

The impact of grade configuration on high school graduation: the case of Argentina's *Ley Nacional de Educación*

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Abstract

The organization of levels in the schooling system determines, among other things, the age at which students transition to secondary school. This may be relevant to students' academic achievement. For instance, teaching methodology may change and younger children may be more susceptible to older peers' influence who tend to perform poorly in secondary school. In this paper, we explore the effects of the grade configuration reform induced by the National Education Law of Argentina implemented in 2006, which allowed provinces to choose whether children completed 7 or 6 school years in primary school, thus transitioning at different ages to secondary school. Following a difference-in-difference methodology we show that delaying transition to secondary school by one year is associated to a 2 percentage point increase in high school graduation rates. Effects are driven by boys and are larger among students from poor households.

Keywords: Education; school graduation rates; Argentina.

1. Introduction

How to group students in different grades across schools is among the most basic questions policymakers in any education system have to face. This determines the number of structural school transitions students undergo, the age at which they make them and the relative age of the peers to whom they are exposed to throughout their childhood and teenage years. Despite the relevance of this question, the empirical evidence is scarce and there isn't an international consensus about the best way to organize students, as can be seen in the different configurations adopted by countries and in many cases within one country (as is the case of Argentina).

In this paper we study the impact of grade configuration induced by the Argentinian educational reform of 2006. The National Education Law N 26.206 (LEN) was approved on December 14, 2006, replacing the old scheme of three Basic General Education (EGB) modules of three years each, and 3 years of *Polimodal* Education to one divided in two blocks of primary and secondary education. Since Argentina is a federal country where primary and secondary public education are administered and financed at the provincial level, this law allowed a variation in terms of the length of primary and secondary school within provinces that we exploit. Each province could opt for a system of 6 years of primary and 6 of secondary (6-6), or 7 years of primary and 5 of secondary (7-5).

We are interested in whether entering secondary school one year later (that is, attending seventh grade within primary school) has a positive effect on the probability of graduating from high school. For this, we exploit the variability in the timing and the structures implemented by the provinces with the LEN. Our results suggest that delaying the transition to secondary school increases the probability of graduating from secondary school by 2 percentage points (equivalent to an increase of almost 5% in secondary school completion for the groups studied).

There is vast evidence of the effect of different educational policies as the increase in compulsory education (Keueger, 1991; Goldin and Katz, 2008; Oreopoulos, 2006; Alzúa et al., 2015) or school construction (Duflo, 2001) on the probability of completing secondary school and on the average number of years of education. However, evidence on how grade configuration and the transition between educational levels can affect education has received less attention by economists.

In the US, there is evidence that the transition to middle school is associated with a loss of academic achievement, elevated suspension rates, and reduced self-esteem (see for example Weiss and Kipnes, 2006; Byrnes and Ruby, 2007; Cook et al., 2008). This also seems to be the case in Argentina: according to official sources, repetition rates increase from 3% to 15% and dropout rates from 1% to 10% approximately between the final grades of primary school and the first year of secondary school. Moreover, recent studies in the US find that such transitions are particularly costly for younger students (Rockoff and Lockwood, 2010; Schwerdt and West, 2013). This suggests that the age at which a student transitions from

primary to secondary school is important, probably because younger students are usually more susceptible to the negative influence of older students (Cook et al., 2008).

There is literature that shows that poor peer performance can have a negative effect on student's achievements (see for example Zimmerman, 2003 and Sacerdote, 2001). Since secondary school students in Argentina typically have worse performance than those in primary, this could have negative effects on the performance of seventh graders. This potential effect could be due to the fact that poor academic performance in secondary school is associated with greater popularity and is therefore positively valued by students. Fryer Jr. and Torelli (2010) find evidence that very high grades imply less popularity for certain groups (African Americans and Latinos) in schools in the United States. Elías et al. (2011) find similar evidence for schools in Gran Buenos Aires (GBA) and north of Argentina.

Furthermore, discrimination among peers could also impact the performance of seventh graders. Hirschberg (2015) finds that most secondary school students believe the major problems in their school are related to students' behavior, such as theft in the classroom, threats, inattention, drugs, smoking during recesses, and they consider that the most important strategies implemented by school authorities are related to dealing with the problems of violence. If these behaviors are more prone, especially in the later years of high school, it may be beneficial for seventh graders to stay out of these situations for an additional year. Consistent with this idea, the results of the Argentinian standardized test *Aprender 2017* indicate that the proportion of young people who experience discrimination at school is higher at the secondary level than at the primary level.

Assessing which is the best grade configuration for a country is difficult because most papers are based on small reforms of a country's current structure. Adding an extra year of primary school would probably have different effects depending on the current length of that level and to which level students are transitioning to. This paper contributes to this literature by studying a case with only two levels (which is the most common structure in Latin America) instead of three. Also, we provide evidence on long term outcomes such as high school completion instead of immediate effects such as attendance rates.

Finally, this paper contributes to the local literature by explaining the improvement in education performance in Argentina in the last few decades. Since the mid-1990s, high school attendance has improved significantly in Argentina. In 1996 79% of people aged 13 to 17 attended a school while 94% did in 2018. Graduation rates increased accordingly from 47% to 64% for people between 18 and 24 years old¹. Alzúa et al. (2015) attribute part of this improvement in the late 1990s and early 2000s to the 1993 Federal Education Law, which expanded compulsory years of schooling from 7 to 9 and reformed the grade configuration. Also, conditional cash transfers (CCT) seem to have had a positive effect on the rate of school attendance in secondary school (Edo et al., 2017) and dropout rates (Edo and Marchionni, 2019) between 2010 and 2014. In this paper we attribute some of the improvement in the past decade to the reform implemented in 2006.

¹ Own calculations based on *Encuesta Permanente de Hogares, Instituto Nacional de Estadísticas y Censos*.

The paper proceeds as follows. Section 2 reviews the context in which the educational reform was implemented and the changes that came with it. Section 3 describes the data and section 4 presents our identification strategy. Section 5 presents the main findings concerning the effects of grade configuration on student achievement. Section 6 provides support for the methodology and considers the robustness of the results. Section 7 concludes.

