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**The collateral effects of private school expansion  
in a deregulated market: Peru, 1996-2019**

José María RENTERÍA

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# The collateral effects of private school expansion in a deregulated market: Peru, 1996-2019

José María Rentería\*

## Abstract

This paper explores the mid-term effects of the *de facto* privatization that has taken place in the Peruvian educational system. It exploits exogenous policy shocks as well as two sources of variation, namely the geographical location of the new private schools and the year of birth of individuals. Both variables determine the degree of exposure to the private school expansion process. The results suggest that this phenomenon has contributed neither to increasing access to formal education nor to improving wages in the labor market. This evidence raises concerns about the impact of privatization on the quality of the education system as a whole as well as the regulatory role of the State.

**Keywords:** Private education, school choice.

**JEL classification:** I21, O15, O22.

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# 1 Introduction

Education privatization refers to the provision of educational services by non-government institutions, whether for-profit or non-profit (Levin, 2001). This type of educational provision has in the last few decades significantly expanded at all educational levels in developing countries.<sup>1</sup>

While this phenomenon constitutes a global trend, the Peruvian case is considered one of the most radical (Balarin & Escudero, 2019). Indeed, especially thanks to a law enacted in the mid-1990s (namely the Legislative Decree N° 882 “Law to Promote Investment in Educational Services”, hereafter DL882), the privatization process in this country has ensued with little intervention from the state and without clear public policies for promoting quasi-markets.<sup>2</sup> Moreover, although families have absolute freedom regarding school choice, they are not backed by public funding, transparent information, or appropriate regulation. These have led some to describe this process as privatization “de facto” or “by default” (Balarin, 2016).

At the global level, evidence on the consequences of educational privatization is still inconclusive and apparently case-specific (Urquiola, 2016). On the one hand, some have argued that the rise of private education fosters universal access and increases quality through higher market competition (Tooley, 1995; Tooley, Dixon, & Gomathi, 2007). On the other, others point out that it increases segregation, weakens educational systems, and may even generate socially undesirable actions (Romero, Sandefur, & Sandholtz, 2020; Sarangapani & Winch, 2010). In this sense, it may constitute “a key challenge to the conception of education as a basic human right and a public good” (Verger, Fontdevila, & Zancajo, 2016, p.3).

Current knowledge is, however, incomplete.<sup>3</sup> For instance, the extent and nature of the heterogeneity within the group of private schools is still largely unexamined. Furthermore, no typology of private schools exists that takes account of such dimensions as their infrastructure, fees, and pupils’ learning achievement.<sup>4</sup> At the same time, little is known about the reasons that households may have for choosing low-fee private schools instead of tuition-free public education.

This paper aims to estimate the causal effects of the increase in the supply of private schools on educational and subsequent labor market outcomes in one country. It exploits the exogenous policy reforms that occurred in Peru during the 1990s, as part of the broader movement toward a more liberalized economy.<sup>5</sup>

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<sup>1</sup>However, it is worth noting that “policies toward private schools in developing countries vary widely, from outright prohibition (Cuba, Sri Lanka) to heavy subsidization (Chile). Consequently, in some countries (Algeria, Mongolia, Tanzania), less than 1 percent of primary school students are enrolled in private schools. In other countries (Chile, Pakistan, Zimbabwe), nearly one half or more are enrolled in private primary schools” (Glewwe & Kremer, 2006, p.964).

<sup>2</sup>Quasi-markets are hybrid forms for public sector provision that use “market philosophies and business sector practices in the delivery of government funded services” (Carey, Malbon, Green, Reeders, & Marjolin, 2020, p.30).

<sup>3</sup>See Day Ashley et al. (2014) for a compelling review of developing countries’ experiences.

<sup>4</sup>However, it is worth mentioning that the Ministry of Education recently published a work classifying private schools on the basis of their fees (see Minedu, 2018).

<sup>5</sup>At the time, Alberto Fujimori was a presidential candidate advocating gradual stabilization

In particular, for the first time in Peruvian history, a law (DL882) was promulgated that allowed private schools to operate on a for-profit basis, and, in addition, offered tax credits to investors.

The empirical strategy here chosen builds on the seminal paper by [Duflo \(2001\)](#), who evaluated the effects of a large public school construction program on education and earnings in Indonesia.<sup>6</sup> However, it differs from Duflo's paper in several ways. First, it takes into account the effects of public and private sector expansion in turn. Second, it considers secondary education because it still had space to increase provision, unlike primary education, which had already good indicators in the Peruvian context. Third, it has been able to observe different cohorts at exactly the same age, thanks to the span of the data available. Finally, it studies the phenomenon as a continuous process rather than as a response to a single shock.

The identification strategy exploits two sources of variation that determine the individuals' degree of exposure to the privatization process: the year of birth and the province of birth.<sup>7,8</sup> This sort of natural experiment provides the framework for the causal evidence. Furthermore, the methods that were deployed account for other competing mechanisms such as the Juntos Conditional Cash Transfer Program, and changes in labor regulations, as well as Peru's sustained levels of economic growth and poverty reduction.

Using rich national household surveys, yearly applied since 2004, the degree of exposure to the treatment, and several educational and labor market outcomes, were observed. Survey data were complemented by information from the School Census (1993, 1998-2019) and the Population Census (1993, 2007, 2017).

The results show that the provinces with an initial intense presence of private schools are those where the private expansion showed the greatest increase. The results also suggest that the treatment has had a negative effect on the outcomes under study. This finding is somewhat counter-intuitive, at least for secondary completion, since one would have expected that more private schools would increase access to formal education and competition, thereby raising quality and human capital. However, the findings of the present paper are in line with several recent studies (both qualitative and quantitative) that point to an important expansion of low-fee (and at the same time low-quality) educational institutions and to their negative

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instead of the austerity and liberal reforms advocated by his opponent, Mario Vargas Llosa. However, Fujimori "abandoned virtually every economic proposal laid out in [his] campaign once [he] won office and replaced them with policies proposed by [his] rival candidate on the right" ([Stokes, 1997](#), p.210). Thus, these were unexpected reforms.

<sup>6</sup>Recent extensions include [Akresh, Halim, and Kleemans \(2022\)](#) and [Mazumder, Rosales-Rueda, and Triyana \(2019\)](#).

<sup>7</sup>As of December 2019, Peru's territory is divided into 24 departments, which are subdivided into provinces (196) composed of districts (1,874). These numbers have evolved throughout the country's history; see [INEI \(2020, p.23\)](#).

<sup>8</sup>According to the 2017 Population Census, 71% of basic education students attend a school located in their district of birth. The percentage with regard to the province of birth must be higher because it is a larger administrative division. Unfortunately, I could not calculate this percentage at the level of province of birth because of query restrictions in the open data available at <https://censos2017.inei.gob.pe/redatam>.

consequences in the labor market.

The rest of the paper is organized as follows. First, some elements of the context are presented, including some stylized facts and a description of the regulatory background (section 2). Then, the data and methods for estimating the effects of expanding private supply are described (section 3). Next, the main results are presented (section 4) followed by a number of robustness checks (section 5). Finally, a discussion, with concluding remarks and implications for public policy, is provided (section 6).

## 2 Background

### 2.1 Stylized facts

The Peruvian basic education system is composed of both private and public schools. In 2021, there were 53,627 schools (25.8% private) in which 6,496,208 students in total were enrolled (21.8% in the private sector).<sup>9</sup>

The rise of the private sector shares is a relatively recent, and primarily urban, phenomenon. It is particularly concentrated in major cities (cf. Figure 1).<sup>10</sup> Since 1998, the enrollment rate in those schools has doubled, representing at present a third of total enrollment at the country level (cf. Figure 2), and a half in the capital, Lima.<sup>11</sup>

More particularly, in the case of secondary education, the number of schools has increased consistently, since 1990 at least. Consequently, the ratio of private to public schools followed the same pattern and stabilized around 2005, as depicted in Figure 3. However, a more dramatic change may be observed in the enrollment ratio. Indeed, around the same year, 2005, a remarkable increase in this indicator favored the private sector, increasing from 0.20 to a peak of nearly 0.35 ten years later.

According to [Guadalupe et al. \(2017, p.48\)](#), private sector expansion occurred alongside three simultaneous phenomena: (i) sustained levels of economic growth and poverty reduction (and therefore more purchasing power at the household level for private educational services); (ii) regulatory changes during the 1990s, allowing the supply of for-profit private education; and (iii) a drastic loss of public school prestige. As reported in the next section, the roots of the private share explosion can be traced to a law enacted in the mid-1990s.

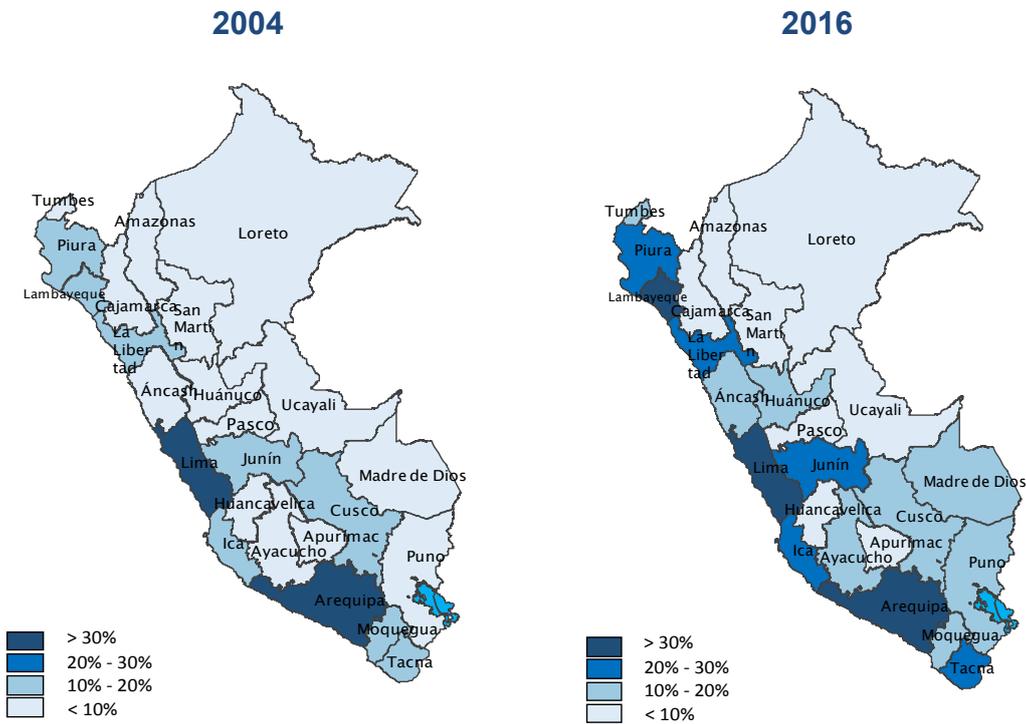
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<sup>9</sup>Magnitudes for primary plus secondary levels. See <http://escale.minedu.gob.pe/magnitudes>

<sup>10</sup>The literature dealing with this topic is still scarce and almost exclusively qualitative. Some contributions include [Balarin, Kitmang, Ñopo, and Rodríguez \(2018\)](#); [Cuenca \(2013\)](#); [Guadalupe, León, Rodríguez, and Vargas \(2017\)](#); [Sanz \(2014\)](#).

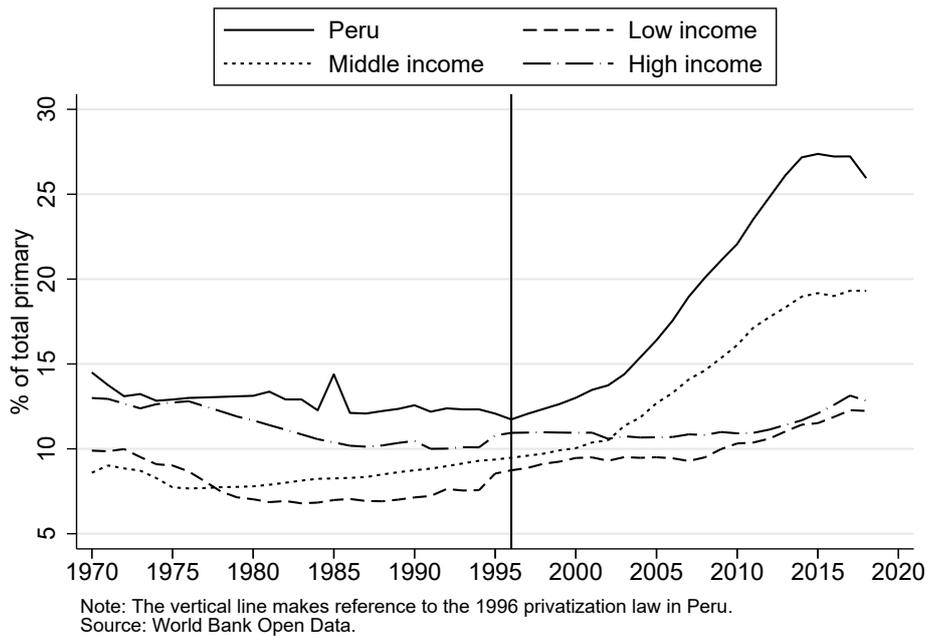
<sup>11</sup>In this metropolis, the number of private schools doubled between 2004 and 2012. The schools spread all over the city, including marginal poor areas, as Figure D.1 shows.

