On the Peruvian educational problem : inequality, privatization, and well-being

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"Confianza en el anteojo, nó en el ojo;
en la escalera, nunca en el peldaño;
en el ala, nó en el ave"

César Vallejo (París, 1937)

UNIVERSITÉ PARIS I PANTHÉON SORBONNE

Abstract

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PhD thesis

by José María Rentería Vásquez

Peru has experienced substantial increases in enrollment rates and years of schooling since 1940. However, there is still a serious problem regarding the quality of the educational provision: many pupils learn little in school. The literature shows that such an issue can have long-term negative effects on the scope of individual lives. In this context, the present thesis, which consists of three essays dealing with the Peruvian case, aims to study three channels of the country's educational problem. The first essay provides, for the first time in the literature, both lower and upper bound estimates of the inequality of opportunity (IOp) on learning achievement. It also, for the first time, studies the role of time-varying circumstances, a problem that has so far been neglected in the IOp literature. The second essay explores the mid-term effects of the *de facto* privatization that took place thanks to a law enacted in 1996. By exploiting two sources of variation, namely the geographical location of new private schools and the birth years of individuals, it shows that this phenomenon has not contributed to increasing access to formal education nor to improving wages in the labor market. The final essay examines the influence of teacher subjective well-being (TSWB) on the mathematics learning achievement of public-school students. It identifies three dimensions of TSWB: workplace relationships, working conditions, and living conditions. The results show both that TSWB has an inverted U-shaped effect on test scores and that workplace relationships are the most influential TSWB factor in students' academic achievement.

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Keywords: Education, inequality of opportunity, learning achievement, privatization, subjective well-being.

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JMRV

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Abbreviations

CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CNRS	French National Center for Scientific Research
COVID-19	Coronavirus disease 2019
CPV	Population and Housing Census
df	Degrees of freedom
DIGC	General Directorate of School Management Quality
DL882	Legislative Decree Nº 882 "Law to promote investment in educational services"
DU	Emergency Decree
DU002	Emergency Decree No. 002-2020 "that establishes measures to fight against informality in the provision of educational services by private schools, and to strengthen their education provision"
ECE	Student Assessment Census
EFA	Exploratory Factor Analysis
ENAHO	National Household Survey
ENDO	National Teacher Survey
FE	Fixed-effects
GDP	Gross Domestic Product
GRADE	Group for the Analysis of Development
INDECOPI	Agency for Competition and Consumer Protection
INEI	Peruvian National Bureau of Statistics
IOp	Inequality of Opportunity
IRD	French Research Institute for Development
ISCED	International Standard Classification of Education

IV	Instrumental Variables method
LLECE	Latin American Laboratory for Assessment of the Quality of Education
MINEDU	Peruvian Ministry of Education
MLD	Mean log deviation
NP	Niehues and Peichl (2014)
OLS	Ordinary Least Squares
OECD	Organisation for Economic Co-operation and Development
PISA	Program for International Student Assessment
PPVT	Peabody Picture Vocabulary Test
RMSEA	Root mean square error of approximation
sd	Standard deviation
SD2021	Supreme Decree Nº005-2021-MINEDU "Regulation of private basic education institutions"
SIJE	Education Legal Information System
SPIJ	Peruvian Legal Information System
SUNEDU	National Superintendency of Higher University Education
SWB	Subjective well-being
TSWB	Teacher subjective well-being
UGEL	Local Educational Administration Unit
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
YLS	Young Lives Study

Chapter 1

Introduction

An apparent paradox besets developing countries when it comes to education and the labor market. The general rule is that while they have increased access to basic and tertiary education, the outcomes for the labor market (such as informality, real wages, or decent work) have not consistently improved.

In Latin America, secondary school enrollment rates rose from 14% in 1960 to 95% in 2016 (Glewwe, Lambert, & Chen, 2020, p.185). However, "regional productivity growth remains subpar, and the productivity gap with respect to the United States has widened" (Fernández-Arias & Fernández-Arias, 2021, p.1). At the same time, the wage share of GDP in this region has remained around 40% since 1950 (Alarco, 2014, p.46), and informality nowadays characterizes more than 50% of total employment (David, Lambert, & Toscani, 2021, p.148). Furthermore, it is considered one of the most socially unequal regions in the world (UNDP, 2021, p.4).

Theoretically, the well-documented improvements in education should have led to better outcomes. According to standard theory, schooling in fact increases human capital since it enhances skills. Human capital also increases productivity and therefore wage acquisition in the labor market (Becker, 1962; Mincer, 1958; Schultz, 1961). Latin America's weak link in this causal chain may come from omitting the notion of *class* as a central economic concept (Bowles & Gintis, 1965) or taking productivity as an individual instead of a social trait (Fix, 2018); these are just two examples of the shortcomings of human capital theory.

Whatever the reason, Peru seems frequently to be placed at an extreme in the region. Among other traits, it bears higher rates of informal employment than its neighbors (David et al., 2021), higher income inequality (Amarante & Colacce, 2018), lower productivity (Céspedes, Lavado, & Ramírez, 2016), and a lower tax-to-GDP ratio (OECD, 2021). For the record, during the pandemics it was "the country with the highest number of COVID-19 deaths per 100,000 population" in the world (Ramírez-Soto & Ortega-Cáceres, 2022, p.1). Peru is a country of extremes, not only in quantifiable dimensions.[1] For instance, in the 1990s it applied one of the most aggressive liberalization plans and is one of the most unstable democratic political regimes in recent times (six presidents in the last ten years).

Why does this country seem to have a natural predilection for putting itself in such extreme positions? We may claim at least that it has to do with its history: how it was born as a country, and how capitalism was born there. Peruvian society is difficult to grasp because it still betrays its potent heritage from colonialism that contributes nothing to social cohesion (Cotler, 1978; Pereyra, 1993). In addition, it is a very diverse country in ethnic, cultural, and geographical terms, if not more.

This thesis examines a field where Peru is no less extreme: education. Indeed, in international comparative studies this country is notorious for frequently coming among the last in learning achievement (Schleicher, 2018). It suffers among other things a high degree of school segregation (Benavides, León, & Etesse, 2014), poor equity (OECD, 2022), low public spending on education (Ñopo, 2018), and a wide infrastructural gap in the sector (L. Sánchez, 2020).

In this context, I propose to explore the Peruvian educational problem from the perspective of three agents: children, schools, and teachers. This choice is justified because they are key actors in the educational process (Barber, Chijioke, & Mourshed, 2010; Hanushek, 2020; Unesco, 2010).

As noted by the Ministry of Education in its plan for the period 2016-2021 (Minedu, 2016), four components define the bounds of this sector, related to learning quality,

[1] Of course, not all is bad news. Peru has also displayed important growth rates and monetary poverty reduction in the present century (Herrera, 2017).

teacher quality, infrastructure, and management.[2] This thesis tackles the first two components directly and the other two indirectly. The arrangement of the present work is as follows.

Chapter 2 examines the extent to which characteristics that are beyond the control of children affect their educational outcomes. In this context, the objective is to measure the inequality of opportunity for learning achievement, a measure which allows us to ascertain whether the playing field is equal for all. Whenever circumstances of birth determine outcomes later in life, real freedoms are compromised. It is commonly held that skin color or the mother tongue are attributes that should not penalize individuals. Accordingly, it is useful to know how far a society is from this ideal. For this purpose, I make use of a very rich and unusual data set: the Young Lives Study (YLS). This survey has been following two cohorts of children since 2002. The younger cohort was surveyed for the first time when they were around a year old. Thus, YLS data provide valuable information virtually since these children were born. I apply two different methodologies, one conceived as a lower bound (Ferreira & Gignoux, 2011) and the other as an upper bound (Niehues & Peichl, 2014). The results suggest that circumstances related to the first year of life account for at least one-third of the total variance in learning achievement when children are eight years old, and their influence declines to at least one-fifth at age fifteen. Likewise, the maximum amount attributable to unjust inequalities is approximately 70%. Furthermore, because of the rich set of variables available, I test –for the first time in the inequality of opportunity literature– the influence of time-varying circumstances. The findings show that such circumstances do not have a major impact on upper bound measures using panel data.

Chapter 3 focuses on the collateral effects of private school expansion which followed the passing of a law in 1996 to promote investment in educational services, with the objective of persuading the private sector to help increase the numbers and coverage of the education system. For the first time in the country's history, it allowed investors to operate on a for-profit basis and obtain tax credits. In this context, the objective of this chapter is to identify the effects of the creation of new private schools on individuals' secondary completion and real wages. This question is important because the evidence suggests that most of the private schools in this expansion were low-cost schools (Minedu,

[2]The reform process on which that plan is built-on is described in detail by Saavedra and Gutiérrez (2020).

2018) that may be associated with low-quality educational provision. For this purpose, I used mainly the National Household Survey (2004-2019) and the School Census. The empirical strategy exploits two sources of variation, namely the geographical location of 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 not contributed 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 global quality of the educational system as well as the regulatory role of the State.

Chapter 4, co-authored with Dante Solano, studies teachers' subjective well-being (TSWB) and its effect on students' learning achievement. Before bringing in more details on this topic, let me first give some elements of the context and motivation that guided the chapter. Between 2015 and 2018, I worked at the Peruvian Ministry of Education (Minedu), in the Department for the Promotion of Teacher's Well-being and Recognition. I was in charge of the National Teacher Survey operation. It was a very rewarding experience, since I took part directly or indirectly in almost all the activities of the survey, from design, questionnaire drafting, to supervising the data collection, etc. It was a great opportunity to meet teachers from very diverse schools across the country. This fieldwork gave me a very comprehensive picture of the educational conditions in difficult circumstances, particularly in rural areas. These experiences made me eager to understand Peru's educational problem from various perspectives. Dante Solano was also working at the time in the same Department of Minedu. His expertise in subjective well-being led him to propose a reformulation of the existing battery of related items in ENDO's questionnaire, based on the current state of the art and previous works by other scholars in Peru. We made some adjustments and, after a successful pilot test, these modifications were included. Dante and I then drafted a collaborative research program to combine our specialized fields of knowledge (Psychology and Economics, respectively). Our program included topics on teacher vocation, rural schools, wage gaps, and subjective well-being. As is well-known, research ideas take time to mature. It should therefore be no surprise that this chapter attains one of the goals that we set several years ago. In this context, it is worth mentioning that studying teachers is in itself worthwhile. For a long time the spotlight shone on the way in which families and

peers affect students' performance, principally due to the pioneering report by Coleman et al. (1966) on equality of educational opportunity. However, recent research also shows that teachers do matter "when assessed in terms of student performance instead of the more typical input measures based on characteristics of the teacher and school" (Hanushek, 2020, p.167). With this in mind, the objective of Chapter 4 is to estimate the influence of teacher subjective well-being on the mathematics learning achievement of public-school students in Peru.[3] For this purpose, we used the National Teacher Survey and the Census Student Assessment. After analyzing items related to teachers' life and work satisfaction with exploratory and confirmatory factor analysis, we identified three dimensions of TSWB: i) workplace relationships, ii) working conditions, and iii) living conditions. We implemented instrumental variables estimation and quantile regressions to disentangle the relationship between TSWB and students' learning outcomes. The results show that TSWB has an inverted U-shape effect on test scores, suggesting the presence of the "too-much-of-a-good-thing effect" (Pierce & Aguinis, 2013) and hence the existence of an optimal threshold after which its effect becomes detrimental.[4] Workplace relationships appear to be the most influential TSWB factor on students' academic achievement. This variable has a great potential for letting policymakers influence and improve teachers' performance in the short term.

To understand the endeavor of the present thesis in a unified framework, let us consider Figure 1.1, which is an adapted version of the proposal by Bourguignon (2018).[5] Any individual faces a set of circumstances (box A) that are beyond her control. They may be time-variant (e.g., natural disasters) or time-invariant (e.g., her place of birth), and of which only a subset can be observed by the researcher. To increase her levels in relevant outcomes (box F) such as her living standards, the individual exerts some level of effort (box B), which, in turn, may be influenced by her preferences (box C). In most cases, but not always, the educational outcomes (box E) mediate or moderate the results in other realms (box F). Both variables (circumstances plus efforts) together with some random

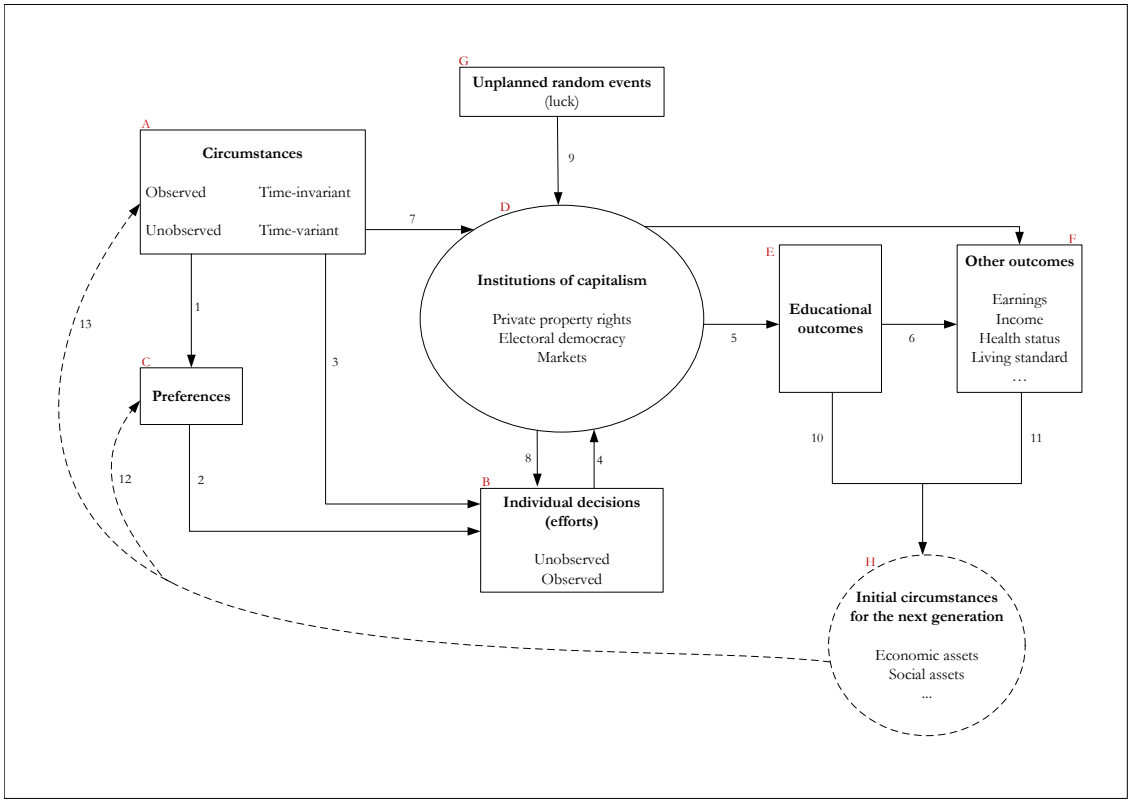
[3] It is worth mentioning that teacher well-being has been identified as one of the priority topics that need more attention for the 2021-2026 education research agenda in Peru (Rodríguez, 2022).

[4] This finding seems to be in line with the aphorism attributed to Oscar Wilde: "Everything in moderation, including moderation" and also with a popular saying in Peru: "Bueno es culantro, pero no tanto".

[5] While this framework is clear in theory, it is worth mentioning that there are some difficulties that arise in practice. As noted by Herrera, Correa, and Cozzubo (2022), they are at least three: the identification of the net effects driven by circumstances and individual decisions, the non-observable nature of many circumstances and efforts, and the bi-directional relationship between opportunities and outcomes.

events or luck (box G) determine the individual's outcomes once they have interacted in a particular institutional setting (circle D). In a static framework, equality of opportunity is achieved when the effect of arrows 1, 3, and 7 is zero.[6] In a dynamic framework, the outcomes of the current generation would constitute the initial conditions of the following generation (circle H), therefore, configuring the new hyperplane of circumstances for the younger cohort. In this case, intergenerational equality of opportunity is achieved when the effect of arrows 10 and 11 can be neutralized. In the present thesis, I examine the impact of three circumstances (box A) on educational outcomes (box E) and eventually also on labor market outcomes (box F). On one hand, the circumstances under study are circumstances from birth (Chapter 2), the educational privatization process (Chapter 3), and the teachers' subjective well-being (Chapter 4). On the other hand, the outcomes of interest are learning achievement (Chapters 2 and 4), school completion (Chapter 3), and wages (Chapter 3).

FIGURE 1.1: Conceptual framework



Source: Author's adapted version of Bourguignon (2018).

[6] Some may also include the effect of arrow 9, which is debatable.

The general contribution of this thesis is that it provides several perspectives, representing different agents, on the Peruvian educational problem. At the same time, it provides rigorous evidence on topics that have several different temporal horizons. Inequality has long been examined, whereas privatization started to receive attention only just before the 21st century. For its part, teachers' subjective well-being rather looks to the future.

The empirical nature of this work must not be understood as an endorsement of an instrumentalist view of education. On the contrary, my personal concept is linked more closely to the capability approach; in fact, I support its emphasis on the "understanding of education as intrinsically valuable. Being educated provides and enhances the possibility of engaging in activities that contribute to one's fulfillment in life and are not simply instrumental in securing better jobs or positions in society" (Terzi, 2010, p.197).

I wish this thesis may contribute to the understanding of some aspects of the Peruvian educational problem and, by so doing, will be useful in ameliorating the educational provision, hoping that more children reach fulfillment in life one day.

Chapter 2

Inequality of educational opportunity and time-varying circumstances: Longitudinal evidence from Peru

2.1 Introduction

Developing countries have experienced substantial increases in enrollment rates and average years of schooling since 1960 (J.-W. Lee & Lee, 2016). However, the quality of the educational provision is still a serious problem: many pupils learn little while in school (Glewwe & Kremer, 2006). Vertiginous educational expansion has been accompanied by increasingly insufficient financial and human resources. As a consequence, the lack of infrastructure, equipment, and well-trained teachers –among other factors– have become more apparent.