2. The educational reform

Grade configuration in Argentina has changed several times since the end of the 20th century. From 1884, with the Common Education Law (LEC), education in Argentina was structured by three non-compulsory years of kindergarten (from ages 3 to 5), seven compulsory years of primary school (from ages 6 to 12) and 5 non-compulsory years of secondary level (from ages 13 to 17).

This system remained unchanged for over a century until the approval of the Federal Law of Education in 1993, which modified the grade configuration and increased the years of compulsory education. The structure of kindergarten did not change but the law made its last year mandatory. Primary and secondary school were replaced by four three-year modules of schooling, the first three called General Basic Education (EGB 1, 2 and 3) and the last one *Polimodal*. In this change, the first 9 years of education (EGB 1, 2, and 3) were mandatory and only *Polimodal* was optional. This implied an increase in compulsory education from 7 to 10 years.

Since students typically shared spaces with their counterparts in the same level of education, and schools could either offer only primary education, only secondary or both, this law imposed a new burden on schools. Many schools had to re-organize shifts and spaces, and some even had to change the number of years of education they offered. For this reason, the LFE implementation processes in the provinces were guided by disparate criteria, adopting different modalities according to the jurisdiction and at different moments in time. In fact, provinces were allowed to phase the implementation of the reform along the period 1995-1999.

According to the Ministry of Education (2018), the building situation in many cases defined the decisions made by the governments, including those related to pedagogical aspects and the organization of sections or teaching establishments, among others. The main difference was in the treatment and location given to the third cycle of EGB. The most popular option was to keep the first 6 years of schooling together and merge the 7th grade to a second level of schooling, which in fact established a primary level of 6 years of study (EGB 1 and 2) and secondary level of 6 years, divided into two cycles: EGB 3 and *Polimodal*. Other options were to maintain complete EGB in primary schools, adding two years of schooling to the previous seven, or to separate the third cycle of the EGB as an autonomous unit with its own direction. These were most common in rural areas.

In 2006, the grade configuration was changed again by the National Law of Education (LEN). With the implementation of this law, Argentina returned to the primary-secondary structure, and augmented the compulsory years of schooling from 10 to 13 by making mandatory the final 3 years of secondary school. Due to the differences in the provinces' school infrastructure and in their ease to rearrange their grade configurations, two models were proposed: the first, maintaining the old organization of a 7-year primary and a 5-year secondary; and the second: a 6-year primary school and a 6-year high school. The main difference between the two systems is how students who should attend the seventh a year are treated. On one hand, in the provinces that adopted the 7-5 system, the 7th year students shared time and common spaces with younger primary school students. On the other hand, students at that same grade from the provinces that adopted the 6-6 system coexisted with older secondary level students.

Table 1 summarizes the changes in grade structures and the number of compulsory years of education required by each reform.

Table 1: Changes in educational structure in Argentina

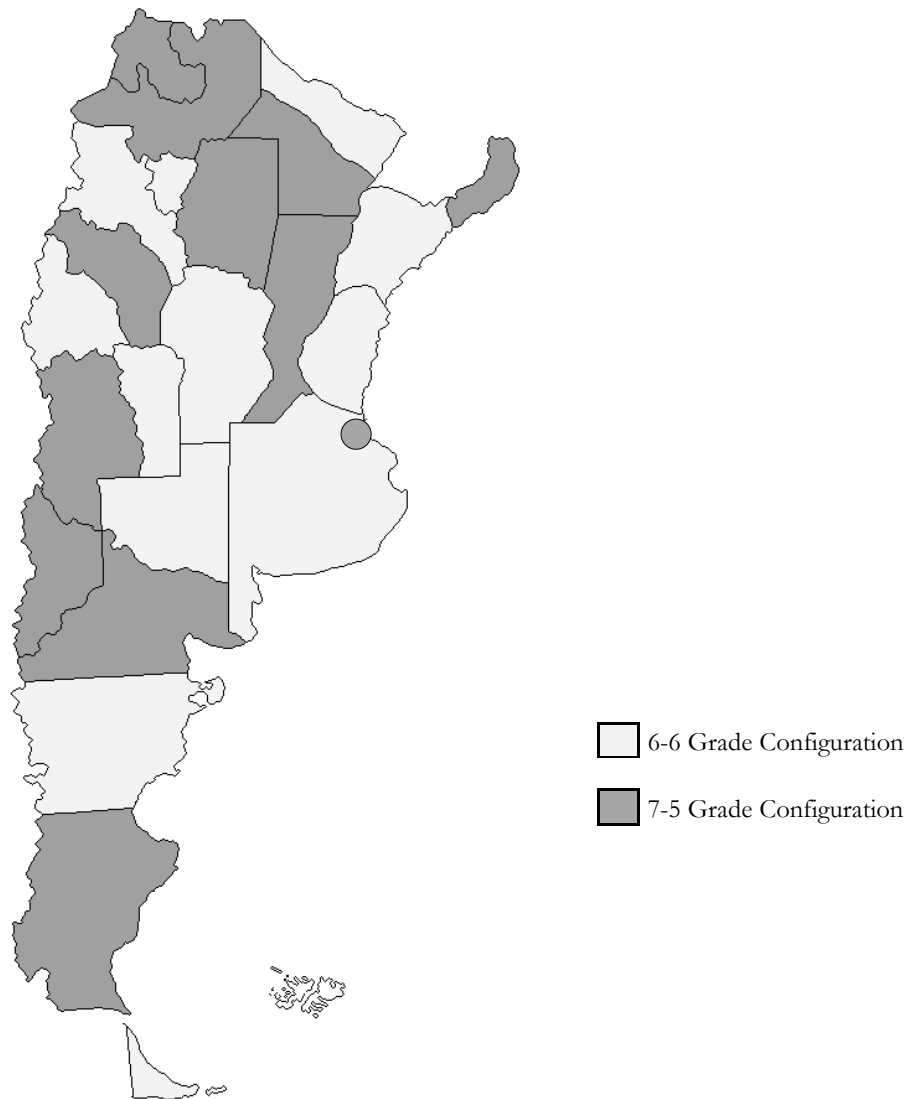
Age	1984	1993	2006	
	LEC	LFE	LEN 6-6	LEN 7-5
5	Kindergarten	Kindergarten	Kindergarten	Kindergarten
6	Primary School	EGB 1	Primary School	Primary School
7				
8				
9		EGB 2		
10				
11	EGB 3	Secondary School	Secondary School	
12				
13				
14	Polimodal			
15				Secondary School
16				
17				
Provinces	All	22	12	12

Source: own elaboration based on official sources.

