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***The impact of education on marriage and cohabitation. A  
causal analysis for Argentina***

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*Tesis de Maestría en Economía de*  
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**“El impacto de la educación en el matrimonio y la cohabitación. Un análisis causal para Argentina”**

Resumen

*El 14 de abril de 1993 el Congreso de la Nación Argentina aprobó la Ley Federal de Educación No 24.195, la cual implicó, entre otras cosas, un cambio significativo en la extensión de la escolaridad obligatoria, que pasó de 7 a 10 años. Este trabajo evalúa el impacto de la educación en el matrimonio y la cohabitación explotando la flexibilidad de implementación que la ley permitió, que implicó que algunas provincias aplicaran las reformas de manera rápida y masiva, mientras que otras optaran por un enfoque más gradual. Los resultados de las estimaciones sugieren un fuerte efecto negativo de la educación en la cohabitación. Además, se encuentran impactos positivos significativos sobre el matrimonio para individuos en el primer quintil de la distribución de ingresos y para la submuestra de individuos que siempre vivió en la misma provincia. Los resultados son robustos a la inclusión del partido político como covariable.*

Palabras clave: transición demográfica, matrimonio, cohabitación, educación.

**“The impact of education on marriage and cohabitation. A causal analysis for Argentina”**

Abstract

*On April 14th 1993 the Ley Federal de Educación No 24.195 was passed on the Argentinean National Congress, and among other things, it involved a significant change in the extension of mandatory education, which went from 7 to 10 years. This paper evaluates the impact of education on marriage and cohabitation by exploiting the flexibility of implementation the law allowed, which implied that some provinces enforced the reforms quickly and massively, while others decided on a more gradual approach. Estimation results suggest a strong negative effect of education on cohabitation. Moreover, significant positive impacts on marriage are found for people in the first quintile of the income distribution and for the sub-sample of individuals that*

*always lived in the same province. Results prove to be robust to the inclusion of political party as a covariate.*

Keywords: demographic transition, marriage, cohabitation, education.

Códigos JEL: I2, J1.



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# 1 Introduction

It has become clear that the patterns of couple and family formation have changed radically during the last few decades, with less people getting married and more people deciding on cohabitation as an alternative to marriage or remaining single. Although these changes have been noticed for the population as a whole, there has been a marked socioeconomic gradient. In this regard, it seems that while more educated people cohabit more than in the past, they continue getting married, although they do it at an older age. On the other hand, for the less-educated, cohabitation is more common, and it seems to have lost the stigma of social unrecognition. The consequences of these demographic patterns have been registered in terms of different variables, from people's levels of well-being, including mental and physical health, to household structure and children's well-being and development levels.

On April 14th 1993 the Ley Federal de Educación No 24.195 (Educational Federal Law in English, LFE from now on) was passed on the Argentinean National Congress. This law implicated changes in the Argentinean educational structure, and among other things, it involved a significant change in the extension of mandatory education, which went from 7 to 10 years.

The purpose of this paper is to estimate the impact of education on marriage and cohabitation. In order to do that, we exploit the flexibility of implementation the LFE allowed, which implied that some provinces enforced the reforms quickly and massively, while others decided on a more gradual approach. In this regard, exposure to treatment is defined by both individuals' birth cohort and timing of implementation of the law in each province. Regression outputs suggest that education had a strong negative impact on cohabitation. Moreover, positive and significant impacts on marriage are found for people in the first quintile of the income distribution and for the sub-sample of individuals that always lived in the same province. Results prove to be robust to the inclusion of political party as a covariate.

The remainder of the paper is organized as follows. Section 2 describes the phenomenon of the second demographic transition focusing on the changes on marriage and cohabitation patterns. Section 3 concentrates on the changes brought about by 1993's Ley Federal de Educación. Section 4 is devoted to the description of the identification strategy and the data. Section 5 presents the estimated impact of the law on marriage and cohabitation and Section 6 proposes some robustness checks. Section 7 concludes.

## 2 Second Demographic Transition

The term second demographic transition was first conceived by Lesthaeghe and van de Kaa in 1986 to refer to the demographic changes observed through Europe in the fifties and the sixties. According to the authors, the most salient feature of the period was the strong reduction observed in fertility rates, which was also complemented by a decrease in marriage rates and the emergence of new household arrangements -which involved increases in the rates of cohabitation, separation and divorce-, a disconnection between conception and legal unions, and an increase in childbearing outside marriage (Lesthaeghe, 2010; van de Kaa, 1987). At the beginning, the concept was only used to describe changes in the European configuration of households, but after some time authors started to see these demographic patterns in other developed nations -such as the United States, Canada, Australia and New Zealand-, and eventually, the use of the term was generalized for developing regions as well, such as countries from Asia and Latin America (Zaidi and Morgan, 2017).

The economic theory of marriage was pioneered by Becker in the 70' (1973, 1974, 1981), who tried

to rationalize the family paradigm corresponding to the post World War II period. According to Becker, marriage could be described as a rational arrangement between two individuals, for whom being in a joint economic union was more productive than remaining single (Goldstein and Kenney, 2001). In this regard, those considering getting married would compare the expected utility of marriage versus that of being single, with cohabitation never being even an option (Lundberg, Pollak and Stearns, 2016).

According to van de Kaa (1987, 2001) and Lesthaeghe (2010), the demographic trends of the second demographic transition were driven by the social and cultural change towards post-modern norms and attitudes -particularly those focusing on individualism and self-fulfillment- which motivated the fall and postponement of maternity, also helped by the new contraception technologies. In this regard, factors such as increased individual autonomy, the strengthening of women's role in the labor market, and the income sex gap were some of the factors that motivated these demographic changes in developed countries.

For developing countries, however, research suggests that there were other elements driving the changes. In this regard, Cerruti and Binstock (2009) mention economic crisis, unequal economic growth and social inequality for Latin America, which may have triggered women to enter the labor market when her partners were not able to. Moreover, according to Castro (2002), while in occidental societies the demographic changes of the second demographic transition are thought as part of a modernization process, and cohabitation is considered as a "test-drive" before marriage or as an alternative to being single, in Latin America, Caribbean and Sub-Saharan African countries, cohabitation may be working as a direct substitute of marriage, especially among the poorest or less-educated. In these cases the absence of a formal ceremony or a legal contract does not seem to deprive individuals from the social recognition of the union, nor does it condition their behavior towards conception.

## 2.1 Educational Gradient

Although in the last decades the mentioned demographic patterns have accelerated for individuals in every population group, there has been a clear socioeconomic gradient. In particular, evidence shows a strong correlation between individuals' socioeconomic status and their household structure and family characteristics, which respond to different roots and dynamics in each case. In particular, the pattern is quite clear in terms of marriage and cohabitation trends, existing plenty of evidence suggesting that both in developed and developing countries the declines in marriage and the increases in cohabitation are more marked for less educated individuals and vice versa (Carlson, 2018; Esteve and Florez-Paredes, 2018; Perelli-Harris and Lyons-Amos, 2016).