Peru has not been an exception. While the gross primary enrollment ratio was 99% in 2016 (INEI, 2018), the Student Assessment Census conducted by the Ministry of Education in the same year showed that only 34% and 46% of second-grade primary students obtained satisfactory results in mathematics and reading tests, respectively (Minedu, 2017). International comparison studies such as the Programme for International Student Assessment (PISA) and the Latin American Laboratory for Assessment

of the Quality of Education (LLECE) depict a similar reality (cf. OECD, 2016; Unesco, 2015). Certainly, it is worth mentioning that the evidence provided by both national and international assessments also suggests that there has been significant progress in recent years. Nevertheless, the indicators are still far from meeting the standards for an upper-middle-income country.

In addition, the Peruvian educational system is considerably inequitable. The recent literature dealing with this topic has established some stylized facts.[1] In particular, poverty status, parental education, ethnic origins, and rural residence, are variables that are systematically correlated with both educational inputs (e.g. school characteristics, teachers' pedagogical content knowledge) and outcomes (e.g. completion, learning achievement).

Implicitly, previous works have claimed that the influence of the above-mentioned variables on the educational outcomes of children is *unjust*. Likewise, the previous literature has generally investigated the importance of those variables independently.

The present work aims to comprehensively determine the extent to which characteristics that are beyond the individual responsibility of children affect their educational outcomes. In other words, I will address the problem of the distribution of educational opportunities. In this sense, relying on the philosophically meaningful distinction between *circumstances* and *efforts*, I will explicitly differentiate between fair and unfair sources of inequality.[2] In the inequality of opportunity (IOp) literature, *circumstances* can be seen as those aspects that are beyond individual control and thus for which individuals should not be held accountable. Genes, sex, and family background are examples. On the other hand, *effort* comprises personal choices, and therefore individuals are held responsible for it. In this context, both *circumstances* and *efforts* may influence relevant *outcomes*, such as income or welfare. Equality of opportunity is achieved when circumstances play no role in the determination of outcome levels (Roemer, 1998).

Analyzing the distribution of educational opportunities is a matter of particular interest because it will shape the future outcomes of children, especially (but not exclusively)

[1] Recent reviews include Cueto and Felipe (2018), Guadalupe, León, Rodríguez, and Vargas (2017), Ñopo and Kitmang (2017), and Cueto, Miranda, and Vásquez (2016).

[2] It is noteworthy that the source of inequality matters from an ethical point of view. Indeed, most "would agree that effects of circumstances on persons' well-being that are beyond the control of individuals should be rectified, while at least some differential outcomes due to choice are not compensable at the bar of justice" (Roemer & Trannoy, 2015, p.294).

when they enter the labor market. Nevertheless, education might not be seen as an instrumental dimension of well-being, but as a dimension to which every child has the same right.[3]

Compared to the existing literature on inequality of opportunity, this document offers four important contributions. First, it studies educational inequality based on achievement, that is, educational disparities are addressed by means of standardized test scores, which are expected to reflect what children have truly learned. This allows "for potentially much greater insight into the determinants of educational achievement, and might therefore contribute to the design of policies that raise average learning levels, or that reduce educational disparities" (Ferreira & Gignoux, 2014, p.241). It is noteworthy that in the IOp literature there are very few authors who analyze this type of inequality in the educational realm, and those who do so, are mainly concerned with outcomes such as "school completion" or "years of formal schooling". These kinds of outcomes do not allow us to study the results of the learning process.

Second, I use a rich longitudinal database on children, which provides a very unusual set of "circumstance" variables, from practically the time when the sampled infants were born. This database also provides the opportunity to study changes in variables over time that have classically been taken for granted as time-invariant in the IOp literature, which could potentially be as a nonnegligible mistake. In addition, it is important to note that the use of panel data has been acknowledged as a promising path to address the problem of the "partial observability of circumstances"[4] (Balcázar, 2015), which causes underestimation bias to an unclear extent for lower bound IOp measures using cross-sectional data.

Third, I provide both lower and upper bound estimates of educational IOp. Indeed, thanks to this longitudinal approach, I am able to account for unobserved circumstances and apply an adapted version of the upper-bound methodology proposed by Niehues and Peichl (2014).

[3] As a matter of fact, the General Education Law N° 28044 (2003) states that education is a fundamental right and a free-cost public service when provided by the state, which ensures the right to an integral, high-quality, and universal education for every person.

[4] i.e. the fact that the full set of circumstances is not observed in the data.

Fourth, I tackle the *time-varying circumstances* problem.[5] Indeed, because the IOp literature has traditionally focused on only one specific stage of life (typically adulthood), it has been implicitly taken for granted that childhood circumstances do not vary over time. This is obviously not a problem when considering innate characteristics such as ethnic origin or sex. Nevertheless, taking some other circumstances as time invariant might be more controversial, such as socioeconomic background, nutritional status, or even parental education levels and occupations. All these variables can potentially vary over time. The rich longitudinal database that I use allows us to explore the impact of this kind of circumstance on IOp measures. Thus, I critically evaluate the methodology of Niehues and Peichl (2014).

The empirical analysis relies on the Young Lives Study (YLS). This is a multidisciplinary longitudinal research program focusing on childhood poverty, coordinated by the University of Oxford, and carried out in Ethiopia, India, Peru, and Vietnam. This survey followed two cohorts of children for fifteen years beginning in 2002. In each country, the sample is composed of approximately 1,000 children from the older cohort (born circa 1994) and 2,000 children from the younger cohort (born circa 2001). Five rounds of data collection have taken place since the first round. For my purposes, I focus only on the younger cohort because the rich set of circumstances is observed beginning when they were one year old. In this way, I am able to unambiguously identify the evolution of the influence of circumstances on children's learning achievement as measured through reading and mathematics tests.

Following Hufe, Peichl, Roemer, and Ungerer (2017), the analysis relies on sets of circumstances. The sets under consideration include basic individual, household, and parental characteristics, as well as early childhood conditions, health-related variables, and shocks. The effort variables are proxied by the child's allocation of time: number of hours per day allocated to study at home and to leisure activities.

To provide an accurate estimation of the extent of IOp on learning achievement, I use two complementary methodologies. The first one follows Ferreira and Gignoux (2011) and serves as a lower bound estimate of IOp. Indeed, it is designed in such a way that adding new potentially unobserved circumstances can only increase the share of unjust inequalities. However, since the extent of the underestimation of this lower

[5] Let us define "time-varying circumstances" as those circumstances that have a high probability to change over the lifetime of a human being.

bound is unknown, providing an upper bound estimate is also relevant. Therefore, by exploiting the time-series dimension of the data set cited above, I provide an upper bound estimate of IOp under the key assumption that circumstances are exogenous and do not vary over time. Using a fixed-effects model, this method implies that the time-invariant individual effect is the maximum extent to which an individual should not be responsible for (Niehues & Peichl, 2014).

Since both methods were developed to measure the extent of IOp on labor market earnings, I introduce a slight variation in order to apply them pertinently to the measure of IOp on standardized test scores. Indeed, unlike the original methods, which use the mean log deviation (MLD) as inequality index, I make use of the simple variance as inequality index, which is the most appropriate choice for studying test scores constructed from item response theory models (Ferreira & Gignoux, 2014). Additionally, I do not proceed with the log-linearization of the dependent variables, which is a common practice when analyzing earnings but is not suitable for standardized test scores.

Finally, since my database permits us to trace several circumstances over time, I am able to critically evaluate Niehues and Peichl (2014)'s upper bound method. As noted above, this methodology relies heavily on the assumption that circumstances do not vary over time. For the first time, this work empirically tests the importance of this assumption using real data, which is its main contribution to the IOp literature.

The findings suggest that the effect of inequality of opportunity on learning achievement is an important issue for the Peruvian educational system. A set of sixteen circumstances (coming almost exclusively from the child's first year of life) account for important shares of the variance in mathematics and reading test scores: one-third at age 8 and one-fifth at age 15. Furthermore, the maximum amount of inequality attributable to unfair sources lies at approximately 70%. The results are robust to different outcomes and inequality measures.

Regarding methodological issues, distinguishing the indirect effects of circumstances on learning outcomes makes little difference for IOp estimates: the philosophical debate on compensation approaches for the direct and indirect effects of circumstances on the outcome seems not to be a critical concern for practical purposes. Likewise, the Niehues and Peichl (2014)'s upper bound methodology proved to be robust to the inclusion of time-varying circumstances. This evidence suggests that the particular time-varying

class of circumstances used here has a constant impact on the outcome of interest or, more generally, that the individual-specific effect is the most important component of learning achievement outcomes.

The rest of the paper is organized as follows. First, a brief state of the art is presented (section 2.2). Then, the data that are used (section 2.3) and the methods for estimating lower and upper bounds of IOp (section 2.4) are described. After that, the main results are presented (section 2.5) and some robustness checks are conducted (section 2.6). Finally, a discussion with concluding remarks and some implications for public policy are provided (section 2.7).

2.2 Related literature

Inequality of opportunity, inspired by the theoretical work of Rawls (1971), ceased to be a subject exclusively in the domain of philosophers thanks to its formalization in the works of van de Gaer (1993) and Roemer (1993, 1998).[6] Consequently, in the last decade, several studies have been carried out in the field of economics, and these have given rise to two different approaches to the topic: the ex-ante and the ex-post perspectives.[7] While the former analyzes individuals who share the same circumstances, the latter focuses on individuals who exert the same degree of effort.

Most of the empirical work on inequality of opportunity has focused on the labor market, using earnings as the relevant outcome. There are very few authors who have analyzed this type of inequality in the educational realm (for developing countries in general and for Andean countries in particular), and those who do, are mainly concerned with outcomes such as 'school completion' or 'years of formal schooling'. For instance, Yalonetzky (2012) develops two dissimilarity indices to measure IOp, and applies them to study IOp in Peru in terms of educational attainment levels (i.e. years of schooling). The author found that the share of IOp on this outcome has been reduced in recent decades, particularly among the younger cohorts.

Some exceptions include the work of Gamboa and Waltenberg (2012), who use a non-parametric approach inspired by Checchi and Peragine (2010). By exploiting the PISA

[6] Some seminal philosophical works are those of Arneson (1989, 1990), Cohen (1989), and Dworkin (1981a, 1981b).

[7] cf. Fleurbaey and Peragine (2013) and Ramos and van de Gaer (2016) for a compelling discussion.

2006-2009 databases to study IOp for educational achievement in six Latin American countries, they found that IOp accounts for up to 25%, and established that parental education and school type are important sources of unfair inequality.

Ferreira and Gignoux (2014) study IOp in terms of learning achievement in mathematics, reading, and science. They use the 2006 PISA database, which includes 57 countries (but not Peru). Their lower bound methodology showed that IOp accounts for 35% of all disparities in educational achievement. In addition, they convincingly argue that the simple variance is the most suitable inequality measure for analyzing standardized test scores. Indeed, unlike other widely used inequality measures, it is ordinally invariant to standardization.

Regarding the Peruvian educational system, the evidence suggests that traditional school resources and teacher characteristics are important determinants of student performance. Furthermore, although the schools are widely distributed throughout the territory, "they are heterogeneous in terms of physical and human resources available, such as qualified teachers, school materials, and equipment" (G. León & Valdivia, 2015, p.83).

The evidence also shows that there is a strong positive association between socioeconomic status at early ages and teacher's knowledge of the content and the students. Furthermore, the latter variable is positively correlated with pupil educational achievement (Cueto, León, Sorto, & Miranda, 2017). Socioeconomic status during childhood also correlates with higher college attendance at age 22 (Das, Singh, & Yi Chang, 2022).

Likewise, it has been documented that cognitive gaps between advantaged and disadvantaged children appear early in life, and there are no substantial changes in this situation once they enter school (Schady et al., 2015). For the urban/rural case in Peru, Castro and Rolleston (2018) argue that the significant and persistent cognitive gaps do not decrease over time because the school environment reinforces them.

2.3 Data

The empirical analysis in the present work relies on the Young Lives Study (YLS). This is a multidisciplinary longitudinal research program focused on childhood poverty, coordinated by the University of Oxford, and carried out in Ethiopia, India, Peru, and

Vietnam. This survey followed two cohorts of children for fifteen years beginning in 2002. In each country, the sample is composed of approximately 1,000 children from the older cohort (born circa 1994) and 2,000 children from the younger cohort (born circa 2001). Five rounds of data collection have taken place since the first round.[8]

The sampling strategy used in Peru is described in detail by Escobal et al. (2003). In broad terms, a hundred households within twenty sentinel sites were chosen using a multistage, cluster-stratified, random sampling approach. It has been shown that YLS households are very similar to the average household as depicted by other national-scale surveys. Indeed, the YLS sample "covers the full diversity of children in Peru in a wide variety of attributes and experiences. Therefore while not suited for simple monitoring of child outcome indicators, the Young Lives sample is an appropriate and valuable instrument for analyzing causal relations and modeling child welfare and its longitudinal dynamics in Peru" (Escobal & Flores, 2008, p. iv).[9]

The present analysis relies only on the younger cohort because a rich set of circumstances is observed beginning when they were one year old. In this way, I will be able to unambiguously identify the evolution of the influence of circumstances on children's learning achievement as measured through literacy and mathematics tests, which are the outcomes of interest.[10] It is noteworthy that these tests were inspired by traditional tests such as the Early Grade Reading Assessment, Cloze, and PISA; they were administered in the preferred language of the children and contained items of increasing difficulty. Cueto and León (2012) provide a complete description and analyze their psychometric characteristics for YLS round 3.[11]

[8]The surveys were carried out in 2002, 2006, 2009, 2013, and 2016. Additionally, a school survey was carried out in 2010 for a subsample of 572 children from the younger cohort distributed across 132 primary schools. For more details, cf. Appendix B.1.

[9]However, it is noteworthy that the richest five percent of districts were excluded from sampling due to the goal of oversampling poor areas. As a consequence, our IOp estimates will likely be downward biased.

[10]It is important to mention that in this paper the outcomes are measured as z-values of the raw scores. Indeed, the Rasch scores are not available for rounds 4 and 5 of the Peruvian sample. Regardless, rounds 2 and 3 show that both the raw and Rasch scores are strongly correlated ($\rho > 0.95$).

[11]Similar technical notes for rounds 4 and 5 are forthcoming.

2.4 Methodology

To provide an accurate estimation of the extent of IOp on learning achievement, I use two complementary methodologies. The first follows Ferreira and Gignoux (2011) and serves as a lower bound estimate of IOp. Indeed, it is designed in such a way that adding new potentially unobserved circumstances can only increase the share of unjust inequalities. However, since the extent of underestimation in this lower bound is unknown, providing an upper bound estimate is also relevant. Therefore, by exploiting the time-series dimension of the dataset described above, I provide an upper bound estimate of IOp under the key assumption that circumstances are exogenous and do not vary over time. Using a fixed-effects model, this method implies that the time-constant individual effect is the maximum amount of circumstances which an individual should not be responsible for (Niehues & Peichl, 2014).

As a general framework, first let us consider two determinants of an individual outcome y_{is} (in our case, mathematics and reading tests scores), for individual i at time point s: (i) *circumstances* C_i, which are characteristics outside individual control (e.g. ethnic origin, gender, family background), and hence a source of *unjust* inequalities in outcomes; and (ii) *effort* E_{is}, which represents all factors affecting the outcome and that are assumed to be the result of personal responsibility. Hence:

$$y_{is} = f(C_i, E(C_i)_{is}) \tag{2.1}$$

Let us then partition the population of individuals $i \in \{1, ...N\}$ into a set of disjunct *types* $\Pi = \{T_1, T_2, ...T_k\}$, i.e. subgroups of the population that are homogeneous in terms of their circumstances. According to the classic weak definition, perfect equality of opportunity is achieved if the mean advantage levels μ are identical across types: $\mu^l(y) = \mu^k(y)$, $\forall l, k | T_l, T_k \in \Pi$. Measuring IOp thus means capturing the extent to which $\mu^l(y) \neq \mu^k(y)$, for $l \neq k$.

The usual procedure consists of computing a measure of IOp by constructing a hypothetical smoothed distribution $\mu^k(y)$, which is obtained when each individual outcome y_i^k is replaced by the group-specific mean for each type $\mu^k(y)$. Based on this smoothed

distribution, the absolute IOp level can be computed for any scale-invariant inequality index I[12]:

$$\theta_a = I(\{\mu_i^k\}) \tag{2.2}$$

Therefore, the relative share of total inequality that can be attributed to circumstances is given by:

$$\theta_r = \frac{I(\{\mu_i^k\})}{I(y)} \tag{2.3}$$

2.4.1 Lower bound

Ferreira and Gignoux (2011) proposed a log-linearization of equation (2.1). For our purposes, a logarithm of the dependent variable is not appropriate since the outcome of interest deals with standardized test scores.[13] Therefore, the equation is written:

$$y_{is} = \alpha C_i + \beta E_{is} + u_{is} \tag{2.4}$$

The indirect effect of circumstances on the outcome through effort is given by:

$$E_{is} = \kappa C_i + v_{is} \tag{2.5}$$

As noted by Niehues and Peichl (2014), "since it is unlikely that we will observe all relevant circumstance and effort variables that shape individuals' outcomes, estimating this model will likely yield biased estimates. However, to compute IOp shares, it is not necessary to estimate the structural model and to derive causal relationships" (p.78).

[12] In fact, the only index that respects the axioms of anonymity, normalization, population replication, scale invariance, subgroup decomposability, path-independent decomposability, and the Pigou-Dalton transfer principle, is the *mean log deviation* $MLD = \frac{1}{N}\sum_i ln\frac{\mu_y}{y_i}$ (Foster & Shneyerov, 2000).

[13] The log transformation of income or earnings is a common practice since it is usually more normally distributed than the original variables, which are generally highly right-skewed. In contrast, the test score and normal distributions usually look alike. Moreover, test scores are typically "constructed from the raw results by means of Item Response Theory (IRT) models, which attempt to account for 'test parameters', so as to better infer true learning. This process generates an arbitrary metric for test scores, which are then typically standardized to some arbitrary mean and standard deviation" (Ferreira & Gignoux, 2014, p.212).