Note: the Autonomous City of Buenos Aires and Río Negro never adopted the LFE and always maintained a 7-5 grade configuration as established by the LEC.

Each province had to choose one of these two models (i.e., the last two columns in Table 1). According to the National Directorate for Information and Evaluation of Educational Quality, 12 provinces adopted the first model (7–5): City of Buenos Aires, Catamarca, Chaco, Jujuy, La Rioja, Mendoza, Misiones, Neuquén, Río Negro, Salta, Santa Fe and Santiago del Estero; and the remaining 12 adopted the second model (6–6): Buenos Aires, Córdoba, Corrientes, Chubut, Entre Ríos, Formosa, La Pampa, San Juan, San Luis, Santa Cruz, Tierra del Fuego and Tucumán, as shown in Figure 1.

Figure 1: Grade configuration by province



Source: own elaboration based on official sources.

Note: CABA is represented with a circle because it would not be visible in the map.

According to the Argentinian Ministry of Education, the provinces' choice of which system to adopt depended on how much progress they had made and how they structured their grade configurations after the LFE. Jurisdictions such as Santiago del Estero or Santa Cruz, which continued with the LEC structure almost without modifications, opted for the first model. On the other hand, jurisdictions such as Buenos Aires and La Pampa, which made further progress in the implementation of LFE, opted for the 6-6 grade configuration. This suggests that provinces that ended up adopting the 6-6 configuration did not undergo significant changes in how their schools worked *de facto*. Finally, two jurisdictions (Autonomous City of Buenos Aires and Río Negro) never adopted the LFE and have always

maintained the original 7-5 system. Table A1 in the appendix presents the regulations issued by each province and the year of implementation.

3. Data

The implementation of the LEN was not accompanied by any impact evaluation strategy, so we rely on observational data. Our primary source of data is the main household survey of Argentina, *Encuesta Permanente de Hogares* (EPH), from 2003 to 2018. It has a quarterly frequency and collects data of income, employment variables, and demographic characteristics of individuals living in 32 urban areas throughout the country.

Information about the implementation of the law and on provinces' expenditure on education comes from the Argentinian Ministry of Education and covers the period from 2003 to 2018. Since annual inflation rates in Argentina are high² (16% on average), we adjusted these figures to obtain the real expenditure in education.

The analysis is restricted to timely high school graduation and the sample include only individuals aged 18 or 19 at the moment of the survey. This definition is used for two reasons. In the first place, because this is the age in which students should have graduated. Graduating from high school on time implies a high educational performance and greatly increases the probability of attending higher levels of education. Second, due to the time in which the law was implemented, there is insufficient data to analyze completion at older ages. By 2018 (the last year for which all the relevant information is available), the first cohort who was affected by the law was aged less than 17 in 3 provinces, 18 or 19 in 5 provinces, 20 in 5 provinces, and 21 in the remaining 8 (two are excluded from the analysis for reasons that are stated further on). Therefore, focusing on individuals aged 18 and 19 at the time of the survey allows for including the largest amount of provinces with at least one treated cohort.

Two jurisdictions (Autonomous City of Buenos Aires and Río Negro) that never adopted the LFE and have always maintained the original 7-5 system. For this reason they are excluded from the analysis. We also exclude the area of “Gran Buenos Aires” (GBA), because we can't identify if children living in GBA attended to school in CABA or in Buenos Aires, since although both urban areas belong to different administrative regions they are in fact part of the same city. If the percentage of students from GBA who attend school in CABA varies over time, including this agglomerate could bias the results³.

Table 2 shows descriptive statistics for individuals according to the grade configuration implemented in the province they live in. There aren't significant differences in individual characteristics (age or gender). However, individuals from provinces that adopted a 7-5 configuration after the reform live in larger and poorer households.

² I used the inflation rate published by the Central Bank of Argentina (BCRA).

³ Including GBA in the analysis does not change our results. Estimates are available upon request.

Table 2: Descriptive statistics

	Variables	7-5 Provinces	6-6 Provinces	Difference
Individual Characteristics	Age	18.487 (0.002)	18.487 (0.002)	(0.000) (0.003)
	Gender (male)	0.496 (0.002)	0.49 (0.002)	0.006* (0.003)
Head of the Household Characteristics	Age	47.309 (0.062)	46.258 (0.056)	1.051*** (0.084)
	Gender (male)	0.622 (0.002)	0.639 (0.002)	(0.017***) (0.003)
	Education	0.421 (0.002)	0.432 (0.002)	(0.011***) (0.003)
	Single parent	0.372 (0.002)	0.372 (0.002)	0.000 (0.003)
	Employed	0.741 (0.002)	0.736 (0.002)	0.005* (0.003)
Household Characteristics	Household size	5.236 (0.012)	5.008 (0.01)	0.228*** (0.015)
	Number of Children	1.529 (0.008)	1.454 (0.007)	0.075*** (0.011)
	Poor household	0.464 (0.002)	0.381 (0.002)	0.053*** (0.003)
	<i>N</i>	41,803	53,167	94,970