**Figure 1:** Peru: Enrollment in private schools, 2004-2016 (% of total enrollment)

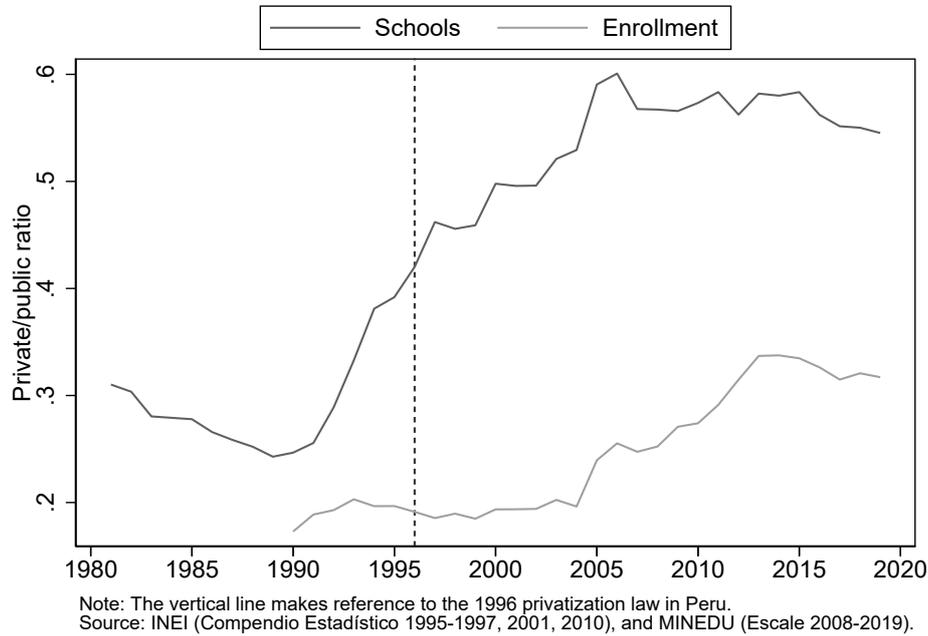


Source: Balarin (2017, p.17).

**Figure 2:** Private sector participation in total enrollment, 1970-2018 (selected countries)



**Figure 3:** Secondary level: Schools and enrollment private to public ratio, 1990-2019



## 2.2 Regulation

During the authoritarian government of Alberto Fujimori (1990-2001), several reforms were implemented in order to develop a neoliberal free-market economy.<sup>12</sup> The country “experienced one of the fastest trade liberalization processes and one of the deepest labor market reforms in Latin America. These reforms were accompanied by a downsizing of the public sector, the start of a privatization process, the abolition of all state-owned monopolies, and a tax reform. In addition, restrictions to capital account transactions were eliminated while the financial sector was deregulated” (Saavedra & Torero, 2004, p.131).<sup>13</sup> In this context, the process of deregulation and privatization made no exception for the education sector.

From 1991 to 1996, at least three attempts, inspired by the Chilean experience, were made to massively privatize basic education.<sup>14,15</sup> However, they faced strong opposition from teachers and civil society and were not implemented.

Nevertheless, at the end of 1996, the “Law to Promote Investment in Educational

<sup>12</sup>For a chronology of educational policies in Peru, see Balarin (2005, pp.126-142) for the period 1990-2004, as well as Balarin (2017, pp.30-46) for the period 1995-2017. For a compelling description of the evolution of the Peruvian educational system, see Guadalupe et al. (2017). Likewise, see Sanz (2014, pp.47-60) for a summary focusing on the period 1950-2011, and Haddad (1994, pp.33-71) for the period 1968-1980.

<sup>13</sup>More details regarding labor market regulation during this period are provided in Appendix B.

<sup>14</sup>Table 1 summarizes the main legislation acts on the topic for the period 1990-2006.

<sup>15</sup>Some works dealing with the Chilean case include Carrasco and Gunter (2018); Elacqua (2012); Epple, Romano, and Urquiola (2017).

**Table 1:** Chronology of legislation associated with educational privatization

Type	Code	Year	Description	Status
Legislative Decree	699	1991	Transfer of schools to promoters (“transfer of use”)	Not passed
Legislative Decree	26011	1994	Transfer of schools to COMUNED (municipalities and parents)	Not passed
Legislative Decree	26012	1994	Educational financing	Not passed
Legislative Decree	26013	1994	Coverage expansion	Not passed
Law	26549	1995	Law of private educational institutions	Current
Legislative Decree	882	1996	Law to promote investment in educational services	Current
Supreme Decree	004-98-ED	1998	Regulation of infractions and sanctions for private educational institutions	Repealed in 2021
Supreme Decree	007-98-ED	1998	Regulation of transformations for private educational institutions	Current
Law	27665	2002	Law on the protection of the family economy regarding the payment of fees in private educational centers	Current
Law	28044	2003	General law on education	Current
Supreme Decree	009-2006-ED	2006	Regulation of private educational institutions of basic and vocational education	Repealed in 2021
Supreme Decree	005-2021	2021	Regulation of private educational institutions of basic education	Current

Source: [Cuenca \(2013, p.79\)](#) and the Education Legal Information System (SIJE). Author’s elaboration.

Services” (DL882) was finally enacted. This law was promoted as a solution to the problem of the public sector’s incapacity to satisfy the increasing demand. Indeed, it was presented as a policy that would modernize the education system and increase its supply and coverage. The DL882 powerfully implemented the deregulation of private educational activities, “allowing private schools to operate on a for-profit basis, and offering tax credits to investors” (Balarin, 2015, p.11).<sup>16</sup> In this context, “private education, once the preserve of economic elites, has become the choice of the emerging middle-classes, and also of many poor families who can now access low fee private schools” (Balarin & Escudero, 2019, p.2).<sup>17</sup>

After the end of the authoritarian regime and the transition to democracy, the “General law of education” was promulgated in 2003. One of the main features introduced by this law is related to the functions of regulating and supervising the quality of education provision (Leyva, 2017, p.92). Indeed, it devolved this responsibility to decentralized agencies.<sup>18</sup> In particular, these decentralized agencies were now in charge of authorizing the opening of new private schools. But they were not prepared for their new responsibilities because they lacked economic, human, and administrative resources. As a consequence, private schools proliferated in a disorderly way, nourished by the “silence procedure” applied to them.<sup>19</sup>

More details on the evolution of this regulation are provided by Balarin (2017). However, it is worth pointing out that “the regulations have been erratic, and over time the choice has been a scheme of regulatory patching in an attempt to plug the gaps generated by the DL882 and remedy the unwanted practices provoked by those gaps, such as informality, abuses in the collection of fees, discriminatory conditions for school enrollment, etc.” Balarin (2017, pp.34-35, *author’s own translation*). Moreover, regulation was not exclusively in charge of the Ministry of Education. Other actors, such as the Parliament and the Agency for Competition and Consumer Protection<sup>20</sup> also passed initiatives concerning private education.

In this context, the Peruvian educational market has experienced a “de facto” privatization behind the State. In this market, parents can freely choose which school their child should attend. There is no geographical restriction, such as other countries impose. On the contrary, parents can choose any tuition-free public school<sup>21</sup> or any private school they can afford. In this regard, “Peru may qualify as a radical example in the global trend to develop markets in education. [Indeed,] families’

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<sup>16</sup>Tax relief was promoted but no direct public funding.

<sup>17</sup>Regarding the higher education market, it has been documented that increased access after deregulation came at the cost of a deterioration in the quality supplied (Yamada, Lavado, & Martínez, 2015).

<sup>18</sup>Unidad de Gestión Educativa Local (UGEL), whose jurisdiction spans the province level, and the Dirección Regional de Educación (DRE), with broader jurisdiction at the regional level.

<sup>19</sup>More precisely, if a demand for a new school opening has no official response after sixty days, it is assumed to be positive and can start to operate.

<sup>20</sup>Instituto Nacional de Defensa de la Competencia y de la Protección de la Propiedad Intelectual (INDECOPI).

<sup>21</sup>While public education is meant to be free, in reality, households bear some expenses “in form of voluntary and sometimes unlawfully demanded contributions towards educational materials, uniforms, school activities, etc.” (Balarin, 2015, p.13).

choices are not backed by public funding, transparent information, or by appropriate regulation and policies that may limit the effects of choice on educational segregation dynamics” (Balarin & Escudero, 2019, p.2).

### 2.3 The demand

Peru’s demand for private education is explained by at least six factors. First, public-school prestige has progressively declined, and thus the idea that “private is better” has almost become common sense (Román & Ramírez, 2018). However, it is not necessarily true, as the recent National Student Assessment reports show.<sup>22</sup> In addition, parents perceive some problems with the public provision, e.g. teacher absenteeism, closures due to strikes, and the low wages of public sector teachers.

Second, families have wide liberty in the choice of school. In this way, they are able to overcome the crisis of public-school quality and make strategic choices. However, parents lack information about the standard of private provision. Households (especially poor ones) make choices without, among other things, knowing the quality provided or their rights under the law.

Third, private education is seen as a means of social mobility. More generally, education is linked to notions of progress and more opportunities, “embodying the hopes and dreams of the most excluded populations for becoming truly integrated into Peruvian society” (Balarin, 2015, p.19). Attending a public school does not contribute to social differentiation and so private education is preferred.

Fourth, in the peripheral districts, households prefer schools that are nearby. Indeed, schools closer to home “make schooling more compatible with families’ (especially mothers’) other domestic responsibilities, and allow parents to be more vigilant of their children -taking them to and picking them up from school- in precarious urban contexts that are perceived by their dwellers as being very high risk” (Balarin, 2015, p.18). Thus, some families’ choices are influenced by the lack of a nearby public school.

Fifth, parents also have a concern about the conditions of educational provision. For example, a small number of students per class tends to be seen as an indicator of school quality. In the public sector, this is not generally the case.

Last but not least, Peru has experienced impressive GDP growth rates during the last two decades (on average 5% per year) and considerable reduction in the rate of monetary poverty (20% in 2019 versus 49% in 2004), which have been actively accompanied by public policies such as the Juntos conditional cash transfer program.

### 2.4 The supply

The current Peruvian legislation guarantees liberty of education provision. Every natural or legal person has the right to establish and operate school centers and programs (General Law of Education 2003, Art. 5). In this context, the private

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<sup>22</sup>See, for instance, Minedu (2017).

initiative is considered helpful for expanding coverage, innovation, quality, and financing of educational services.

For more than two decades, private school provision (opening of new schools and operation) has been virtually unsupervised. The state's supervisory capacity was overwhelmed. The disorderly decentralization process, which started in 2003, intensified the problems already caused by bureaucracy and insufficient resources. This has led to some unintended consequences during the privatization process.

First, the private sector has grown almost exclusively in urban areas, most of all in Peru's most important cities in the country. This fact raises the question of equity in the system, since rural areas have not benefited much from privatization.

Second, an informal market of unlicensed schools has emerged.<sup>23,24</sup> They provide questionable education quality, and in most cases are not on the radar of the authorities. These schools do not meet minimum standards and are not recognized by the system. However, it is not infrequent in many cities to see ordinary houses that operate as unlicensed schools.

Third, private schools are becoming increasingly heterogeneous in terms of fees, infrastructure, and quality (Minedu, 2018). Before the reforms described in section 2.2, private education was concentrated among the wealthy middle class and upper class households. Accordingly, this type of education was more homogeneous than it is now. Differentiated channels of provision, however, to target the emerging middle-class and also poor families have been made (Sanz, 2014). As a consequence, a cluster of low-fee schools has emerged, some of which do not meet basic minimum quality standards, as stated above.

Fourth, segregation in the educational system has increased (Ames, 2021). Indeed, "poor families access poor-quality low-fee private schools with pensions of around US\$ 60 per month; while rich families access good quality high-fee private schools with fees above US\$ 1,000 a month" (Balarin & Escudero, 2019, p.19). Evidence shows that a pupil's socioeconomic status and even community factors are closely correlated with learning achievement outcomes (Arteaga & Glewwe, 2019; Benavides, León, & Etesse, 2014). In addition, the social composition of schools has increasingly diverged between schools, but has converged within them.

Finally, in the school-household relationship, new problems have appeared. For instance, parents cannot afford tuition fees because of job insecurity (which, in turn, affects children's educational trajectory by interrupting their periods of attendance); schools (in particular low-budget schools) apply abusive practices, such as stipulating textbooks from specific publishers with whom they have some sort of agreement, demands for unlawful contributions from parents, etc.

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<sup>23</sup>There seems to be no study that identifies all the unlicensed schools nationwide. According to Balarin (2017, p.26), supervisory actions held by the Ministry of Education in 2015 in Lima concluded that most of the unlicensed schools catered for preschool children, and were located in middle and low-income districts.

<sup>24</sup>It is not possible here to control for the unlicensed schools problem, for there is no information about them. The results from this work are consequently biased downwards.

### 3 Data and methodology

Three main databases will be exploited in this study. The first of these is the National Household Survey (ENAHO) by the National Bureau of Statistics. This survey runs in annual series starting in 2004.<sup>25</sup> Currently, the sample consists of around 40,000 households at the national level (urban and rural). ENAHO is a very rich survey, with detailed modules on household expenditure, education, employment, health, etc. For this paper, ENAHO provides the two key variables of individual treatment exposure (the province of birth and the year of birth) as well as the main outcomes (secondary completion and hourly wages).<sup>26</sup> The sample will be restricted to individuals aged 18 to 40 at the time of the survey.

The second database is the National Population Census (CPV) by the National Bureau of Statistics. The most recent censuses were conducted in 1993, 2007, and 2017. The last has information on every student’s school district. For the present paper, the CPV provides the population per age-group for each district, which is particularly important for constructing a baseline for 1993.

Finally, the third database is the School Census by the Peruvian Ministry of Education. Available for 1993 and 1998-2019, it is, however, relatively reliable only from 2004. It provides information on the location, number of students and teachers, and other basic information about schools. Here it will be used mainly for the number of public and private schools per district for each educational level.

In this context, two sources of variation determine the individuals’ **degree of exposure** to the privatization process: year of birth, and province of birth. The former generates exogenous variation in the age of an individual when DL882 was enacted. The latter indicates the number of private schools built in her province of birth.<sup>27</sup> As mentioned in footnote 8, the province of birth is closely correlated with the location where individuals obtain their education, which provides a source of exogenous variation in the exposure to private schools. Current residence would not be suitable for the analysis since households (under the assumption that they perceived that private schools are better) might, for example, move to locations where more private schools are built with the intention of bringing their children better educational opportunities. In contrast, birth location does not suffer from this problem.

