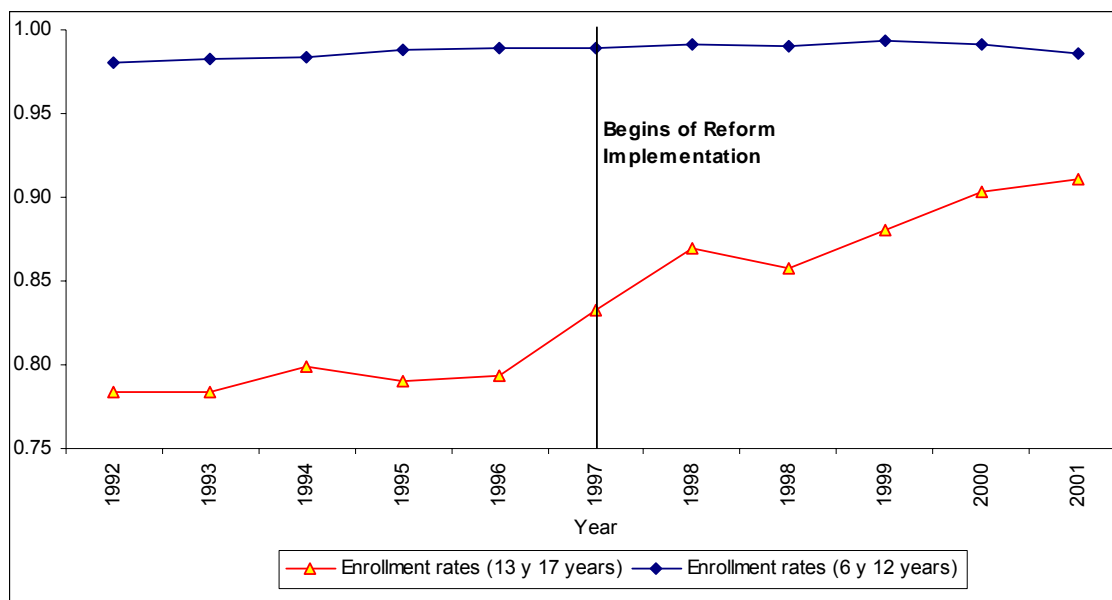
Source: author elaboration based on Education Ministry <http://www.me.gov.ar/cgecse/index.html>

The main objective of the LFE was to expand access to basic education. In the previous levels structure when a child arrive to seven year of mandatory and near universal primary school at the age of 12, see Figure 1 below, she could go to the next level, secondary school or not. This situation was one a possible explication for the difference in enrollment rates by levels

of Figure 1 in the first middle of '90. In LFE provinces that child is beginning a new level, EGB3, which also is mandatory. In this way, the level structure bias the household choice about its children enrollment.

Figure I

Evolution of enrollment rates for primary and secondary age-school



Source: CEDLAS (2005)

Along the last decade, schooling rates significantly increase. This is particularly relevant for children between 13 to 17 years old (as primary school has traditionally been almost universal). As the Figure 1 shows, for that range, schooling rates increased in 4.8% between 1993 and 1997. This amount contrast with the increase in 7.8% for the period of equal length between 1997 (begin LFE) to 2001. Clearly, in this last year, the evolution of enrollment rates for secondary level has a break in its evolution, which contrasts with the relative stability of enrollment rates for primary level. These results must can be dangerous because refer to a sample of 16 main cities until 1998 and 29 since then.

However, they suggest that something happen in the year 1997 which derive in a stable process of convergence between both rates. This result is what we use to argue to favor an extensive and detailed evaluation of the LFE effects on access. In this sense, we hope that this paper serve as starting point for future research.

IV. Methodology and results

The empirical strategy of this paper is organized in two stage. In the first one, we try to evaluate if, at microdata level, the difference in organization of school level has some effect on the probability of access and its quality. In this case, only we are able answer our first question about the existence of a difference in certain moment.

But this strategy does not permit to evaluate the effect of organization of school level on our education measures⁶. To do it is needed a panel for individuals that allow to observe what happens to each individual according to their non-observable characteristics⁷. Unfortunately, this type of information is not available for the Argentina. Instead, we have a cross-section information of microdata for two years –1997 and 2001-. As Younger (2005) note “In cases where surveys are available for more than one point in time, it is possible to construct a panel of provinces, and thus to include a province fixed effect to control for left-out covariates that are constant over time. This is possible even if the survey is not a panel of households, as long as the households are sampled from the same provinces and each survey is representative at the province level”

Because both surveys were conducted from the same sample framework we can construct a panel with aggregate data by province. That structure of data allows us to consider the typical before/after states.