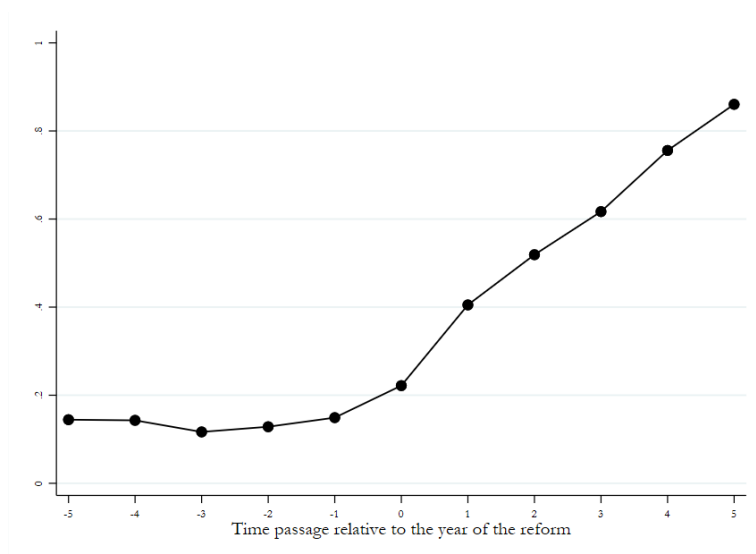
Source: own estimations based on *Encuesta Permanente de Hogares*.

Note: standard errors between parentheses. We define poor households as those in the first quintile of per capita income. Education of the head of the household represents the percentage with complete secondary or higher education. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

While a province adopts the law in a given year, each school may or may not accommodate the structure chosen by the province immediately, depending on the resources available and the facility to do so. There isn't enough information to identify if each individual school changed its grade configuration. Hence, treatment is defined only at the province-level, thus limiting the results as an intention to treat estimates.

Information about the implementation of the LEN within each province is scarce. To see how quickly schools accommodated to the law after it was passed in each province, we study what 15 to 17 years old individuals (that should be attending the last 3 years of high school) referred to as their level of education. Figure 2 shows the percentage of high school students that referred to their education level as "secondary school" (according to the new grade configuration) instead of "EGB" or "Polimodal" (according to the old grade configuration) after the reform.

Figure 2: Adoption of LEN



Source: own estimations based on *Encuesta Permanente de Hogares*.

Notes: adoption of LEN is estimated by the percentage of individuals that referred to their education level as secondary school instead of EGB or *polimodal*. Horizontal axis represents the time passage relative to the reform. Zero identifies the year when the law was implemented in each province, and positive (negative) integers indicate the years after (before) the reform.

Before the reform was implemented this rate was steady below 20%, and it started to grow right after the law was passed. One year after the law was approved, near 40% of individuals reported attending the new grade configuration. By the fifth year after the reform, almost all the individuals reported attending school according to the new configuration. This pattern implies that estimates should be higher for the younger cohorts.

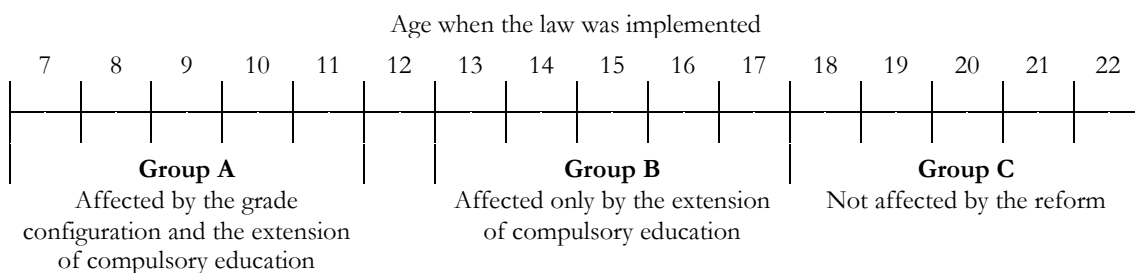
4. Methodology

We are interested in measuring the impact of the change in grade configuration, specifically the effect in high school completion rates for those provinces that adopted the 7-5 system (which henceforth we call *treated* provinces). The date of birth and the province of residence jointly determine if an individual attended secondary school instead of EGB / *Polimodal* and, if so, if they had a 5 or 6 years of secondary school. The effect of the province of residence is straightforward. Regarding the date of birth, we divide individuals into three groups to determine how much they were affected by the law. Since provinces adopted the law in different years, we define these groups relative to the age individuals were when the reform was implemented in their province.

Argentinian children normally attend the seventh grade at the age of 12. Hence, children aged 7 to 11 at the time of the reform were affected by the change of grade configuration, since they would take that grade after the reform. Children aged 12 were excluded from our analysis because they should have been on the seventh grade when the changes were

implemented and it is not clear if they were treated or not⁴. Children aged 13 to 17 were already past the first year of EGB 3 (equivalent to seventh grade of primary or first year of secondary after the LEN) so they should not have been affected directly by the modification in the grade configuration. However, since they were still attending high school they were affected by the extension in the years of compulsory education. Finally, individuals aged 18 to 22 by the time the law became effective should already have finished high school, so they were not affected at all by the law. Figure 3 summarizes how different cohorts were affected by the law.

Figure 3: Exposure to the reform when the law was implemented, by age



Note: individuals aged 12 when the law was implemented are excluded from the analysis because they should have been on the seventh grade and it is not clear how they were affected by the reform.

The identification strategy consists of comparing Group A to Groups B and C to determine the effect of the grade configuration. Only individuals from group A living in treated provinces experienced a significant change in their grade configuration, thus if our hypotheses were true we would expect to see a change only in their graduation rates. The identifications assumptions are that graduation rates of treated and non-treated provinces would have evolved similarly in the absence of the reform and that there was no other contemporaneous event that could have caused differences in the evolution of graduation rates between those groups. The latter does not appear to be a strong assumption considering that the LEN was the largest government initiative meant to improve educational outcomes in the past two decades and that other changes in the education realm, such as the increase in public expenditure and subsequent reforms⁵ did not affect differently the treated and non-treated provinces. Regarding the first assumption, we will provide evidence in its favor in Section 6.