In this regard, research suggests that more educated couples continue to use marriage as a compromise mechanism that facilitates shared investments in children and the household, especially in more developed countries. The increase in cohabitation rates seems to be part of a pattern of delayed marriage and conception used by these couples in order to accommodate a more extensive educational period, facilitated by the generalization of contraceptive methods and the changes in cultural norms in terms of sex before marriage (Lundberg et al., 2016). On the other hand, for less educated and lower income couples shared investments seem to be less feasible, and their probability of marrying is smaller.

According to McLanahan (2004), in the United States the new set of possibilities the mainstream change of the post World War II period brought about, characterized by new identities and new contraceptive technologies, had less value for the less educated women, since they had little incentive to postpone conception and pursue a career in the labor market. At the same time,

the fall in less educated men's real salaries in comparison with their more educated counterparts, and especially with women, cut down the profits of gender division of labor inside the household for these couples (Autor and Wasserman, 2013; McLanahan, 2004). Furthermore, increases in assortative mating exacerbated these changes, since the probability of people marrying inside their own socioeconomic circle increased<sup>1</sup>.

In the case of the United States for example, Copen, Daniels and Mosher (2013) find that while in 1995 only 35% of the women interviewed for the National Survey of Family Growth had cohabited with their first couple, between 2006 and 2010 that proportion had increased to 48%. Similarly, Manning (2013) finds that while at the beginning of 2000 60% of women between 19 and 44 years old had already cohabited, this percentage accounted for 33% of women in the late 80'. Moreover, according to Lundberg et al. (2016), in 2016 27% of cohabiting couples in the United States was not married. Regarding the socioeconomic gradient, these authors also find that in 2010 marriage rates for university graduates were 12 and 17 percentage points higher than those observed for individuals who had not completed college or that had only finished secondary school respectively. Furthermore, Copen et al. (2013) observe that while between 2006 and 2010 70% of less educated women had cohabited in their first union, only 47% of more educated women had done so.

These trends have been noticed in other developed countries as well. In this regard, Perelli-Harris and Lyons-Amos (2016) find positive associations between educational levels and marriage delay in countries such as Austria, Belgium, Bulgaria, Estonia, France, Italy, Lithuania, Netherlands, Norway, Poland, Romania, Russia, Spain, the United Kingdom and the United States.

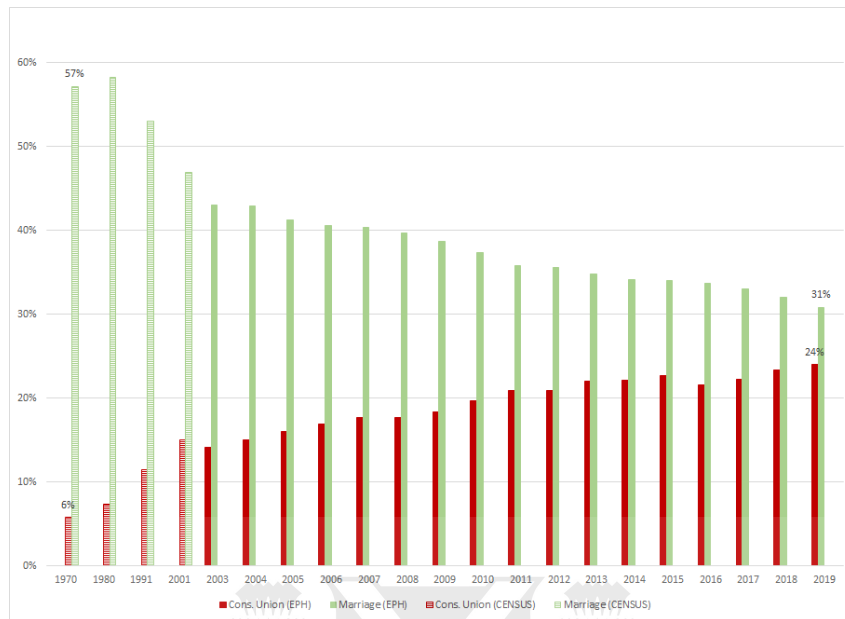
Marriage and cohabitation patterns observed for more developed countries can be found in Latin America as well, although trends are not that clear and data is less abundant. In this regard, the highest levels of cohabitation can be observed in the non-Andean regions of Andean countries -Colombia, Venezuela, Peru and Ecuador- followed by Uruguay and Central America (Esteve and Florez-Paredes, 2018). In the cases of Chile and Uruguay, for example, countries where cohabitation was not so frequent in the past, the trend more than doubled in the first decade of the XXI century, especially among the youngest (Cerrutti and Binstock, 2009). For Mexico, the proportion of married individuals aged between 20 and 30 years old fell from 40% to almost 28% in the last decades, while cohabitation increased from around 15% to 23% (Amadeo, 2019). Regarding the educational gradient, evidence shows that although in general marriage rates decreased and cohabitation rates increased for every socioeconomic levels, marriage continues to predominate among more educated couples (Esteve and Florez-Paredes, 2018).

Data from Argentina suggests that the country was not left behind in terms of these trends: while in 1970 individuals in cohabiting and married unions represented 6% and 57% of total population over 18 years old respectively, in 2010 their participation accounted for 20% and 37% respectively, reaching in 2019 24% and 31% of the total respectively (see Figure 1). In terms of education, Figure 2 shows that while in 1970 more than 60% of individuals over 18 years old with an university degree were married, only 58% of those with incomplete secondary school were as well. In 2019 these percentages were 42% and 31% respectively. Moreover, in the case of individuals with complete secondary school, the proportion married went from 51% to 26% between 1970 and 2019. Regarding cohabitation, while in 1970 less than 1% of university graduates and individuals with complete secondary school, and 6.5% of those who had not finished secondary school were cohabiting, in 2019 these groups accounted for 22%, 24% and 25% of the total respectively in each category (see Figure 3).