Therefore, by introducing the effort from equation (2.5) into equation (2.4), we obtain the reduced form depicted in equation (2.7):

$$y_{is} = (\alpha + \beta\kappa)C_i + \beta v_{is} + u_{is} \tag{2.6}$$

$$y_{is} = \psi C_i + \eta_{is} \tag{2.7}$$

Equation (2.7) can be straightforwardly estimated by OLS. Such a regression will display the fraction of variance explained by circumstances, including both their direct and indirect effects on learning achievement as captured by $\hat{\psi}$. Based on this result, a parametric estimate of the smoothed distribution, where all individuals sharing the same set of circumstances have the same advantage levels, can be computed as follows:

$$\tilde{\mu}^{LB} = \hat{\psi} C_i^K \tag{2.8}$$

In a situation of equality of opportunity, all predicted outcome levels should be identical, i.e. there would not be differences in outcomes due to the observed circumstances C_i^K. Thus, IOp can be measured as the degree of inequality in these counterfactual outcome levels, where differences are only due to differences in circumstances.

This procedure leads to lower-bound estimates because adding another circumstance variable to the analysis can only increase the explained variation. In other words, taking into account new previously unobserved circumstances cannot decrease the share of inequality due to circumstances. However, in cross-sectional designs, it is ordinarily the case that not all potential circumstances can be observed. Therefore, the extent of this underestimation bias is unclear, and an upper-bound estimate is relevant.

The lower bound strategy will be implemented using different sets of circumstances. Table 2.1 shows the list of circumstance variables that are considered.[14,15] It is worth

[14] In addition, some basic descriptive statistics are provided in Appendix B.3.

[15] The following works justify the pertinence of those circumstances: Ames (2006); Briones (2017); Castro, Baca, and Ocampo (2012); Castro and Rolleston (2015); Cueto, León, and Muñoz (2014); Grompone, Reátegui, and Rentería (2018); Higa (2011); Patrinos and Psacharopoulos (1997); Sabates and Di Cesare (2021); A. Sánchez (2017); Singh and Krutikova (2017).

noting that almost all of these variables are from the first round of the survey, i.e. when the child was approximately one year old.

TABLE 2.1: Circumstance sets for the lower bound methodology

Circumstance set	Variables
Individual	Gender, birth order
Geography	Area of residence (urban, rural), region (costa, sierra, selva)
Household	Size, dependency ratio
Wealth	Household wealth index
Mother	Mother's education, mother's age at birth, mother has indigenous tongue
Health	Vaccination, stunting
Schooling	Attended pre-school, age at start of grade 1, first attended school was public
Community	Population (log)

Note: All variables are from round 1, except "attended pre-school" (round 2), "age at start of grade 1" (round 4), and "first school attended was public" (round 3). More details about the variables are provided in table B.1 in the Appendix.
Own elaboration.

A few words on the interpretation of ex-ante IOp as a lower bound are provided for closing this subsection. Brunori, Peragine, and Serlenga (2019) point out that IOp lower bound estimates may suffer from upward bias related to the sampling variance of the estimated counterfactual distribution[16] due to a large number of circumstance interactions or a large number of types (a finer partition of the population reduces the number of observations within each type). In this context, its importance depends on three empirical issues: "the sample size, the joint distribution of outcome and circumstances, and the model specification used to estimate the counterfactual distribution" (Brunori et al., 2019, p.641).

Despite the fact that a given model specification may lead to upward or downward bias, the authors recognize that "underfitted models reinforce the well-known downward bias caused by partial observability" (p.637). Indeed, "when the sample size is large relative to the number of circumstances included in the model, the downward bias is likely to be considerable. However, when the sample size is small relative to the number of types/regressors, upward bias might prevail" (p.641). It is worth mentioning that, in the context of the present paper, the sample size is large relative to the number of

[16]The counterfactual distribution is interpreted, in the ex-ante approach, as the opportunity set for individuals belonging to the same type.

circumstances. Thus, upward bias is unlikely to dominate. Moreover, Brunori *et al.* acknowledge that the linear parametric approach (which is the approach used in section 2.5.2) explains, by construction, less inequality than its nonparametric counterpart (p. 639). Again, this fact reinforces the downward-bias character claimed here. Furthermore, it has been shown that ex-ante IOp estimates are downward biased when the assumption of orthogonality between effort and circumstances holds in the presence of unobservable circumstances (Ferreira & Gignoux, 2011; Luongo, 2011; Roemer, 1998). As the results presented in section 2.5.3 of this paper suggest, this assumption is also plausible here.

Brunori et al. (2019) recommend opting for the "best" balance between the two sources of bias to estimate the "true share" of IOp. Nevertheless, it is worth recalling that the present paper aims to provide both lower and upper bounds, instead of the "true share" of IOp. Indeed, several methods for estimating the aforementioned true share have been proposed in the literature in recent years; however, none of them has proven to be absolutely better than the others. Regardless, the results of Brunori *et al.* systematically show that parsimonious linear estimates are always lower than what they call the "best specification". Likewise, those estimates are also always lower than the full specification. In sum, the downward bias of the lower bound estimates provided in this paper is supported by several arguments.[17]

2.4.2 Upper bound

The methodology detailed in section 2.4.1 yields lower bounds because of the impossibility of observing the full set of circumstances. Niehues and Peichl (2014) –hereafter NP– provide a methodology to estimate upper bounds of IOp under the assumptions that circumstances are exogenous to the individual and neither they nor their effects on the outcome of interest vary over time. Their approach consists of two steps: first, "estimate a FE [fixed-effects] model using panel data to derive a measure of time-constant unobserved heterogeneity. Second, (...) use this estimated unit effect to estimate the maximum extent of inequality which can be attributed to inequality due to circumstances" (NP, p.79).

[17] In any case, Brunori et al. (2019) argue that their method is "preferable when the intent is to compare the level of IOp in two populations" (p.645), which is not the case here.

NP contemplate two extreme possibilities in order address the potential indirect effects of circumstances through effort on the outcome variable. The "responsibility cut" is therefore drawn in **step 1** according to two different approaches detailed below.

In the first approach, there is no compensation for the indirect effects of circumstances on the outcome, i.e. they are treated as part of effort, as suggested by Fleurbaey (2008). As a consequence, these indirect effects are captured by the β-coefficients in the following equation:[18]

$$y_{it} = \beta E_{it} + c_i^{(1)} + u_t + \varepsilon_{it} \tag{2.9}$$

where E_{it} are time-variant effort variables, u_t captures time-specific effects common to all individuals, and ε_{it} is the random error. All circumstances are accounted for by the individual specific unit-effect $c_i^{(1)}$, which is the maximum amount of the effect attributable to circumstances. It unambiguously yields an upper bound because potential unobserved time-invariant effort variables are also captured in this term.

In the second approach, full compensation is granted for the indirect effects of circumstances on the outcome, i.e. they are treated as circumstances, in line with Roemer (1998). Therefore, it is necessary to obtain a measure of effort net of circumstances, which can be done through the following sequential system of equations:

$$y_{it} = u_i + u_t + \varepsilon_{it} \tag{2.10}$$

$$E_{it} = \gamma \hat{u}_i + u_t + e_{it} \tag{2.11}$$

$$y_{it} = \beta \hat{e}_{it} + c_i^{(2)} + u_t + \eta_{it} \tag{2.12}$$

Eq. (2.10) calls for a fixed-effects model without any effort variables. The estimation of the unit effect u_i is then used in Eq. (2.11) "to sterilize all (observed) effort variables E_{it} from the impact of all (observed and unobserved) circumstances by taking out the effect

[18] As in section 2.4.1, the original logs are omitted for the dependent variable.

of $\hat{u}_i$" (NP, p.81). In the present work, only two effort variables E_{it} are used, namely, the number of hours per day spent studying outside school, and the number of hours per day spent on leisure activities. Therefore, the predicted residuals of Eq. (2.11), $\hat{e}_{it}$, can be seen as the sterilized effort variables. They are subsequently plugged into Eq. (2.12) to identify the unit effect $c_i^{(2)}$.

Finally, **step 2** is the same for both approaches. The unit effect $c_i^{(k)}, k \in \{1, 2\}$ is estimated by the following reduced-form model:

$$y_{is} = \psi \hat{c}_i^{(k)} + v_{is} \tag{2.13}$$

The term $\hat{c}_i^{(k)}$ is used "as the maximum extent of inequality which can be attributed to (time-invariant) circumstances" (NP, p.82). As in section 2.4.1, a parametric estimate of the smoothed distribution is constructed by replacing individual outcomes with their predictions. In our case, it would be:

$$\tilde{\mu}^{UB} = \hat{\psi} \hat{c}_i^{(k)} \tag{2.14}$$

Based on these predicted counterfactual levels, upper bound measures are derived for equations (2.2) and (2.3).

Finally, it is worth noting that since both methods detailed in sections 2.4.1 and 2.4.2 were developed to measure IOp on labor market earnings, I introduce a slight variation in order to apply them pertinently to the measurement of IOp on standardized test scores. Indeed, unlike the original methodologies –which use the mean log deviation (MLD) as inequality index (because it satisfies a number of desirable properties, especially path-independent decomposability)–, I make use of the simple variance as inequality index. As noted by Ferreira and Gignoux (2014, p.231), "the mean log deviation is not ordinally invariant in the standardization to which test scores are submitted" in the context of item response theory (IRT) models. As a consequence, the MLD is not suitable for the present study.

2.4.3 The role of time-varying circumstances

To assess the role of (observed) time-varying circumstances and their impact on the Niehues and Peichl (2014)'s upper bound method, I proceed as follows.

In the first approach, I add a vector of time-varying circumstances C_{it} to Eq. (2.9). Thus, it becomes:

$$y_{it} = \beta E_{it} + \lambda C_{it} + c_i^{(1)} + u_t + \varepsilon_{it} \tag{2.15}$$

In the second approach, an analogous strategy is pursued:

$$y_{it} = u_i + \phi C_{it} + u_t + \varepsilon_{it} \tag{2.16}$$

$$E_{it} = \gamma \hat{u}_i + \hat{\phi} C_{it} + u_t + e_{it} \tag{2.17}$$

$$y_{it} = \beta \hat{e}_{it} + \lambda C_{it} + c_i^{(2)} + u_t + \eta_{it} \tag{2.18}$$

Finally, for both approaches a counterfactual for learning achievement is generated $\forall s \neq s'$ as follows:

$$y_{it} = \psi \hat{c}_i^{(k)} + \lambda C_{it} + v_{is} \tag{2.19}$$

$$\tilde{\mu}^{UBT} = \hat{\psi} \hat{c}_i^{(k)} + \hat{\lambda} C_{it} \tag{2.20}$$

The consequent IOp measures are computed in the same way as in the previous sections. It is worth mentioning that this strategy will only be sensitive to observed time-varying circumstances. Thus, it may only be taken as informative of the extent to which the NP methodology is robust or not to the inclusion of such sort of variables. The list of

time-varying circumstances that will be tested is detailed in table 2.2.[19] Their main descriptive statistics are shown in table B.6 in the Appendix.

TABLE 2.2: Time-varying circumstance sets for the upper bound methodology

Circumstance set	Variables (time-variant)
Health	Stunting, food security
Geography	Area of residence (urban, rural), region (costa, sierra, selva)
Household	Size, dependency ratio
Wealth	Household wealth index
Schooling	School type (public, private), commuting time to school
Shocks	Crime, economic, environmental, family (deaths, illnesses, etc.)

Note: Each variable is observed in rounds 3, 4, and 5. More details about the variables are provided in table B.2 in the Appendix.
Own elaboration.

2.5 Results

This section first presents a nonparametric overview of the IOp problem (section 2.5.1) and then presents the results of the lower bound procedure (section 2.5.2), the upper bound estimation (section 2.5.3), and the role of time-varying circumstances (section 2.5.4).

2.5.1 A nonparametric overview

This subsection is devoted to providing some nonparametric empirical intuitions concerning the inequality of opportunity problem using the Young Lives database before measuring IOp shares in the following subsections.[20]

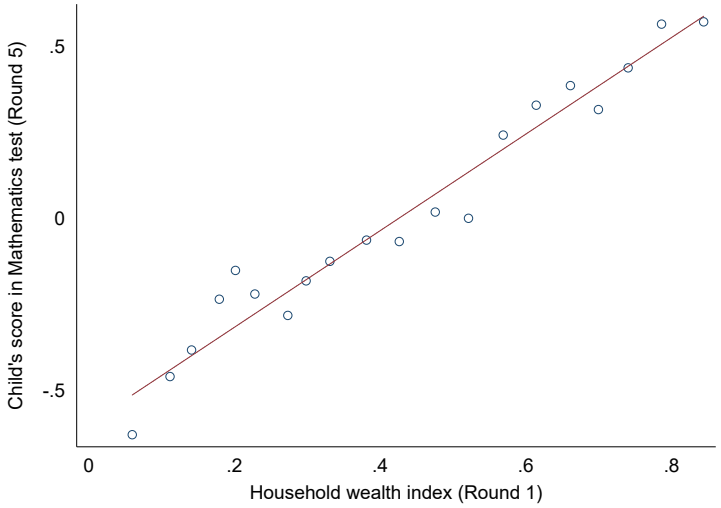
Figure 2.1 shows the conditional expectation functions of the child's score in mathematics and reading when she was 15 years old (y-axis) and the household wealth index when she was 1 year old (x-axis).[21] The relationship is eloquent: on average, the wealthier the

[19] The following works justify the pertinence of those variables: A. Sánchez (2017, 2018); Sparrow and Ponce de León (2015). See also footnote nº 15.
[20] In this subsection I do not calculate any IOp measure.
[21] The details of the wealth index construction and its properties are provided by Briones (2017).

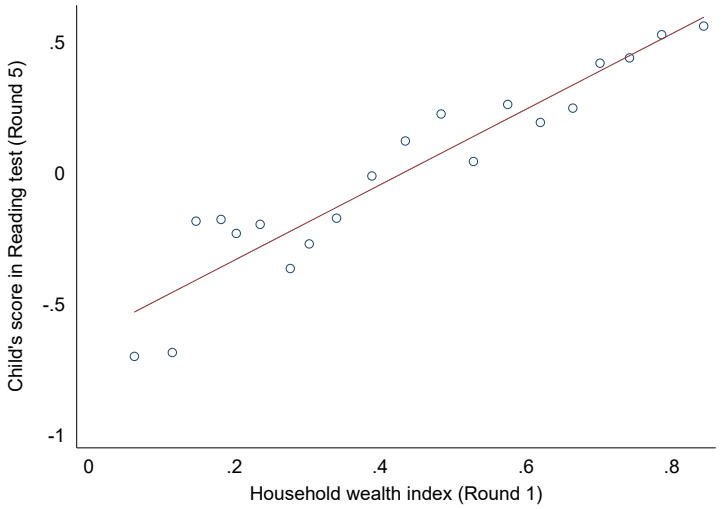
household the child is born into, the better she performs in mathematics and reading tests fifteen years later.

FIGURE 2.1: Mathematics and reading test scores (Round 5) and household wealth index (Round 1)

(A) Mathematics



(B) Reading



Note: Nonparametric representation of the conditional expectation function with 20 equal-sized bins (quantiles of the household wealth index in round 1).
Source: Young Lives Study 2002-2016. Own elaboration.

Let us define *types* of children (i.e. individuals who share the same circumstances) based on the following three circumstance variables:[22] wealth index tercile in round 1 (3

[22]These circumstances are chosen conveniently for illustrative purposes because they explain relevant shares of the variance in test scores, as will be shown in section 2.5.2.

categories: low, medium, high); mother's education (2 categories: primary or less, more than primary); and first school (2 categories: public, private). The combination of these three circumstances yields 12 possible disjunct child *types*, as shown in table 2.3.

TABLE 2.3: Types of children based on three circumstances: wealth index tercile (round 1), mother's education, and child's first school

Wealth index tercile (R1)	**Mother's education**	**First school**	**Child type code**	**Obs.**	**%**
C	P	I	CPI	1	0.1
C	P	U	CPU	506	26.7
C	S	I	CSI	5	0.3
C	S	U	CSU	114	6.0
B	P	I	BPI	12	0.6
B	P	U	BPU	311	16.4
B	S	I	BSI	48	2.5
B	S	U	BSU	260	13.7
A	P	I	API	25	1.3
A	P	U	APU	80	4.2
A	S	I	ASI	208	11.0
A	S	U	ASU	323	17.1

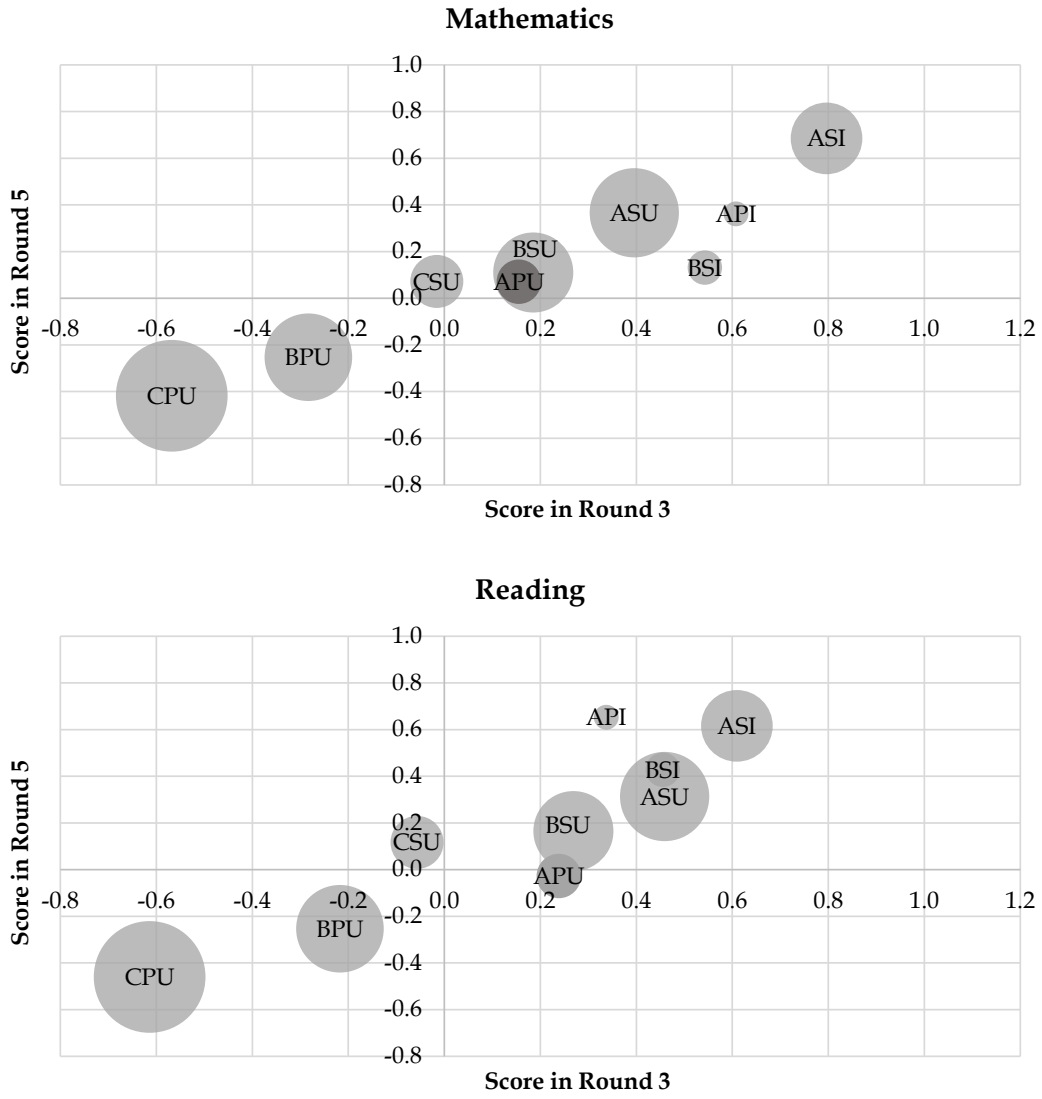
Note: A: High wealth, B: Medium wealth, C: Low wealth, P: Primary or less, S: More than primary, U: Public, I: Private.
Source: Young Lives Study 2002-2016. Own elaboration.