It is worth noting that the extension of compulsory education could have a positive effect on schooling starting on group B. The evaluation of this extension of compulsory years of schooling is beyond the scope of our paper. However, Edo et al. (2017) show some evidence that it did not have any effects on attendance rates and thus it seems implausible that it should have affected graduation rates. This is consistent with the fact that no enforcement mechanisms to accompany this law were implemented, and it is thus unclear through which channels it may have affected school attendance or graduation rates.

⁴ Including children age 12 at the time of the reform does not affect results. In Section 6 we provide evidence that our results hold for different definitions of treated cohorts.

⁵ In 2014 the government increased the compulsory education by making mandatory one extra year of kindergarten. However, this could not explain an increase in high school graduation rates in the period studied.

Formally, we run the following regression:

$$Y_{ijk} = \Gamma (G_k T_{jk}) P_j + \theta X + \alpha_j + \beta_k + \epsilon_{ijk} \quad (1)$$

Where Y_{ijk} is a binary variable that takes value 1 if individual i , who lives in province j , and belongs to cohort k finished secondary school and 0 otherwise. Parameters α_j and β_k represent fixed effects by province and cohort, and X is a vector of individual and province characteristics that we use as controls. P_j is a binary variable that takes the value 1 for the provinces that adopted the 7-5 system and 0 otherwise. G_k is a cohort dummy and T_{jk} indicates whether cohort k in province j was affected by the law. The interaction between G_k and T_{jk} determine if each individual belonged to the group affected by the reform in grade configurations. Therefore the parameter Γ captures the impact of the change of grade configurations to a 7-5 structure on graduation rates.

Controls include characteristics of the individual: sex, age and relationship to the head of the household; characteristics of the head of the household: age, education, sex, marital status (with a partner or single), employment status (employed or unemployed); and characteristics of the household: quintile of per capita income, size of the household and number of children living in it. We also control for province characteristics: if the LFE was partially or fully implemented according to the definition of Alzúa et al. (2015) and the log of real expenditure in education⁶.

During the period of interest Argentina implemented the Universal Child Allowance (AUH), a massive conditional cash transfer (CCT) that included school attendance as a condition. Because this CCT could be correlated with the variable of interest (for example, because the provinces that implemented scheme 7-5 have higher poverty rates), and the evidence suggests that it had effects on academic achievements, we also control for this program. Since the survey does not present a direct way of identifying whether or not the individual receives the transfer, this control is constructed based on the household's eligibility for the transfer⁷.

In this setting, it is likely that errors are correlated within provinces in some unknown way. It is a usual procedure to use clustered robust standard errors to take this possible correlation into consideration. However, this estimator performs poorly with a small number of clusters (in this case, only 22 provinces) or very unbalanced cluster sizes. For this reason, we present

⁶ This variable was adjusted to take into consideration only the 5 years when each individual was supposed to attend high school.

⁷ Only children younger than 18 years old could receive this transfer. For this reason, we control for whether individuals could have received this transfer in the past. To construct the AUH control we use same methodology as Edo et al. (2017): we define the control based on eligibility for the transfer. A young person is eligible to receive the transfer if her parents are inactive, unemployed, employed in the informal sector or self-employed, or if they are domestic employees. Because eligibility for this transfer – that individuals in my sample received in the past - is based on household characteristics, we need to be sure that their household conditions were the same when they received the transfer. For this reason, we exclude individuals that for sure had different household characteristics in the past: we exclude individuals that are currently heads of the household (but they could not have been when they were under 18 years old). This reduces the sample by approximately 10%.

altogether with the usual robust standard errors the results of Approximate Randomization Tests (ART) developed in Canay et al. (2017) to compute clustered standard errors. Because ART requires to have treated and control observations in each cluster, we take clusters as regions (5 regions)⁸.

5. Results

Table 3 shows average graduation rates of 18-19 years old individuals from different groups and grade configurations. Unconditional evidence suggests that taking seventh grade along with elementary school had a positive effect on graduation rates: we only find an increase for group A in those provinces that adopted a 7-5 grade configuration. Moreover, when we compare groups B (affected by the increase in compulsory education) and C we do not observe any changes in the difference between provinces.

Table 3: High school graduation rates. Individuals 18 or 19 years old

	Grade Configuration		Difference (i)-(ii)
	(i)7-5	(ii)6-6	
<i>Panel A: Restricted Sample</i>			
(i) Group A	0,466	0,456	0,01
(ii) Group B	0,424	0,449	-0,025
Difference (i)-(ii)	0,042	0,007	0,035***
<i>Panel B: Full Sample</i>			
(i) Group A	0,466	0,456	0,01
(ii) Groups B & C	0,433	0,461	-0,028
Difference (i)-(ii)	0,033	-0,005	0,038***
<i>Panel C: Placebo</i>			
(i) Group B	0,424	0,449	-0,025
(ii) Group C	0,444	0,473	-0,029
Difference (i)-(ii)	-0,020	-0,024	0,004

Source: own estimations based on *Encuesta Permanente de Hogares*.

Note: individuals are divided into groups according to their age when the law was implemented in their province. Individuals between 7 to 11 years old belong to Group A, individuals between 13 to 17 years old belong to Group B, and individuals between 18 to 22 years old belong to Group C. *Panel A: Restricted sample* compares groups A and B; *Panel B: Full sample* compares group A to groups B and C; and *Panel C: Placebo* compares Groups B and C, which were not exposed to the reform of interest.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

We now assess whether this result holds in a multivariate difference-in-difference framework. Table 4 shows the results. All results include cohort and province fixed effects, as well as controls for individual, household and province characteristics. Columns (2) and (4) also control for the potential impact of AUH. The first two columns only include individuals from groups A and B (who were less than 17 when by the time of the reform), and the last two columns include individuals from all groups.

⁸ For more information on ARTs see also Cai et al. (2021).

Table 4: Probability of graduating from secondary school.