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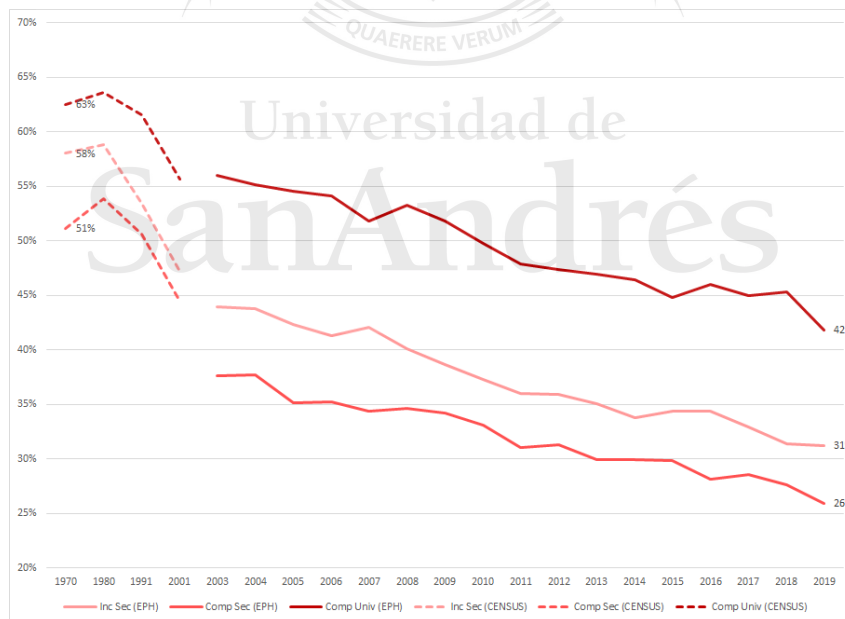
<sup>1</sup>This trend was seen for both developed and developing countries. For America Latina and Argentina, see Ganguli, Hausmann and Viarengo (2014) and Gabrielli and Serio (2017).

Figure 1: Proportion of unions and marriages in total population over 18 years old



Source: own elaboration based on Encuesta Permanente de Hogares and Censo Nacional de Población y Vivenda.

Figure 2: Proportion of marriages in total population over 18 years old by educational level

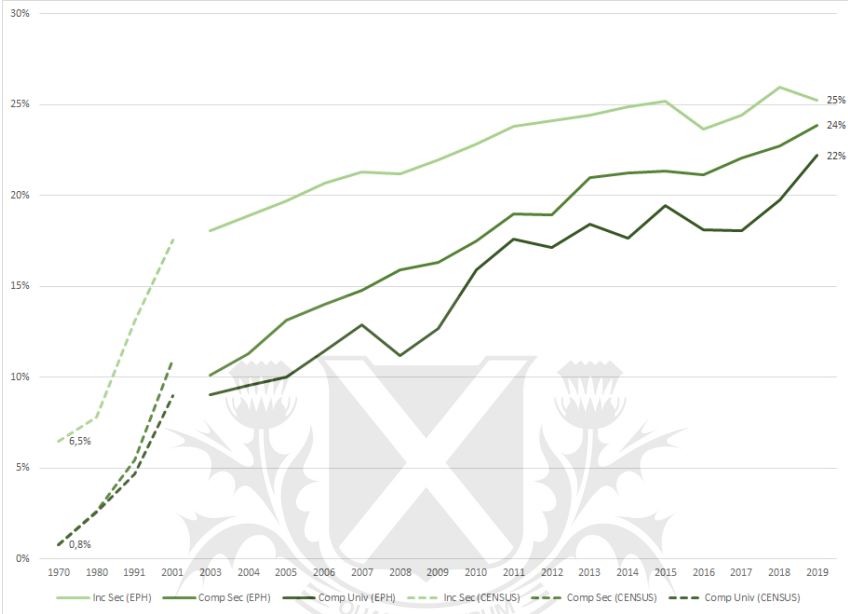


Source: own elaboration based on Encuesta Permanente de Hogares and Censo Nacional de Población y Vivenda.

This socioeconomic gradient has had tremendous consequences in terms of family formation, household structure and individuals' well-being. More educated individuals tend to marry more, have greater access to economic resources, be involved in more stable relationships –with less probability of separation and divorce–, and raise their children in more stable environments. On the other hand, men and women with lower levels of education usually have more limited

access to resources, are part of more unstable relationships –where the probability of dissolution is higher-, and have a higher probability of teenage pregnancy (Arraigada, 2007). Also, in this group the probability of having children outside marriage and with multiple partners is higher, which coupled with the greater probability of separation/divorce, it implies an increased propensity to raise children in continuously changing household structures.

Figure 3: Proportion of unions in total population over 18 years old by educational level



Source: own elaboration based on Encuesta Permanente de Hogares and Censo Nacional de Población y Vivienda.

In this regard, research shows that marriage and cohabitation patterns have strong implications on adults and their children’s well-being (McLanahan and Sandefur, 1994; Waite, 1995; cited on Goldstein and Kenney, 2001). On the one hand, literature suggests that married people tend to be better in terms of physical health. In this regard, Lillard and Waite (1995) find that both married men and women face a smaller risk of dying than those who are not married, and for women, they also find improved financial well-being. Also, the longer the union, the greater the benefits of marriage for both sexes. Furthermore, Soons, Liefbroer, Kalmijn and Johnson (2009) show that in comparison with those who stay single, married and cohabiting individuals experience higher levels of well-being, and this does not correlate with employment or the fact of having children. Also, according to these authors union dissolution seems to impact negatively on people’s well-being, and since individuals with the highest probability to separate or divorce are those cohabiting or with lower educational levels, this result would affect the most less educated and cohabiting couples. Similar results are found by Dykstra and de Jong Gierveld (2004), who show that emotional and social loneliness are key aspects of marital-history differences.

On the other hand, there is plenty of evidence showing that there is a strong association between household structure, children well-being and development, and the transmission of inequality between generations (McLanahan, 2004). In this regard, although the effects of marriage and cohabitation are in part caused by selection<sup>2</sup> into these types of unions, there is some causal

<sup>2</sup>The existence of selection effects refer to the fact that usually the characteristics of people cohabiting (marrying) are different from those of married (cohabiting) individuals, and those characteristics are what affect children’s



evidence to explore (Tommasi, Edo and Thailinger, 2020).

### 3 Educational Reform

On April 14th 1993 the Ley Federal de Educación No 24.195 was passed on the Argentinean National Congress as a part of a broader set of measures that intended to decentralize educational services from a national to a federal management, by transferring to Argentinean provinces the power of provision, administration and financing of schools. In particular, this law implicated a series of changes in the Argentinean educational structure, and among other things, it involved a significant adjustment in the educational curricula and the extension of mandatory education, with a vast reorganization of educational levels.

The seven years of primary education and the first two years of secondary school were merged and replaced by a nine-year level called Educación General Básica (EGB, Basic General Education in English), while the three last years of secondary school were restructured as Polimodal, which involved specializations students could choose from according to their interests (Economics, Biology, Communications). In this regard, while before the enactment of the law school attendance was mandatory only for the seven years of primary education -between ages 6 and 12 approximately- after the reforms were implemented, the period of compulsory education extended to ten years: one year of pre-primary education -children aged around 5- and the nine years of EGB -from ages 6 to 15 approximately-. The new period of mandatory education included children from ages 13 to 15 approximately. Figure 4 shows a comparison of the Argentinean educational system before and after the enactment of the law and the corresponding theoretical age students should have at each level<sup>3</sup>.