Based on this classification, 85% of the sample is contained in five out of the twelve types (CPU, BPU, BSU, ASI, and ASU). Three types are particularly rare in the population of Peruvian children. They are related to pupils born in medium and low-wealth households attending private schools as their first schooling experience (CPI, CSI, BPI). These three types account for less than 1% of the population. Since the number of observations in these cases is very low, these types will be excluded from the analysis in what follows.

Figure 2.2 shows test scores in rounds 3 and 5 by type, where the size of each bin is proportional to the size of the type it represents (cf. table 2.3). A positive correlation is immediately noticeable: the types that performed worst in round 3 also performed the worst in round 5. This nonparametric representation does not suggest any pattern of mobility between types. Indeed, a scenario of equal opportunity in round 5 would display a zero-slope pattern: all types of children would perform equally on average, i.e. exogenous circumstances would play no role in determining the outcome. It is worth noting that the two types at the bottom are related to children born in poor households, whose mother's education is low (primary at most), and whose first school

is public. In contrast, the most well placed types are composed of children born in wealthier households whose mothers have at least some secondary education and who usually started school in a private institution.

FIGURE 2.2: Children's types: Mathematics and reading test scores in rounds 3 and 5



Note: Each bin represents a type, i.e. children who share the same circumstances (cf. table 2.3 for details). The size of each bin is proportional to the relative size of each type. Types with fewer than 25 observations are omitted.
Source: Young Lives Study 2002-2016. Own elaboration.

2.5.2 Lower bound

The exercise carried out in the previous subsection is interesting because it illustrates some intuitions about the inequality of opportunity problem in a clear way. However, a nonparametric approach is very data intensive for estimating IOp measures. As shown in the schematic definition of types with only 3 circumstances (cf. table 2.3), some cases end with very few observations and no consistent estimates can be computed. For this reason, a parametric approach is prioritized in the present work. In this context, the variables that are going to be used in what follows are detailed along with their basic descriptive statistics in appendices B.2 and B.3.

Tables 2.4 and 2.5 implement equation (2.7) for mathematics and reading tests, respectively, accounting for the circumstance variables detailed in table 2.1. Some interesting relations are immediately noticeable. Having lived in rural areas during the first year of life (which is a proxy for being born there) has a strong and persistent negative impact on learning outcomes in adolescence. Likewise, having started schooling in a public institution has an impact in the same direction. In contrast, the level of wealth that the household had around the child's first year of life strongly increases learning achievement at 12 and 15 years. A greater level of education for the mother also points in the same direction.

Based on these results, the lower bound estimates for IOp are shown in figure 2.3. As one might notice from table 2.1, almost all the circumstances considered are obtained from Round 1 (i.e. when the child was approximately one year old). These circumstances explain approximately one-third of the total variance in learning achievement when children are eight years old, and their influence decreases to one-fifth when they are fifteen years old. This is the case for both mathematics and reading tests. The observed decreasing influence of the same set of circumstances is not surprising since other circumstance variables are expected to be more relevant at later ages, particularly variables from the educational context such as school and teacher characteristics.[23] Nevertheless, the fact that circumstances from virtually a child's birth can explain a substantial part of learning outcomes fifteen years later is a matter of particular interest

[23]For instance, using a Peruvian subsample of the Young Lives Study, Cueto et al. (2017) found that "students' socioeconomic status at age 1 and maternal education were positively associated with their teachers' PCK [*pedagogical content knowledge*] by the time students were enrolled in fourth grade" (Cueto et al., 2017, p.329).

TABLE 2.4: Mathematics scores in Rounds 3 to 5 and circumstances (OLS estimates)

	(1) Maths R3	(2) Maths R4	(3) Maths R5
Female	-0.143***	-0.069	-0.214***
	(0.040)	(0.043)	(0.042)
Birth order	-0.059**	-0.023	-0.027
	(0.022)	(0.024)	(0.023)
Rural (R1)	-0.227***	-0.387***	-0.227***
	(0.063)	(0.067)	(0.066)
Sierra (R1)	-0.047	0.123*	0.117*
	(0.055)	(0.058)	(0.057)
Selva (R1)	0.106	0.098	0.026
	(0.068)	(0.072)	(0.071)
Household size (R1)	0.014	0.007	0.012
	(0.010)	(0.010)	(0.010)
Dependency ratio (R1)	-0.396*	-0.243	-0.176
	(0.155)	(0.165)	(0.162)
Wealth index (R1)	0.420**	0.415**	0.516***
	(0.131)	(0.139)	(0.138)
Mother education (R1)	0.045***	0.060***	0.050***
	(0.007)	(0.007)	(0.007)
Mother age at birth	0.012**	0.012**	0.016***
	(0.004)	(0.005)	(0.005)
Mother has indig. tongue	0.040	0.047	0.058
	(0.056)	(0.059)	(0.058)
Stunting (R1)	-0.081*	-0.096*	-0.076*
	(0.035)	(0.038)	(0.037)
Vaccins (R1)	0.062*	0.038	0.007
	(0.027)	(0.028)	(0.028)
Attended pre-school (R2)	0.147*	0.092	0.007
	(0.062)	(0.066)	(0.065)
First school public (R3)	-0.315***	-0.169**	-0.213**
	(0.062)	(0.065)	(0.065)
Age at start of grade 1	-0.417***	-0.129**	-0.030
	(0.039)	(0.041)	(0.041)
Com. population log (R1)	-0.071***	-0.093***	-0.111***
	(0.021)	(0.022)	(0.022)
Constant	2.418***	0.688	0.430
	(0.330)	(0.351)	(0.346)
N	1,638	1,638	1,638
R2	0.328	0.244	0.189
R2-adj.	0.321	0.236	0.180

Standard errors in parentheses

Source: Young Lives Study 2002-2016. Own elaboration.

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

TABLE 2.5: Reading scores in Rounds 3 to 5 and circumstances (OLS estimates)

	(1) Read. R3	(2) Read. R4	(3) Read. R5
Female	0.003	0.037	0.010
	(0.041)	(0.042)	(0.044)
Birth order	-0.100***	-0.037	-0.041
	(0.023)	(0.023)	(0.024)
Rural (R1)	-0.403***	-0.175**	-0.288***
	(0.065)	(0.066)	(0.069)
Sierra (R1)	0.053	-0.047	0.059
	(0.056)	(0.058)	(0.060)
Selva (R1)	0.245***	0.092	0.111
	(0.070)	(0.072)	(0.074)
Household size (R1)	0.008	0.013	0.007
	(0.010)	(0.010)	(0.011)
Dependency ratio (R1)	0.127	-0.213	-0.159
	(0.159)	(0.163)	(0.169)
Wealth index (R1)	0.538***	0.539***	0.320*
	(0.135)	(0.138)	(0.143)
Mother education (R1)	0.036***	0.056***	0.056***
	(0.007)	(0.007)	(0.007)
Mother age at birth	0.017***	0.014**	0.013**
	(0.004)	(0.005)	(0.005)
Mother has indig. tongue	-0.153**	0.008	0.112
	(0.057)	(0.059)	(0.061)
Stunting (R1)	-0.083*	-0.099**	-0.086*
	(0.036)	(0.037)	(0.039)
Vaccins (R1)	0.029	0.025	0.032
	(0.027)	(0.028)	(0.029)
Attended pre-school (R2)	0.234***	0.135*	0.071
	(0.064)	(0.065)	(0.068)
First school public (R3)	-0.085	-0.180**	-0.204**
	(0.063)	(0.065)	(0.067)
Age at start of grade 1	-0.221***	-0.169***	-0.161***
	(0.040)	(0.041)	(0.042)
Com. population log (R1)	-0.064**	-0.060**	-0.068**
	(0.021)	(0.022)	(0.023)
Constant	0.929**	0.570	0.747*
	(0.339)	(0.347)	(0.361)
N	1,638	1,638	1,638
R2	0.301	0.259	0.202
R2-adj.	0.293	0.251	0.193

Standard errors in parentheses

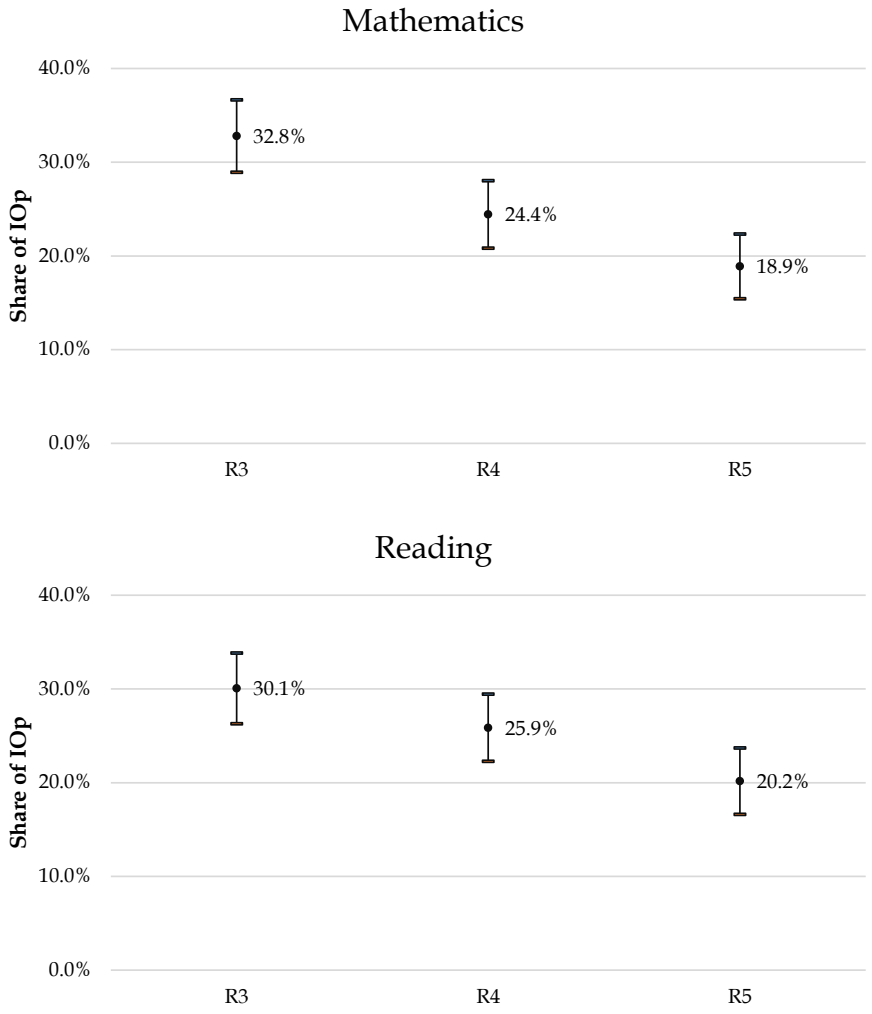
Source: Young Lives Study 2002-2016. Own elaboration.

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

for public policy, especially considering the fact that a sober set of sixteen circumstance variables taken into account in the analysis does this job (cf. table 2.1).

It is worth noting that these results are consistent with the findings of Ferreira and Gignoux (2014), who estimate lower bound IOp shares for some Latin American countries (but not for Peru, which was not included in the sample). Indeed, based on the PISA 2006 database, the authors conclude that IOp shares in Brazil, Chile, and Mexico were approximately 0.26 for reading and 0.30 for mathematics (Ferreira & Gignoux, 2014, p.235).

FIGURE 2.3: Lower bound estimates of inequality of educational opportunity



Note: Bootstrapped confidence intervals at the 95% level, based on 1,000 replications.
Source: Young Lives Study 2002-2016. Own elaboration.

In order to form an idea of the relative importance of the distinct circumstance sets, figure 2.4 shows the decomposition of the share of explained variances measured by R-squared in tables 2.4 and 2.5 into the contributions of the groups of circumstances by means of the Shapley value (Huettner & Sunder, 2012). Among the different circumstance sets, the mother's characteristics are those that account for the largest share. Likewise, school characteristics and household wealth make important contributions. In broad terms, the shares are distributed similarly for rounds 4 and 5, between and within both mathematics and reading tests. However, in round 3, the share of circumstances corresponding to the mother's characteristics set is less sizeable than in later rounds.

2.5.3 Upper bound

Regarding the upper bound estimation procedure, table 2.6 shows the first step for the first approach detailed in section 2.4.2, where no compensation is granted for the indirect effects of circumstances on the outcome (cf. Eq. (2.9)). The two effort variables under consideration –hours per day spent studying outside school and hours per day spent on leisure activities– display the expected signs. Indeed, studying more hours at home increases the scores in both mathematics and reading tests, while the opposite relation is observed for spending more time in leisure activities.

TABLE 2.6: Mathematics and reading FE estimates: First approach (cf. equation 2.9)

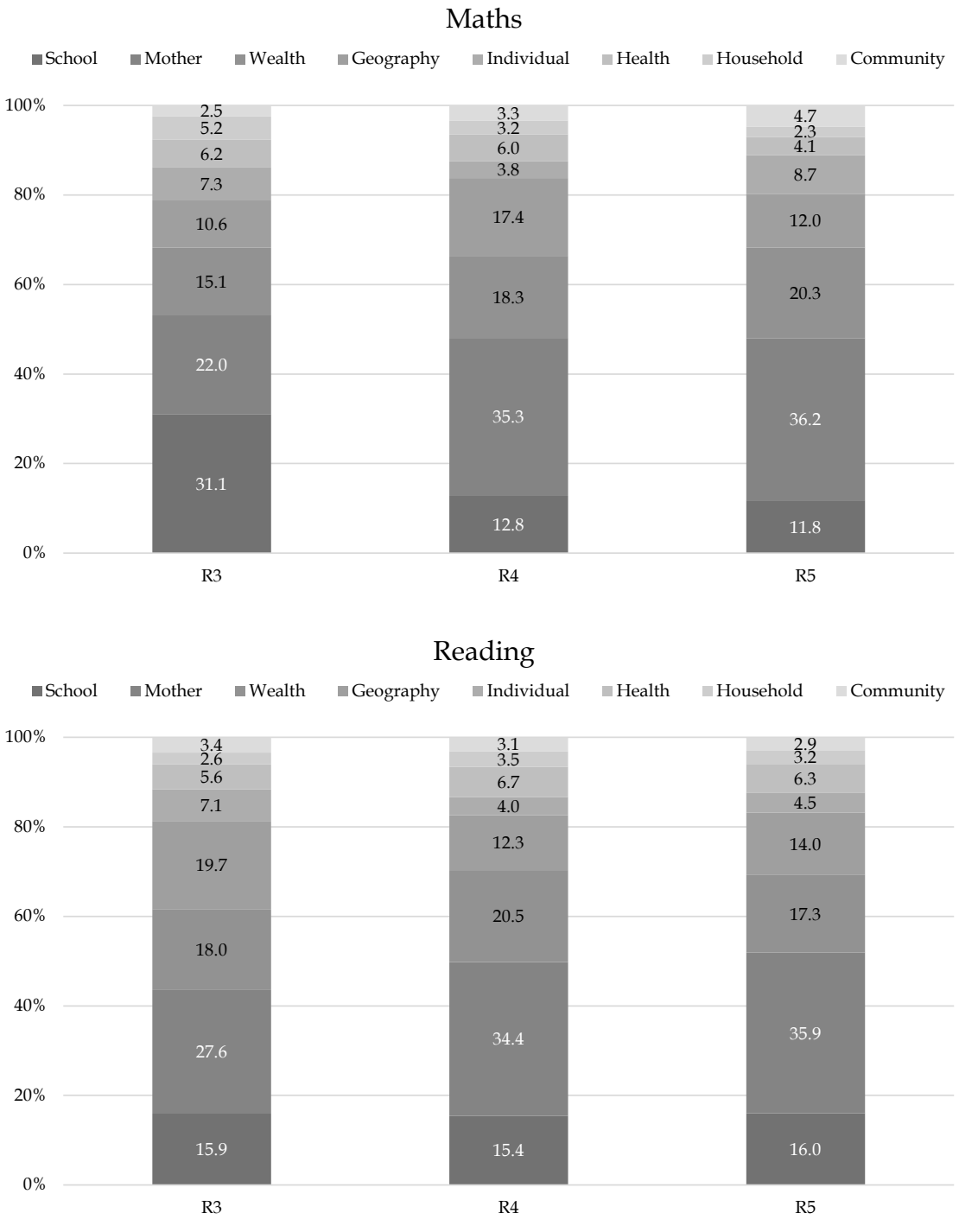
	(1) Maths	(2) Read.
Hours/day studying outside school	0.022	0.043**
	(0.012)	(0.013)
Hours/day leisure activities	-0.020**	-0.007
	(0.008)	(0.008)
Constant	0.100*	-0.005
	(0.044)	(0.049)
Time fixed effects	Yes	Yes
N	4,872	4,872
N_g	1,624	1,624
rho	0.665	0.605
r2_w	0.006	0.004
r2_o	0.004	0.025
r2_b	0.004	0.062
F	4.502	3.134

Standard errors in parentheses

Source: Young Lives Study 2002-2016. Own elaboration.