	(1)	(2)	(3)	(4)
Group A*7-5	0.0208**	0.0233***	0.0171**	0.0179**
	(0.0082)	(0.0091)	(0.0074)	(0.0081)
	[.05]**	[.05]**	[.72]	[.54]
Group A	-0.0185	-0.0119	-0.0148	-0.0158
	(0.0134)	(0.0149)	(0.0104)	(0.0114)
7-5 Province	-0.355***	-0.394***	0.0181	-0.283***
	(0.112)	(0.122)	(0.0331)	(0.0914)
Observations	52,264	44,643	83,378	70,617
Individual HH and Province	Yes	Yes	Yes	Yes
AUH Control	No	Yes	No	Yes
Cohort and City FE	Yes	Yes	Yes	Yes
Sample	Restricted	Restricted	Full	Full

Source: own estimations based on *Encuesta Permanente de Hogares*.

Note: individuals are divided into groups according to their age when the law was implemented in their province. Individuals between 7 to 11 years old belong to Group A, individuals between 13 to 17 years old belong to Group B, and individuals between 18 to 22 years old belong to Group C. *Restricted* sample compares groups A and B, and the *Full* sample compares group A to groups B and C.

Robust standard errors reported in parentheses. ART-based clustered p-values between brackets.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

The results match those previously found. In all regressions, the coefficient of interest is statistically significant and is around 2 percentage points. This evidence supports the hypothesis of this work that the adoption of an academic structure of 7-5 improves the secondary school graduation rates.

Our results imply an improvement of almost 5% in the secondary school completion rate of individuals aged 18 to 19 in the treated provinces. This result is comparable to those documented in Alzúa et al. (2015) and Edo et al. (2017) for different, yet related, outcomes. Indeed, while the former finds an increase of 0.3 to 0.8 in years of schooling as a result of changes in compulsory education introduced by the LFE, the latter estimates a 3.9 percentage point increase in attendance rates of children aged 15 to 17 following the introduction of the AUH.

6. Robustness

Parallel trends assumption

As Table 3 shows, province groups differ in their high school graduation rates prior to the changes implemented by the law, which is in part due to differences in characteristics. Nevertheless, albeit graduation rates levels differ before the education reform, we argue that the time patterns are similar. If time trends are parallel in the pre-treatment period, then it is likely that they would have continued being parallel in the post-treatment period in the absence of the treatment.

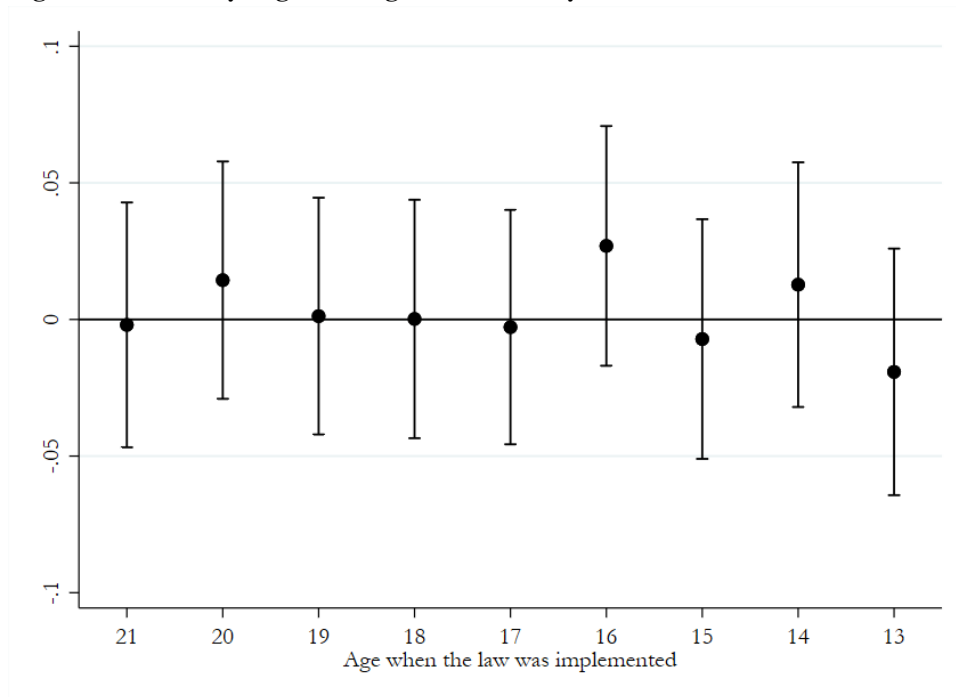
To test the parallel-trend assumption we ran an alternative specification interacting the treatment with the age when the reform was implemented. Formally, we estimate

$$Y_{ijk} = \mu + \sum_{T=13}^{21} \gamma_T P_j * T + \theta X + \alpha_j + \beta_k + \epsilon_{ijk} \quad (2)$$

Where T represents the age of each individual when the law was approved in their province. In this way, γ_T measures the effect for each cohort, and gives a testable restriction on the pattern of the coefficients. Because children aged 13 and older when the law became effective did not benefit from the change in the grade configuration, the coefficients γ_T should be 0. θX , α_j , and β_k , as in our previous specification, account for control variables, province and cohort fixed effects. Finally, ϵ_{ijk} are the robust standard errors.

Figure 4 plots the results. As observed, all the pre event treatment dummies (i.e., dummies for cohorts aged 13 to 21 when the reform took place and that were thus not affected by the treatment) are individually (and jointly⁹) equal to zero, implying that differences between treated and non-treated groups were not statistically significant before the reform. This result provides confidence on the difference-in-differences parallel-trends assumption.

Figure 4: Probability of graduating from secondary school.



Source: own estimations based on *Encuesta Permanente de Hogares*.

Note: bars present 95% confidence intervals for the interaction term between the 7-5 grade configuration and the age an individual was when the reform took place.

⁹ The p-value for the joint test that all six “leads” coefficients are equal to zero is 0.4583.

In addition to this, we perform a series of counterfactual experiments or placebo exercises to gain more confidence in the validity of the identification assumption. In this regard, we run again the same model in Table 4 but restricting the sample to pre-treatment observations (individuals who were older than 13 by the time the reform was implemented), and pretending that the program took place for groups that were more than 12 years old at the moment of the reform implementation.