Figure 4: Comparison between educational systems

Before LFE		Aprox. Age	After LFE	
Pre-Primary	1°	3	1°	Pre-Primary
	2°	4	2°	
	3°	5	3°	
Primary	1°	6	1°	EGB1
	2°	7	2°	
	3°	8	3°	
	4°	9	4°	EGB2
	5°	10	5°	
	6°	11	6°	
	7°	12	7°	
Secondary	1°	13	8°	EGB 3
	2°	14	9°	
	3°	15	1°	Polimodal
	4°	16	2°	
	5°	17	3°	

Source: own elaboration based on Lopez (2012).

Since the implementation of the law was expected to increase the economic pressure over provincial resources, a budget of approximately USD 3,000 million was allocated to investments in educational infrastructure and training (Alzúa, Gasparini and Haimovich, 2010). Furthermore,

well-being beyond family structure.

<sup>3</sup>It must be bear in mind that Argentina has high over-age levels (Velázquez Battistessa, 2014).

despite of the national scope of the law, Argentinean provinces were allowed to define on their own the timing and methodology of implementation of the reforms. In this regard, the reforms were phased along the period 1996-2000, and in consequence, while some provinces enforced them quickly and massively, others decided on a more gradual approach, involving less schools each time. In some places, central aspects of the reform were never implemented, as in Ciudad Autónoma de Buenos Aires and Río Negro. This created variability both in terms of the timing and the intensity of implementation.

Table 1 shows, for each province, the timing and modality of implementation of the law. Those regions that implemented the reforms between 1996 and 1997 were grouped as “early” while those implementing the reforms from 1998 on wards were grouped as “late”. On the other hand, the definitions regarding intensity were taken from Crosta (2009): full and gradual refer to the intensity of implementation in each province from the beginning, while percentage of schools indicate the percentage of educational institutions that had implemented the reforms by 1998<sup>4</sup>.

Table 1: LFE Implementation by province

Province	Impl. Year	Early/Late	Full/Gradual	% of schools
Buenos Aires	1996	Early	Full	98.60
CABA	No Impl.	No Impl.	No Impl.	0.00
Catamarca	1999	Late	Gradual	100.00
Chaco	1997	Early	Gradual	68.20
Chubut	1999	Late	Gradual	100.00
Córdoba	1996	Early	Full	100.00
Corrientes	1997	Early	Full	28.60
Entre Ríos	1997	Early	Full	100.00
Formosa	1998	Late	Full	100.00
Jujuy	1998	Late	Gradual	5.80
La Pampa	1997	Early	Full	95.90
La Rioja	1999	Late	Gradual	100.00
Mendoza	2000	Late	Gradual	100.00
Misiones	1998	Late	Full	100.00
Neuquén	1998	Late	Gradual	0.00
Río Negro	No Impl.	No Impl.	No Impl.	0.00
Salta	1998	Late	Gradual	0.00
San Juan	1997	Early	Full	88.90
San Luis	1998	Late	Full	96.50
Santa Cruz	1998	Late	Full	100.00
Santa Fe	1997	Early	Full	1.70
Santiago del Estero	1998	Late	Full	100.00
Tierra del Fuego	1998	Late	Gradual	92.90
Tucumán	1998	Late	Full	98.70

Source: own elaboration based on Crosta (2009).

In 2007, the Ley Nacional de Educación No 26.206 (Education National Law in English) went back to the old educational structure, and involved a common design for all provinces. The mandatory period of education was extended once again, this time from 10 to 13 years, making all primary and secondary levels compulsory. According to Crosta (2009), this change may have been driven by some negative results obtained as a consequence of the 1993 educational law

<sup>4</sup>When estimating the results, those regions that did not implement the reforms –Ciudad Autónoma de Buenos Aires and Río Negro– were included in the groups late and gradual.

in terms of educational results and trajectories, possibly due to the multiplicity of educational systems among schools in different provinces.

There is a great amount of literature studying the impact of additional years of education on different outcomes. Mainly, they are related to the labor market -Acemoglu and Angrist (1999) for the United States; Oreopoulos (2007) for Canada; Duflo (2001) for Indonesia; and Alzúa et al. (2010) for Argentina-. Also, there are some others focusing on crime -Lochner and Moretti (2004) for the United States; and Lopez (2012) for Argentina-, on children's education -Black, Devereux and Salvanes (2004) in Norway-, on children's health -Chou, Liu, Grossman and Joyce (2007) for Taiwan- and on teen pregnancy -Velázquez Battistessa (2014) for Argentina-.

In terms of demographic changes, although there is substantial evidence establishing a positive association between education levels and marriage and cohabitation rates, so far there are only a few studies trying to show this in terms of causality for the United States and some countries in Europe, but there are no empirical studies for Latin America.

Evidence from the United States shows that better-educated men and women are more likely to marry than the less-educated. In this regard, using two forecasting models Goldstein and Kenney (2001) find that college-graduated women marry at higher levels in spite of the fact they are delaying their entry into first marriage. Similar results are shown by Schoen and Cheng (2006), who use a marriage propensity approach and data from Virginia, North Carolina and Wisconsin in the United States and find that marriage remains strong in all population groups, but is lower among blacks and among individuals with less than 12 years of education. Furthermore, Kalmijn (2013) analyses twenty-five European countries using logit models and finds that in countries where gender roles are more traditional, more educated women are less likely to be married than those with lower levels of education. Conversely, in gender-egalitarian countries, they are more likely to be married. For men, in more traditional countries there is no educational gradient on marriage, but it becomes positive as gender roles become more equal.

## 4 Identification Strategy and Data

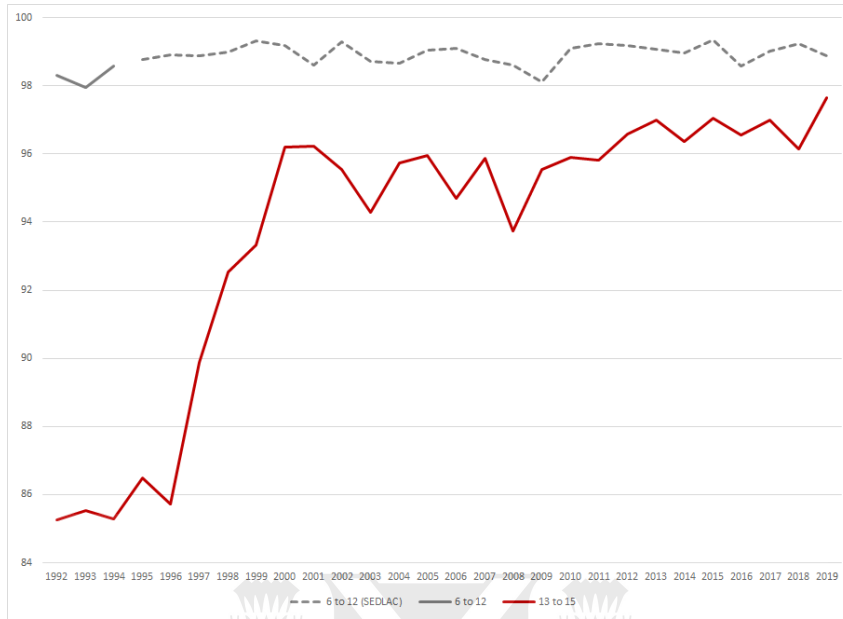
Since the LFE was part of a more general policy aiming to decentralize Argentinean educational services, despite having national coverage, each province had the flexibility to define the timing and modality of implementation of the reforms. In this regard, while some provinces enforced the changes quickly and massively, others decided on a more gradual approach, involving less schools each time. The variation in both the timing -early vs. late- and the intensity -full vs. gradual/percentage of schools affected- of the reform across Argentinean provinces is exploited in order to evaluate the impact of education on marriage and cohabitation.