IV.1. Data

The first part of our analysis will be based on micro data from the Living Conditions Survey 2001 (ECV-2001), SIEMPRO, conducted between July and August of 2001. The survey covers population in urban centers of 5000 or more inhabitants, which represents about 96 % of the total urban population and 84% of total population. The broad level of coverage, which able us to compute statistics representative of provincial level, is the reason for using this survey instead of Permanent Household Survey (EPH, INDEC), which just cover population in urban

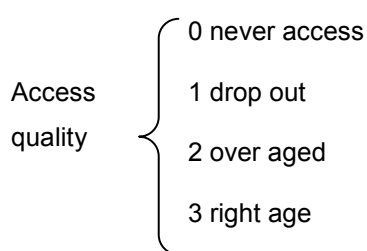
⁶ See Lee(2005), Angrist y Krueger (1999) or Cobb-Clark and Crossley (2003) for an exhaustive presentation of the different methods to carry out evaluations of impact

⁷ Note that in this case, attrition can be a relevant problem since individuals that migrate from one province to another, probably enforced by the effect of the reform, would not be observed.

centers of 100.000 or more inhabitants. In fact, 71.574 individuals and 19.330 households participated in the sample, which expanded account for 31.915.454 and 8.958.122 inhabitants and households respectively. Our population of interest consists in individuals between 13 and 17 years old, which accounts for 3.500.000 individuals. From that sub sample, we concentrate in those that at the moment of the survey had completed previous the 7° year (primary level), which accounts for the 82.6%.

For the second part of our analysis, we will use ECV-2001 and a similar survey conducted in 1997 by the SIEMPRO (EDS-1997). Although these two surveys have similar characteristics and objectives, they do not survey the same individuals and households. Thus, they do not allow to build a panel data at the individual level but we can construct a panel of two years by province. With this panel we will compute the difference in difference estimate of the reform impact.

The measures of access education and quality are computed from this data for individuals between 13 to 17 years. The *access* measure identifies with 1 the individuals that that declare to attend the school and with 0 otherwise. The *quality of access* measure, taken from Crosta (2007), is constructed as a ranking⁸. First, the smaller degree is conformed by those individuals who never access, the next position is occupied by those that drop out. The next two categories distinguish among those that who access but with over age and those that access at the right age for the level. In the next diagram is presented the range value of this index:



In the Table A.1 of Annex descriptive statistics and definition of all variables utilized in the quantitative analysis are presented.

⁸ This index considers all the situations considered in the literature on the educational access. For example see Patrinos and Psacharopoulos (1995,1997), Akabayashi y Psacharopoulos (1999), Rosati y Rossi (2003), Sedlacek et al (2005) or World Bank (2005)

IV.2. The simple relationship between reform and access and its quality

With the probability of access

First, to analyze whether (and in which way) the increase experienced by the schooling rate for children between 13 to 17 years old relates to the implementation of LFE, we consider the following model:

$$\text{Prob (Access=1)} = F(X_i; \text{LFE}) \quad (1)$$

Where *Access* is a binary variable adopting value 1 if individual effectively goes to secondary school and value 0 if doesn't; X_i is a vector of individual variables as age, sex, socioeconomic and demographic characteristic of the household. The remaining are our variables of interest as they try to capture the diverse effects of the Education Federal Law (LFE): LFE is a binary variable that identifies with 1 the individuals that reside in provinces that have completely implemented the LFE and with 0 otherwise. A similar model is estimated where LFE is replace by *Year_LFE* which identifies the number of years since the generalization of LFE in each province.

This estimates, models are presented in Table A.2 of Annex, will allow us to obtain estimations of the difference in probability of access to secondary school level of to individual due to the LFE. The Table II shows the key results of both models in relation to our objective.

In column (i) of Table II we can see the little difference in the probability of access for a individual who resides in a province that have completely implemented the LFE in reference to other similar who resides in a province that not have completely implemented the LFE: The first have an additional probability of 3.8%. But when we compute the probability conditional to the number of years since the generalization of LFE, column (ii) of Table II, we can see that increase in the intensity not implies an increase in the probability of access. On the contrary, the difference in the probability among a province with 5 years from the implementation regarding another that does not make it is 1.1% less⁹. Similar qualitative results emerge when we evaluate this difference at other points, as you can see from row 7 to 13.

⁹ Notice you the negative sign of the coefficient of this variable

Table II

Change in probability of access by LFE

Change in the probability of access		
at	LFE (i)	Year_LFE (ii)
x=min	0.9267	0.9633
x=max	0.9647	0.9525
min->max	0.0381	-0.0108
x=0	0.9267	0.9633
x=1	0.9647	0.9614
0->1	0.0381	-0.002
x-1/2	0.9389	0.9588
x+1/2	0.9708	0.9566
-0.5	0.0319	-0.0022
x-1/2sd	0.9504	0.9596
x+1/2sd	0.9639	0.9557
+sd/2	0.0135	-0.0039

The heterogeneity in the access

The previous analysis does not allow us to analyze heterogeneities in the access. In this section we use the *index of heterogeneity in access (HA)* proposed by Crosta (2007).