Let consider the following specification, inspired by [Kuecken, Thuilliez, and Valfort \(2021\)](#), who exploit the variation of exposure relative to the individual’s birth cohort and survey year:

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<sup>25</sup>From 1997 to 2003 it was applied only in one trimester per year.

<sup>26</sup>Due to its large size, Metropolitan Lima has been split by the present paper into five “provinces”: Lima Norte, Lima Este, Lima Centro, Lima Sur, and Callao. The partition follows the one used by the National Bureau of Statistics ([INEI, 2014](#), p.9).

<sup>27</sup>In this paper, the verb “build” is used interchangeably with “open”. However, it is worth noting that new private schools do not always *build* new infrastructure; sometimes they simply *open*.

$$y_{ipct} = \alpha + \beta (\text{private}_p \times \text{exposure}_{ic}) + \mathbf{X}_{ipct}'\Gamma + \delta_p + \delta_{ct} + \varepsilon_{ipct} \quad (1)$$

where  $y_{ipct}$  is an outcome for individual  $i$ , born in province  $p$ , belonging to cohort  $c$ , and surveyed in year  $t$ . In the literature related to the approach adopted here (Akresh et al., 2022; Duflo, 2001; Mazumder et al., 2019), the variable  $\text{private}_p$  would be defined as the number of private secondary schools at the province level constructed after DL882, per 1,000 population aged 12-17 in the baseline. In this paper, such specification will be tested later as an additional robustness check (see section 5). For the moment, I will rather define  $\text{private}_p$  as the number of private secondary schools (per 1,000 population aged 12-17) that already existed in the province at the baseline. This choice is justified to prevent any concern about endogeneity. Indeed, as shown in Figure 4, the number of *new* private schools opened in the provinces since 1993 is correlated with the initial quantity of private schools.<sup>28</sup> As a consequence, the latter can be considered an exogenous proxy for the former, which is actually the variable that matters in this endeavor. Next, the term  $\text{exposure}_{ic}$  represents the proportion of an individual’s secondary education life (expected years) under which DL882 operated. The vector  $\mathbf{X}_{ipct}$  stands for the following set of individual characteristics: gender, mother tongue, and migration status. The terms  $\delta_p$  and  $\delta_{ct}$  are province of birth and cohort-by-survey-year fixed-effects, respectively, which address potential bias from omitted variables. Standards errors are clustered at the province of birth level. In this context, the parameter  $\beta$  identifies the treatment effect.

Eq.(1) studies the intensive margin, but we can also explore the **extensive margin** by redefining  $\text{exposure}_{ic}$  as a dummy variable that equals one for individuals who started secondary education after 1996. In any case, the identification assumption is that the change in outcomes across birth cohorts in provinces that opened many private schools would have been the same in the absence of the privatization process as the change across birth cohorts in provinces that opened fewer private schools. We test this assumption in section 5, implementing both simpler and more complex specifications, including placebo tests, different definitions for treatments, treated and control groups, and other extensions.

## 4 Results

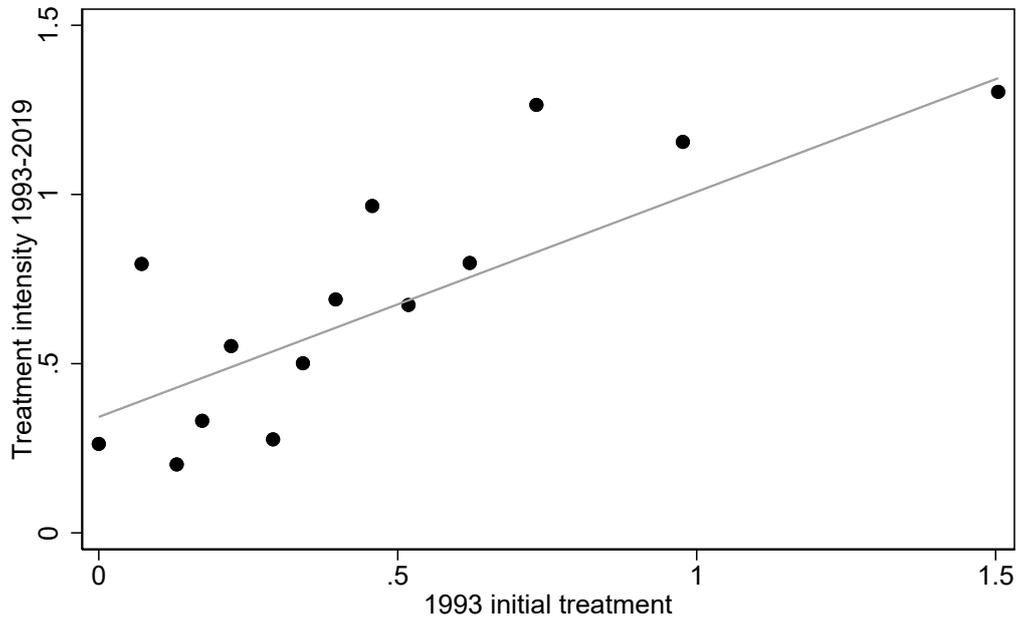
### 4.1 A simplified overview

Before deploying the empirical strategy presented in section 3, let us consider a simpler descriptive framework. For this purpose, provinces of birth were divided into two groups: high and low intensity treatment. **High-intensity** treatment provinces are those of the fourth quartile, according to their average treatment intensity for the period 2004-2019.<sup>29</sup> Quartiles 1 to 3 constitute the group of **low-**

<sup>28</sup>Appendix C presents a descriptive analysis of the dynamics of private schools at the province level.

<sup>29</sup>Treatment intensity is defined as the number of private secondary schools at the province level constructed since the baseline, per 1,000 population aged 12-17 in the baseline.

**Figure 4:** Provinces: Treatment intensity, 1993-2019



1/ Nonparametric representation of the conditional expectation function with equal-sized bins (quantiles of the initial treatment in 1993).  
2/ Lima is split into four regions.  
Source: School Census 1993 and 2017 (MINEDU), and Population Census 1993 and 2017 (INEI).

**intensity** treatment provinces.

High-treatment provinces displayed an average treatment intensity equal to 1.39 for the period 2004-2019, whereas low-treatment provinces had a value of 0.174. In other words, over the period under consideration, in high treatment provinces the number of **new** private secondary schools per 1,000 population of secondary school age in 1993 was on average 1.39, at the province level.

Table 2 presents the means of secondary completion, years of schooling, and real hourly wages for different cohorts and types of provinces. On the one hand, panel A depicts the experiment of interest, where individuals with little or no exposure to the privatization process (born between 1970-1980, i.e. finishing secondary education by 1986-1996) are compared to those who were exposed during their secondary schooling (born between 1990-2000, i.e. finished secondary education by 2006-2016).<sup>30</sup> On the other, panel B depicts a control experiment, which consists of comparing two cohorts who had no exposure to the privatization process.

<sup>30</sup>The sample is restricted to individuals aged 18 to 40 at the moment of the surveys.

**Table 2:** Means of secondary completion, years of schooling, and real hourly wages, by cohort and type of exposure to treatment

	Completed secondary			Years of schooling			Real wages		
	Treatment in province of birth			Treatment in province of birth			Treatment in province of birth		
	High (1)	Low (2)	Difference (3)	High (4)	Low (5)	Difference (6)	High (7)	Low (8)	Difference (9)
<b>Panel A: Experiment of interest</b>									
Born 1990-2000	0.834 (0.002)	0.779 (0.002)	0.055*** (0.003)	11.588 (0.017)	11.159 (0.016)	0.429*** (0.023)	4.581 (0.071)	4.035 (0.065)	0.546*** (0.096)
Born 1970-1980	0.676 (0.003)	0.588 (0.003)	0.088*** (0.004)	10.75 (0.026)	9.909 (0.024)	0.841*** (0.035)	8.371 (0.115)	7.681 (0.11)	0.69*** (0.158)
Difference	0.157*** (0.004)	0.191*** (0.003)	-0.034*** (0.005)	0.838*** (0.029)	1.25*** (0.027)	-0.412*** (0.039)	-3.79*** (0.135)	-3.646*** (0.127)	-0.144 (0.185)
<b>Panel B: Control experiment</b>									
Born 1970-1979	0.669 (0.003)	0.582 (0.003)	0.087*** (0.004)	10.689 (0.028)	9.868 (0.025)	0.821*** (0.037)	8.478 (0.129)	7.81 (0.122)	0.668*** (0.176)
Born 1960-1969	0.606 (0.008)	0.517 (0.006)	0.09*** (0.01)	10.022 (0.072)	9.206 (0.061)	0.817*** (0.093)	8.105 (0.301)	6.886 (0.212)	1.219*** (0.366)
Difference	0.063*** (0.008)	0.066*** (0.006)	-0.003 (0.01)	0.667*** (0.072)	0.662*** (0.061)	0.004 (0.093)	0.373 (0.326)	0.923*** (0.244)	-0.551 (0.407)

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01. Standard errors in parentheses.

Sources: National Household Survey 2004-2019, Population Census 1993, and School Census 1993-2019.

The results in panel A of Table 2 show that (i) secondary completion for both cohorts was higher in high treatment provinces; (ii) more private schools were opened in regions where secondary completion was already high; (iii) secondary completion augmented in both types of provinces, but it increased more in the low treatment regions; (iv) the double-difference (cf. row 5, column 3) indicates –under a number of identification assumptions– a negative causal effect. Furthermore, according to the control experiment conducted in panel B (with two cohorts that were not exposed to the privatization process), the double-difference is close to zero. This suggests that the experiment of interest is consistent.

Nevertheless, it is worth noting that the estimates presented in the above table may be biased, since they do not control for other factors that may affect enrollment.<sup>31</sup> However, it is a useful illustrative exercise that provides some evidence of the phenomenon under study.

Before showing the results of the equations stated in section 3, let us close this subsection with a graphical event study. Figure 5 plots the estimated relationships between the dependent variables and the treatment intensity (i.e. the number of private secondary schools constructed in the province of birth since 1993 per 1,000 population aged 12-17, that is, three years before DL882). For the purposes of this figure, the treatment intensity is averaged for the period 2004-2019. The x-axis shows 5 years before and 5 years after DL882 (i.e. the year of the DL882 act, 1996, is year zero). Each point represents the number of years preceding or succeeding DL882 at the time the respondent would have been expected to end secondary education. For each dependent variable, the y-axis plots the coefficient of the treatment intensity, controlling for age, survey year, and survey design. Regression fits are provided separately for the pre- and post-DL882 periods with 95% confidence intervals for each coefficient. In this situation, the figure suggests that the treated cohorts that finished secondary education after DL882 suffered a decrease in the probability of secondary school completion and in hourly wages, below the norms of the pre-privatization period.

## 4.2 Econometric results

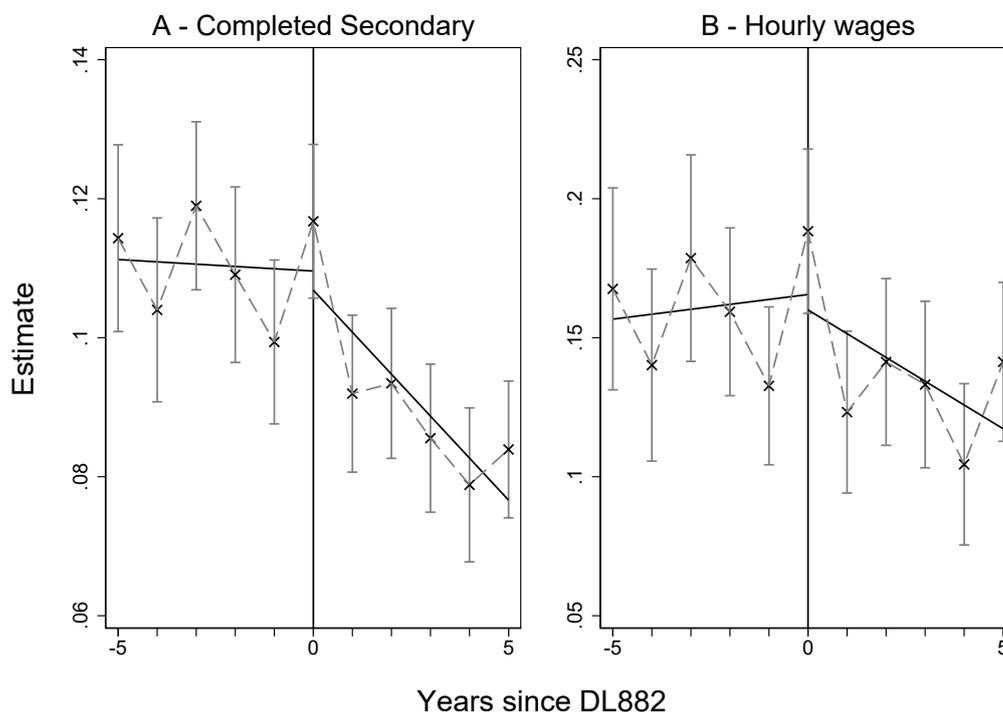
Table 3 presents the results of Eq.(1). For both dependent variables –secondary completion and hourly real wages– the treatment effect is negative. Indeed, a marginal increase in treatment intensity implied a 7.7 percentage point reduction in the probability of completing secondary education. Likewise, real wages could have been expected to decrease by 8.3% per worked hour. Additionally, Table 4 presents the extensive margins. The values are very similar to those listed in the previous table, but slightly higher.

These findings are somewhat counter-intuitive. One would have expected that more private schools would contribute to increasing access to formal education, for it

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<sup>31</sup>Among the simplifications, it can be mentioned, for example, that cohorts have been collapsed, mixing different years of birth. However, as will be shown later in section 5, pre-trends are plausibly parallel.

**Figure 5:** Graphical event study



Notes: For each dependent variable (secondary completion and hourly wages, respectively in Panels A and B), the y-axis plots the coefficient of the province-of-birth treatment intensity (average 2004-2019), controlling for age, survey year, and survey design. The x-axis shows a 10-year window around the DL882 act (1996 is year zero). Each point represents the number of years preceding or succeeding DL882 at the time the respondent would have been expected to end secondary education. The sample is restricted to individuals aged 18-40 at the time they were surveyed. Source: National Household Survey (2004-2019) and School Census (1993, 2010).