To help motivate the strategy, figures 5 to 7 show the evolution of students' enrollment rate between 1992 and 2019 and its relationship with the implementation of the reforms. Figure 5 shows the enrollment rate for youngsters between 6-12 and 13-15 at a national level. In this regard, it is clear that while enrollment for the younger group -ages for which schooling was already mandatory before 1996<sup>5</sup>- is almost full and remains quite constant for the entire period considered, the enrollment rate for the older group increases, with a big jump between 1996 and 2000. Moreover, Figure 6 shows the enrollment rate for students between 13 and 15 years old but distinguishing between those provinces that implemented the reform earlier (between 1996 and 1997) and those that did it later or that never did. In this case, despite enrollment rate increases in both cases, there is a big jump between 1996 and 2000 for those provinces that implemented the reform earlier.

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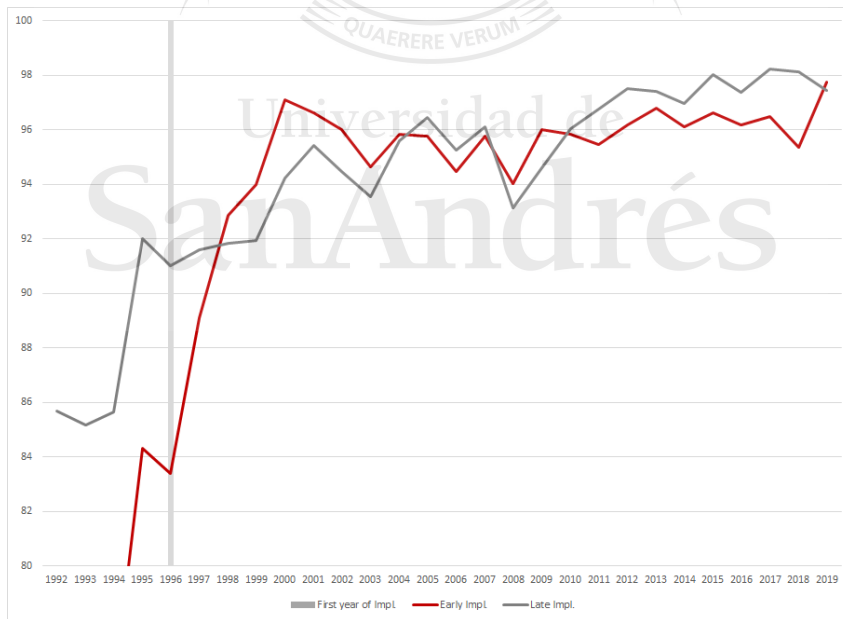
<sup>5</sup>Year in which the reforms were first implemented by some provinces.

Figure 5: Enrollment rate by age group



Source: own elaboration based on Encuesta Permanente de Hogares and SEDLAC.

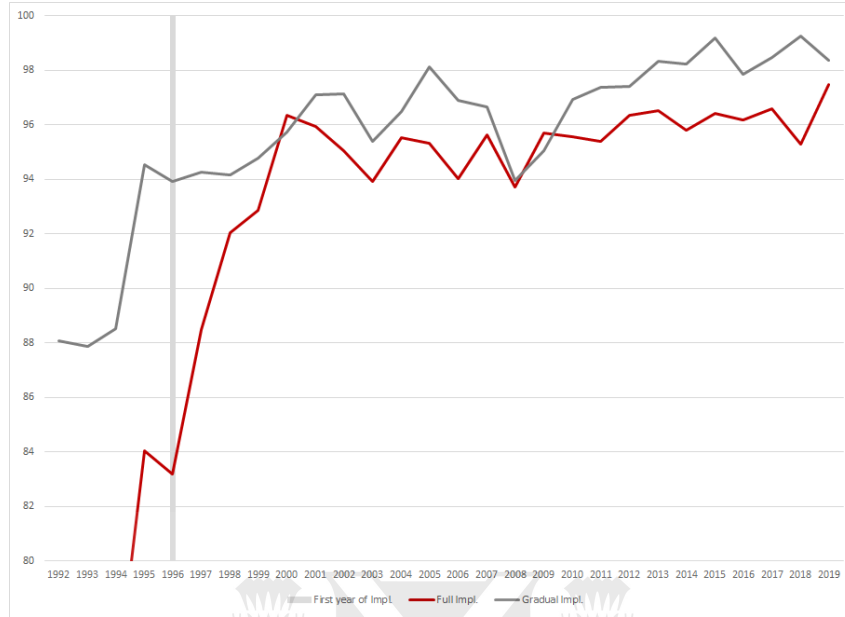
Figure 6: 13-15 year-olds' enrollment rate by implementation timing



Source: own elaboration based on Encuesta Permanente de Hogares.

Furthermore, Figure 7 shows that the enrollment rate for youngsters between 13 and 15 years old increased in all provinces, but the improvement was more significant for those regions that implemented the reform with more intensity. These results can be complemented by those suggested by Alzúa et al., (2010), who find that the educational reform had positive effects on some educational outcomes, such as years of education and high school completion.

Figure 7: 13-15 year-olds' enrollment rate by implementation intensity



Source: own elaboration based on Encuesta Permanente de Hogares.

In order to establish a causal and unbiased relationship between the variables of interest, we need an identification strategy that, conditional on an identification assumption, ensures the exogeneity of the independent variable. A simple ordinary least square (OLS) regression of marriage or union rates over education and other controls most certainly would imply biased estimations, since there would probably be elements in the error term correlated with both the dependent and independent variable. In this regard, elements such as individuals' family, upbringing, community background, and motivation are some examples of possible determinants of both schooling and union decisions.

To tackle this issue, we use the LFE as a source of exogenous variation for education, using the interaction between the cohort indicators (timing and region) and the intensity of the reforms as an instrument for education. In this regard, exposure to treatment is defined by both the timing of implementation and the birth cohort, which means that those who were treated were so because they were born in provinces that implemented the reform quickly and because given their birth cohort, they were young enough to be affected by those reforms.