This index, can be motivated starting from considering that each one of the positions in the ranking derives in certain utility U_i^* which comes given for:

$$U_i^* = X_i b + e_i \quad (2)$$

where X_i is the vector of the observable characteristics for individual i and for its family group (note that for simplicity X_i , includes also the LFE variables); b is the vector of parameters of the utility function; e_i is an error term that captures non observables that affect the individual's utility.

But for each individual we can only observe the educational state to which arrived lapsed a certain history of decisions taken by his parents. With this information we construct the index of access quality previously presented. This index reflects that when the effective utility increases the child tends to be in greater educational status. That is:

$$HA_i=j \text{ si } \mu_{j-1} < U_i^* < \mu_j \quad (3)$$

With $j \in (0, 3)$, all possible positions in the rank, and $\mu_0 = -\infty$; $\mu_j \leq \mu_{j+1}$ y $\mu_m = \infty$.

The probability of observing a particular value j (the value that we observe when the utility value “overcomes” a certain threshold so that we can observe certain behavior associated with the access) will be:

$$P (HA_i=j | x_i) = \Lambda(\mu_j - X_i b) - \Lambda (\mu_{j-1} - X_i b) \quad (4)$$

where $\Lambda (.)$ is the distribution function cumulative standard logistics. This probability is estimated using ordered logit¹⁰.

Based on equation (4), it is possible to do exercises similar to those in the previous stage, but now considering differences in probabilities of never access, drop-out, over-aged and access in the expected age.

A problem with model of equation belongs to the assumption of parallel lines, ie, that the marginal effects are constant across categories. This assumption can be observed in that the vector b of coefficients doesn't have subindex. Brant (1990) propose a test to evaluate this case, whose results can be observed in the Table A.3 of Annex. As this supposition it is not fulfilled, we use the models propose for Williams (2006), which can be written as:

$$P (HA_i=j | x_i) = \Lambda(\mu_j - X_i b_j) - \Lambda (\mu_{j-1} - X_i b_j) \quad (5)$$

The coefficients of all model, see Table A.3 of Annex, can be interpreted as follow: we have 4 categories, going from 0 to 3. The first panel of coefficients can be interpreted as those from a binary logit regression where the dependent variable is recoded as 0 vs. 1+2+3. The second panel of coefficients can be interpreted as those from a binary logit regression where the dependent variable is recoded 0+1 vs. 2+3 and the third panel in similar way but for 0+1+2 vs. 3. In this type of model we can use the coefficients signs to have preliminary conclusions: positive coefficients mean that higher values on the covariates make higher values on the dependent variable more likely.

¹⁰ See Long (1997) for a basic presentation of this models

With this model we compute estimates of the probabilities conditional to the implementation of LFE and its years of implementation, what can be see in each column of Table III. In the first block we show as change the probability to belong to each category of our index of quality of access. The first row tell us that people who resides in a LFE province has less probability to drop out or never access but also of to be in term. In mean, these people have a greater probability to be over aged.¹¹

The intensity of application of the reform (years of its application), block 2, tell us that in mean people following the first year all probabilities, except that of to be in term, trend to increase. But as the reform is persists the picture reverse since that all probabilities, except that of to be in term, trend to decrease. The results regards Year_LFE of 5 must be evaluate carefully because only two provinces, Buenos Aires and Cordoba, have this outcome.

Table III

Change in probability of quality of access by LFE

	Never access (i)	Drop out (ii)	Over aged (iii)	In term (iv)
LFE				
No	0.0650	0.0853	0.4087	0.4410
Yes	0.0607	0.0666	0.6502	0.2226
<i>Diff</i>	-0.0043	-0.0187	0.2414	-0.2184
Total	0.0617	0.0712	0.5909	0.2762
Year_LFE				
2	0.0395	0.0541	0.2502	0.6562
3	0.0434	0.0584	0.2582	0.6399
<i>Diff</i>	0.0039	0.0043	0.0080	-0.0163
4	0.0460	0.0597	0.2534	0.6408
<i>Diff</i>	0.0026	0.0013	-0.0048	0.0009
5	0.0301	0.0455	0.2093	0.7151
<i>Diff</i>	-0.0160	-0.0143	-0.0441	0.0743
Total	0.0440	0.0578	0.2576	0.6405

As conclusion of this section we can consider that the first models allow considering that the LFE provinces tends to a bigger access probability. While the second models would be

¹¹ You must note that the sum of probabilities is 1 and that the sum of difference is 0.

evaluating that this bigger probability originates in a bigger retention of individuals with smaller achievements (to implement the LFE increase the probability associated to over age) and with more promotion for the youngest cohorts (as it lapses the time the implementation increases the probability to be in term).