**Table 3:** Effect of the educational privatization expansion on secondary completion and hourly wages - Intensive margin (cf. Eq. 1)

	(1) Comp. Sec.	(2) Hourly wages
private X exposure	-0.077*** (0.012)	-0.083*** (0.029)
Female	-0.056*** (0.007)	-0.348*** (0.017)
Indigenous mother tongue	-0.313*** (0.012)	-0.477*** (0.027)
Migrated from province of birth	0.042*** (0.008)	0.214*** (0.025)
No. of obs.	513,906	319,656
R-squared	0.218	0.145

Note: Regressions include province of birth fixed-effects and interactions between cohort and survey year. Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 4:** Effect of the educational privatization expansion on secondary completion and hourly wages - Extensive margin

	(1) Comp. Sec.	(2) Hourly wages
private X binary exposure	-0.081*** (0.012)	-0.093*** (0.034)
Female	-0.050*** (0.007)	-0.346*** (0.017)
Indigenous mother tongue	-0.308*** (0.011)	-0.470*** (0.028)
Migrated from province of birth	0.040*** (0.007)	0.210*** (0.025)
No. of obs.	385,133	233,880
R-squared	0.224	0.141

Note: Regressions include province of birth fixed-effects and interactions between cohort and survey year. Robust standard errors in parentheses are clustered at the province of birth level.

Individuals with partial exposure are excluded.

Source: National Household Survey 2004-2019.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

expands the alternatives for pupils and reduces the distance from home (whenever new schools choose to set up in locations where no public schools already exist near the perimeter). In addition, more private schools should increase competition in the education market and as a consequence increase the quality of the service. This should boost human capital and the level of wages in the labor market.

The findings showed in this section, however, challenge this logic, which is based on the standard theory. Some features are apparent which this discourse leaves out of account. The following section first tries to confirm that these results are not driven by the research design and then looks for elements to explain these counter-intuitive findings.

## 5 Robustness checks and extensions

### 5.1 Parallel trends

According to the parallel trends assumption, untreated provinces should provide an adequate counterfactual of the trend that treated provinces would have followed had they not been treated. This assumption cannot be proved because it is impossible to observe the latter situation regarding the treated group; however, some evidence in this direction can be provided.

The cohort born in 1985 was expected to start secondary education in 1996, i.e. at 11 years old. This is the first cohort that can be considered fully exposed to treatment. Individuals born before 1985 were partially exposed (born 1980-1984) or never exposed to the privatization process (born < 1980).

Dividing provinces of birth into high and low treatment can be helpful in examining the tendencies.<sup>32</sup> Figures E.1 and E.2 in the Appendix show parallel linear trends to similar pre-treatment slopes for high-treatment and low-treatment provinces. The main difference we observe before DL882 is a difference of levels.

What explains the initial difference in levels? High-treatment provinces are fundamentally nine times more populated and a half less rural than low-treatment provinces. It is surprising, however, that the average number of basic public schools in the baseline is the same (158). In contrast, the number of basic private schools differs substantially (103 in high-treatment versus 7 in low-treatment provinces). The average numbers of new private schools in the provinces for the period 2004-2019 were 0.89 and 0.72 (per 1,000 age-group population), respectively.

It is worth noting that we are not examining the outcomes in absolute terms, but in percentages (secondary completion) and natural logarithm (hourly wages). In any case, we are interested in trends, not in the absolute values.

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<sup>32</sup>In this subsection we consider the high-treatment provinces, those placed in the fourth quartile according to their baseline treatment. The others are considered low-treatment provinces.

## 5.2 One survey year, binary treatment, and binary exposure

The main analysis of this paper used a pooled sample with the objective of increasing the number of surveyed individuals born around 1996. This strategy implies including an error term of the form  $\varepsilon_{ipct}$  which may raise some concerns, since it adds an extra complexity that would otherwise have been avoided if we had had one survey year with large enough observations for statistical power. Indeed, the pool 2004-2019 encompasses a set of concomitant events (political, economic, climate-related, etc.) that may not be convincingly controlled for in the main equation. Therefore, this subsection presents results if only one survey year  $t$  is used. In this case, let consider  $t = 2016$ . In addition, to simplify even further the econometric specification, the continuous intensity of the treatment is dismissed. Instead, the binary treatment  $treat$  is used, which takes the value of 1 if the individual  $i$ 's province of birth belonged to the fourth quartile in 2016 in terms of its treatment intensity (until 2016), and 0 otherwise. Moreover, exposure to treatment is also binary. Indeed,  $post_c$  equals 1 for individuals expected to have started secondary education after 1996, and zero for individuals expected to have finished secondary education before 1996. Finally,  $\mathbf{X}_{ipc}'\Gamma$ ,  $\delta_p$ , and  $\delta_c$  are the same as in Eq.(1). Then, the new specification reads:

$$y_{ipc} = \beta_0 + \beta_1 post_c + \beta_2 (post_c \times treat_p) + \mathbf{X}_{ipc}'\Gamma + \delta_p + \delta_c + \varepsilon_{ipc} \quad (2)$$

The results are shown in Table 5. The estimate for  $\beta_2$  is negative and significant for both outcomes.

**Table 5:** Effect with binary treatment and binary exposure, 2016 (cf. Eq. 2)

	(1) Comp. Sec.	(2) Hourly wages
post X treat	-0.073*** (0.024)	-0.087** (0.039)
Female	-0.050*** (0.008)	-0.288*** (0.022)
Indigenous mother tongue	-0.268*** (0.016)	-0.386*** (0.038)
Migrated from province of birth	0.034*** (0.009)	0.162*** (0.034)
No. of obs.	30,511	18,118
R-squared	0.204	0.122

Note: Regressions include cohort and province of birth fixed-effects.

Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2016.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 5.3 Placebo test: unexposed cohorts

If the identification assumption holds, the changes in outcomes between older cohorts (i.e. unexposed to the privatization process) should not differ. Therefore, this subsection implements a similar strategy to that in Eq.(2) but with some differences. First, it uses the whole pooled data set. Second, this time it compares two groups that ended secondary education before DL882. Therefore, it changes the definition of the variable  $post_c$ . Now, this indicator variable equals 1 for individuals who finished secondary education between 1991 and 1995, and 0 for an older cohort who finished secondary education between 1986 and 1990. Third, the treatment is the same as that in Eq.(1), i.e. the baseline treatment. Thus, the new specification reads:

$$y_{ipct} = \beta_0 + \beta_1 post_c + \beta_2 (post_c \times private_p) + \mathbf{X}_{ipct}' \cdot \Gamma + \delta_p + \delta_{ct} + \varepsilon_{ipct} \quad (3)$$

As Table 6 shows, the coefficients of the interaction term  $post_c \times private_p$  are not significantly different from zero, suggesting that the main results are not driven by a failure of the identification assumption.

**Table 6:** Placebo test: unexposed cohorts

	(1) Comp. Sec.	(2) Hourly wages
post X	-0.002	0.001
private	(0.004)	(0.009)
Female	-0.083*** (0.009)	-0.392*** (0.020)
Indigenous mother tongue	-0.355*** (0.015)	-0.559*** (0.035)
Migrated from province of birth	0.053*** (0.009)	0.277*** (0.032)
No. of obs.	138,445	100,144
R-squared	0.232	0.139

Note: Regressions include cohort and province of birth fixed-effects.

Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019.

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

### 5.4 Placebo test: different outcomes

This subsection, based on Eq.(1), runs placebo tests using outcomes that should not be influenced by the quasi-experimental design: household size, household per capita income (log), and household per capita expenditure (log). Table 7 shows the results. The effect is not significantly different from zero, as expected.

**Table 7:** Placebo test: different outcomes

	(1)	(2)	(3)
	Household size	HH per capita income	HH per capita expenditure
private X exposure	-0.030 (0.101)	-0.090 (0.058)	-0.078 (0.059)
Female	0.126*** (0.009)	-0.058*** (0.004)	-0.018*** (0.003)
Indigenous mother tongue	0.156*** (0.041)	-0.545*** (0.025)	-0.430*** (0.021)
Migrated from province of birth	-0.318*** (0.023)	0.264*** (0.031)	0.231*** (0.026)
No. of obs.	514,277	514,270	514,277
R-squared	0.062	0.276	0.305

Note: Regressions include province of birth fixed-effects and interactions between cohort and survey year. Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 5.5 Heterogeneous effects

This subsection examines the impact of the privatization process in different types of region. New private schools in densely populated provinces should increase the availability of slots or reduce the overcrowding in public schools. By contrast, in low-density provinces, the expected effect should be to reduce the commuting time or the distance between children's home and their schools.

Let define high (low) density provinces of birth when their population per square kilometer is above (below) the median in 1993. With this classification, Table 8 shows the privatization effects by type of region of birth, using Eq.(1). The results suggest that new private schools had no effect on secondary completion in low-density regions. However, they had a negative effect on the densely populated provinces. This result could signify that pupils tend to drop out of private schools more in such regions than elsewhere.

Qualitative studies have already revealed that late payment and fee defaults are a serious problem for parents with children in private schools (Balarin et al., 2018). This is no surprise, given that 3 out of 4 workers in the Peruvian labor market are informally employed (INEI, 2021). This most often implies instability in labor earnings and precariousness. It is worth recalling the evidence of private enrollment increasing especially in peripheral districts (Cuenca, 2013), where the informal economy is prevalent. As a result, the parents living there find it more difficult to pay school fees in such and children sometimes have to take paid work to cover the household expenses.

Late payment and fee defaults are also a palpable problem for low-cost schools since they depend heavily on these revenues for their operation (Fontdevila, Marius, Balarin, & Rodríguez, 2018). They can lead schools to close or interrupt the educational service. Additionally, private schools used to suspend the educational provision to pupils in response to late payment or fee default, but since 2002 the government has banned this practice.<sup>33</sup>

Another factor in the greater dropout rates in the private sector would be that once children are attending private schools it is very unlikely that they will come back to the public school system. Stigmatization and the loss of reputation and credibility of the public sector have already been identified in parents' discourses, but the private option is also a strategy for identification and social differentiation in the school realm. Parents who send their children to private schools are seen as concerned and committed to the education of their children (Sanz, 2015). Coming back to a public school would not be an option for them.

**Table 8:** Heterogenous effects by type of province of birth (density)

	Low density province of birth		High density province of birth	
	(1) Sec. comp.	(2) Hourly wages	(3) Sec. comp.	(4) Hourly wages
private X exposure	-0.090 (0.055)	-0.400*** (0.096)	-0.175*** (0.037)	-0.185** (0.081)
Female	-0.075*** (0.007)	-0.358*** (0.021)	-0.048*** (0.009)	-0.345*** (0.022)
Indigenous mother tongue	-0.277*** (0.014)	-0.478*** (0.042)	-0.337*** (0.017)	-0.468*** (0.035)
Migrated from province of birth	0.086*** (0.012)	0.282*** (0.032)	0.024*** (0.008)	0.186*** (0.031)
No. of obs.	154,776	93,843	358,278	225,315
R-squared	0.185	0.138	0.219	0.143

Note: Regressions include province of birth fixed-effects and interactions between cohort and survey year. Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019.

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

## 5.6 Alternative intensity: school capacity

Throughout this document, treatment has been related to the number of (new) private schools. This subsection tests an alternative definition, namely, the number

<sup>33</sup>Law N° 27665, “Law for the protection of the family economy regarding the payment of fees in private educational centers and programs”.

of students who could enroll in private schools, i.e. their total capacity. Here, Eq.(1) is implemented, but by modifying the  $private_p$  term. This time, it signifies the number of private secondary school pupils enrolled in private schools in 2007, divided by the secondary age-group population in 1993. The results are shown in Table 9. The effect is still negative for the two outcomes under study.

**Table 9:** Alternative intensity: school size

	(1) Sec. completion	(2) Hourly wage
School capacity X exposure	-0.009*** (0.001)	-0.011*** (0.002)
Female	-0.056*** (0.007)	-0.348*** (0.017)
Indigenous mother tongue	-0.313*** (0.012)	-0.477*** (0.027)
Migrated from province of birth	0.043*** (0.008)	0.215*** (0.025)
No. of obs.	513,906	319,656
R-squared	0.218	0.145

Note: Regressions include province of birth fixed-effects and interactions between cohort and survey year. Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 5.7 The “exhaustion” effect

It is clear that there is a general trend in all of Peru to increase the rate of secondary school completion, with the obvious upper bound of 100%. Private schools have opened up in more densely populated areas, where school completion rates were already high. Therefore, one might argue that once the total is close to 100% it gets more difficult to increase school completion rates by very much, which would explain the negative effect shown above. This subsection proposes two ways to address this issue.

The first approach is a variation of what was previously shown in Figure 5. Now, I interact the effect of privatization of education (the mean treatment intensity for the period 2004-2019 for each province of birth) with the 1993 secondary education completion rate, at the province of birth level. The results are shown in Figure E.3 in the Appendix. The y-axis plots the coefficient of this interaction, separately for each outcome under study, whereas the x-axis represents the number of years preceding or succeeding DL882 at the time the respondent would have been expected to end secondary education. The figure shows a clear decline in both secondary completion and hourly wages after DL882.

As a second approach, I take as the control group individuals who finished secondary education very near 1996, and at the same time were born only in high-treatment provinces. This choice is justified, since they faced already high contextual school completion rates, based on Figure E.1. For this purpose, let us consider an analogous strategy to the one applied in subsection 5.3, Eq.(3). However, this time the indicator variable  $post_c$  equals 1 for individuals who started secondary education very close to DL882 (1996-1999), and 0 for individuals who finished secondary education just before (1990-1995) but were born only in high-treatment provinces (baseline treatment fourth quartile). Table 10 shows the results. The effect is still negative for secondary completion, but does not appear to be statistically significant for hourly wages.