Table 5 shows the results for four alternative fake implementations: individuals aged 14, 15, 16 and 17. In all cases the coefficient accompanying the interaction term is small and not statistically significant. These results imply that secondary graduation rates experienced a differential shift among children aged 11 and younger in the treated provinces at the time the law was implemented but clearly not before and not among older children.

Table 5: Probability of graduating from secondary school. Placebo regressions

	Placebo: age when the law was implemented							
	13	14	15	16	17	18	19	20
Treated*7-5	-0.0228 (0.0140) [-.56]	-0.0072 (0.0101) [-.75]	-0.0122 (0.0087) [-.48]	-0.0015 (0.0081) [-.67]	-0.0037 (0.0079) [-.86]	-0.0049 (0.0083) [-.67]	-0.0049 (0.0091) [-.82]	0.0016 (0.0110) [1]
Treated Group	-0.0007 (0.0116)	0.0245** (0.0096)	-0.0247*** (0.0094)	0.00578 (0.0094)	0.00520 (0.0093)	0.0239*** (0.0089)	0.0113 (0.0089)	0.0134 (0.0091)
7-5	0.206*** (0.0292)	0.211*** (0.0292)	0.210*** (0.0292)	0.201*** (0.0293)	0.202*** (0.0295)	0.203*** (0.0297)	0.205*** (0.0302)	0.199*** (0.0312)
Observations	53,926	53,926	53,926	53,926	53,926	53,926	53,926	53,926
Individual HH and Province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AUH Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort and City FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: own estimations based on *Encuesta Permanente de Hogares*.

Robust standard errors reported in parentheses. ART-based clustered p-values between brackets.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Alternative definition of treated groups

In Argentina, the grade a student is supposed to attend is determined by their age at July 1st. Since the data does not allow us to observe the exact date of birth of individuals (only their current age), it is not possible to be certain of the grade they should be attending (which could vary up to a year). Furthermore, the survey only informs on the school level the student is in (primary or secondary), not the exact school year. And given that the percentage of students above the stipulated age for a given school year in Argentina is high (around 30% for the secondary level, according to Hirschberg (2015)) it is therefore not possible to determine precisely which school year an individual was studying at each moment in time. To assess whether this may be driving our results, we follow a strategy similar to Alzúa et al. (2015) and vary the definition of groups.

In the main results presented in Table 4 we compared individuals aged 7 to 11 years old by the time of the reform (treated) to individuals between 13 and 17. We now vary this definition to restrict the groups we are comparing in the three following ways: (1) first we compare individuals aged 10 to 12 (treated) to those between 13 and 15 years old (control); (2) second, we compare individuals aged 7 to 10 years (treated) to those between 14 and 17; (3) finally, we compare individuals aged 8 to 11 (treated) to those between 13 and 16 (control). Table 6 presents the results

Table 6: Probability of graduating from secondary school. Alternative treated groups

	(1)	(1)	(2)	(2)	(3)	(3)
Group A*7-5	0.0126 (0.00881) [.25]	0.0162* (0.00974) [.10]*	0.0234** (0.00912) [.05]**	0.0267*** (0.0101) [.05]**	0.0268*** (0.00933) [.16]	0.0293*** (0.0103) [.05]**
Group A	-0.00209 (0.0104)	0.00237 (0.0116)	-0.0147 (0.0147)	-0.00650 (0.0163)	0.0167 (0.0302)	0.0193 (0.0323)
7-5 Province	0.0142 (0.163)	-0.0859 (0.0711)	-0.272** (0.133)	-0.297** (0.146)	-0.497*** (0.121)	-0.567*** (0.133)
Observations	43,630	37,192	42,128	35,941	41,974	35,738
Individual HH and Province	Yes	Yes	Yes	Yes	Yes	Yes
Cohort and City FE	Yes	Yes	Yes	Yes	Yes	Yes
AUH Control	No	Yes	No	Yes	No	Yes
Treated ages	10 to 12	10 to 12	8 to 11	8 to 11	7 to 10	7 to 10
Control ages	13 to 15	13 to 15	13 to 16	13 to 16	14 to 17	14 to 17

Source: own estimations based on *Encuesta Permanente de Hogares*.

Robust standard errors reported in parentheses. ART-based clustered p-values between brackets.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Table 6 shows the results. For each new age definition of groups, two columns are presented: with and without controlling for the eligibility to the AUH program. Coefficients found for the alternative sample definitions are similar to those found in the main specification and in all but one case remain statistically significant. Our results are therefore robust to alternative definitions of treated groups and thus do not seem to be driven by the imprecise definition of groups imposed by the data. Also, this evidence supports the hypothesis that the impact should be higher for younger cohorts that were more likely affected by the reform.

6. Heterogeneous Effects

So far our estimates show that the 7-5 grade configuration increased high school graduation rates, but heterogeneities may be hidden behind this average effect. In this section we explore whether the impact of the reform varied across groups. In particular, we look for heterogeneous effects across students' gender and their families' per capita income. To do this, we replicate our main estimates in Table 4 restricting the sample to these groups.

Table 7 presents the results dividing the sample by the self-reported gender in the survey. Results show that the increase in graduation rates was mostly driven by improvements among men: the estimated impact for boys is nearly 4 percentage points while that of girls is below 1 percentage point and not statistically significant.

Table 7: Probability of graduating from secondary school. Heterogeneities by Gender

	Male	Male	Female	Female
Group A*7-5	0.0359*** (0.0122) [.17]	0.0381*** (0.0110) [.44]	0.0106 (0.0134) [.16]	-0.0047 (0.0121) [.75]
Group A	-0.0457** (0.0201)	-0.0368** (0.0154)	0.0251 (0.0221)	0.0077 (0.0169)
7-5 Province	-0.352** (0.168)	-0.375*** (0.125)	-0.433** (0.178)	0.0463 (0.0533)
Observations	23,611	37,318	21,032	33,299
Individual HH and Province	Yes	Yes	Yes	Yes
AUH Control	Yes	Yes	Yes	Yes
Cohort and City FE	Yes	Yes	Yes	Yes
Sample	Restricted	Full	Restricted	Full

Source: own estimations based on *Encuesta Permanente de Hogares*.