IV.3. Impact evaluation

The previous analysis use microdata just for one year (2001). So from they, we can not conclude if those LFE provinces improve the access condition or not more than non LFE provinces. In this way, they do not answer questions like the following: suppose that at the beginning of the reform the conditional probability of access in a certain province that implements the reform was of 0.1 while in another that doesn't implement it, was of 0.95. Then, in the year 2001 we observe that the differences continue being significant, for example 0.4 versus 0.97. Do these results imply that reform has not been successful? Clearly, the answer is not, since the province with the lower probability had more than doubled its probability while the other province hardly modified it.

To take account for this situation, in this section we will follow the strategy used by Galiani and Schargrotsky (2002) for the case of the secondary school decentralization in Argentina on achievement (national test scores). The strategy and its results is explained below.

Unconditional effect on access and its quality

We can construct the standard table before after, for both, LFE and Year_LFE which emerge from our panel of provinces for two years¹². In the first block of Table IV we can see what will be the unconditional difference in difference estimate for access and its quality (HA). After LFE we see an improvement in both indicators for those provinces under it: they increase the enrollment rate in 60.5 point, from 29.35% in 1997 to 89.84% in 2001. This increase is greater in 4 points than that of no-LFE provinces. For the quality index we can see a similar picture. We see an improvement in the quality for both set of province, but greater for those under LFE. Note that as much for the access as for their quality, in the year 1997 the provinces

¹² Note that because we can construct a panel only for two year we can not evaluate the assumption of common time trend. See Meyer (1995)

in treatment were in a worse situation for what the net effect is superior to the own increment. The following two blocks show what happen with access when LFE intensity increases. In this case, we can see that the own effect increase stepwise from 0 to 2, from 2 to 4 and from 4 to 5. This evolution is similar for both indicators.

Table IV

Before-after results of the Education Federal Law

Treatment	1997	Access 2001	Diff
T	0.2935	0.8984	0.6049
NT	0.3224	0.8898	0.5673
Diff	-0.0289	0.0086	0.0375

Treatment	1997	Quality 2001	Diff
T	1.8337	2.4966	0.6629
NT	1.8509	2.4361	0.5852
Diff	-0.0172	0.0605	0.0777

Intensity of treatment	1997	Access 2001	Diff
0	0.3224	0.8898	0.5673
2	0.3069	0.9171	0.6102
3	0.3234	0.8987	0.5754
4	0.2666	0.8843	0.6177
5	0.2064	0.9047	0.6983
Mean DD			0.0327

Intensity of treatment	1997	Quality 2001	Diff
0	1.8509	2.4361	0.5852
2	1.8430	2.5285	0.6855
3	1.8742	2.4743	0.6001
4	1.7954	2.4945	0.6992
5	1.7526	2.5319	0.7793
Mean DD			0.0485

Note:

All means are estimated from the panel of aggregate data

T: LFE provinces; NT: no LFE provinces

Conditional effect of the LFE on access and its quality

As stated, the key objective of this paper is to identify the effect of implementing the Education Federal Law on access to secondary school as well as its quality, both of these

outcomes measured by the access condition and a index of heterogeneity. As it is generally recognized, to identify the effect of a reform requires taking into account the endogeneity problem arising for the presence of unobservable factors that jointly affect the outcomes studied. To address this problem, we exploit the geographic variation in the time and intensity of implementation of the LFE. As we previously note in Section III the implementation process was heterogeneous. Some provinces don't take the LFE, other take it although at different periods and then, with different intensities. This fact generates an exogenous variation that provides an instrument to identify the causal effect of changing the levels structure on access and its quality.

To simplify, consider evaluating the impact of the LFE on access. Then the difference in difference estimator is obtained by estimating the following regression:

$$\text{Access}_{jt} = \alpha_0 \text{LFE}_{jt} + \lambda_t + \mu_j + \varepsilon_{jt} \quad (6)$$

where Access_{jt} is the schooling rate in province j and year t , LFE_{jt} is a zero-one indicator that equals 1 if province j in year t is implementing the LFE. Therefore, at the province level, the effect of interest is that of LFE_{jt} on Access_{jt} : α_0

Naturally, the identification of α may require that we include a set of control variables x in the regression function (4):

$$\text{Access}_{jt} = \alpha_0 \text{LFE} + \beta_0 x_{jt} + \lambda_t + \mu_j + \varepsilon_{jt} \quad (7)$$

This model controls for the existence of province specific trends in the evolution of access induced, for example, by local economic or demographic conditions. Also, it controls for other reforms implemented in that moment as was the decentralization process, because the Education Federal Law affects simultaneously public and private schools. We estimate this model using FGLS with fixed effects for province and year and using two variables as control, the mean household equivalent income (ien) and the years of education of household head (j_aedu)¹³. See Table V for the models and Table A.5 for summary statistics of the panel.