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

FIGURE 2.4: Variance decomposition by circumstance sets



1/ Decomposition from regressions shown in tables 2.4 and 2.5.
2/ The variables that compose each circumstance set are detailed in table 2.1.
Source: Young Lives Study 2002-2016. Own elaboration.

The details of the second upper bound approach –where the indirect effects of circumstances are also treated as circumstances– are depicted in tables 2.7 and 2.8 for mathematics and reading tests, respectively. The procedure consists of estimating a system of three equations. In both tables, column (1) implements Eq. (2.10), columns (2) and (3) implement Eq. (2.11) for each effort variable, and column (4) does the same for Eq. (2.12). The specific individual unit effect that results from column (4) is then used to estimate the maximum extent of IOp.

TABLE 2.7: Mathematics FE estimates: Second approach (cf. equations 2.10, 2.11, and 2.12)

	(1)	(2)	(3)	(4)
	Maths	Hours study	Hours leisure	Maths
Individual effect from col.(1)		0.194***	0.121***	
		(0.016)	(0.025)	
Residuals from col.(2)				0.022
				(0.012)
Residuals from col.(3)				-0.020**
				(0.008)
Constant	0.060***	1.901***	4.133***	0.060***
	(0.015)	(0.023)	(0.036)	(0.015)
Time fixed effects	Yes	Yes	Yes	Yes
N	4,872	4,872	4,872	4,872
N_g	1,624			1,624
rho	0.665			0.665
r2_w	0.002			0.006
r2_o	0.000			0.001
r2_b	.			0.000
F	2.948	83.598	81.185	4.502

Standard errors in parentheses

Source: Young Lives Study 2002-2016. Own elaboration.

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

Table 2.9 therefore summarizes the upper bound IOp estimates following the two approaches. The estimates are very close and consistent at approximately 70%. This is the maximum amount of inequality that can be attributed to circumstances, which are assumed to be time-invariant. Not surprisingly, the second approach yields higher values "due to the inclusion of the indirect effects of circumstances on the observed effort variables" (Niehues & Peichl, 2014, p.87). However, the two special extreme treatments for the indirect effects of circumstances on effort make little difference. This suggests that circumstances and efforts are likely to be, to a large extent, orthogonal for educational achievement. This result is in line with the findings of Asadullah, Trannoy, Tubeuf, and

TABLE 2.8: Reading FE estimates: Second approach (cf. equations 2.10, 2.11, and 2.12)

	(1) Read.	(2) Hours study	(3) Hours leisure	(4) Read.
Individual effect from col.(1)		0.212***	0.166***	
		(0.016)	(0.026)	
Residuals from col.(2)				0.043**
				(0.013)
Residuals from col.(3)				-0.007
				(0.008)
Constant	0.051**	1.901***	4.133***	0.051**
	(0.016)	(0.023)	(0.036)	(0.016)
Time fixed effects	Yes	Yes	Yes	Yes
N	4,872	4,872	4,872	4,872
N_g	1,624			1,624
rho	0.608			0.609
r2_w	0.000			0.004
r2_o	0.000			0.001
r2_b	.			0.000
F	0.001	91.999	87.763	3.134

Standard errors in parentheses

Source: Young Lives Study 2002-2016. Own elaboration.

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

Yalonetzky (2021), according to whom the correlation between overall effort and circumstances is negligible for performance scores among secondary school pupils in rural Bangladesh.

TABLE 2.9: Upper bound estimates of inequality of educational opportunity

	Approach 1	**Approach 2**
Mathematics	68.55	68.80
	[64.13 ; 72.96]	[64.34 ; 73.24]
Reading	65.40	66.48
	[61.41 ; 69.38]	[62.41 ; 70.53]

Note: Confidence intervals at the 95% level in brackets, based on 1,000 replications bootstraps.
Source: Young Lives Study 2002-2016.
Own elaboration.

2.5.4 Time-varying circumstances and upper bound IOp estimates

The impact of the inclusion of time-varying circumstances on the upper bound estimates is explored in this subsection. All the regressions used for the calculations are presented in Appendix B.4.

Regarding the first upper bound approach, table B.7 displays the results of the regression presented in Eq. (2.15). Most of the time-varying circumstances do not appear to be statistically significant. Even the two effort variables are not simultaneously significant for both mathematics and reading tests, although they do show the expected signs. This result probably suggests that unobserved heterogeneity (which includes circumstances such as innate intelligence) is the critical element when analyzing learning achievements. Note that this component is controlled for in the context of fixed-effects regressions.

The counterfactuals generated from these regressions yield IOp upper bounds of 70.17% and 66.15%, respectively, for mathematics and reading tests, as shown in the first column of table 2.10. These magnitudes are very close to those previously calculated without considering time-varying circumstances (cf. table 2.9). Actually, they are statistically identical, as evidenced by the confidence intervals from both tables.

The results of the second IOp upper bound approach including time-varying circumstances point in the same direction. Indeed, the maximum amount of inequality is similar to that previously calculated where time-varying circumstances were not considered. Furthermore, their confidence intervals are virtually the same.

TABLE 2.10: Upper bound estimates of inequality of educational opportunity, including time-varying circumstances

	Approach 1	**Approach 2**
Mathematics	70.17 [65.66 ; 74.66]	70.38 [65.86 ; 74.88]
Reading	66.15 [62.10 ; 70.18]	67.30 [63.19 ; 71.39]

Note: Confidence intervals at the 95% level in brackets, based on 1,000 replications bootstraps.
Source: Young Lives Study 2002-2016.
Own elaboration.

These findings might suggest that the Niehues and Peichl (2014) methodology is robust to the issue of omitted time-varying circumstances when studying learning achievement outcomes. After all, it could be the case that these kinds of circumstances have a constant impact on the outcome of interest, and thus it is already captured through the specific unit effect $c_i^{(k)}$. Nevertheless, at the present stage of research, this result should be taken with caution since the set of time-varying circumstances considered here does not systematically appear to be statistically significant in the models.

2.6 Robustness checks

For robustness checks, I proceed by using a different outcome first and then using different inequality measures.[24] Appendix B.5 provides all the material used for the discussion in this section.

In addition to the mathematics and reading tests, during the Young Lives Study, surveys were also administered for the Peabody Picture Vocabulary Test (PPVT).[25] It is a test of receptive vocabulary ability composed of 204 items, which are individually and orally administered, "untimed, and norm-referenced. The task of the test taker is to select the picture that best represents the meaning of a stimulus word presented orally by the examiner" (Cueto & León, 2012, p.6).

Certainly, the PPVT is not intended to provide estimates of learning achievement. However, it is informative for receptive vocabulary ability, which is also a relevant outcome for individuals during their childhood.

In this context, the OLS estimates from regressing the PPVT scores on circumstances (cf. table B.10) are remarkably similar to those shown previously in section 2.5.2 for mathematics and reading test scores: the set of circumstances under consideration has similar explanatory power for the variance of the three tests. As a consequence, it is not surprising that the corresponding lower-bound estimates are also congruent. Indeed, the lower bound IOp shares for PPVT scores decrease from 35% in round 3 to 24% in round 5. Both the shares and the sense of the evolution of IOp are similar to the previous findings. Regarding the upper bound IOp estimates, the counterfactuals constructed

[24] Additionally, Appendix B.6 shows a rank correlation analysis for different inequality measures, at the cluster level (20 sentinel sites as determined by the survey design).

[25] cf. Cueto and León (2012) for more details.

from the results shown in tables B.11 and B.12 yield IOp shares of 75% at most, for both approaches. These numbers are slightly higher than those previously found in section 2.5.3; however, they suggest similar conclusions.

Finally, the second robustness check involves the use of different inequality measures. Although it has been shown that the variance is the most suitable inequality measure for analyzing standardized test scores (cf. Ferreira & Gignoux, 2014), I provide results using other well-known inequality indices. It is important to mention that, since the outcomes used in the previous sections include zero and negative values, some inequality indices are not defined. For this reason, I recentered the distribution of the test scores to set 1 as the minimum value.

Table 2.11 presents the results for the lower bound estimates using the Gini coefficient and indices from the generalized entropy class, with values -1, 0 (mean logarithmic deviation), 1 (Theil index), and 2 (half the square of the coefficient of variation). Some regularities are noticeable. IOp shares are consistently the highest in round 3 and the lowest in round 5. This means that the source of unfair inequality coming from the circumstances under consideration (cf. table 2.1) decreases over time. As mentioned before, other circumstances might become more relevant as the child advances in her schooling career. Furthermore, the values of the generalized entropy class indices are near the IOp shares calculated with the simple variance in section 2.5.2. This is not the case for the Gini coefficient, which estimates considerably higher values. The Lorenz curves for mathematics test scores shown in figure B.3 might be useful in understanding the issue: the smoothed distribution built from the circumstances is very close to the original distribution from round 3. It is worth mentioning that the Gini coefficient has some well-known limitations; for instance, it can give the same value to two different distributions, is most sensitive to inequalities in the middle portion of the distribution, and fails to satisfy the diminishing transfers axiom. Moreover, the Gini coefficient, as well as the Theil index, is not ordinally invariant to the standardization of test scores (Ferreira & Gignoux, 2014, p.242).

Regarding the upper bound IOp shares calculated with other inequality measures, table 2.12 shows the results of an analogous exercise. Once again, the estimates are similar to those previously shown in section 2.5.3. Among the different indices, the mean value is 0.70, with a range from a minimum of 0.61 to a maximum of 0.85. The results also

TABLE 2.11: Lower bound relative shares of IOp: Different inequality measures (cf. Equation 2.3)

	Gini	GE(-1)	GE(0)	GE(1)	GE(2)
Mathematics					
Round 3	0.543	0.236	0.265	0.284	0.295
Round 4	0.475	0.157	0.184	0.204	0.218
Round 5	0.380	0.101	0.121	0.133	0.137
Reading					
Round 3	0.445	0.148	0.170	0.187	0.198
Round 4	0.485	0.180	0.203	0.218	0.228
Round 5	0.397	0.117	0.133	0.145	0.153
PPVT					
Round 3	0.583	0.222	0.263	0.294	0.315
Round 4	0.562	0.238	0.270	0.290	0.301
Round 5	0.481	0.150	0.183	0.204	0.218

Note: GE(a) are inequality indexes from the Generalized Entropy class for a = -1, 0 (mean logarithmic deviation), 1 (Theil index), 2 (half the square of the coefficient of variation).
Source: Young Lives Study 2002-2016. Own elaboration.

provide evidence that taking the set of time-varying circumstances into account does not make a difference.

2.7 Final discussion

2.7.1 A note on the age of consent

Due to the notion of *age of consent*, prior to which individuals are supposed to have no responsibility for their actions[26], primary and secondary education are generally taken as circumstance variables. Indeed, the common view is that "if a child is lazy in school, there might be factors not under his control that explain his laziness" (Roemer & Trannoy, 2015, p.276).

This statement may be true. However, why does this "responsibility cut" have to be so sharp? Could it be instead a continuously increasing function? Arneson argues that the justification for the former simplification stands on "the conviction that individuals are not (very much) responsible for their childhood preference formation" (Arneson,

[26]This notion can be seen as "the nonarbitrary and morally significant line between childhood and adulthood and that children are not responsible for their preferences in the way that adults are deemed to be" (Arneson, 1990, p.179).

TABLE 2.12: Upper bound relative shares of IOp: Different inequality measures (cf. Equation 2.3)

	Gini	GE(-1)	GE(0)	GE(1)	GE(2)
Without time-varying circumstances					
First approach					
Mathematics	0.85	0.65	0.68	0.70	0.72
Reading	0.82	0.61	0.64	0.66	0.67
Second approach					
Mathematics	0.85	0.65	0.68	0.70	0.72
Reading	0.82	0.61	0.64	0.66	0.67
With time-varying circumstances					
First approach					
Mathematics	0.85	0.65	0.69	0.71	0.72
Reading	0.82	0.61	0.64	0.66	0.68
Second approach					
Mathematics	0.85	0.65	0.69	0.71	0.72
Reading	0.82	0.62	0.64	0.66	0.68

Note: GE(a) are inequality indexes from the Generalized Entropy class for a = -1, 0 (mean logarithmic deviation), 1 (Theil index), 2 (half the square of the coefficient of variation).
Source: Young Lives Study 2002-2016. Own elaboration.

1990, p.179), *brackets in the original*), implying that there still exists some space to responsibility, even if it is not large.

Should achievement during basic education be considered entirely as a circumstance? Is there absolutely no place for conscientious pupil effort? In other words, is pupil effort entirely determined by exogenous factors?

On the one hand, it is worth mentioning that "the view on the cut between fair and unfair inequality in school performance seems to be somewhat at variance with the age of consent view" (Asadullah, Trannoy, Tubeuf, & Yalonetzky, 2018, p.2), as the empirical evidence provided by Lu, Chanel, Luchini, and Trannoy (2013) suggests. On the other hand, my paper displays results suggesting orthogonality between pupil effort and circumstances, in accordance with Asadullah et al. (2021)'s empirical findings.

The literature on developmental psychology provides evidence showing that decision-making autonomy increases gradually during middle childhood and adolescence (Wray-Lake, Crouter, & McHale, 2010). More precisely, from 10 to 14 years old, individuals

feel a greater sense of individuation and "become more aware of who they are and are more likely to take responsibility for their own behaviors" (Van Noorden & Bukowsky, 2017, p.592). Moreover, they start to deidealize their parents and become conscious of their defects, thus relinquishing dependence on them.

It is worth mentioning that *when* and *how* autonomy is evinced seem to be culture specific. For example, "autonomy, individuality, and personal freedom are strong cultural values in the United States and in most Western industrialized societies. Within this tradition, parents generally socialize their children to make their own decisions, parents will expect young adolescents to begin to demonstrate autonomy and take on additional responsibility, adolescents will have increasing desires for individual rights and responsibility, and older adolescents will move out of the home of origin and attempt to make it on their own. However, these expectations and desires vary among cultures within and outside of the United States" (Zimmer-Gembeck & Collins, 2007, p.193).

In practice, then, there does not exist such a thing as a universal "age of consent" that sharply separates the time before and after individual responsibility. Instead, self-awareness increases gradually before adulthood and differently according to each culture.

In my view, normative rules should be compatible with human beings' individual and social experiences. In this context, the view of a precise age of consent is not suitable for studying inequality of opportunity to the extent to which awareness and responsibility of own behavior are gradually incremental phenomena.

Based on this, the results presented in section 2.5.2 can be interpreted as a sort of "maximin". That is, they reflect the maximum part of responsibility that the lower bound measure can support. Had an increasing responsibility-function been defined (which would relate the age and the part of responsibility that individuals are expected to be held accountable for), then the question would be solved. However, because such a function does not exist today, the measures that I provide are useful as a reference for the maximum amount of inequality for which pupils should be held responsible in the context of lower-bound measures.

2.7.2 Concluding remarks

This document explores the problem of inequality of educational opportunity in Peru for the period 2002-2016 using a unique longitudinal database of children who were followed since they were approximately one year old. It offers, for the first time in the literature, both lower and upper bounds of IOp for learning achievement using standardized test scores. In addition, it explores a previously neglected problem: the role of time-varying circumstances.

The methods rely on Ferreira and Gignoux (2014) and Niehues and Peichl (2014). Certainly, there is a large number of IOp measures that have been proposed in the literature, and it has also been shown that methodological choices are not innocuous.[27] However, since the objective of the present work was to establish lower and upper bounds for educational IOp (and not its exact *true* share), the mentioned warning does not pose a critical problem.

Furthermore, some authors argue that "all measurable achievement and behaviors of children, before an age of consent is attained, are the result of their circumstances. (...) [*i.e.*] children should not be held responsible for any of their accomplishments before that age" (Hufe et al., 2017, p.501). According to this view, there is no place for *effort* when analyzing childhood outcomes. However, there is evidence suggesting that pupils' overall effort explains a large extent of within-school variations in test scores, whereas circumstances are more important for explaining between-school variation (Asadullah et al., 2021, p.3). Regardless, it is worth noting that I used only two effort variables: the number of hours allocated to study at home and to leisure activities. These variables seem to be reasonable for this study.[28,29]

In this context, the results suggest that circumstances related to the first year of life account for at least one-third of the total variance in learning achievement when children are eight years old, and their influence decreases to at least one-fifth at age fifteen. Likewise, the maximum amount attributable to *unjust* inequalities is approximately 70%.

[27] According to Ramos and van de Gaer (2017), among the three main measurement criteria –ex-ante/ex-post, direct/indirect, and parametric/nonparametric– it seems that the former choice is the most relevant since it substantially influences IOp orderings.

[28] It may also be noticed that time-varying effort variables are needed to compute the upper bounds of IOp within the Niehues and Peichl (2014) framework; otherwise, the upper bounds would be 100%.

[29] Observable circumstances from the data set do not show high correlations with these variables. Certainly, some unobserved circumstances such as parents' attitudes may influence them. They are not perfect measures of exerted effort but they do reflect it to some extent.

The differences between bounds found here are consistent with previous works focusing on monetary outcomes (Hufe, Peichl, & Weishaar, 2021; Niehues & Peichl, 2014). New methodological improvements are needed to provide narrower IOp estimates that would not "misguide judgments on the normative significance of inequality. (...) Until such innovations materialize, bounding the range of potential estimates remains a viable way to limit the scope for downplaying the normative significance of inequality in the countries of interest" (Hufe et al., 2021, p.18). In any case, the evidence provided here points that educational IOp shares are important and are consistent with the view according to which "breaking the strong association between socio-economic characteristics, educational opportunities, and educational outcomes is, perhaps, the main challenge for Peruvian education" (Cueto & Felipe, 2018, p.67, *own translation*).

Furthermore, the distinction between the two extreme positions of reward principles for the indirect effect of circumstances on outcomes proved to make little difference. Likewise, time-varying circumstances seem to be a minor problem when measuring upper bounds of IOp using panel data. A plausible reason might be that their effect on the outcome is constant in practice.