**Table 10:** The exhaustion effect: Alternative control group

	(1) Comp. Sec.	(2) Hourly wages
post X private	-0.042*** (0.007)	0.004 (0.013)
Female	-0.055*** (0.010)	-0.342*** (0.024)
Indigenous mother tongue	-0.314*** (0.011)	-0.427*** (0.032)
Migrated from province of birth	0.031*** (0.008)	0.155*** (0.027)
No. of obs.	130,930	84,263
R-squared	0.165	0.173

Note: Regressions include cohort and province of birth fixed-effects.

Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 5.8 Accounting for province-specific time-varying trends

Following Duflo (2001), in this subsection I account for the factors underlying the allocation of private schools and for other interventions that could confound the privatization process effects. Therefore, I estimate:

$$y_{ipct} = \alpha + \beta (post_c \times private_{1993p}) + \sum_c (\mathbf{P}_p \times \tau_c) \delta_c + \mathbf{X}_{ipct}' \cdot \Gamma + \delta_p + \delta_{ct} + \varepsilon_{ipct} \quad (4)$$

In this equation,  $\mathbf{P}_p \times \tau_c$  captures birth-year fixed effects interacted with the following province-level covariates: the number of secondary-school-aged children in the province in 1993, the secondary level enrollment rate of the province in 1993, the

number of public secondary education schools in 1993, and the number of private secondary education schools in 1993. These interactions control for the province-specific time-varying trends that might influence outcomes.

The term  $post_c$  is defined as in Eq.(2), i.e. it equals 1 for individuals who were expected to have started secondary education after 1996, and zero for individuals who were expected to have finished secondary education before 1996.

The results are displayed in Table 11. The effect is still negative and statistically significant for both outcomes.

**Table 11:** Effect accounting for province-specific time-varying trends

	(1) Comp. Sec.	(2) Hourly wages
post X private	-0.073*** (0.021)	-0.200*** (0.040)
Female	-0.050*** (0.007)	-0.347*** (0.017)
Indigenous mother tongue	-0.307*** (0.011)	-0.470*** (0.028)
Migrated from province of birth	0.040*** (0.007)	0.210*** (0.025)
No. of obs.	383,917	233,181
R-squared	0.226	0.143

Note: Regressions include cohort and province of birth fixed-effects.

Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019.

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

## 5.9 Privatization as a process

It is clear from section 2.2 that the privatization process started during the 1990s and was the result of a few important changes in legislation, from which DL882 stands out. From this perspective, we can also examine the educational privatization process as a whole.

By not focusing on the effect of one particular policy shock, this subsection takes the phenomenon as a continuous and progressive process, acknowledging that it is the consequence of different legislation changes (cf. Table 1). Therefore, it proposes two additional identification strategies for this natural experiment. The first one is analogous to that of Mazumder et al. (2019, p.245):

$$y_{ipt} = \beta Exposed_{s^*} \times private'_{p,s'} + \sum_t (\mathbf{P}_p \times \tau_t) \delta_t + \mathbf{X}_{ipt} \gamma + \alpha_p + \tau_t + \varepsilon_{ipt} \quad (5)$$

where  $y_{ipt}$  is the outcome of interest for individual  $i$ , born in province  $p$ , in year  $t$ . The variable  $Exposed_{s^*}$  is a dummy that captures the time of exposure to the privatization process. It takes the value of one starting from the expected year of individual  $i$ 's entrance to secondary school,  $s^*$ . The variable  $private'_{p,s'}$  is treatment intensity (i.e. the change in the number of private secondary schools, in birth province  $p$ , between 1993 and individual  $i$ 's last year  $s'$  of secondary education, per 1,000 secondary-school-aged children in  $p$  in 1993). The parameters  $\alpha_p$  and  $\tau_t$  are respectively province of birth and year of birth fixed-effects. The term  $\mathbf{P}_p \times \tau_t$  captures birth-year fixed effects interacted with the same province-level covariates as in subsection 5.8. Likewise,  $\mathbf{X}_{ipt}$  stands for the same set of individual characteristics as before: gender, mother tongue, and migration status. Standards errors are clustered at the province of birth level.

Finally, the alternative identification strategy focuses on the number of private schools instead of the number of *new* private schools. Thus:

$$y_{ipt} = \beta Exposed_{s^*} \times private_{p,s'} + \sum_t (\mathbf{P}_p \times \tau_t) \delta_t + \mathbf{X}_{ipt} \gamma + \alpha_p + \tau_t + \varepsilon_{ipt} \quad (6)$$

By focusing on the number of private schools instead of the number of *new* private schools, Eq. (6) provides a complementary understanding of the privatization process.

The implementation of Eq.(5) with *completed secondary education* as the dependent variable is presented in Figure F.1, which plots the  $\beta$  of interest, i.e. the coefficient of the interaction between  $Exposed_{s^*}$  and  $private'_{p,s'}$ , for different cohorts.<sup>34</sup> Because, by definition,  $private'_{p,s'}$  is zero for the cohorts that started secondary school before 1993, the first cohort observed is the one born in 1987, which started secondary school in 1998 (the first year after 1993 for which we have data on the School Census, as detailed in section 3). In this context, a consistent decline in the effect on secondary school completion is observed. However, the upper bound of the confidence interval at the 5% of significance level is very close to zero. In terms of wages, Figure F.2 shows that the consistent decline starts for cohorts born during the 1990s.

Clearer trends are observed when considering the variation in terms of  $private_{p,s'}$ , instead of  $private'_{p,s'}$ , across provinces. Regarding secondary completion, Figure F.3 shows that the coefficient of the interaction term becomes positive for individuals who entered secondary school by 1987 and afterwards. However, the positive effect vanishes for those who entered as of 2004. A sharp change in the trend can be observed a couple of years after the privatization law.<sup>35</sup>

Furthermore, an interesting parallel is established when using real wages as a dependent variable (cf. Figure F.4). This time, the interaction term shows similar

<sup>34</sup>The complete results of the regressions for some key cohorts are presented in Appendix F.

<sup>35</sup>It is worth recalling that this law enacted in 1996 was one of the most important legislative changes of the last 30 years. However, it is not the only one (cf. section 2.2 and Table 1).

behavior to that observed in Figure F.3. In particular, the effect appears to be positive for approximately the same cohorts (born between 1975 and 1990) with a strong intensification of the trend's decline for exposures immediately after the privatization law.

In sum, the results shown in this section suggest that the privatization explosion (particularly noted from 2004 onwards) has been detrimental in terms of both education and wages.

## 6 Conclusions

The present paper studies the effects of the educational privatization that has impacted on Peru since the 1990s in both secondary school completion and real hourly wages. This is a particularly relevant case for study since this country is an example of almost extreme liberalization, where the state did not greatly intervene in the configuration of the educational market.

Using household surveys as well as population and school censuses, the empirical strategy exploits the variation in the private school expansion across provinces and the year of birth of individuals. These exogenous variables determine the degree of exposure to the privatization process.

The results show that provinces with an initial intense presence of private schools are those where the private expansion increased more. The Peruvian private school expansion process differs widely from what is documented for other latitudes.<sup>36</sup> The results also suggest that, for the youngest cohorts, the treatment has a negative effect on the outcomes under study, after an initial period of positive effects.

The finding that the expansion of private schools has led to worse educational and labor market outcomes may seem counter-intuitive. However, we can outline some possible explanations. Cueto, Felipe, and León (2020) show that dropping out in the Peruvian context is more likely to occur during secondary school. At age 12 the main evoked reason is school fees, while at age 15 it is the need to take paid work (in addition to the first reason). Late payments and fee defaults have also been identified in qualitative research (e.g. Balarin et al., 2018; Rodríguez & Saavedra, 2020); these can have a directly negative impact on secondary completion. Not to mention that the large spread of the informal economy can cause parents to have difficulty in honoring the bills from their chosen schools. Instability in labor earnings and the precariousness linked with informal employment (INEI, 2021; Rentería, 2015), combined with the fact that most new private schools settled in peripheral districts (Cuenca, 2013), together power the vicious circle. Furthermore, low-cost schools cannot cover their operational expenses unless they collect their fees (Fontdevila et al., 2018).

Besides, parents mistakenly think that new private schools are by definition better than the existing public ones (Sanz, 2014). In fact, they tend to be worse. A recent

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<sup>36</sup>For instance, in Pakistan this phenomenon is more rural-driven (Andrabi, Das, & Khwaja, 2008).

study by the Ministry of Education (Minedu, 2018) brings up evidence for the period 2007-2016 in this regard. First, on average, private schools' learning achievement exhibits a sort of standstill, in contrast with the continuous progress shown in the public sector. Second, performance in standardized tests is an increasing function of school fees. Third, only expensive or very expensive private schools systematically perform better than public schools in such tests.<sup>37</sup> However, they represent only 2% of the range of private schools and 7% of private student enrollment. This evidence suggests that the privatization process has been driven mainly by low-quality schools.

Many parents are probably unable to discern school quality at the right time, and by the time they figure this out it is too late to get their children back into public schools (or they may even simply prefer not to send their children to public schools again). Since firms are able to discern workers' human capital relatively quickly, they can penalize the workers who come from low-quality private schools by paying them less when they enter the labor market.

Evidence on school quality, together with the results presented in this paper, makes sense also for our findings related to labor earnings. Indeed, it is well known that cognitive and non-cognitive skills are positively correlated with outcomes of this kind (Cunningham, Parra, & Sarzona, 2016; Lavado, Velarde, & Yamada, 2021; Yamada, Castro, & Medina, 2019). Furthermore, other scholars (albeit focusing on higher education) have identified patterns in this regard. For instance, Yamada et al. (2015) document a decline in the absolute quality of higher education after 1996, especially driven by the new universities created after deregulation, which they identify as lower in quality. These authors also estimate that 4 out of 10 college graduates are underemployed. Manrique and Yamada (2017) argue that the problem is persistent, since 77% of over-educated workers stay in the same conditions for the following year. In contrast, having enrolled in a high-quality university significantly reduces the probability of falling into underemployment. In addition, Oviedo and Yamada (2017) show that the rate of return to university quality is sizable (16% to 49% for students from high-quality institutions).

In sum, the evidence presented here is in line with qualitative and other quantitative works that study the Peruvian case. At this stage of research, we can plausibly state that liberalizing educational markets does not necessarily lead to better outcomes for the educational system, and, in the mid-term, nor for labor market outcomes.

Since good intentions can easily cause negative consequences in the mid or long term, the present paper has at least two direct implications for public policy: First, not all markets are suitable for being governed by the "invisible hand". Second, the State's regulatory role should be carefully considered, especially for markets where human fulfillment is involved, such as education or health.

Finally, promising directions for future research include the impact of the privatization process on other realms (outside education or the labor market), on second-

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<sup>37</sup>Minedu (2018) defines four categories of private schools based on their tuition fees compared to mean labor earnings at the regional level: low cost, medium cost, expensive, and very expensive.

generation outcomes, as well as the dropout phenomenon in the private sector. Nevertheless, more data are needed to accurately differentiate schools within the private sector, because it displays high levels of heterogeneity.

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# Appendices

## A Theoretical background

Following [Figueroa \(2015a, 2015b, 2017\)](#), consider a model with three social groups, hierarchically defined by their ethnic origins and their position in the production process: white capitalists (A), mixed workers (X), and native workers (Z).<sup>38,39</sup>

While A and X are first-class citizens, Z are second-class citizens. In this society, the conversion of years of schooling into human capital is heterogeneous, depending on the social group.<sup>40</sup> In fact, the children of richer households attend higher-quality schools and therefore obtain higher levels of human capital for a given educational level, as depicted in [Figure A.1](#). Social groups accumulate human capital along different paths.

Let assume that firms buy human capital (and not years of education) in the labor market. In this context, “profit-maximizing firms will generate hierarchical labor markets based on the human capital level of workers, in which wage rates will be higher in labor markets for higher human capital levels (...) Therefore, in the labor market, those X-workers and Z-workers that have the same years of education will not get the same wage rate” ([Figueroa, 2015b](#), p.19). [Figure A.2](#) shows that, for a given number of years of formal education E, the market wages are different for each social group, which is explained by their differences in human capital ([Figure A.1](#)).

Therefore, the theory predicts that white capitalists, mixed workers, and native workers, will accumulate human capital hierarchically in that order, and also that this fact will be reflected in the wages they will obtain in the labor market. As a consequence, a supply shock of private schools would not affect this hierarchy. Mixed and native workers may increase their years of schooling, but the final result in terms of human capital and real wages will remain unchanged. Nevertheless, we can also differentiate the type of new private schools. If most of the new schools that open target poor families (Z), that will increase the competition in the Z-labor-market, and therefore reduce Z-workers’ wages, which were already the lowest in

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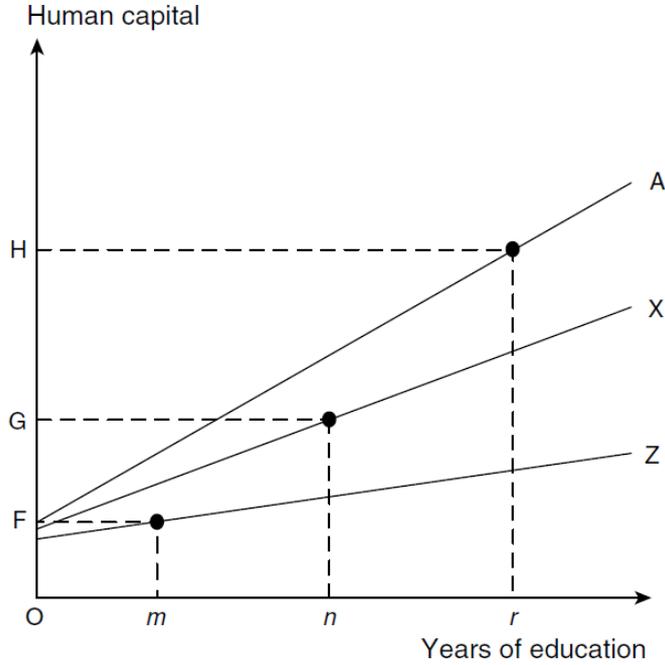
<sup>38</sup>This scheme is pertinent for societies such as Peru’s, with a strong colonial legacy and large native populations. The scheme is also correlated with language inequality because there exists a hierarchy of languages ([Figueroa, 2015b](#), chap. 2). In this country, several native languages coexist and act as social markers, but Spanish is dominant. Different accents of Spanish also act as social markers.