¹³ In reality we compute this model using the means of each variable used for the microdata models, but as we expect only both variables used are relevant.

In this case we can observe in the first row that for all models the coefficient of LFE is positive and significant. But its level varies depending of model specification. In the column (i) of this table we show that if we do not put any control the LFE increase in 0.044 the rate of access. This value is similar to what we could be found when we control alternatively for a education years of head (*j_aedu*) in column (ii) or household equivalent income (*ien*) in column (iii) but when include both variables in the models change the level of the LFE coefficient to 0.028 but still is significant. Note, that in this last model probably both controls have high correlation, remark the change of sign for *j_aedu*. For this reason probably we prefer the model in column (iii).

When we evaluate the quality of access similar results apply but some things should be clarified. In this case the LFE coefficient change for each model specification, with a range from 0.058 for the most general model of column (viii) to 0.114 for the model which only control for head education of column (vi). Also note that for this case all variables are significant but still the change in the coefficient of education is presented.

Table V

Impact estimation of LFE application on access and its quality

Dependent Variable	Access				Access quality			
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
LFE	0.044*	0.045*	0.044*	0.028*	0.078**	0.114*	0.092*	0.058*
	(4.20)	(4.15)	(5.44)	(6.41)	(2.04)	(11.81)	(18.41)	(5.45)
j_aedu		-0.002		0.018*		-0.016**		0.054*
		(-0.59)		(8.21)		(-1.93)		(7.72)
ien			-0.0001*	-0.0002*			-0.001*	-0.001*
			(-5.95)	(-10.54)			(-8.53)	(-8.97)
_cons	0.364*	0.377*	0.442*	0.409*	2.01*	2.119*	2.323*	2.216*
	(20.31)	(13.46)	(26.74)	(29.78)	(44.45)	(27.70)	(61.62)	(55.68)
Observation	48	48	48	48	48	48	48	48
Groups	24	24	24	24	24	24	24	24
Wald chi2(25)	495927.26				1434.22			
Wald chi2(26)		265018.00	1216619.00			22803.07	271688.83	
Wald chi2(27)				264883.26				1.22E+07
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes

(i) t-statistics are in braces

(ii) All regressions include year and province fixed effects.

(iii) * Statistically different from zero at the 0.01 level of significance, ** Statistically different from zero at the .05 level of

Because, the previous estimates fails to recognize that the response to treatment can vary with the degree of exposure to it, we use the variable that reflects the exposure to the reform, Year_LFE. Naturally, the identification of α may require that we include a set of control variables x in the regression function (6). Thus, we have that:

$$\text{Access}_{jt} = \alpha_0 \text{Year_LFE} + \beta_0 x_{jt} + \lambda_t + \mu_j + \varepsilon_{jt} \quad (8)$$

In the first column of Table VI can be observed what will be the unconditional fixed effect estimate for the impact of an additional year of treatment on *access*. In this case the effects are some are more modest, since in this case is of 0.013 points. When we introduce our controls, columns (ii) and (iii), the LFE coefficient, as previously, does not change but when compute the general model, column (iv) the effect is reduced halfway. Also note that remains the perverse negative sign for all controls.

When these models are computed for the quality index, as did not happen in any of the previous models, the results are very similar between all specifications and the signs of the control are some more intuitive. The range of Year_LFE coefficients is 0.027 for the three first models, columns (v) to (vii) and decrease to 0.022 for the complete model. This happens because probably some part of the effect interacts with the education climate in the province.

Table VI

Impact estimation of intensity of LFE application on access

Dependent Variable	<i>Access</i>				<i>Access quality</i>			
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
Year_LFE	0.013*	0.013*	0.015*	0.007*	0.027*	0.029*	0.027*	0.022*
	(5.03)	(4.87)	(6.23)	(4.35)	(18.54)	(19.73)	(41.75)	(10.36)
j_aedu		-0.0001		0.02*		-0.006		0.053*
		(-0.02)		(6.00)		(-0.97)		(5.12)
ien			-0.0001*	-0.0002*			-0.0004*	-0.001*
			(-3.20)	(-6.34)			(-6.79)	(-6.28)
_cons	0.364*	0.365*	0.427*	0.39*	2.015*	2.056*	2.267*	2.211*
	(18.98)	(9.14)	(19.47)	(16.00)	(27.19)	(27.56)	(54.61)	(42.52)
Observation	48	48	48	48	48	48	48	48
Groups	24	24	24	24	24	24	24	24
Wald chi2(25)	160393.82				431666.06			
Wald chi2(26)		180402.62	192976.32			1648613.00	688552.85	
Wald chi2(27)				285836.85				1.73E+05
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes

(i) t-statistics are in braces

(ii) All regressions include year and province fixed effects.