For future research, regarding the lower bound procedure, it would be important to include particular circumstances that are relevant for each stage of the life path, for example, school and teacher characteristics for secondary education. This may be possible by matching the YLS database with the school census and other surveys carried out by the Peruvian Ministry of Education.[30] On the other hand, more evidence is needed regarding the impact of time-varying circumstances on upper bound estimates of IOp. The present work studied this issue for the first time, but more research in different contexts is needed. Finally, besides the measure of the extent of IOp, the most promising research path involves the underlying process and mechanisms that determine IOp, which are still poorly understood, especially with respect to the effect of preferences and aspirations. Making a link with the theory of intergenerational mobility could be a promising avenue for filling this gap.

[30] Unfortunately, I was not given access to the YLS database with the child's school identifier, but it does exist.

Chapter 3

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

3.1 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.[1]

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 Nº 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

[1] 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).

promoting quasi-markets.[2] 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.[3] 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.[4] 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.[5]

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.

[2] 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).

[3] See Day Ashley et al. (2014) for a compelling review of developing countries' experiences.

[4] 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).

[5] At the time, Alberto Fujimori was a presidential candidate advocating gradual stabilization 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.

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.[6] 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.[7,8] 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)

[6] Recent extensions include Akresh, Halim, and Kleemans (2022) and Mazumder, Rosales-Rueda, and Triyana (2019).

[7] 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).

[8] 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.

that point to an important expansion of low-fee (and at the same time low-quality) educational institutions and to their negative 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 3.2). Then, the data and methods for estimating the effects of expanding private supply are described (section 3.3). Next, the main results are presented (section 3.4) followed by a number of robustness checks (section 3.5). Finally, a discussion, with concluding remarks and implications for public policy, is provided (section 3.6).

3.2 Background

3.2.1 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).[9]

The rise of the private sector shares is a relatively recent, and primarily urban, phenomenon. It is particularly concentrated in major cities (cf. Figure 3.1).[10] Since 1998, the enrollment rate in those schools has doubled, representing at present a third of total enrollment at the country level (cf. Figure 3.2), and a half in the capital, Lima.[11]

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 3.3. An equally important 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.

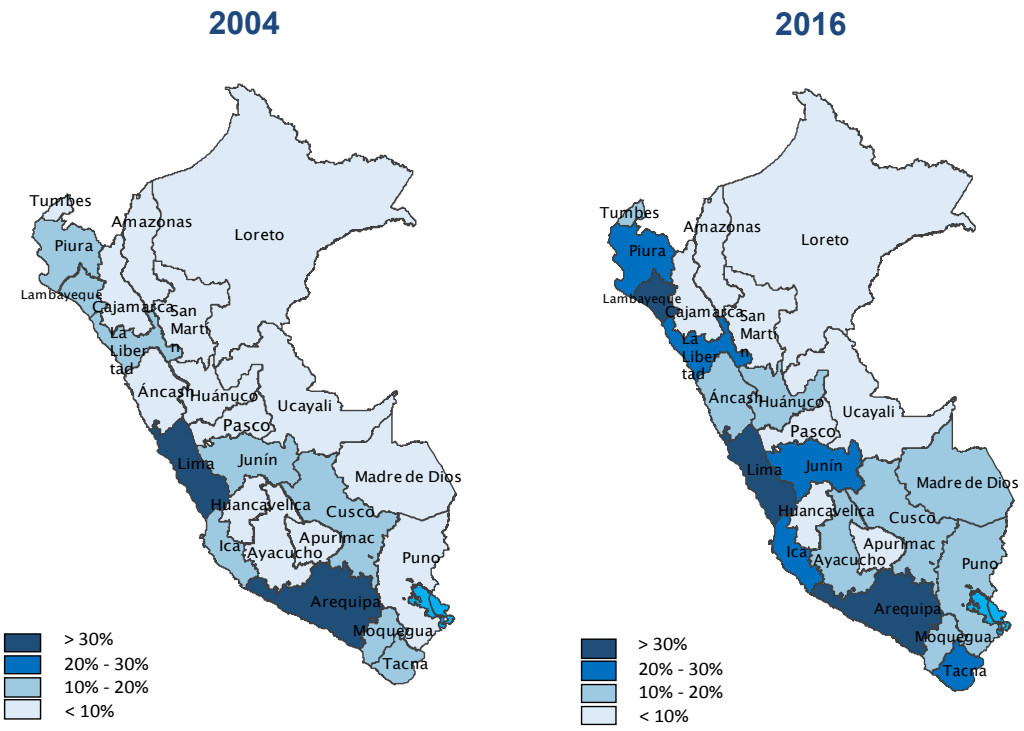
According to Guadalupe et al. (2017, p.48), private sector expansion occurred alongside three simultaneous phenomena: (i) sustained levels of economic growth and poverty

[9] Magnitudes for primary plus secondary levels. See http://escale.minedu.gob.pe/magnitudes

[10] 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 et al. (2017); Sanz (2014).

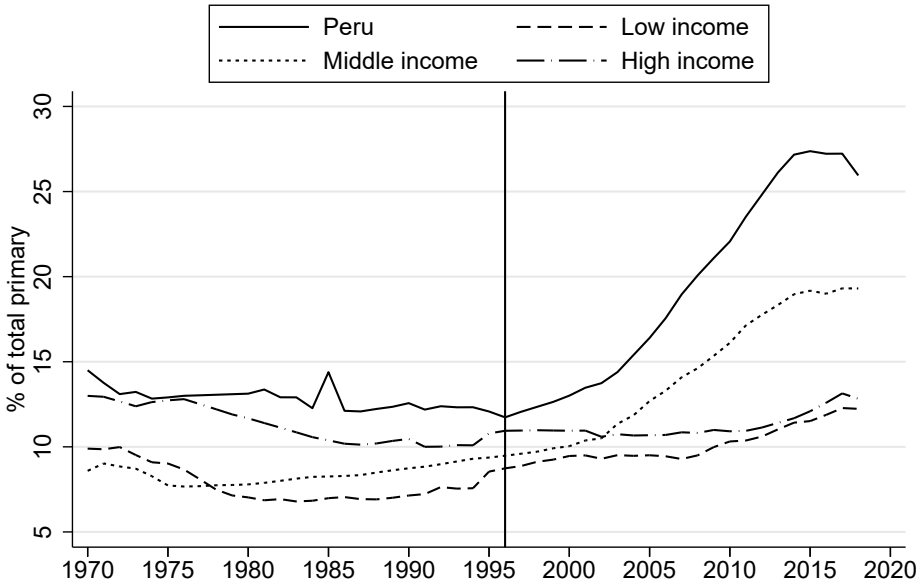
[11] In this metropolis, the number of private schools doubled between 2004 and 2012. The schools spread all over the city, including marginal poor areas, as Figure C.6 shows.

FIGURE 3.1: Peru: Enrollment in private schools, 2004-2016 (% of total enrollment)



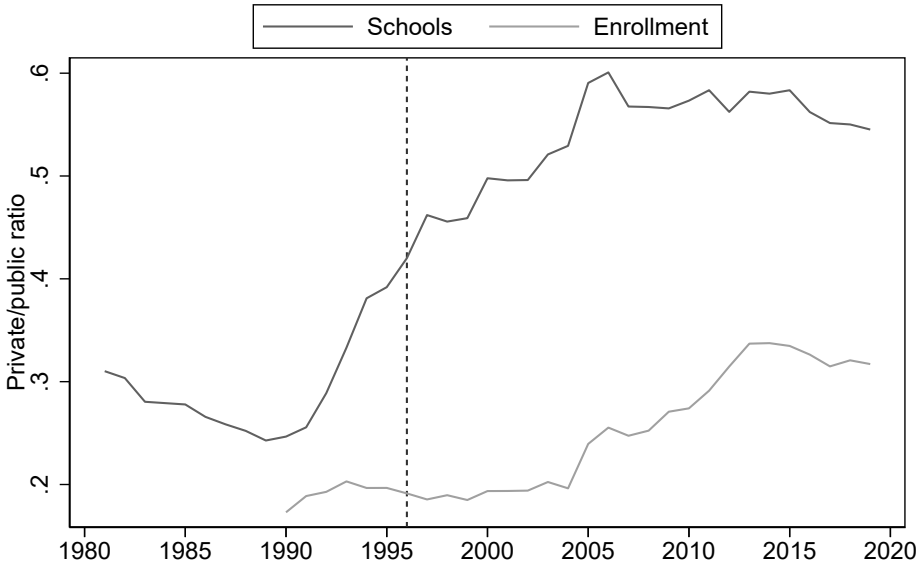
Source: Balarin (2017, p.17).

FIGURE 3.2: Private sector participation in total enrollment, 1970-2018 (selected countries)



Note: The vertical line makes reference to the 1996 privatization law in Peru.
Source: World Bank Open Data.

FIGURE 3.3: Secondary level: Schools and enrollment private to public ratio, 1990-2019



Note: The vertical line makes reference to the 1996 privatization law in Peru.
Source: INEI (Compendio Estadístico 1995-1997, 2001, 2010), and MINEDU (Escale 2008-2019).
Own elaboration.

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.

3.2.2 Regulation[12]

During the authoritarian government of Alberto Fujimori (1990-2001), several reforms were implemented in order to develop a neoliberal free-market economy.[13] 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

[12] Appendix D presents the results of the qualitative fieldwork that I conducted in Lima during 2022 with Diana Safra, the coauthor of that section. It deals with regulatory issues, with a special focus on Supreme Decree No. 005-2021-MINEDU "Regulation of private basic education institutions".

[13] 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.

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).[14] In this context, the process of deregulation and privatization made no exception for the education sector.

TABLE 3.1: 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.

[14] More details regarding labor market regulation during this period are provided in Appendix C.2.

From 1991 to 1996, at least three attempts, inspired by the Chilean experience, were made to massively privatize basic education.[15,16] 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 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).[17] 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).[18]

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.[19] 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.[20]

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

[15] Table 3.1 summarizes the main legislation acts on the topic for the period 1990-2006.

[16] Some works dealing with the Chilean case include Carrasco and Gunter (2018); Elacqua (2012); Epple, Romano, and Urquiola (2017).

[17] Tax relief was promoted but no direct public funding.

[18] 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).

[19] 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.

[20] 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.

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[21] also passed initiatives concerning private education.

In this context, the Peruvian educational market has experienced a "by default" 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[22] 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' 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).

3.2.3 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.[23] 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

[21] Instituto Nacional de Defensa de la Competencia y de la Protección de la Propiedad Intelectual (INDECOPI).

[22] 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).

[23] See, for instance, Minedu (2017).

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.

3.2.4 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 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.[24,25] 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 3.2.2, 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 et al., 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.

[24]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.

[25]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.

3.3 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.[26] 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).[27] 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.[28] 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

[26] From 1997 to 2003 it was applied only in one trimester per year.

[27] 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).

[28] 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*.

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:

$$y_{ipct} = \alpha + \beta \left(private_p \times exposure_{ic} \right) + \mathbf{X}_{ipct}'\Gamma + \delta_p + \delta_{ct} + \varepsilon_{ipct} \tag{3.1}$$

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 $private_p$ 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 3.5). For the moment, I will rather define $private_p$ 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 3.4, the number of *new* private schools opened in the provinces since 1993 is correlated with the initial quantity of private schools.[29] 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 $exposure_{ic}$ 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.[30] The terms δ_p and δ_{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 β identifies the treatment effect.

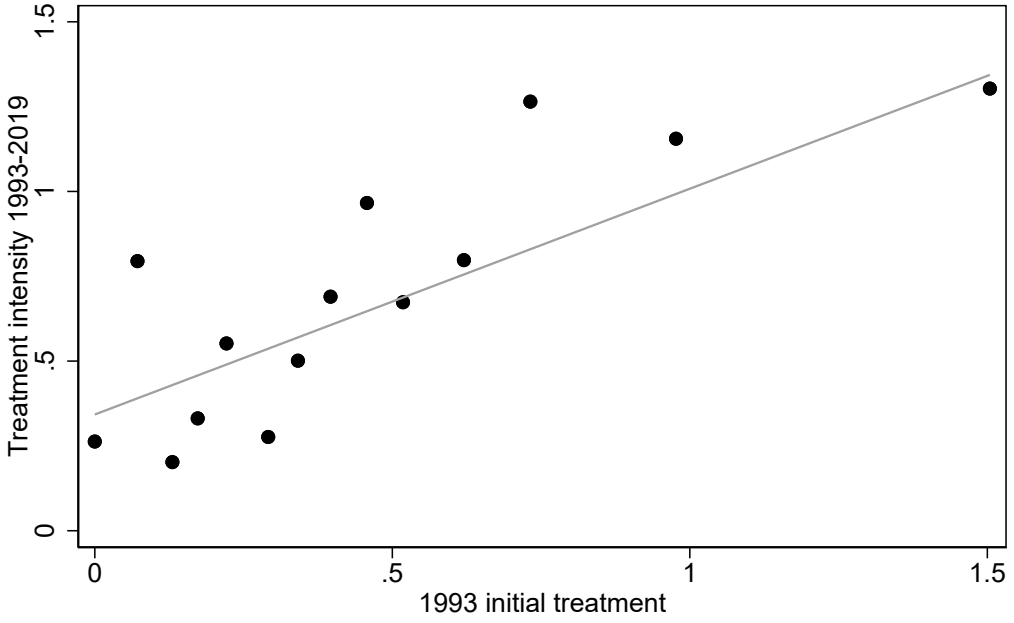
Eq.(3.1) studies the intensive margin, but we can also explore the **extensive margin** by redefining $exposure_{ic}$ as a dummy variable that equals one for individuals who started

[29] Appendix C.3 presents a descriptive analysis of the dynamics of private schools at the province level.

[30] The relevance of these variables are studied by Cueto, Guerrero, León, Seguin, and Muñoz (2012); Singh and Krutikova (2017); Yamada (2010).

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 3.5, implementing both simpler and more complex specifications, including placebo tests, different definitions for treatments, treated and control groups, and other extensions.

FIGURE 3.4: 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).

3.4 Results

3.4.1 A simplified overview

Before deploying the empirical strategy presented in section 3.3, 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.[31] Quartiles 1 to 3 constitute the group of **low-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 3.2 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).[32] On the other, panel B depicts a control experiment, which consists of comparing two cohorts who had no exposure to the privatization process.

[31] 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.

[32] The sample is restricted to individuals aged 18 to 40 at the moment of the surveys.

TABLE 3.2: 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)
Panel A: Experiment of interest									
Born 1990-2000	0.834	0.779	0.055***	11.588	11.159	0.429***	4.581	4.035	0.546***
	(0.002)	(0.002)	(0.003)	(0.017)	(0.016)	(0.023)	(0.071)	(0.065)	(0.096)
Born 1970-1980	0.676	0.588	0.088***	10.75	9.909	0.841***	8.371	7.681	0.69***
	(0.003)	(0.003)	(0.004)	(0.026)	(0.024)	(0.035)	(0.115)	(0.11)	(0.158)
Difference	0.157***	0.191***	-0.034***	0.838***	1.25***	-0.412***	-3.79***	-3.646***	-0.144
	(0.004)	(0.003)	(0.005)	(0.029)	(0.027)	(0.039)	(0.135)	(0.127)	(0.185)
Panel B: Control experiment									
Born 1970-1979	0.669	0.582	0.087***	10.689	9.868	0.821***	8.478	7.81	0.668***
	(0.003)	(0.003)	(0.004)	(0.028)	(0.025)	(0.037)	(0.129)	(0.122)	(0.176)
Born 1960-1969	0.606	0.517	0.09***	10.022	9.206	0.817***	8.105	6.886	1.219***
	(0.008)	(0.006)	(0.01)	(0.072)	(0.061)	(0.093)	(0.301)	(0.212)	(0.366)
Difference	0.063***	0.066***	-0.003	0.667***	0.662***	0.004	0.373	0.923***	-0.551
	(0.008)	(0.006)	(0.01)	(0.072)	(0.061)	(0.093)	(0.326)	(0.244)	(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.

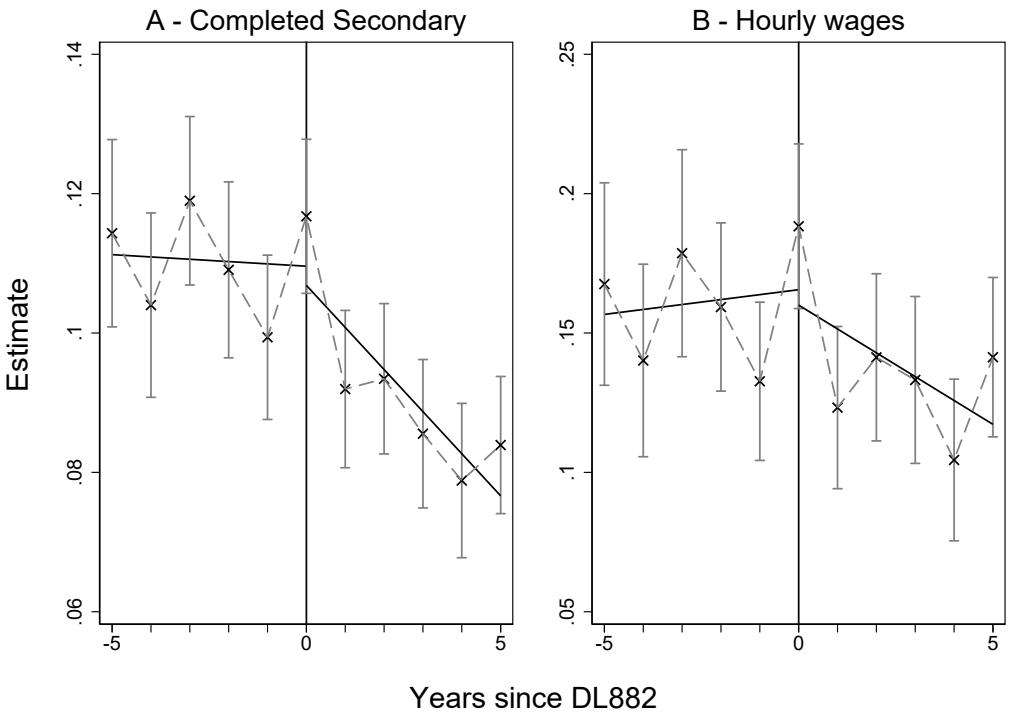
The results in panel A of Table 3.2 show that (i) secondary completion for both cohorts was higher in high treatment provinces; (ii) more private schools were opened in regions where secondary completion was already high; (iii) secondary completion augmented in both types of provinces, but it increased 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.[33] 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 3.3, let us close this subsection with a graphical event study. Figure 3.5 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.