The idea behind the identification strategy is that individuals in both groups are on average equal in their characteristics, and they only differ in terms of the treatment status, that is, more years of education. In this regard, if differences were to be seen between the two groups when evaluating the impact of education on individuals' behavior regarding marriage and cohabitation, these would only be a consequence of the implementation of the reform. This way, the controls' behavior is a good contrafactual of the behavior treated individuals would have had if they had not been treated. Then, the causal relationship will be structured comparing treated and control subjects through an OLS regression.

We use a difference-in-difference approach similar to the one adopted by Alzúa et al. (2010), who tried to estimate the impact of the LFE on different educational and labor market outputs, and by Duflo (2001), who tried to measure the effect of an Indonesian school construction program on educational outcomes as well. The OLS regression is as follows:

$$Y_{ijk} = \alpha_j + \beta_k + \theta_1 X_j + \theta_2 X_i + \gamma (P_j * T_j) + e_{ijk}$$

where,

$Y_{ijk}$  is the outcome of interest of individual  $i$  (marriage, cohabitation), living in province  $j$ , belonging to cohort  $k$ ;

$\alpha_j$  is the province fixed effect;

$\beta_k$  is the cohort fixed effect;

$X_j$  is the vector of characteristics of province  $j$ ;

$X_i$  is the vector of characteristics of individual  $i$ ;

$T_{jk}$  is the treatment; equal to 1 if individuals are treated according to province and cohort and 0 otherwise;

and  $P_j$  is the intensity of the LFE implementation in the province.

Following Alzúa et al., (2010), birth cohorts are defined according to individuals' exposure to the reforms. The idea behind the construction of the cohorts is that in the new mandatory school levels, namely years 8 and 9 in the EGB, children would be approximately between 13 and 15 years old. Since children that in 1996 were already attending secondary school under the previous educational structure were not affected by the reforms, the effect was mostly concentrated among those who were in primary school and were younger than 13 years old. "Young" cohorts in Table 2 represent those individuals young enough to be affected by the reforms, while "Old" cohorts represent those too old to be affected. In order to make the estimations more robust, and to consider possible problems with grade repetition, different definitions of cohorts were used.

Table 2: Birth cohorts

Cohort	Young	Old
1	8 9 10 11 12	14 15 16 17 18
2	8 9 10 11	15 16 17 18
3	11 12 13	14 15 16

Notes: ages in 1996.

Source: own elaboration based on Alzúa et al. (2010).

On the other hand, the intensity of the LFE implementation in each province is measured by two variables (Alzúa et al., 2010). The first one is a dummy variable that indicates if the province had a full implementation of the reforms since the beginning or not –full vs. gradual-. The other, refers to the share of schools that had adopted the reform by 1998. Both definitions are used in order to give more robustness to the estimations.

Control variables are measured at a provincial level and are the following: education spending per student, unemployment, school enrollment, school enrollment among students between 13 and 15 years old, and mean income. Also, we use individual's age and sex.

Despite the fact that the unit of observation is the individual, variability in terms of exposition to treatment is defined by both province and birth cohort. Since we are using province of residence in order to define treatment, this may represent an issue if internal migration is high.

Own calculations suggest that the proportion of people not living in the same province they were born varied from 17% to 16% between 2003 and 2018 respectively at a national level. In this regard, to provide more robustness to our estimates, different specifications are used, where individuals are linked both to their province of residence and their province of origin when defining treatment.

Moreover, since the structure in the application of the reforms established by the LFE was not assigned randomly among provinces, one issue that may work against our identification strategy is provincial governments' choice in terms of when and how to implement the changes. In this regard, if their decision were to be correlated with unobservable variables that also affect the decision to marry or to cohabit, there would be a problem with the exogeneity of the treatment. Alzúa et al. (2010) estimate a hazard model of the probability of implementing the reform, and find that the only significant variable is provincial governments' political party. In this regard, when political party is included as a covariate to control for this possible issue, results remain the same (see Table 8 at the Annex).

The primary source of information is the Argentinean household survey, Encuesta Permanente de Hogares (EPH), using conglomerates as a representation of provinces<sup>6,7,8</sup>. Also, data on reform intensity is gathered from Crosta (2009). Regarding the education spending per student, information was taken from CGECSE, SsPPI, SE, Ministerio de Educación de la Nación and DINIECE. The period considered for the evaluation goes from 2003 to 2018. In this regard, if we consider that the oldest student affected by the reform was around 13 years old in 1996, this student would have had 20 years old in 2003 and 35 in 2018. According to own calculations based on the national census, Censo Nacional de Población y Vivienda, in 2001 the average age to marry or to start cohabiting was around 25, which fits with the selected time frame. Summary statistics are found in Table 3.

Table 3: Summary statistics

Variable	mean	sd	min	max
Educ. Level	3.08	1.66	1.00	6.00
Educ. Level 13-35 years old	3.73	1.34	1.00	6.00
Enrollment rate 6-12 years old	0.99	0.09	0.00	1.00
Enrollment rate 6-12 years old	0.96	0.20	0.00	1.00
Unemployment rate	0.08	0.27	0.00	1.00
Unemployment rate 15-35 years old	0.12	0.32	0.00	1.00
Marriage	0.26	0.44	0.00	1.00
Marriage 15-35 years old	0.13	0.33	0.00	1.00
Cohabitation	0.13	0.34	0.00	1.00
Cohabitation 15-35 years old	0.21	0.41	0.00	1.00
Income	1716.65	4751.03	0.00	250000.00
Income 15-35 years old	1719.64	4095.29	0.00	220000.00

Source: own elaboration.

<sup>6</sup>Although the EPH only covers urban population, the share of rural population in Argentina is small. In 2010 it was less than 9% (Instituto Geográfico Nacional, 2010).

<sup>7</sup>Between 1992 and 2018 conglomerates covered by the EPH changed. Data considers available information each year.

<sup>8</sup>The conglomerate San Nicolás/Villa Constitución was classified as part of Buenos Aires province.

## 5 Results

In order to provide more robustness to the evaluation results, different samples and cohort definitions are used. The samples considered are: all individuals, women, men, and individuals in the first and fifth quintiles in the income distribution. Also, three cohort definitions are considered (see Table 2). Outcome variables are marriage and cohabitation.

Estimation results are presented in tables 4 and 5. In both cases, the effects of the educational reform on marriage and cohabitation are captured by the interaction between two variables: a dummy variable identifying affected cohorts -both by individuals' age and timing of implementation of the reforms in the province they live in-, and a variable measuring the intensity of the reform. Results in Table 4 use a single binary variable to measure intensity: full vs. gradual depending on how generalized the implementation of the reforms was since the beginning in each province. Results in Table 5 use the percentage of schools that had adopted the reforms by 1998 in each province as a measure of intensity.

Results do not vary significantly between cohorts and definitions of intensity. Regarding the full/gradual definition, the Ley Federal de Educación had a negative and significant impact on cohabitation: an additional year of education increased cohabitation by a 20.8% to a 22.5% depending on the cohort definition. Similar results are obtained when working with gendered samples: for both men and women results for cohabitation are also negative and significant at a 99.9% and vary from 17.1% to 23% and from 20% to 24.5% respectively. Regarding the effects of education on marriage, results have a greater deviation but all of them are non-significant for these three sub-samples. For cohort 3 they are positive, while for the others, it depends on the sample definition.