<sup>39</sup>Answers to the question on self-ethnic identification of the 2017 Population Census suggest that 5.89% of the population self-identifies as white, 60.20% as mixed, and 25.80% as native.

<sup>40</sup>This theory assumes that “students participating in the education process will be endowed with unequal cognitive skills or capacities, depending on the social group to which they belong. Nutrition, health, and early intellectual stimulation are the main channels through which the wealthy can develop higher levels of learning capacity in their children when compared to the poor. (...) [In addition], language proficiency, which is also associated with the socioeconomic level of households, is another factor that brings inequality in developing cognitive skills” ([Figueroa, 2015b](#), p.13).

the whole economy.

**Figure A.1:** Relations between education and human capital, by social groups A, X, and Z



Source: [Figueroa \(2015b, p.17\)](#).

The structural equations are as follows:

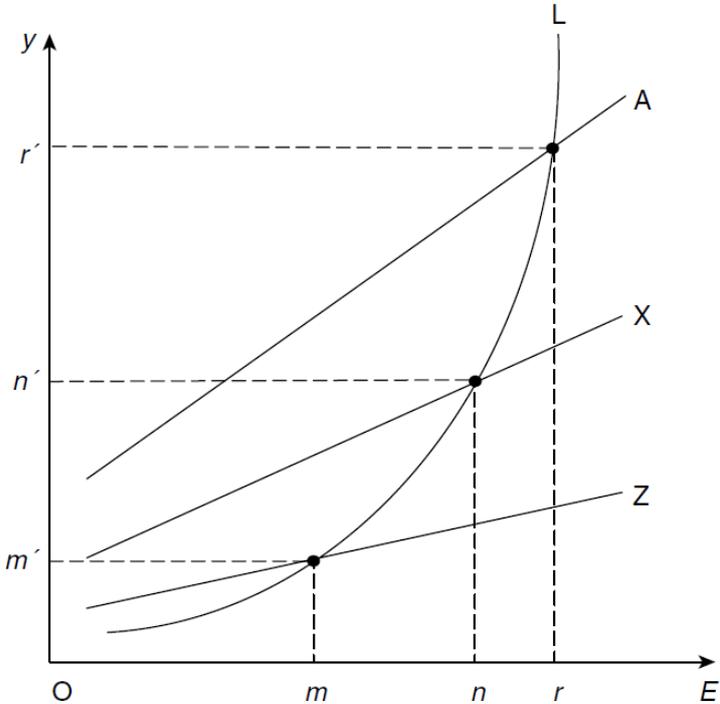
$$h = F(E, S), \quad F_i > 0, \quad \text{where } S = (A, X, Z) \quad (7)$$

$$y = G(h, S), \quad G_i > 0 \quad (8)$$

$$y = \Phi(E, S), \quad \Phi_i > 0 \quad (9)$$

where  $h$  is the human capital,  $E$  the number of years of education,  $S$  a qualitative variable that represents the social background, i.e. the three social groups defined above, and  $y$  the labor market income. “Income increases with years of schooling, and given the number of years of schooling, it increases with the order of the social background” ([Figueroa, 2015b, p.21](#))

**Figure A.2:** Wages ( $y$ ) and years of education ( $E$ ) relationships, by social groups A, X, and Z



Source: [Figuroa \(2015b, p.22\)](#).

## B Labor market regulation

Labor market regulation deserves some discussion since it is potentially a confounding factor in the analysis.

Until 1991, the Peruvian Labor Code had the reputation of being restrictive, protectionist, and cumbersome (ILO, 1994). However, in that year, “labor market regulations were relaxed through a succession of reforms. Firing costs diminished sharply through the progressive elimination of job stability regulations, the reduction in red tape for the use of temporary contracts, and changes in the severance payment structure” (Saavedra & Torero, 2004, p.132).

A second wave of reforms was carried out in 1995, when the prior job security rules and the two-tier regime were eliminated. “These changes, plus the reduction in severance payments, implied a sharp reduction in firing costs, which may be interpreted as a lower level of the tax on dismissals perceived by firms” (Saavedra & Torero, 2004, p.137).

The results of the structural reforms on labor market outcomes were unexpected. In particular, “the rate of informality increased steadily during the 1990s despite the increased benefits of formality through the deregulation of the labor markets, a healthy macroeconomic recovery, and tighter tax codes and regulation” (Chong, Galdo, & Saavedra, 2008, p.244).

Since the global quality of jobs did not increase during this period, it can be argued that there is no incentive effect from the labor market to confound with the reforms in the educational market.

## C Descriptive provincial dynamics

Four main variables will be used throughout this section; they are defined as follows (cf. Table C.1). It is worth mentioning that these definitions do not necessarily correspond to the ones used in the main text. First, I define “**private intensity**” ( $PI$ ) as the number of private schools (of secondary education level) in year  $t$ , per 1,000 age-group population in 1993 (for the same educational level), at the province level.<sup>41</sup> Second, I define “**current private intensity**” ( $CPI$ ) as the number of private schools (of secondary education level) in year  $t$ , per 1,000 age-group population in the same year  $t$  (for the same educational level), at the province level. Third, I define “**private intensity change**” ( $\Delta PI$ ) as the change in private intensity between years  $t$  and  $t - 1$ . Fourth, I define “**basal private intensity change**” ( $\Delta BPI$ ) as the change in private intensity between 1993 and year  $t$ . These four definitions will be useful for understanding some key descriptive statistics in this section.

**Table C.1:** Definitions of variables

	Numerator	Denominator
	Nb of private schools in year	Age-group population in year
Private intensity ( $PI$ )	$t$	1993
Current private intensity ( $CPI$ )	$t$	$t$
Private intensity change ( $\Delta PI$ )	Change in $PI$ between $t - 1$ and $t$	
Basal private intensity change ( $\Delta BPI$ )	Change in $PI$ between 1993 and $t$	

Note: Only secondary-level schools. The population of reference is aged 12-17. Own elaboration.

The number of new private schools built since 1993 is closely positively correlated with the population at baseline (within the age-group), and negatively related to the number of public schools already existing in the province. Table C.2 depicts a sort of path dependence: as time moves forward, both relationships become stronger.

The private intensity ( $PI$ ) is not homogeneous across provinces.<sup>42</sup> There are 21 provinces, out of 191, where private intensity remained constant over the whole period of study. They all display a  $PI$  equal to zero, which is due to the fact that no private secondary school has opened in their territory, at least since 1993.

According to Table C.3, the larger the population at baseline, the larger the number of private schools. Likewise, over the period 1993-2017, provinces that were in the

<sup>41</sup>The year 1993 is taken as the baseline because the National Population Census and the National School Census were both conducted in 1993, before the privatization law of 1996, which is the main (but not the only) reference of legislation change, as shown in section 2.2 and Table 1.

<sup>42</sup>Due to its large size, Metropolitan Lima has been split into five “provinces”: Lima Norte, Lima Este, Lima Centro, Lima Sur, and Callao. The partition follows the one used by the National Bureau of Statistics (INEI, 2014, p.9).

**Table C.2:** Secondary education: New private schools built since 1993 at the province level (OLS estimates)

	(1)	(2)	(3)	(4)	(5)
	Until 2004	Until 2008	Until 2012	Until 2016	Until 2019
Population in 1993	1.352*** (0.072)	1.943*** (0.108)	2.255*** (0.134)	2.732*** (0.178)	2.905*** (0.198)
Nb. of public schools in 1993	-0.350*** (0.074)	-0.509*** (0.110)	-0.624*** (0.137)	-0.704*** (0.182)	-0.749*** (0.202)
Constant	-1.485 (1.297)	-1.734 (1.938)	-1.783 (2.408)	-3.183 (3.201)	-3.962 (3.561)
N	191	191	191	191	191
R2	0.846	0.834	0.810	0.786	0.771
R2-adj.	0.844	0.833	0.808	0.784	0.768

Standard errors in parentheses

Source: MINEDU, Censo Escolar. Own elaboration.

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

fourth quartile in 1993 according to their  $PI$  are those that experienced the greatest increase, in absolute terms, in the number of private schools.

It is noteworthy that the private intensity dynamics are irregular in some cases. Indeed,  $PI$  may increase or decrease in consecutive periods (cf. Figures C.1 and C.2). As a consequence, unlike Duflo (2001), whose treatment always increases, it is important here to take into account the  $PI$  at the moment of schooling for each individual. This is done in section 5.9.

Table C.4 summarizes the distribution of provinces according to their current private intensity ( $CPI$ ) quartile in 1993 and 2019. This table suggests that there have been differential relative treatment intensities across provinces. For instance, 61% of provinces in Q1 in 1993 remained in the same relative position in 2019. However, a fifth of them (19%) passed to Q3 in 2019. The most important relative change is observed for Q3 of 1993, where 23% passed to Q4 in 2019.

Figure C.3 shows the relationship between net attendance rate and private intensity. Two findings are worth noting. First, provinces that had the greatest private intensity in the baseline (Q4) are those that experienced the greatest increases in  $PI$  between 1993 and 2017. More generally, the extent of  $PI$  seems to be correlated with the initial  $PI$ . Second, regardless of the initial  $PI$ , at the end of the period all quartiles show similar net attendance rates, close to 90%. This implies that public educational services (and concomitant public policies such as the Juntos conditional cash transfer program) have played an important role in the democratization of education, at least in those regions with relatively few private schools.

**Table C.3:** Provinces: Age-group population and number of private schools, by private intensity (*PI*) quartile in 1993 (secondary level)

Private intensity quartile in 1993	N	Age-group population (thousands)		Number of private schools	
		1993	2017	1993	2017
<b>Total</b>	<b>191</b>	<b>13.9</b> (23.4)	<b>13.5</b> (26.0)	<b>9.3</b> (35.3)	<b>26.7</b> (86.8)
Q1	72	4.4 (3.6)	3.8 (3.1)	0.0 (0.0)	1.6 (3.1)
Q2	24	12.4 (7.1)	10.4 (6.2)	1.6 (1.2)	7.7 (9.6)
Q3	48	13.7 (11.7)	13.1 (12.0)	4.6 (4.2)	16.6 (27.5)
Q4	47	29.5 (41.1)	30.4 (46.4)	32.4 (66.2)	85.3 (159.7)

Note: Standard deviations in parenthesis.

Source: Population Census (INEI) and School Census (MINEDU), 1993 and 2017.

Own elaboration.

**Table C.4:** Provinces: Current private intensity (*CPI*) distribution, 1993-2019 (%)

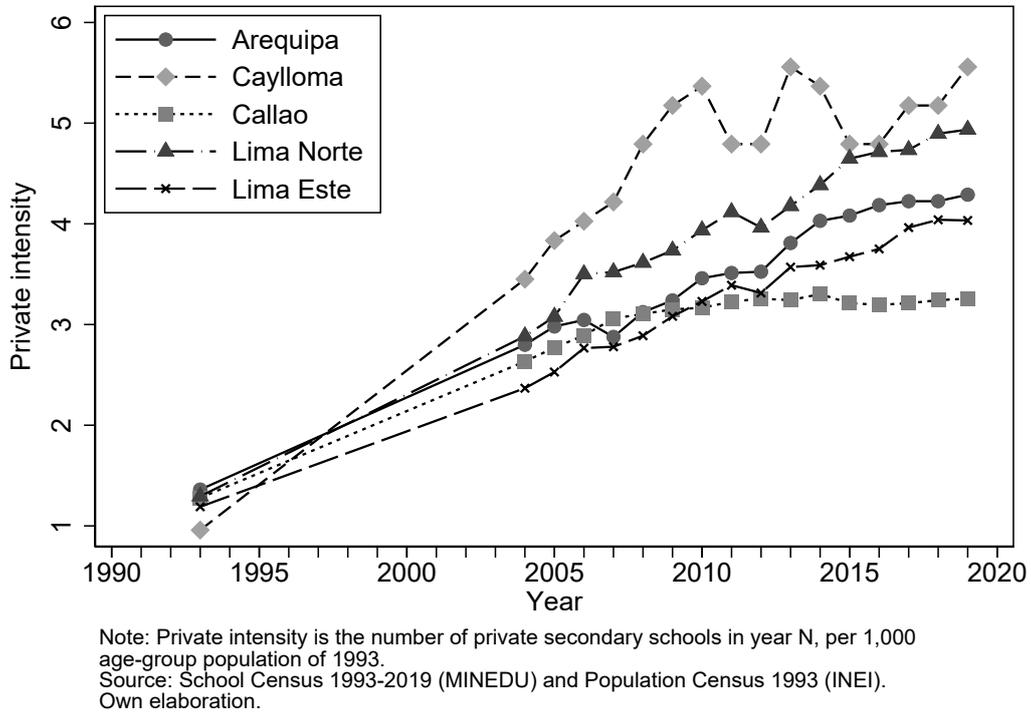
		CPI quartile in 2019				
		Total	Q1	Q2	Q3	Q4
CPI quartile in 1993	<b>Total</b>	<b>100</b>	<b>30</b>	<b>20</b>	<b>25</b>	<b>25</b>
	<b>Q1</b>	<b>100</b>	<b>61</b>	15	19	4
	<b>Q2</b>	<b>100</b>	17	<b>54</b>	17	13
	<b>Q3</b>	<b>100</b>	15	19	<b>44</b>	23
	<b>Q4</b>	<b>100</b>	6	11	19	<b>64</b>