[33] 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 3.5, pre-trends are plausibly parallel.

FIGURE 3.5: 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).

3.4.2 Econometric results

Table 3.3 presents the results of Eq.(3.1). 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 3.4 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 expands

TABLE 3.3: Effect of the educational privatization expansion on secondary completion and hourly wages - Intensive margin (cf. Eq. 3.1)

	(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 3.4: 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

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.

3.5 Robustness checks and extensions

3.5.1 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.[34] Figures C.7 and C.8 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

[34] 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.

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.

3.5.2 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 ε_{ipct} which may raise some concerns, since it adds an extra complexity that would otherwise haven 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, $\mathbf{X}_{ipc}{}'.\Gamma$, δ_p , and δ_c are the same as in Eq.(3.1). Then, the new specification reads:

$$y_{ipc} = \beta_0 + \beta_1 post_c + \beta_2 \left(post_c \times treat_p\right) + \mathbf{X}_{ipc}{}'.\Gamma + \delta_p + \delta_c + \varepsilon_{ipc} \tag{3.2}$$

The results are shown in Table 3.5. The estimate for β_2 is negative and significant for both outcomes.

TABLE 3.5: Effect with binary treatment and binary exposure, 2016 (cf. Eq. 3.2)

	(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

3.5.3 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.(3.2) 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.(3.1), i.e. the baseline treatment. Thus, the new specification reads:

$$y_{ipct} = \beta_0 + \beta_1 post_c + \beta_2 \left(post_c \times private_p\right) + \mathbf{X}_{ipct}{}'.\Gamma + \delta_p + \delta_{ct} + \varepsilon_{ipct} \tag{3.3}$$

As Table 3.6 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 3.6: Placebo test: unexposed cohorts

	(1) Comp. Sec.	(2) Hourly wages
post X	-0.002	0.001
private	(0.004)	(0.009)
Female	-0.083***	-0.392***
	(0.009)	(0.020)
Indigenous	-0.355***	-0.559***
mother tongue	(0.015)	(0.035)
Migrated	0.053***	0.277***
from province of birth	(0.009)	(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

3.5.4 Placebo test: different outcomes

This subsection, based on Eq.(3.1), 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 3.7 shows the results. The effect is not significantly different from zero, as expected.

3.5.5 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 3.8 shows the privatization effects by type of region of birth, using Eq.(3.1). 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

TABLE 3.7: Placebo test: different outcomes

	(1) Household size	(2) HH per capita income	(3) HH per capita expenditure
private X	-0.030	-0.090	-0.078
exposure	(0.101)	(0.058)	(0.059)
Female	0.126***	-0.058***	-0.018***
	(0.009)	(0.004)	(0.003)
Indigenous	0.156***	-0.545***	-0.430***
mother tongue	(0.041)	(0.025)	(0.021)
Migrated	-0.318***	0.264***	0.231***
from province of birth	(0.023)	(0.031)	(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

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.[35]

[35]Law Nº 27665, "Law for the protection of the family economy regarding the payment of fees in private educational centers and programs".

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 3.8: 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	-0.400***	-0.175***	-0.185**
	(0.055)	(0.096)	(0.037)	(0.081)
Female	-0.075***	-0.358***	-0.048***	-0.345***
	(0.007)	(0.021)	(0.009)	(0.022)
Indigenous mother tongue	-0.277***	-0.478***	-0.337***	-0.468***
	(0.014)	(0.042)	(0.017)	(0.035)
Migrated from province of birth	0.086***	0.282***	0.024***	0.186***
	(0.012)	(0.032)	(0.008)	(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

3.5.6 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 of students who could enroll in private schools, i.e. their total capacity. Here, Eq.(3.1) 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 3.9.[36] The effect is still negative for the two outcomes under study.

TABLE 3.9: 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. R-squared	513,906 0.218	319,656 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

3.5.7 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 3.5. 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 C.9 in the Appendix. The y-axis plots the coefficient of this interaction, separately for each

[36] Since the definition of $private_p$ is different here, the results are not directly comparable with the previous ones. However, I have performed the test with their z-scores and the coefficients are very similar.

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 C.7. For this purpose, let us consider an analogous strategy to the one applied in subsection 3.5.3, Eq.(3.3). 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 3.10 shows the results. The effect is still negative for secondary completion, but does not appear to be statistically significant for hourly wages.

TABLE 3.10: 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

3.5.8 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:

$$y_{ipct} = \alpha + \beta\left(post_c \times private_{1993p}\right) + \sum_c \left(\mathbf{P}_p \times \tau_c\right)\delta_c + \mathbf{X}_{ipct}{}'.\Gamma + \delta_p + \delta_{ct} + \varepsilon_{ipct} \quad (3.4)$$

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.(3.2), 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 3.11. The effect is still negative and statistically significant for both outcomes.

TABLE 3.11: 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

3.5.9 Privatization as a process

It is clear from section 3.2.2 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 3.1). 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):

$$y_{ipt} = \beta Exposed_{s^*} \times private'_{p,s'} + \sum_t (\mathbf{P}_p \times \tau_t)\, \delta_t + \mathbf{X}_{ipt}\gamma + \alpha_p + \tau_t + \varepsilon_{ipt} \tag{3.5}$$

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 α_p and τ_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 3.5.8. 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:

$$y_{ipt} = \beta Exposed_{s^*} \times private_{p,s'} + \sum_t (\mathbf{P}_p \times \tau_t)\, \delta_t + \mathbf{X}_{ipt}\gamma + \alpha_p + \tau_t + \varepsilon_{ipt} \tag{3.6}$$

By focusing on the number of private schools instead of the number of *new* private schools, Eq. (3.6) provides a complementary understanding of the privatization process.

The implementation of Eq.(3.5) with *completed secondary education* as the dependent variable is presented in Figure C.10, which plots the β of interest, i.e. the coefficient of the interaction between $Exposed_{s^*}$ and $private'_{p,s'}$, for different cohorts.[37] 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 3.3). 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 C.11 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 C.12 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.[38]

Furthermore, an interesting parallel is established when using real wages as a dependent variable (cf. Figure C.13). This time, the interaction term shows similar behavior to that observed in Figure C.12. 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.

3.6 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

[37] The complete results of the regressions for some key cohorts are presented in Appendix C.6.

[38] 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 3.2.2 and Table 3.1).

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.[39] 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 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

[39] For instance, in Pakistan this phenomenon is more rural-driven (Andrabi, Das, & Khwaja, 2008).

expensive or very expensive private schools systematically perform better than public schools in such tests.[40] 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

[40] 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.

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-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.

Chapter 4

Does teacher subjective well-being influence students' learning achievement? Evidence from the Peruvian public basic education[1]

4.1 Introduction

Teachers play a fundamental role in determining the quality of a school (Hanushek & Rivkin, 2006). It has been shown that they not only have a causal impact on student achievement during schooling but also have long-term effects on outcomes in adulthood (Chetty, Friedman, & Rockoff, 2014a, 2014b, 2017). However, several countries report serious concerns about attracting and maintaining an adequate supply of good quality teachers (OECD, 2005).

Evidence from behavioral science (mostly outside the educational realm) suggests a promising way of addressing these concerns, at least in part. Indeed, conditions of

[1]This chapter is co-authored with Dante Solano, PhD candidate in the School of Politics and International Studies at the University of Leeds, UK.

subjective well-being[2] seem not only to attract and retain talent but also to foster job performance and productivity (Erdogan, Bauer, Truxillo, & Mansfield, 2012; Harter, Schmidt, & Keyes, 2003). The relevant literature has usually explored broad subjective well-being variables such as life or job satisfaction (Caprara, Barbaranelli, Steca, & Malone, 2006). However, such an approach does not allow us to understand properly the relevant well-being concerns of individuals (Yamamoto, 2017). For this reason, some authors suggest giving more attention to needs or experiences at the individual level (Tay & Diener, 2011; Weiss & Rupp, 2011).

In adopting the latter approach, the objective of the present paper is twofold: it aims to identify the subjective well-being structure of basic public education teachers in Peru and to estimate its effect on students' mathematics learning achievement measured by standardized tests. To our knowledge, this is the first attempt in the literature to address these two issues together.

Any research focusing on the factors that influence student learning is challenging on conceptual, methodological, and empirical grounds. The reason is that a student's learning is influenced by a wide range of actors (including herself, her family, her classmates, her teachers, etc.) and also by a wide range of contextual circumstances (such as her school's organization and resources, curriculum structure and content, etc.) In our case, the challenge is double: we attempt to measure the impact of a latent variable, namely, teachers' subjective well-being, which is, in addition, suspected of endogeneity in the main equation. Indeed, it cannot be measured without error, and it may also be correlated with other omitted variables that configure the teacher's quality, but that cannot be measured or observed in the data. Moreover, we also suspect heterogeneous effects, which makes the identification even more challenging.

Our matter is of first interest because it has direct implications for educational policy. It points to the problem of achieving greater efficiency with feasible investment, focusing on a key agent of the educational process, namely, the teacher. If we show a significant effect of teacher subjective well-being on students' academic performance, a new variable with high potential for being influenced by policymakers will become

[2] i.e. the cognitive-affective evaluations of their own lives that people carry out (Diener, Lucas, & Oishi, 2002).

available.[3] For instance, satisfaction with life or individual conditions could be included as indicators when recruiting and selecting teachers. Likewise, positive interventions for current teachers, such as personal and professional development, could be contemplated to improve their subjective well-being and thereby boost their effectiveness in the short term.

In relation to the existing literature, this paper offers three major contributions. First, it identifies the subjective well-being (SWB) structure of public sector teachers using an unusual and rich nation-wide representative sample. In the case of Peru, SWB has been analyzed by Yamamoto, Feijoo, and Lazarte (2008), Yamamoto (2014), and by Yamamoto (2017) from an emic perspective identifying the most relevant needs of this society, but there still is a gap in the literature when it comes to school teachers. Second, the present paper provides evidence on the relationship between teachers' subjective well-being and students' academic performance in a developing country. At the international level, evidence on this topic is still scarce, focused on high-income countries, based on small and selective samples (i.e. selected through convenience and purposive sampling), or not fully convincing in terms of causality (for a review, see Hascher & Waber, 2021). In addition, a part of the related literature studies only partially this relationship, since only one component of teacher subjective well-being (traditionally job satisfaction) is analyzed. In contrast, we consider a number of different facets of subjective well-being. Finally, this paper combines techniques borrowed from psychometrics and econometrics. Its interdisciplinary vocation -which locates it on the frontiers of Psychology, Economics, and Education- constitutes an advantage over other studies since the notions, concepts, and theories that will be mobilized to achieve the objectives will provide complementary insights.

To tackle our objectives accordingly, the empirical strategy relies mainly on the National Teacher Survey (ENDO)[4] 2016 and 2018, carried out by the Peruvian Ministry of Education.[5] This survey includes several items related to satisfaction with life and working

[3] It is worth mentioning that, although what children bring to school (abilities, family background, etc.) explains systematically the greatest variation in learning achievement, among "those variables which are potentially open to policy influence, factors involving teachers and teaching are the most important influences on student learning" (OECD, 2005, p.26).

[4] "Encuesta Nacional a Docentes de Instituciones Educativas Públicas y Privadas" - ENDO.

[5] Even though ENDO is a very rich survey (it has approximately 100 questions divided into 10 modules, including initial training, professional trajectory, economy, health, perception, among others), this survey has been little exploited by researchers, probably because of a lack of knowledge about its existence. Therefore, this study is a great opportunity to value a kind of survey that is not common anywhere in the world, especially among developing countries.

conditions, and is representative of regular basic education teachers at the national level (urban and rural) in both private and public schools. Although its sample is made up of approximately 10,000 teachers in each edition, to obtain our subjective well-being measures aggregated at the school level we restrict the ENDO sample to primary and secondary public sector teachers (12,600 pooled observations approximately). In this way, we are able to match these data with school average scores in mathematics, obtained from the Census Student Assessments of 2016 and 2018 (which evaluate students enrolled in primary -2nd and 4th grades, and secondary -2nd grade). We complement this information with data from the School Census (2016 and 2017) to obtain our school characteristics variables, and the Poverty Map (2013 and 2017) for monetary poverty rates at the district level.

Based on the existing theoretical literature and empirical evidence, we propose a structure for teachers' subjective well-being which has three dimensions. They reflect teachers' satisfaction with their i) living conditions, ii) working conditions, and iii) relationships with colleagues. To validate this structure, we first proceed with an exploratory factor analysis on a random half subsample, which is afterwards more rigorously tested with confirmatory factor analysis on the other random half of the sample.

Next, we study the effect of teachers' subjective well-being on students' performance in standardized test scores. After discarding endogeneity, we perform quantile regressions to estimate heterogeneous effects across the distribution of the response variable.

The results suggest that the levels of teacher subjective well-being (TSWB) differ significantly between primary and secondary education, between teachers who chose their profession by vocation and those who did not, and between those who would and would not like to change their school district, among others. Likewise, TSWB appears to affect students' learning achievement in an inverted U-shaped form, suggesting the existence of an optimal threshold after which too much TSWB is detrimental.

Once the whole distribution is examined, it appears that TSWB does not significantly increase students' math scores in those schools where the average performance is very low, but its effect increases as the school performance does (at least in the first half of the distribution). TSWB factor 3 (working conditions) benefits only the best schools in terms of learning achievement. Finally, the most influential factor in students' scores

is related to teachers' workplace relationships (TSWB factor 1). This could be an interesting variable for public policy to influence.

The rest of the paper is organized as follows. First, we present the current state of the art on the topic and the conceptual and theoretical framework that will guide this work (section 4.2). Then we describe the data (section 4.3) and the empirical strategy for testing the teacher subjective well-being structure, and its impact on students' learning achievement (section 4.4). Next, the main results are presented (section 4.5) followed by a series of robustness checks (section 4.6). The conclusions and a discussion of their policy implications close the document (section 4.7).

4.2 Conceptual framework

Subjective well-being (SWB) refers to the different evaluations that individuals make about their life experiences (Diener et al., 2017). Therefore, SWB includes the reflective cognitive judgments that people make about their life as a whole, or about specific domains such as health, work, or others (Diener, Oishi, & Tay, 2018). Diener et al. (2017) argue that the different facets of SWB can be measured through factor analysis and that a proper SWB assessment requires the measurement of several facets. Furthermore, one may expect correlations between these facets themselves, and distinctive associations with other variables.

This framework is critical to the understanding of workers' SWB, which has been traditionally studied in the field of Organizational Psychology (Fisher, 2010; Harter et al., 2003). Conventionally, research on this area tackles SWB through job attitudes such as job satisfaction or commitment (Hulin & Judge, 2003). However, this literature has more recently started to pay more attention to workers' needs and experiences (Weiss & Rupp, 2011), including SWB facets beyond the workplace. In this regard, the relationship between life satisfaction and workers' well-being shows mutual influence (Ford, Cerasoli, Higgins, & Decesare, 2011). Besides, situational features and the working context are also relevant to SWB (Diener et al., 2017). More interestingly, both the workplace and life well-being are positively related to job performance and the attraction and retention of workers (Erdogan et al., 2012).

Empirical research suggests that life satisfaction and workplace well-being are related to different psychological, social, and economic features. Harter et al. (2003) performed a meta-analysis regarding SWB at work. Based on data collected from Gallup, they reviewed studies on twelve indicators which comprise principally relationships with peers and supervisors, working conditions, recognition, and perception of one's own performance. They found that these SWB indicators correlate with several business outcomes such as employee turnover reduction, and the improvement of rates of customer satisfaction, productivity, and profit.

Several authors have noted the importance of understanding the needs and experiences that are related to life satisfaction. Tay and Diener (2011) analyzed representative samples from 123 countries, finding that basic needs such as money for food and shelter are related to life satisfaction. Psychological needs such as relatedness and competence are also positively related to it (Church et al., 2013). Recently, Ngamaba (2017) found that perceptions of health, freedom of choice, trust, and financial satisfaction, are the main factors related to life satisfaction in 85 representative national samples collected by the World Values Survey. Evidence from Peru identifies similar emic indicators of subjective well-being, but grouped into four factors: feeling good about oneself, living in a good place, status, and family (Yamamoto, 2017).

In educational research, teachers' SWB is a concern that has received growing importance in the last few decades. However, a proper idea of teachers' SWB has been impossible, because the studies of it have relied on mutually incompatible frameworks and traditions. Most of the initial works were focused on negatives of well-being, such as burnout and stress. Contemporary studies have focused on understanding the structure of teachers' job attitudes (Renshaw, Long, & Cook, 2015; Van Horn, Taris, Schaufeli, & Schreurs, 2004), the role of life satisfaction on teachers (Duckworth, Quinn, & Seligman, 2009; E. S. Lee & Shin, 2017), and some interventions to promote teacher well-being, which can include features of mental and physical health (Hwang, Bartlett, Greben, & Hand, 2017). Furthermore, there is very little evidence on the relationship of teachers' SWB to student outcomes (Caprara et al., 2006; Duckworth et al., 2009; Hwang et al., 2017). Besides, this little evidence has almost exclusively focused on developed countries.

Based on the current state of the art, we postulate that there are three relevant dimensions of teachers' subjective well-being, namely *satisfaction with* i) living conditions, ii) working conditions, iii) workplace relationships.

The first dimension aligns with life satisfaction, a critical aspect of subjective well-being (Diener, Inglehart, & Tay, 2013; Diener et al., 2018; Pavot & Diener, 2009). Emic research in Peru suggests that this component is related to satisfaction with one's health, self-esteem, family relationships, entertainment, and one's children's education (Yamamoto, 2017; Yamamoto et al., 2008).

The second dimension is related to job security and working conditions. Extensive evidence testifies to the relevance of these aspects to teachers' well-being (E. S. Lee & Shin, 2017; Toropova, Myrberg, & Johansson, 2021). It is to be expected that some aspects, such as satisfaction with salary (Currall, Towler, Judge, & Kohn, 2005), recognition of achievements (Shann, 1998), and conditions of retirement (Holochwost, DeMott, Buell, Yannetta, & Amsden, 2009), would be related to this dimension.