(iii) * Statistically different from zero at the 0.01 level of significance, ** Statistically different from zero at the .05 level of significance,

V. Conclusions

Over the last decade, Argentina embarked on a broad education reform. The Federal Education Law (LFE) (Law N° 24.195), passed in 1993, implied a dramatic change in the educational system. The main objective of the Federal Law was to expand access to basic education. The main instrument to achieve this objective was a new organization of the schooling level structure and contents, and the extension of mandatory schooling from 7 to 10 years. The sequence and characteristics of the process differed across provinces. Today, fifteen years later, the National Ministry of Education is promoting a counter-reform which proposes back to the old level schooling structure, based on the perception that the LFE has been negative in terms of learning outcomes and the schooling paths.

In this paper we try to evaluate what is the relationship among the LFE and the access and its quality. To do this we do two type of analysis. First we try to evaluate if exist differences in the schooling system performance across provinces according to the LFE implementation? To answer this we compute no lineal probability models from which we found that a little difference in the probability of access, 3.8%, originated in the LFE. Also we do not observe difference based on the intensity of application. In quality terms, people who resides in a province which implements the LFE has less probability to drop out or never access but also of to be in term. In mean, these people have a greater probability to be over aged. But in this case the intensity of LFE implies improvement on the quality of access.

In this way, LFE provinces tend to get a bigger access probability originates in a bigger retention of individuals with smaller achievements and with more promotion for the youngest cohorts.

The other question was which have been the effects of the LFE on *access* and the *quality of that access*? We found, unconditional, that after treatment both measures improve more in those province under LFE. For the access case this improve is of 4 points. For the quality index we see a similar picture. Also we see an improvement in the quality for both set of province, but greater for those under LFE.

To identify the effect of implementing the Education Federal Law on access to secondary school as well as its quality, we compute FGLS panel data estimates with fixed effects for province and year and using two variables as control, the mean household equivalent income

(ien) and the years of education of head household (j_aedu). *In all case we found a positive and significant effect of LFE on access and its quality.* For access the effect to be under LFE will be of 0.04, which is very close to unconditional estimates, and of 0.013 of an additional year of implementation. Note that if this value is the true effect in nearly 10 years probably, in mean, all provinces under LFE would reach the same universality as the primary school coverage.

The interpretation of the effects on quality is something more complex. When we evaluate for the effect to be in LFE we can found a positive sign but its magnitude is unclear, ranging from 0.058 to 0.114 index points. But when we estimate the effect of intensity the value of coefficient is more stable, around 0.02 or 0.03.

In this paper we found a positive and significant effect that suggest very interesting access results to the future for province which apply the Education Federal Law. This paper has two conclusions. In this sense, first, as we expect a reform which increases the range of age promotion to the next level favor the access outcome on that level. Second, for Argentina, in the face of an imminent counter reform which main objective is to introduce again a reorganization of levels and curricula of school system, adding a relevant element at the moment to chose among alternatives level structures.

VI. References

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VII. Appendix

Table A.I

Summary statistics and definition for microdata

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
access	1 if individual effectively goes to secondary school and 0 other case	5820	0.902	0.298	0	1
quality	0 for individuals that did never entry, 1 for those that dropout, 2 for over-aged and 3 for those that are in the expected level for their age	5820	2.504	0.787	0	3
age	age in years	6897	14.997	1.404	13	17
men	1 if men 0 in other case	6897	0.511	0.500	0	1
ien	household equivalent income	6891	250.2	340.9	0.0	5150.7
childs	# of children in household	6897	1.668	1.660	0	9
h_size	Size of household	6891	5.702	2.275	1	18
n_parents	# of parents in household	6897	1.774	0.418	1	2
j_aedu	Education years of household head	6897	8.593	4.308	0	17
LFE	1 the individuals reside in provinces that have completely implemented the LFE and 0 othercase	6897	0.754	0.431	0	1
Year_LFE	Years since the generalization of LFE	6897	2.735	1.772	0	5