Table 4: Impact of educational reform on marriage and cohabitation  
Full/Gradual

	Cohort 1	Cohort 2	Cohort 3	Cohort 1	Cohort 2	Cohort 3
	Marriage			Cohabitation		
All	0.017 (0.50)	-0.022 (-0.60)	0.066 (1.52)	-0.225*** (-6.15)	-0.208*** (-5.41)	-0.216*** (-6.04)
<i>N</i>	75068	60901	43574	75068	60901	43574
Women	-0.002 (-0.07)	-0.033 (-0.95)	0.046 (0.85)	-0.220*** (-4.55)	-0.245*** (-4.90)	-0.200*** (-4.53)
<i>N</i>	38284	31067	22211	38284	31067	22211
Men	0.037 (0.92)	-0.011 (-0.26)	0.088 (1.41)	-0.230*** (-5.80)	-0.171*** (-3.66)	-0.228*** (-4.74)
<i>N</i>	36784	29834	21363	36784	29834	21363
Quintile 1	0.006 (0.15)	-0.046 (-1.22)	0.253*** (3.89)	0.095 (1.01)	0.222* (2.16)	-0.118 (-1.27)
<i>N</i>	11718	9590	6451	11718	9590	6451
Quintile 5	-0.113** (-2.77)	-0.163*** (-5.28)	-0.144* (-2.29)	-0.328*** (-3.65)	-0.353*** (-3.69)	-0.222* (-2.36)
<i>N</i>	16134	12980	9648	16134	12980	9648

Standard errors clustered at the provincial level.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$



When looking at samples by income distribution quintiles, regression outputs change a little. For the first quintile, results depend mostly on cohort definition. Effects of education on cohabitation are only negative for cohort 3, but they are not significant. For the other two cohorts they are positive, and for cohort 2, also significant at a 95%. This may be related with the fact that poorer people are usually also the less-educated, which is correlated with a greater probability of cohabitation. Regarding results on marriage, they also vary depending on the cohort definition. For cohorts 1 and 3 they are positive and for cohort 3 also significant.

For the fifth quintile, effects of education on both marriage and cohabitation are all negative and significant. The results on marriage may be driven by the fact that wealthier people also tend to be more educated, which is usually correlated with the postponement of marriage in order to fit a longer educational period. In this regard, it may be that if our sample included more years after 2018, results would be a little different since they will include older people -more prone to be married- affected by the reforms.

Table 5: Impact of educational reform on marriage and cohabitation  
Percentage of schools

	Cohort 1	Cohort 2	Cohort 3	Cohort 1	Cohort 2	Cohort 3
	Marriage			Cohabitation		
All	0.000 (0.50)	-0.000 (-0.60)	0.001 (1.52)	-0.002*** (-6.15)	-0.002*** (-5.41)	-0.002*** (-6.04)
<i>N</i>	75068	60901	43574	75068	60901	43574
Women	-0.000 (-0.07)	-0.000 (-0.95)	0.000 (0.85)	-0.002*** (-4.55)	-0.002*** (-4.90)	-0.002*** (-4.53)
<i>N</i>	38284	31067	22211	38284	31067	22211
Men	0.000 (0.92)	-0.000 (-0.26)	0.001 (1.41)	-0.002*** (-5.80)	-0.002*** (-3.66)	-0.002*** (-4.74)
<i>N</i>	36784	29834	21363	36784	29834	21363
Quintile 1	0.000 (0.15)	-0.000 (-1.22)	0.003*** (3.89)	0.001 (1.01)	0.002* (2.16)	-0.001 (-1.27)
<i>N</i>	11718	9590	6451	11718	9590	6451
Quintile 5	-0.001** (-2.77)	-0.002*** (-5.28)	-0.001* (-2.29)	-0.003*** (-3.65)	-0.004*** (-3.69)	-0.002* (-2.36)
<i>N</i>	16134	12980	9648	16134	12980	9648

Standard errors clustered at the provincial level.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

With the second definition of intensity, percentage of schools affected by the reform by 1998, results are similar to the ones obtained before but smaller. The effects of education on cohabitation for the full sample and the gendered samples are also negative and significant at a 99.9% but they are always smaller, around 0.2%. Moreover, results on marriage are non-significant and almost zero in all cases. For income samples, estimation outputs are also similar to the ones obtained before but smaller.

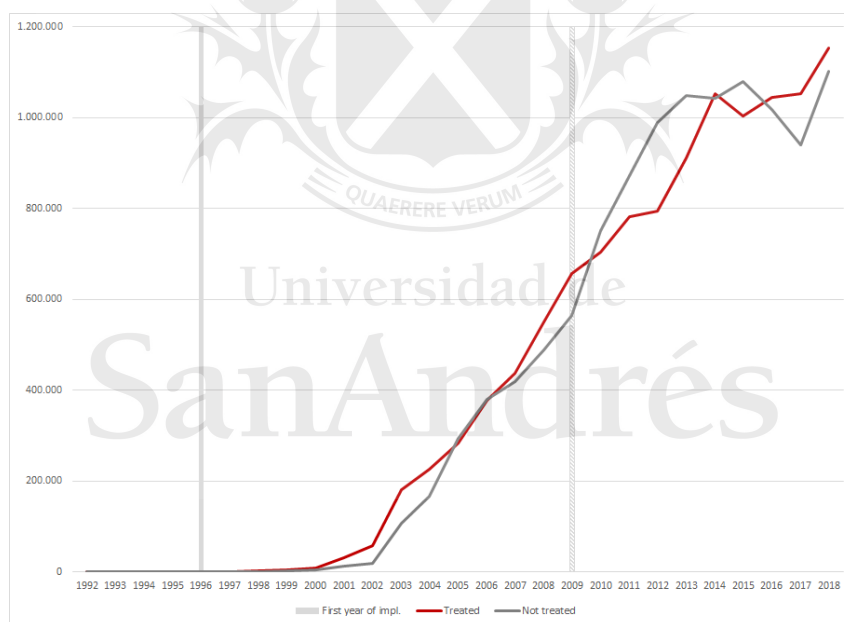
## 6 Robustness Checks

### 6.1 Parallel Trends

The suggested effects of education on cohabitation are supported by the analysis of treated and non treated individuals' trends in terms of informal unions<sup>9</sup>. As shown in Figure 8, between 1992 and 2009 approximately, cohabitation trends for both groups move in parallel: before the implementation of the reforms in 1996 affected students are too young to be in informal unions; and after, cohabitation increases for both groups similarly.