Source: School Census 1993 and 2019

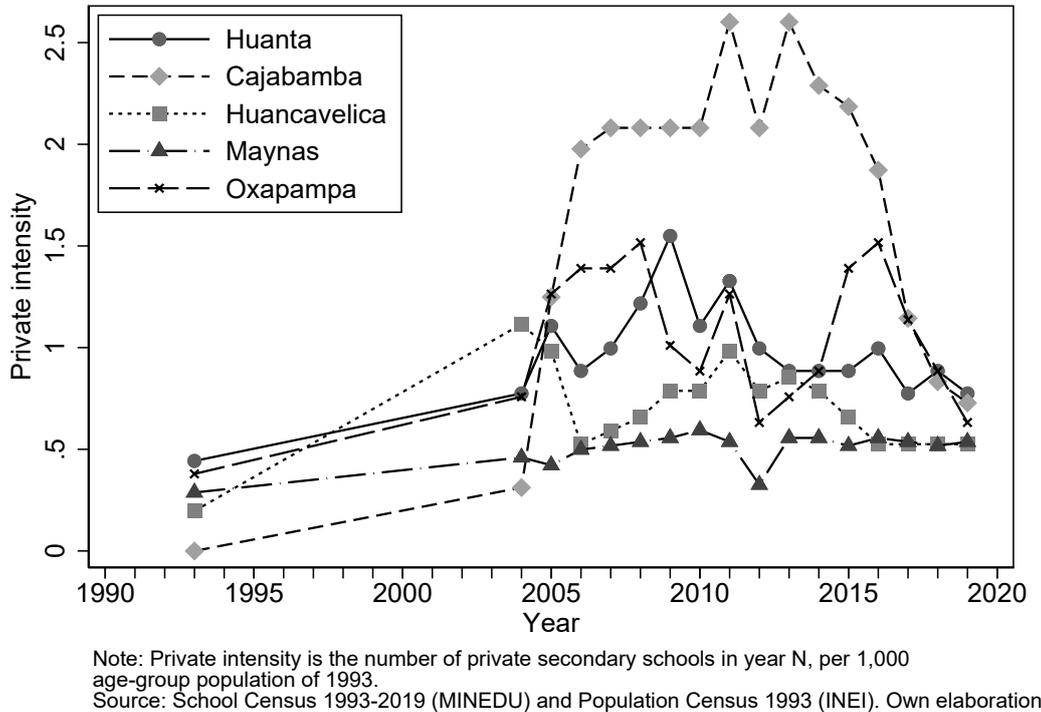
(MINEDU), Population Census 1993 (INEI).

Own elaboration.

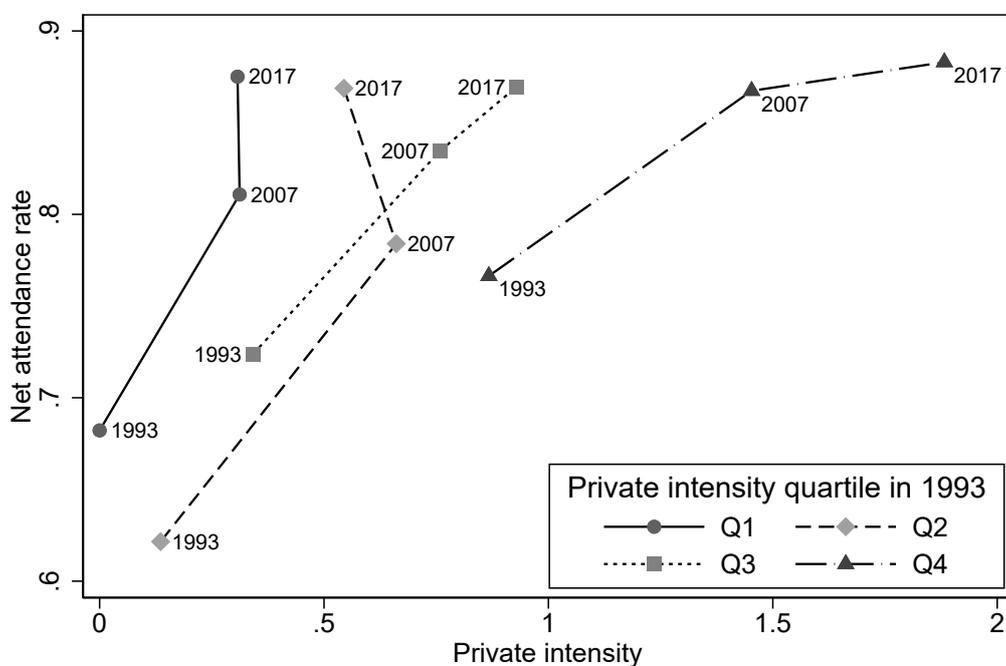
**Figure C.1:** Provinces with high average private intensity, 1993-2019



**Figure C.2:** Provinces with at least six periods of decreasing private intensity, 1993-2019



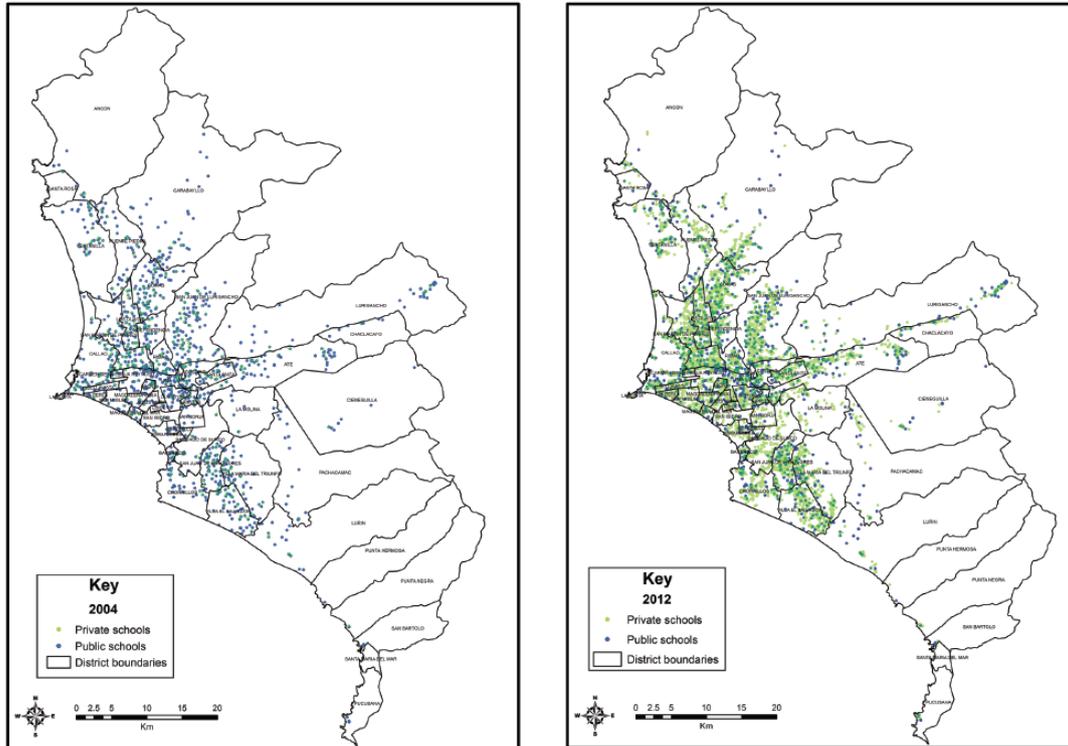
**Figure C.3:** Provinces: Net attendance rate by private intensity, 1993-2017 (secondary education)



Source: School Census 1993, 2007, 2017 (MINEDU) and Population Census 1993, 2007, 2017 (INEI). Own elaboration.

## D Metropolitan Lima: Public and private schools, 2004-2012

Figure D.1: Privatization in Metropolitan Lima

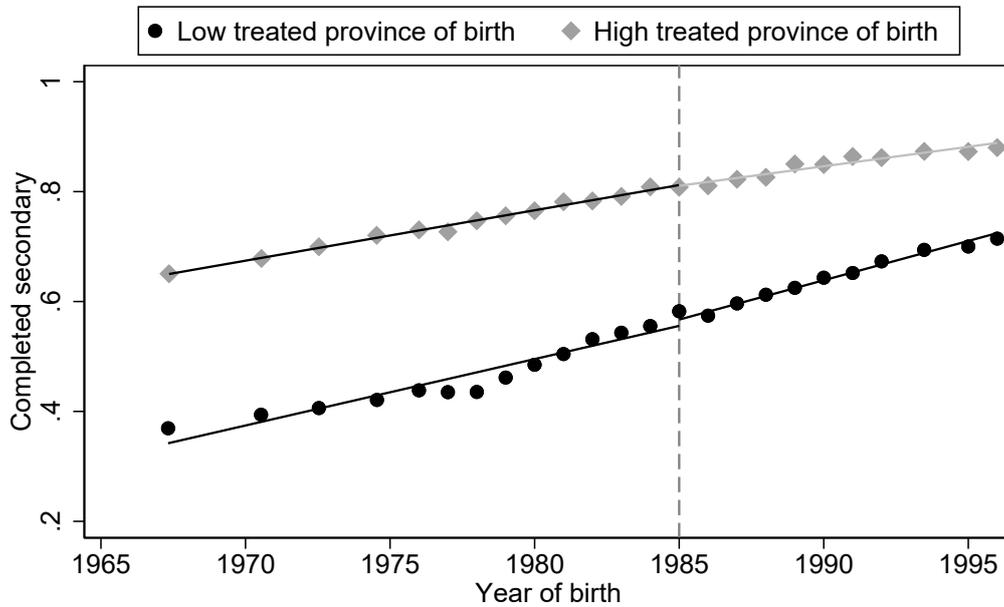


Source: Balarin (2015, p.10).

# E Robustness checks - Additional material

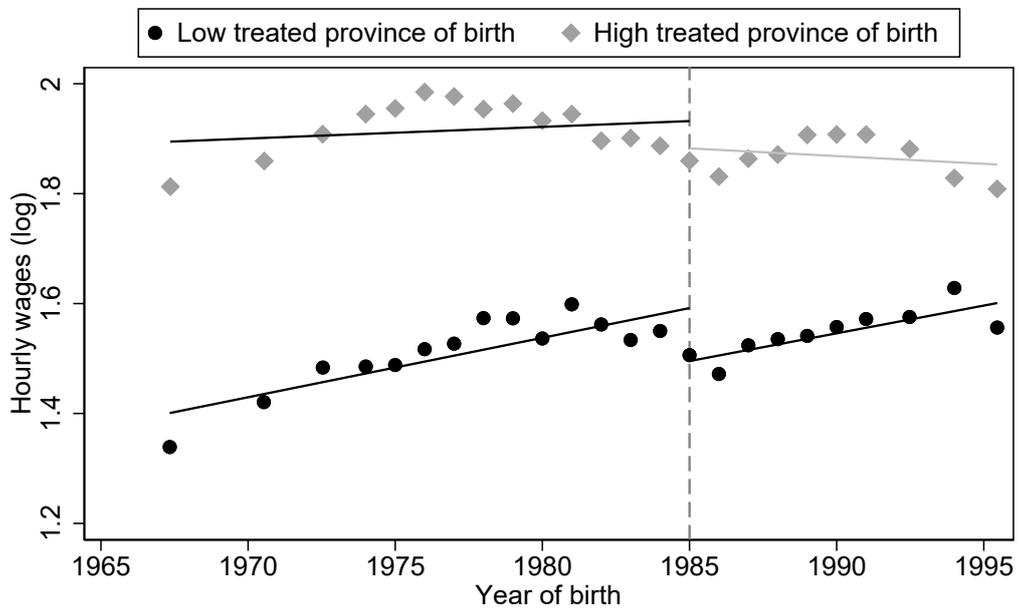
## E.1 Pre-trends

Figure E.1: Pre-trends in secondary school completion



Note: High treated provinces are those of the fourth quartile according to their Treatment Intensity in 1993.  
Source: ENAHO 2004-2019, School Census 1993-2019, and Population Census 1993.  
Own elaboration.

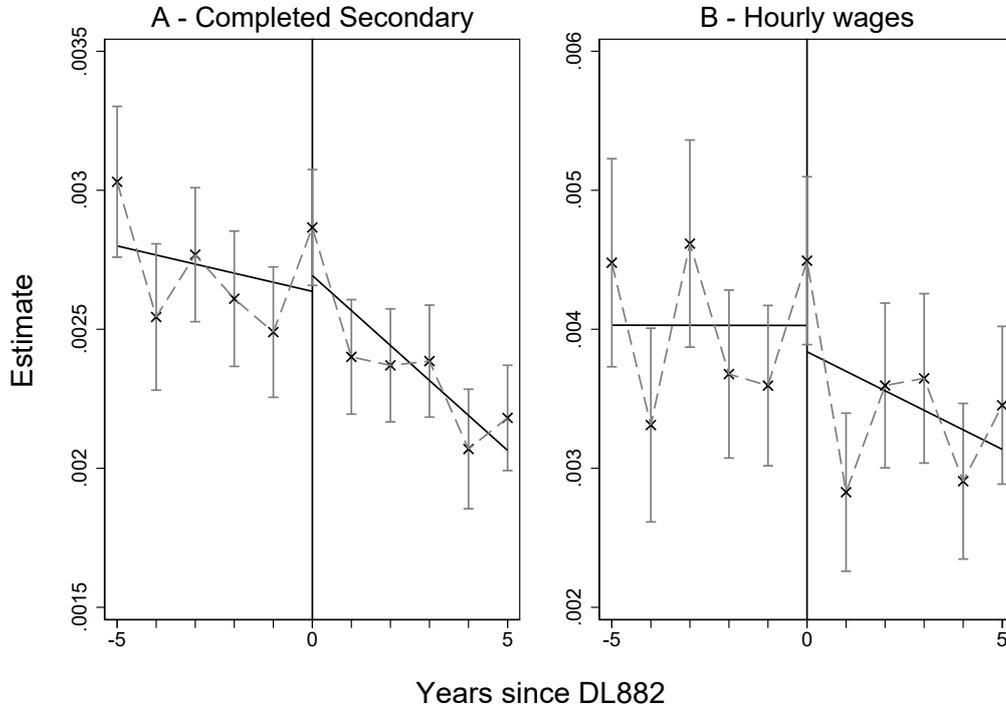
**Figure E.2:** Pre-trends in hourly wages



Note: High treated provinces are those of the fourth quartile according to their Treatment Intensity in 1993.  
Source: ENAHO 2004-2019, School Census 1993-2019, and Population Census 1993.  
Own elaboration.