Source: ECV 2001-Siempro

Table A.2

Logit estimates for access

Dependent Variable	Logit 1	Logit 2	Logit 3	Logit 4	Logit 5
Access	(i)	(ii)	(iii)	(iv)	(v)
age	-0.678 (-311.66)	-0.694 (-315.83)	-0.694 (-315.83)	-0.677 (-310.81)	-0.694 (-315.83)
men	-0.208 (-41.90)	-0.22 (-43.89)	-0.22 (-43.89)	-0.213 (-42.79)	-0.22 (-43.89)
ien	0.001 (78.75)	0.001 (75.64)	0.001 (75.64)	0.001 (79.87)	0.001 (75.64)
childs	-0.045 (-25.91)	-0.045 (-24.66)	-0.045 (-24.66)	-0.051 (-28.89)	-0.045 (-24.66)
h_size	-0.171 (-139.89)	-0.168 (-130.32)	-0.168 (-130.32)	-0.168 (-136.75)	-0.168 (-130.32)
n_parents	0.682 (118.59)	0.616 (105.27)	0.616 (105.27)	0.666 (115.73)	0.616 (105.27)
j_aedu	0.174 (258.55)	0.187 (264.39)	0.187 (264.39)	0.176 (260.39)	0.187 (264.39)
LFE			0.773 (18.05)		
Year_LFE				0.062 (51.90)	-0.054 (-7.72)
_cons	11.332 (319.21)	11.458 (296.36)	11.458 (296.36)	11.111 (308.64)	11.458 (296.36)
Province fixed effects?	No	Yes	Yes	No	Yes
McFadden's R2	0.2220	0.2420	0.2420	0.2230	0.2420
McFadden's Adj R2	0.2220	0.2420	0.2420	0.2230	0.2420
Maximum Likelihood R2	0.1250	0.1360	0.1360	0.1260	0.1360
Cragg & Uhler's R2	0.2760	0.3000	0.3000	0.2780	0.3000
McKelvey and Zavoina's R2	0.4290	0.4530	0.4530	0.4310	0.4530
Efron's R2	0.1590	0.1740	0.1740	0.1600	0.1740

Notes:

t-statistics in braces

All variables are significant to 0.01

Table A.3

Brant test

Variable	LFE			Year_LFE		
	chi2	p>chi2	df	chi2	p>chi2	df
All	82.64	0.000	16	83.59	0.000	16
age	37.96	0.000	2	38.1	0.000	2
menores	2.1	0.350	2	2.2	0.332	2
ien	13.61	0.001	2	12.86	0.002	2
childs	1.79	0.408	2	1.83	0.400	2
h_size	3	0.223	2	3	0.223	2
n_parents	1.51	0.470	2	1.61	0.448	2
j_aedu	1.82	0.403	2	1.74	0.418	2
LFE	11.76	0.003	2			
Year_LFE				12.15	0.002	2