Note: individuals are divided into groups according to their age when the law was implemented in their province. Individuals between 7 to 11 years old belong to Group A, individuals between 13 to 17 years old belong to Group B, and individuals between 18 to 22 years old belong to Group C. *Restricted sample* compares groups A and B, and the *Full sample* compares group A to groups B and C.

Robust standard errors reported in parentheses. ART-based clustered p-values between brackets.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Table 8 presents the results dividing the sample by income. We divide the sample in three: (1) poor individuals, defined as those in the first quintile of per capita income; (2) middle class individuals belonging to the second or third quintile; and (3) rich individuals who belong to the top two quintiles. Our results show that the effect was more significant in the poorest individuals: the point estimates for this group are between 2,5 and 4,5 percentage points, while the coefficients for the other two are near or below 2 percentage points and are not statistically significant.

Table 8: Probability of graduating from secondary school. Heterogeneities by Income

	Poor	Poor	Middle Class	Middle Class	Rich	Rich
Group A*7-5	0.0445***	0.0259**	0.0054	0.0065	0.0125	0.0251
	(0.0130)	(0.0118)	(0.0144)	(0.0129)	(0.0258)	(0.0230)
	[.05]**	[.37]	[.70]	[.35]	[.65]	[.93]
Group A	-0.0243	-0.0302*	-0.0220	-0.0146	0.0497	0.0301
	(0.0234)	(0.0179)	(0.0232)	(0.0180)	(0.0358)	(0.0270)
7-5 Province	-0.374**	0.0318	-0.452**	0.213***	-0.189	0.0631
	(0.179)	(0.0610)	(0.193)	(0.0613)	(0.140)	(0.0842)
Observations	20,088	30,587	18,499	29,332	6,056	10,698
Individual HH and Province	Yes	Yes	Yes	Yes	Yes	Yes
AUH Control	Yes	Yes	Yes	Yes	Yes	Yes
Cohort and City FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Restricted	Full	Restricted	Full	Restricted	Full

Source: own estimations based on *Encuesta Permanente de Hogares*.

Note: individuals are divided into groups according to their age when the law was implemented in their province. Individuals between 7 to 11 years old belong to Group A, individuals between 13 to 17 years old belong to Group B, and individuals between 18 to 22 years old belong to Group C. *Restricted sample* compares groups A and B, and the *Full sample* compares group A to groups B and C.

Robust standard errors reported in parentheses. ART-based clustered p-values between brackets.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Both of these findings are consistent with the results of Alzúa et al. (2015) and Edo et al. (2017). One possible explanation is that boys and poor individuals have lower graduation rates in our sample and thus have higher margins to improve. The larger magnitude of the effect in poor children is also consistent with the hypothesis of peer influence as one of the mechanisms playing a role in my results. While it is true that secondary students typically have worse performance than those in primary, this is –for a large number of reasons beyond the scope of this paper- particularly important in the lower quality schools that typically attend poor students. Thus, we would expect the influence within these schools to be larger, and the impact of avoiding those influences to be greater. Further research is needed to understand the underlying mechanisms of our results.

Conclusion

Grade configuration determines the number of structural school transitions students make, the age at which they make them and the relative age of the peers to whom they are exposed to throughout their childhood and teenage years. Determining which grade configuration for a country is best can be a difficult task because most papers are based on small reforms of a country's current structure limiting external validity of many results. In this paper, we contribute to this literature by studying the case of Argentina.

In a context where the educational system is divided only in two levels, we showed the importance of the individual's age when they transition from one level to the other. Exploiting the variability in the timing and the structures implemented by the provinces with the LEN allowed us to implement a difference in differences methodology to measure the impact of delaying the transition to secondary school one year.

Our results suggest that transitioning to secondary school after seventh grade instead of sixth grade increases the probability of graduating from secondary school by 2 percentage points (equivalent to an increase of almost 5% in secondary school completion for the groups studied). The magnitude of the effect is comparable to the effect caused by an increase in compulsory education (Alzua et al., 2015) or the impact of AUH, a massive CCT (Edo et al., 2017). Also, this effect was stronger for boys and individuals living in poor households. Further research is needed to understand the channels through which grade configuration could explain our results.

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Appendix

Table 1: Province's regulation regarding the LEN

Grade Configuration					
7-7			6-6		
Province	Year	Regulation	Province	Year	Regulation
Ciudad de Buenos Aires*	No regulation		Buenos Aires	2007	L.E.N° 13688
Chaco	2010	L. N°6478	Catamarca	2013	L.Pcial.E. N°5381
Jujuy	2007	D.A N° 8509	Córdoba	2010	L.E.N° 9870
La Rioja	2009	L.E.N° 8678	Corrientes	2008	D. N° 222
Mendoza	No regulation		Chubut	2010	L.E.N° 91
Misiones	2007	R.N° 289	Entre Ríos	2008	L.E.N° 9890
Neuquén	No regulation		Formosa	2007	R N° 5476
Río Negro*	No regulation		La Pampa	2009	L.E N° 2511
Salta	2008	L.E N° 7546	San Juan	2007	Resolución N° 5641
Santa Cruz	2012	L.E.N° 3305	San Luis	2008	D. N° 154
Santa Fe	2007	D. N° 2885	Tucumán	2008	Resolución N° 620
Santiago del Estero	2007	L.N° 6876	Tierra del Fuego	2015	L.E.N° 1018

Source: own elaboration based on official sources

Notes: D.A: "Decreto Acuerdo"; L: "Ley"; L.E.: "Ley de Educación"; L.Pcial.E.: "Ley Provincial de Educación"

* CABA and Rio Negro never adopted the LFE and have always maintained the original 7-5 system.