Because of the nature of the outcome variable, it is actually expected that the effects of the reforms do not appear until after several years. In this regard, in 2009, when students affected by the reforms are between 21 and 26 years old, trends start to diverge, and cohabitation for treated individuals continues increasing but at a lower pace than cohabitation for the non-treated, as theory predicts. This result could not have been driven by the 2007 Education Law because of two factors: usually, it is the first impact the one that counts for the most, in this case, the first extension of mandatory education in 1993; and children affected by the 2007's reforms are still too young to cohabit in 2009 and thereafter.

Figure 8: Parallel trends in cohabitation



Source: own elaboration.

### 6.2 Internal Migration

As mentioned previously, since treatment is defined by individuals' age and province of residence, if internal migration were to be high, this could represent an issue in terms of the identification strategy. In this regard, to provide more robustness to the results, estimations are also made for a sub-sample of individuals that never moved and continue living in the same province they were born. Both definitions of intensity are used.

Estimations show that the effect of education on cohabitation continues to be negative and

<sup>9</sup>Full/gradual definition of intensity was used.

significant at 99.99%. Results vary between 19.8% and 23% for the first specification and around 0.2% for the second. On the other hand, for one of the cohort definitions the effect is also significant on marriages at a 99%: an extra year of education increases marriages by 11.4% and 0.1% for the first and second specifications respectively.

Table 6: Impact of educational reform on marriage and cohabitation  
Treatment by province of origin

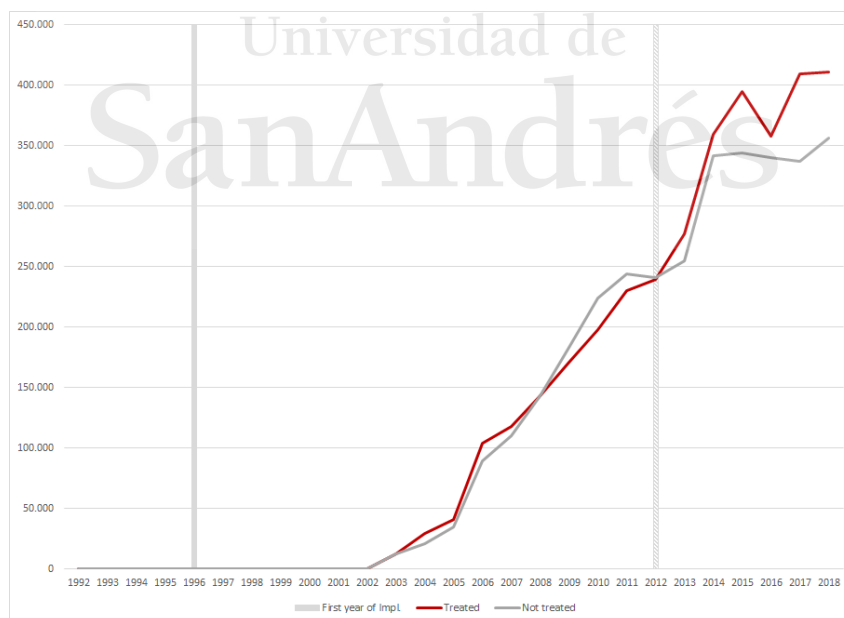
	Cohort 1	Cohort 2	Cohort 3	Cohort 1	Cohort 2	Cohort 3
	Marriage			Cohabitation		
Full/Gradual	0.048	0.008	0.114**	-0.222***	-0.198***	-0.230***
	(1.23)	(0.20)	(2.59)	(-5.80)	(-4.63)	(-6.05)
<i>N</i>	64357	52456	36695	64357	52456	36695
Percentage of schools	0.000	0.000	0.001**	-0.002***	-0.002***	-0.002***
	(1.23)	(0.20)	(2.59)	(-5.80)	(-4.63)	(-6.05)
<i>N</i>	64357	52456	36695	64357	52456	36695

Standard errors clustered at the province level.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

These results in terms of marriage are supported when analyzing trends for treated and non-treated individuals. As Figure 9 suggests, after 2012 marriage trend for treated individuals starts increasing at a more rapid rate than that of non treated individuals<sup>10</sup>.

Figure 9: Parallel trends in marriage  
Treatment by province of origin



Source: own elaboration.

<sup>10</sup>Full/gradual definition of intensity was used.

### 6.3 Conglomerates

Table 7 shows estimation results for the sub-sample of conglomerates for which data was available from 1992 to 2018. The effect of education on cohabitation continues to be negative and significant, although for cohort 3 it is less strong than in the original specification. The effect of education on marriage continues to be positive but non-significant for the first definition of intensity, and it is almost equal to zero for the second one.

Table 7: Impact of educational reform on marriage and cohabitation  
Same conglomerates

	Cohort 1	Cohort 2	Cohort 3	Cohort 1	Cohort 2	Cohort 3
	Marriage			Cohabitation		
Full/Gradual	0.061	0.040	0.033	-0.229***	-0.216***	-0.122**
	(1.47)	(1.00)	(0.53)	(-6.14)	(-4.81)	(-3.15)
<i>N</i>	44083	35684	25540	44083	35684	25540
Percentage of schools	0.001	0.000	0.000	-0.002***	-0.002***	-0.001**
	(1.47)	(1.00)	(0.53)	(-6.14)	(-4.81)	(-3.15)
<i>N</i>	44083	35684	25540	44083	35684	25540

Standard errors clustered at the province level.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

## 7 Conclusions

There is a great deal of literature discussing the effects of education on family formation patterns. However, there has not been solid evidence of the causal effect of education on marriage and cohabitation beyond some correlations and probabilistic models. This paper contributes to the measurement of that relationship for Argentina, by exploiting the characteristics of the Ley Federal de Educación No 24.195, which allowed for a variation in both timing and intensity of implementation.

The results suggest a strong negative impact of education on cohabitation for almost all sample choices. These results uphold when using different definitions of intensity and for both a sub-sample of people that always lived in the same province, and a conglomerate-homogeneous sub-sample. Also, positive and significant effects on marriage are found for people in the first quintile of the income distribution and when restricting the sample only to those individuals who always lived in the same province. Results prove to be robust to the inclusion of political party as a covariate.

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## 9 Annex

Table 8: Impact of educational reform on marriage and cohabitation  
Political party as a covariate

	Cohort 1	Cohort 2	Cohort 3	Cohort 1	Cohort 2	Cohort 3
	Marriage			Cohabitation		
Full/Gradual	0.018	-0.021	0.066	-0.221***	-0.206***	-0.213***
	(0.53)	(-0.58)	(1.48)	(-6.34)	(-5.54)	(-5.92)
<i>N</i>	75068	60901	43574	75068	60901	43574
Percentage of schools	0.000	-0.000	0.001	-0.002***	-0.002***	-0.002***
	(0.53)	(-0.58)	(1.48)	(-6.34)	(-5.54)	(-5.92)
<i>N</i>	75068	60901	43574	75068	60901	43574

Standard errors clustered at the province level.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$