Table A.4

Estimates for the quality of access

Dependent Variable	Ologit 1	Ologit 2	Ologit 3	Ologit 4	Ologit 5	Ologit 6
<i>Quality</i>	(i)	(ii)	(iii)	(iv)	(v)	(v)
<i>Outcome</i>						
0						
age	-0.492859 * (-6.26)	-0.4889718 * (-6.18)	-0.4943566 * (-6.29)	-0.4923847 * (-6.25)	-0.490685 * (-6.20)	-0.4909684 * (-6.20)
men	-0.4427957 * (-5.02)	-0.4592423 * (-5.13)	-0.4440876 * (-5.03)	-0.4605611 * (-5.14)	-0.4483108 * (-5.08)	-0.4603074 * (-5.14)
ien	0.0030089 * (3.17)	0.0030725 * (3.18)	0.0029489 * (3.11)	0.003 * (3.11)	0.0030153 * (3.19)	0.0030701 * (3.19)
childs	-0.066044 ** (-1.95)	-0.0596468 ** (-1.73)	-0.0686865 ** (-2.03)	-0.0586729 ** (-1.71)	-0.0694768 ** (-2.06)	-0.0592858 *** (-1.72)
h_size	-0.1358081 * (-5.31)	-0.1384318 * (-5.25)	-0.1334894 * (-5.20)	-0.1380501 * (-5.25)	-0.1327712 * (-5.17)	-0.1381457 * (-5.26)
n_parents	0.7377982 * (7.27)	0.7066124 * (6.85)	0.7319064 * (7.19)	0.7096138 * (6.88)	0.7241079 * (7.10)	0.7087623 * (6.88)
j_aedu	0.1480138 * (12.71)	0.1526455 * (12.58)	0.15013 * (12.77)	0.1525729 * (12.59)	0.1513975 * (12.83)	0.1527108 * (12.60)
LFE			-0.0706353 (-0.36)	-0.5560684 (-1.57)		
Year_LFE					0.0633083 (1.51)	-0.1375378 (-1.52)
_cons	9.250049 * (7.15)	9.167485 * (6.89)	9.32524 * (7.18)	9.505227 * (7.14)	8.996592 * (6.82)	9.265022 * (6.88)
1						
age	-0.7163471 * (-10.35)	-0.7149343 * (-10.24)	-0.7163376 * (-10.31)	-0.7165477 * (-10.25)	-0.714386 * (-10.21)	-0.7166933 * (-10.20)
men	-0.4427957 * (-5.02)	-0.4592423 * (-5.13)	-0.4440876 * (-5.03)	-0.4605611 * (-5.14)	-0.4483108 * (-5.08)	-0.4603074 * (-5.14)
ien	0.0017531 * (3.68)	0.0017921 * (3.70)	0.0017438 * (3.68)	0.0017744 * (3.68)	0.001748 * (3.69)	0.0017777 * (3.67)
childs	-0.066044 ** (-1.95)	-0.0596468 ** (-1.73)	-0.0686865 ** (-2.03)	-0.0586729 ** (-1.71)	-0.0694768 ** (-2.06)	-0.0592858 *** (-1.72)
h_size	-0.1358081 * (-5.31)	-0.1384318 * (-5.25)	-0.1334894 * (-5.20)	-0.1380501 * (-5.25)	-0.1327712 * (-5.17)	-0.1381457 * (-5.26)
n_parents	0.7377982 * (7.27)	0.7066124 * (6.85)	0.7319064 * (7.19)	0.7096138 * (6.88)	0.7241079 * (7.10)	0.7087623 * (6.88)
j_aedu	0.1480138 * (12.71)	0.1526455 * (12.58)	0.15013 * (12.77)	0.1525729 * (12.59)	0.1513975 * (12.83)	0.1527108 * (12.60)
LFE			0.0904881 (0.59)	-0.3953693 (-1.15)		
Year_LFE					0.0502999 (1.51)	-0.1501656 *** (-1.66)
_cons	11.89659 * (10.64)	11.84653 * (9.99)	11.81489 * (10.24)	12.02235 * (9.90)	11.68926 * (10.04)	11.9825 * (9.83)
2						
age	-0.6317949 * (-18.00)	-0.6362076 * (-18.07)	-0.6329755 * (-18.04)	-0.6369289 * (-18.07)	-0.6327933 * (-18.04)	-0.6368326 * (-18.06)
men	-0.4427957 * (-5.02)	-0.4592423 * (-5.13)	-0.4440876 * (-5.03)	-0.4605611 * (-5.14)	-0.4483108 * (-5.08)	-0.4603074 * (-5.14)
ien	0.0006246 * (2.64)	0.0006586 * (2.71)	0.0006371 * (2.71)	0.0006644 * (2.74)	0.0006464 * (2.74)	0.0006636 * (2.73)
childs	-0.066044 ** (-1.95)	-0.0596468 ** (-1.73)	-0.0686865 ** (-2.03)	-0.0586729 ** (-1.71)	-0.0694768 ** (-2.06)	-0.0592858 *** (-1.72)
h_size	-0.1358081 * (-5.31)	-0.1384318 * (-5.25)	-0.1334894 * (-5.20)	-0.1380501 * (-5.25)	-0.1327712 * (-5.17)	-0.1381457 * (-5.26)
n_parents	0.7377982 * (7.27)	0.7066124 * (6.85)	0.7319064 * (7.19)	0.7096138 * (6.88)	0.7241079 * (7.10)	0.7087623 * (6.88)
j_aedu	0.1480138 * (12.71)	0.1526455 * (12.58)	0.15013 * (12.77)	0.1525729 * (12.59)	0.1513975 * (12.83)	0.1527108 * (12.60)
LFE			0.302172 (2.98)	-0.1608149 (-0.53)		
Year_LFE					0.0846716 (3.63)	-0.111006 (-1.33)
_cons	8.747214 * (15.45)	8.762533 * (13.83)	8.513577 * (14.78)	8.739501 * (13.80)	8.461058 * (14.65)	8.748535 * (13.82)
Province fixed effects?	No	Yes	No	Yes	No	Yes
Number of obs	5815	5815	5815	5815	5815	5815
Wald chi2(11)	662.32	769.61	714.59	772.61	732.70	732.70
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Psuedo R2	-359.2876	-355.6007	-358.5743	-355.3649	-358.1235	-358.1235

Note: all models are estimated by generalized ordered logit. These models were computed by the gologit2 command of Williams (2006)
t-statistics in braces

Table A.5

Statistics descriptive for panel data by province

Variable		Mean	Std.Dev.	Min	Max	Observations	
quality	overall	2.16	0.34	1.70	2.70	N	48
	between		0.07	2.04	2.30	n	24
	within		0.33	1.73	2.59	T	2
access	overall	0.60	0.30	0.20	0.95	N	48
	between		0.04	0.52	0.67	n	24
	within		0.30	0.24	0.96	T	2
ien	overall	293.66	126.20	117.89	865.24	N	48
	between		110.03	172.51	623.16	n	24
	within		63.86	51.59	535.74	T	2
j_aedu	overall	5.34	3.47	1.00	11.05	N	48
	between		0.94	4.16	9.28	n	24
	within		3.34	1.28	9.41	T	2
LFE	overall	0.35	0.48	0.00	1.00	N	48
	between		0.23	0.00	0.50	n	24
	within		0.43	-0.15	0.85	T	2
Year_LFE	overall	1.19	1.71	0.00	5.00	N	48
	between		0.87	0.00	2.50	n	24
	within		1.48	-1.33	3.67	T	2