## E.2 The "exhaustion effect"

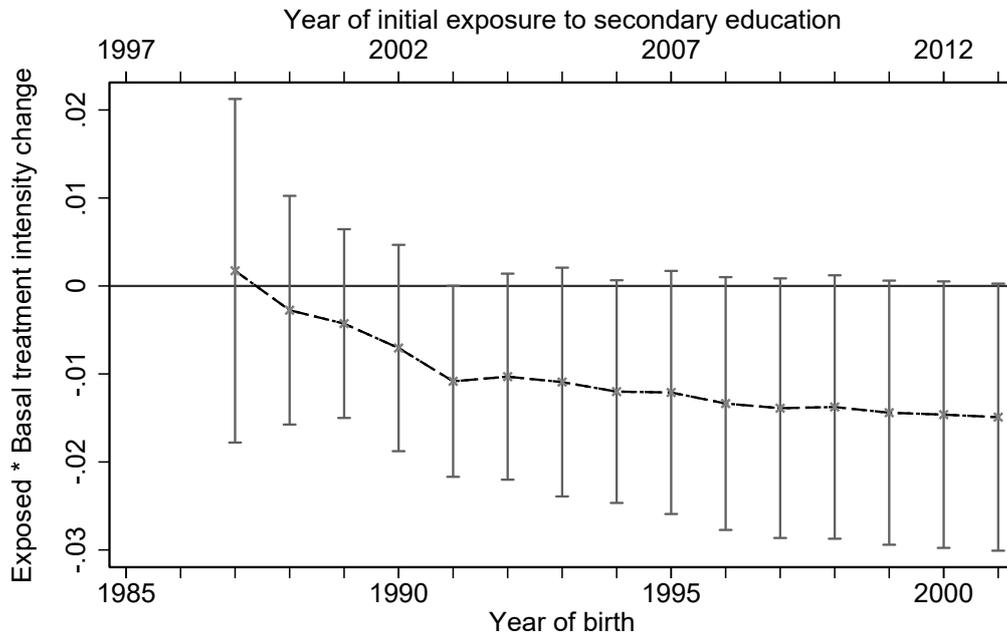
Figure E.3: Graphical event study



Notes: For each dependent variable (secondary completion and hourly wages, respectively in Panels A and B), the y-axis plots the coefficient of the interaction between the 1993 secondary school completion rate and the treatment intensity (average 2004-2019), both at the province of birth level. Controls include survey fixed-effects, age, gender, mother tongue, migration status, and survey design. The x-axis shows a 10-year window around the DL882 act (1996 is the year zero). Each point represents the number of years preceding or succeeding DL882 at the time the respondent would be expected to end secondary education. The sample is restricted to individuals aged 18-40 at the time they were surveyed. Source: National Household Survey (2004-2019) and School Census (1993, 2010). Own elaboration.

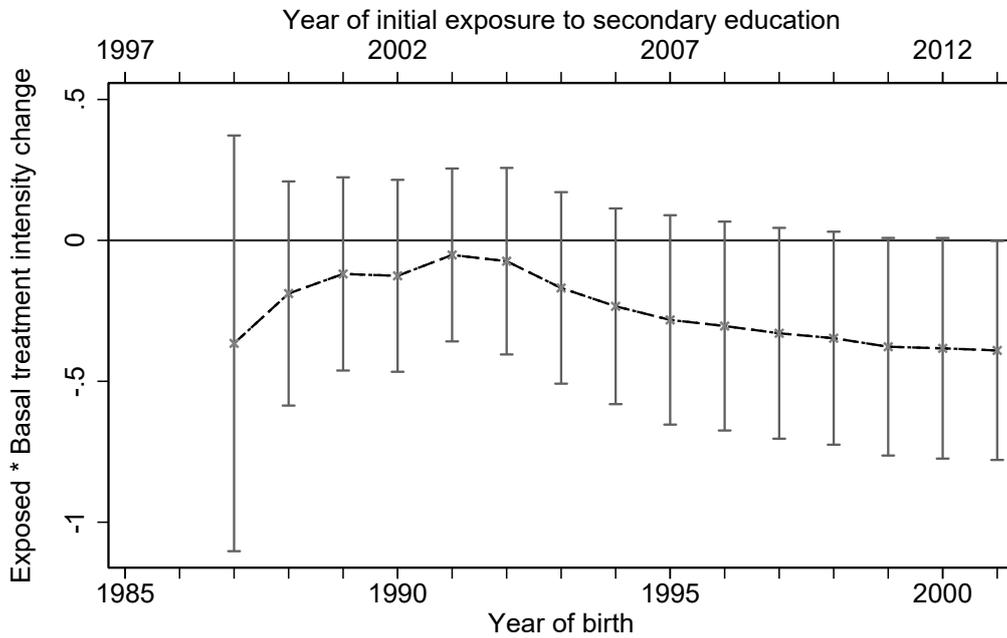
## F Privatization as a process results

**Figure F.1:** Coefficients of the interactions Exposed \* private' in the province of birth (Dependent variable: Completed secondary education)



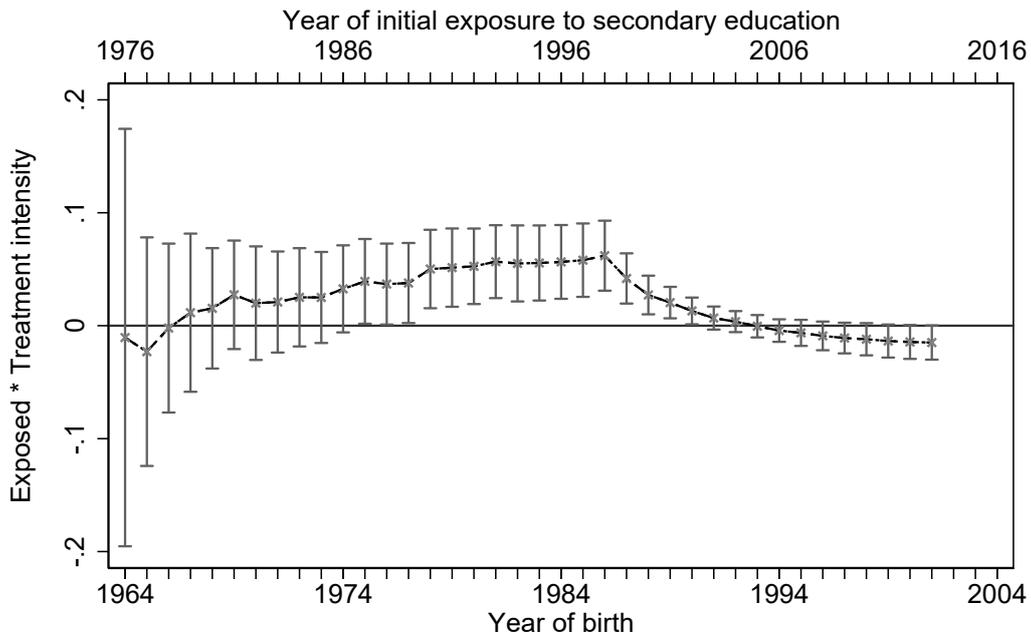
Note: Shaded area shows 95% confidence intervals.  
Source: National Household Survey (2004-2019) and School Census (1993, 2010).  
Own elaboration.

**Figure F.2:** Coefficients of the interactions Exposed \* private' in the province of birth (Dependent variable: Real wage)



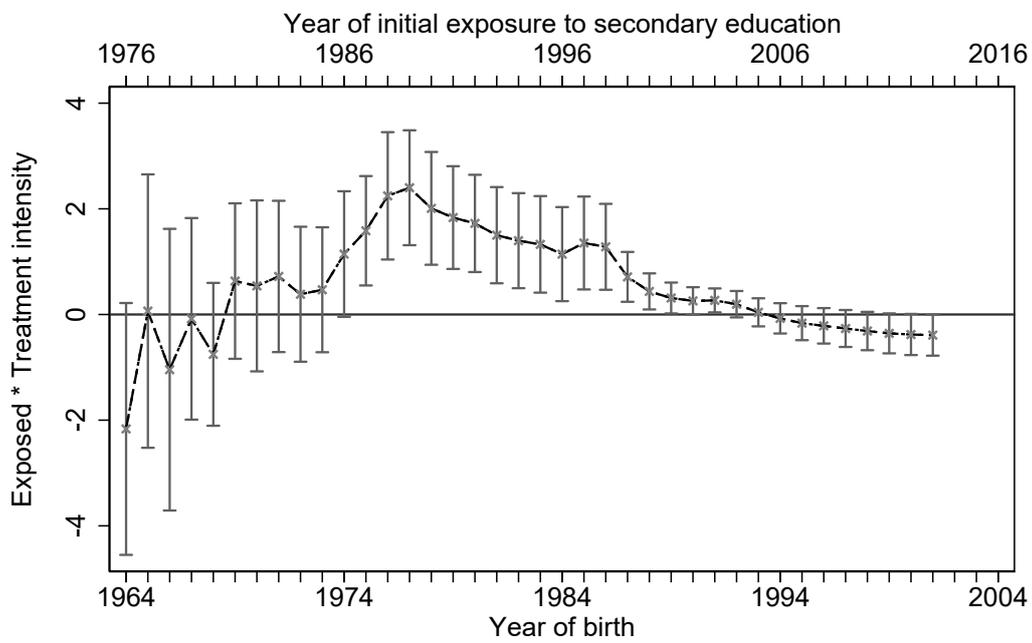
Note: Shaded area shows 95% confidence intervals.  
 Source: National Household Survey (2004-2019) and School Census (1993, 2010).  
 Own elaboration.

**Figure F.3:** Coefficients of the interactions Exposed \* private in the province of birth (Dependent variable: Completed secondary education)



Note: Shaded area shows 95% confidence intervals.  
 Source: National Household Survey (2004-2019) and School Census (1993, 2010).  
 Own elaboration.

**Figure F.4:** Coefficients of the interactions Exposed \* private in the province of birth (Dependent variable: Real wage)



Note: Shaded area shows 95% confidence intervals.  
 Source: National Household Survey (2004-2019) and School Census (1993, 2010).  
 Own elaboration.

**Table F.1:** Treatment intensity: Effect of the educational privatization expansion on secondary completion (cf. Eq. 5)

	Exposed=1 if born before		
	(1) 1990	(2) 1995	(3) 2000
Exposed X Intesity	-0.007 (0.006)	-0.012* (0.007)	-0.015* (0.008)
Female	-0.056*** (0.007)	-0.056*** (0.007)	-0.056*** (0.007)
Indigenous mother tongue	-0.314*** (0.012)	-0.314*** (0.012)	-0.314*** (0.012)
Migrated from province of birth	0.044*** (0.008)	0.044*** (0.008)	0.044*** (0.008)
No. of obs.	512,314	512,314	512,314
R-squared	0.215	0.215	0.215

Note: All regressions include the following fixed effects: province of birth, year of birth, and year of birth interacted with province-level covariates.

Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019. Own elaboration.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table F.2:** Treatment intensity: Effect of the educational privatization expansion on real wages (cf. Eq. 5)

	Exposed=1 if born before		
	(1) 1990	(2) 1995	(3) 2000
Exposed X Intensity	-0.126 (0.173)	-0.282 (0.188)	-0.383* (0.198)
Female	-3.993*** (0.087)	-3.993*** (0.087)	-3.992*** (0.087)
Indigenous mother tongue	-2.070*** (0.174)	-2.071*** (0.174)	-2.070*** (0.174)
Migrated from province of birth	1.346*** (0.151)	1.346*** (0.151)	1.347*** (0.152)
No. of obs.	512,684	512,684	512,684
R-squared	0.017	0.017	0.017

Note: All regressions include the following fixed effects: province of birth, year of birth, and year of birth interacted with province-level covariates.

Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019. Own elaboration.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table F.3:** Treatment intensity: Effect of the educational privatization expansion on secondary completion (cf. Eq. 6)

	Exposed=1 if born before			
	(1) 1970	(2) 1980	(3) 1990	(4) 2000
Exposed X Intensity	0.020 (0.025)	0.053*** (0.017)	0.013** (0.006)	-0.014* (0.008)
Female	-0.056*** (0.007)	-0.056*** (0.007)	-0.056*** (0.007)	-0.056*** (0.007)
Indigenous mother tongue	-0.314*** (0.012)	-0.313*** (0.012)	-0.314*** (0.012)	-0.314*** (0.012)
Migrated from province of birth	0.044*** (0.008)	0.044*** (0.008)	0.044*** (0.008)	0.044*** (0.008)
No. of obs.	512,314	512,314	512,314	512,314
R-squared	0.215	0.216	0.215	0.215

Note: All regressions include the following fixed effects: province of birth, year of birth, and year of birth interacted with province-level covariates.

Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019. Own elaboration.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table F.4:** Treatment intensity: Effect of the educational privatization expansion on real wages (cf. Eq. 6)

	Exposed=1 if born before			
	(1) 1970	(2) 1980	(3) 1990	(4) 2000
Exposed X Intensity	0.541 (0.820)	1.724*** (0.466)	0.257* (0.132)	-0.379* (0.197)
Female	-3.993*** (0.087)	-3.994*** (0.087)	-3.993*** (0.087)	-3.992*** (0.087)
Indigenous mother tongue	-2.069*** (0.174)	-2.049*** (0.173)	-2.067*** (0.173)	-2.071*** (0.174)
Migrated from province of birth	1.346*** (0.151)	1.346*** (0.151)	1.347*** (0.151)	1.347*** (0.152)
No. of obs.	512,684	512,684	512,684	512,684
R-squared	0.017	0.017	0.017	0.017

Note: All regressions include the following fixed effects: province of birth, year of birth, and year of birth interacted with province-level covariates.

Robust standard errors in parentheses are clustered at the province of birth level.

Source: National Household Survey 2004-2019. Own elaboration.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$