The third dimension is related to the interpersonal relationships that teachers develop in their workplace, which affect their subjective well-being (E. S. Lee & Shin, 2017; Van Horn et al., 2004; Zembylas & Papanastasiou, 2006). Thus, it is to be expected that relationships with colleagues and superiors play a significant role (Macuka, Burić, & Slišković, 2017). This dimension should also include satisfaction with other members of the educational community, since evidence suggests that relations with students (Roorda, Koomen, Spilt, & Oort, 2011; Spilt, Koomen, & Thijs, 2011) and also students' parents (Hoover-Dempsey, Bassler, & Brissie, 1992; Lasky, 2000) are relevant for teachers.

Even though these three dimensions are conceptually related to two different aspects of subjective well-being (life and work), the literature suggests that both are especially closely connected in the case of teachers (Day & Leitch, 2001; Renshaw et al., 2015). Therefore, all these dimensions align with the framework of subjective well-being. In section 4.4.1 we describe the empirical strategy that we used to test this structure, and in section 4.5.1 we present the results.

4.3 Data

The main source of information used in this study comes from the National Teacher Survey (ENDO) carried out by the Peruvian Ministry of Education. Although four editions are available (2014, 2016, 2018, and 2020), this paper reports the use of only the second and third waves. It should be noted that the last edition had a very different methodological approach (the survey was by phone) and asked fewer questions. At the same time, the scales of subjective well-being used in 2014 differ from those used in 2016 and 2018 (6 Likert-type response options were offered instead of 4). Therefore, we opted to focus on 2016 and 2018, which also had variables that were useful later as instruments (cf. section 4.4.2).

ENDO provides representative information on regular basic education teachers (preschool, primary, and secondary education) at the national level in both the private and public sectors.[6] For 2016, its sample was made up of roughly 9,800 teachers distributed over 3,000 schools; for 2018, the sample was around 15,000 teachers distributed over 4,500 schools. However, we made two important choices. We excluded private sector teachers because theirs is a very heterogeneous universe, with a wide array of motivations, conditions, origins, etc. (Díaz & Ñopo, 2016). More importantly, the private sector exhibits drastic differences in the quality of education provided, which is a function of the amount of fees charged (Minedu, 2018). In addition, private schools benefit from significant liberty for the nature of their educational provision, since the Ministry of Education provides only general guidelines for them. In contrast, public-sector teachers inhabit a sort of working-class in the Peruvian context. However, we also, as explained below, exclude preschool teachers, in order to provide a coherent match with the students' scores at the school level.

Even though ENDO is a very rich survey (it has approximately 100 questions divided into 10 modules[7]), it has been little exploited by researchers, probably because of a lack of knowledge about its existence. Therefore, this study is a great opportunity to evaluate a kind of survey that is uncommon anywhere in the world, especially among developing countries.

[6] It allows inferences with 95% confidence according to the level of education (initial, primary, secondary), geographical location (urban, rural), type of school (public, private), and region.

[7] Among those that stand out are questions on initial training, professional trajectory, the respondent's economic state, health, and perception.

For the purposes of this paper, ENDO provided mainly the questions dealing with teachers' subjective well-being. These questions are of the form: "*Taking all things together, would you say you are...? (i) Not at all satisfied, (ii) A little satisfied, (iii) Satisfied, (iv) Very much satisfied*". Table 4.1 shows the dimensions included in ENDO's questionnaire.[8]

TABLE 4.1: National Teacher Survey: Items related to subjective-well being

	Taking all things together, would you say you are: not at all satisfied, a little satisfied, satisfied, or very much satisfied with...?
1	Your life
2	Your health status
3	Your job in your school
4	The education that you can provide to your children
5	Your future retirement conditions
6	Your self-esteem
7	Society's recognition towards your job as a teacher
8	Your relationship with your family
9	Your recreational activities
10	Your pedagogical activity
11	Your students' achievement and your relationship with them
12	The Ministry of Education's recognition of teachers
13	Your relationships with colleagues
14	Your relationship with the Principal
15	Your relationships with students' parents
16	Your school's location
17	Your salary
18	Your relationships with the community

Source: National Teacher Survey (2016, 2018),
as elaborated by the present authors.

The main analysis of this paper, which is displayed in section 4.5.2, builds on aggregated data at the school level. However, to obtain school TSWB measures we must first work at the teacher level.

In this context, the sample for obtaining TSWB measures at the school level was made up of 12,661 teachers, almost equally distributed between primary and secondary school levels, as shown in Table E.1 in the Appendix. Likewise, the teachers working in urban schools tended to be older and to have permanent positions. These patterns are similar to those shown by other authors. (e.g. Díaz & Ñopo, 2016; Guadalupe et al., 2017).

[8]It is noteworthy that in 2018 a dimension (infrastructure and equipment of the school) was added that was not present in 2016. To ensure comparability, we exclude it from the analysis.

The teachers whom we surveyed are distributed among 3,720 clusters (per school-year), as shown in Table E.2. In more clusters than not (almost 6 out of 10), between one and three teachers were surveyed. As stated above, the objective was to work at the school level, since we had no identifier to match students' test scores to particular teachers, only to schools. In this sense, the characteristics of the sample of schools are presented in Table E.3.

The second database is the Census Student Assessment (ECE[9]), which is a national standardized test administered by the Ministry of Education.[10] Depending on the year, the ECE is administered to second or fourth-grade primary students[11], and also to second-grade secondary students. Although it has evolved to greater diversity of subjects in secondary education, here, for the sake of comparability, we restricted the analysis to the results of mathematics tests alone. Likewise, we considered only the population in regular basic education in 2016 and 2018.

Using ECE, we calculated the pupils' mean score in mathematics tests for each school-year. Then we transformed them into z-scores (at the school level) and assigned these scores to each of the schools surveyed by ENDO.

Finally, we used the School Census 2016 and 2018 (Ministry of Education) to obtain characteristics at the school level (numbers of pupils and teachers, geographical location, among others), as well as the poverty maps for 2013 and 2018 (National Bureau of Statistics) to assign to each school the average poverty rate of its district in monetary terms. We also made use of the 2016 second ballot presidential election database (National Office of Electoral Processes), to obtain the proportion of voters at the district level for left- and right-wing parties. This variable was used as an instrument for SWB, as explained in the next section.

[9] Evaluación Censal de Estudiantes.

[10] ECE's statistical population was drawn from schools with at least five pupils enrolled in the targeting grade.

[11] In the case of fourth grade students, some years target regular basic education, intercultural bilingual education, or both.

4.4 Methodology

4.4.1 Teacher subjective well-being

In this subsection, we describe the proceeding for assessing teacher subjective well-being based on the National Teacher Survey (ENDO). Here we present only the general guidelines, but in section 4.5.1 we provide all the detailed intermediate and final empirical results.

Table 4.1 presents the eighteen items of ENDO that ask about the level of satisfaction with different aspects of life and work. Based on the literature review, we suggested that these items can be grouped under three headings, as stated in section 4.2: satisfaction with (i) living conditions, (ii) working conditions, and (iii) workplace relationships. To validate this structure of teachers' subjective well-being, we followed the standard scale development procedures and recommendations stated in the recent literature (e.g. Cabrera-Nguyen, 2010; Graham et al., 2011; Renshaw et al., 2015). Specifically, after randomly splitting the sample into two subsamples, we proceeded as follows:

First, we performed an Exploratory Factor Analysis (EFA) with subsample 1, as a preliminary step to observing if the proposed latent variables emerged among ENDO's items (Fabrigar & Wegener, 2012; Goretzko, Pham, & Bühner, 2021).[12] We closely followed the modern evidence-based best practice procedures compiled by Watkins (2022).

We were dealing with ordinal data and therefore, we used polychoric correlations for building the covariance matrix. Moreover, since the item "not at all satisfied" was generally chosen by few respondents -as shown in Table 4.2- we merged it with the category "a little satisfied" to increase the precision of the estimation (DiStefano, Shi, & Morgan, 2021). Next, we conducted iterated principal factor extraction with initial communalities estimated by squared multiple correlations (Tabachnick & Fidell, 2019), because a maximum likelihood estimation would be sensitive to the nonnormal character of our data (Watkins, 2022, p.123).[13] We retained the factors based on parallel analysis, minimal average partials, and scree. Then we applied a Promax rotation (Cureton &

[12] "The purpose of EFA is to explain as well as possible the correlations, or covariance, among measured variables (Sheskin, 2011). In EFA, measured variables are thought to correlate with each other due to underlying latent constructs called factors" (Watkins, 2022, p.69).

[13] Maximum likelihood is one of the most often recommended extraction methods for EFA, but it is not appropriate for our ordinal data (Fabrigar, MacCallum, Wegener, & Strahan, 1999; Field, 2013).

Mulaik, 1975) because it allowed the factors to be correlated (Schmitt & Sass, 2011), which is consistent with the "ubiquity of intercorrelations among social science variables" (Watkins, 2022, p.126).

It should be mentioned that, as a first step, we removed items that (i) did not involve a clear statement about the satisfaction of a particular need among teachers, or (ii) that was designed to capture more general subjective dimensions of well-being (e.g. life, job). Then we removed items that had factor loadings below 0.3 after the rotation (Field, 2013) and looked at the alpha reliability of the scales (DeVellis, 2017).

Second, to test our theoretical three-dimension solution, we performed a Confirmatory Factor Analysis (CFA) (Brown, 2015) with subsample 2. The advantage of this approach was that it allowed us to make statistical inferences. We looked closely at the recommended indicators of model fit (Browne & Cudeck, 1992) before also analyzing the Cronbach Alpha to test the reliability of items for each dimension (Bland & Altman, 1997; Cronbach, 1951).

Finally, we tested the external validity of these dimensions by analyzing the correlation between the scores obtained in each of these latent variables (based on CFA) with other indicators also present in ENDO. This complied with two conditions: i) being also related to subjective well-being, and ii) not having been included in the previous steps. This kind of test is a common practice for validating psychometric constructs (Graham et al., 2011; Renshaw et al., 2015).

4.4.2 Assessing the impact of teacher subjective well-being on student academic performance

To assess the impact of teacher subjective well-being on student academic performance, we started with a simple OLS regression of the following form:

$$Y_s = SWB_{fs} + SWB_{fs}^2 + Y_{sb} + \mathbf{A}_s + \mathbf{B}_d + \mathbf{C}_s + \varepsilon_s \tag{4.1}$$

For each school s: Y_s is the average students' test z-score in school s, SWB_{fs} is the school s's score in the subjective well-being factor f, where $f \in [1, 3]$. Y_{sb} is the average test z-score, in school s, in baseline year b (2015), $\mathbf{A}_s$ is a vector of school characteristics:

number of teachers, female teacher ratio, fixed-term teacher ratio, student-teacher ratio, number of educational areas. $\mathbf{B}_d$ is a vector of school's district d characteristics: poverty rate, rural, geographic domain. $\mathbf{C}_s$ controls for survey year and tested grade. Finally, ε_s is the usual error term.

It is worth mentioning that Y_{sb} can be considered exogenous, since it reflects the z-scores in a baseline year (2015), i.e. before the outcome under study (z-scores from 2016 and 2018). Y_{sb} is therefore independent of Y_s because it reflects the performance of an older cohort of students. The term Y_{sb} has particular relevance, for it controls omitted information that otherwise would be captured in the error term.

One may argue that there is reverse causality in Eq.(4.1), since students performing badly negatively affect TSWB, despite the fact that teachers are trained in dealing with such cases (because they are part of their profession). Taking an analogous situation, clinical psychologists are trained to deal with patients who have serious problems. Such cases are meant to have no influence on psychologists' personal lives -they have an adequate toolkit to distance themselves from them. Furthermore, evidence from the UK suggests that student achievement does not affect teachers' well-being (Kidger et al., 2016, p.79). In any case, to clear up any doubt about the endogeneity of the coefficients of SWB_{fs} and its quadratic form, we performed an augmented regression test, as suggested by Davidson and MacKinnon (1993), consisting of the following steps:

$$SWB_{fs} = \mathbf{Z}_{fs} + Y_{sb} + \mathbf{A}_s + \mathbf{B}_d + \mathbf{C}_s + \delta_s \tag{4.2}$$

$$SWB^2_{fs} = \mathbf{Z}^2_{fs} + Y_{sb} + \mathbf{A}_s + \mathbf{B}_d + \mathbf{C}_s + \gamma_s \tag{4.3}$$

$$Y_s = SWB_{fs} + SWB^2_{fs} + \hat{\delta_s} + \hat{\gamma_s} + Y_{sb} + \mathbf{A}_s + \mathbf{B}_d + \mathbf{C}_s + \gamma_s \tag{4.4}$$

First, Eq.(4.2) regresses the suspected endogenous variable SWB_{fs} on a vector of instruments $\mathbf{Z}_{fs}$, and all the exogenous variables from Eq.(4.1). Likewise, Eq.(4.3) does the same for the SWB quadratic term. As suggested by Wooldridge (2010), its instrument is the square of the original Z. In the final step, the residuals $R = \hat{\delta_s} + \hat{\gamma_s}$ are included in Eq.(4.1), as shown in Eq.(4.4). Subsequently, we tested the null hypothesis that R is

equal to zero. If this hypothesis can not be rejected, we can plausibly state that SWB_{fs} is not endogenous.

4.4.2.1 The instruments

We used three sets of instruments to assess teacher subjective well-being:

a) Z1: commuting time

It is well established in the literature that commuting significantly contributes to the worker population's well-being, since it is a significant component of their daily activities (Chatterjee et al., 2020). People who live close to their work (or who commute for a relatively short time) show a greater propensity to declare better states of subjective well-being (Clark, Chatterjee, Martin, & Davis, 2020). Therefore, the distance (in minutes) between the teachers' homes and their schools was expected to have a direct impact on their subjective well-being. We claim that this distance is a good instrument because it also complies with the exclusion restriction. Indeed, one may argue that work productivity is independent of commuting because "commuting cost could be fully compensated by wage premiums or lower land rents, so the commuting would not influence job satisfaction and performance" (Ma & Ye, 2019, p.131). Wage premiums do exist in the Peruvian public educational system. For example, if a school is in a rural area, the wage premium is a function of the school's distance from the provincial capital and the population of its catchment.

b) Z2: political preferences and voter turnout

In recent decades, political scientists and psychologists have suggested that political orientation influences subjective well-being. Napier and Jost (2008) find that right-wing individuals in the United States have higher happiness indicators than left-wing ones, as the former are less affected by economic inequalities, which is a critical aspect of left orientation (Bobbio, 1996; Jost, Glaser, Kruglanski, & Sulloway, 2003). Cross-cultural evidence suggests that this subjective well-being gap between left-wing and right-wing individuals is incremented by the levels of economic and social threat in a country (Onraet, Van Assche, Roets, Haesevoets, & Van Hiel, 2016). In addition, recent studies indicate that subjective well-being is an important aspect of political

behavior; specifically, of vote turnover. Happier individuals tend to participate in the electoral process and be more engaged in politics (for a review, cf. Ward, 2019). Recent evidence also suggests that election outcomes have an impact on the life satisfaction of individuals (D. Gray, Pickard, & Munford, 2021). Therefore, political preferences and electoral outcomes influence the subjective well-being of individuals. For this research, we proxied political preferences and electoral behavior through two variables from the second ballot of the 2016 presidential election: both the proportion of voters in the right-wing party, and voter turnover, at the district level. There is no reason why either variable would directly affect pupils' learning achievement; they have nothing to do with children's educational outcomes.

c) Z3: school performance trend

The recent evolution of the school in terms of the outcome of interest may serve as an instrument. Indeed, if the school is continuously improving its performance in national standardized tests, it is an indicator that good things are happening inside the school and such optimistic evidence can positively affect teachers' SWB. More importantly, this variable complies with the exclusion restriction because it involves older cohorts of pupils, whose scores do not directly affect the scores of current students. We materialize this variable by taking the beta coefficient after regressing $y_{it} = \alpha_i + \beta_i time + \varepsilon_{it}$ for each school i and $time$ ranging from 2012 to 2016 (recoded in the sequence 1 to 5). It is worth noting that the main drawback of this instrument lies in the schools that were observed, for it requires schools to have been tested in the period of reference. Therefore, schools that had been created recently or were temporarily closed and did not take part in ECE evaluation had to be excluded from this approach. This explains the sample size reduction in the tables that are shown below. However, we consider that this variable, despite its limits, is pertinent and informative.

4.4.3 The effect on the whole students' scores distribution

To look more deeply at the effect of TSWB on the whole distribution of students' test scores, we decided to run quantile regressions. This choice was justified because it offered a much richer and more focused view than conventional models, which typically focus on the conditional mean of the response variable across the values of the predictors.

Indeed, quantile regression "is capable of providing a more complete, more nuanced view of heterogeneous covariate effects" (Koenker, Chernozhukov, He, & Peng, 2018, p.xvii). This is the case because it estimates quantile-specific effects that describe the impact of covariates not only on the center but across the entire outcome distribution (Chernozhukov & Hansen, 2008, p.379). In this context, quantile regression is particularly appealing when the central and the tail quantiles are affected differently by the covariate of interest.

Following Wooldridge (2010), let $q(\tau)$ be the τth quantile of the distribution of y_i. Then, for $0 < \tau < 1$, it is verified that $P\left(y_i \leq q\left(\tau\right)\right) \geq \tau$ and $P\left(y_i \geq q\left(\tau\right)\right) \geq 1-\tau$. Assuming that the quantiles are linear in parameters, and writing the τth quantile of Y_s as , we have:

$$Quant_{\tau}\left(y_s|\mathbf{X}\right) = \alpha_0\left(\tau\right) + \mathbf{X}\beta_0\left(\tau\right) \tag{4.5}$$

Vector $\mathbf{X}$ includes all the right-hand variables of Eq.(4.1).

4.5 Results

4.5.1 Structure of teachers' subjective well-being

Following the procedure described in section 4.4.1, here we present the results validating the theoretical three-factor model of teacher subjective well-being previously proposed in section 4.2. As mentioned above, ENDO includes eighteen items that inquire about the level of teachers' satisfaction with different aspects of their life and work. Table 4.2 presents their distribution for our sample of interest, composed of 12,661 teachers.

TABLE 4.2: Public basic education teachers: Subjective well-being items (percentages)

	Satisfaction with...	Total	Not at all satisfied	A littlesatisfied	Satisfied	Very much satisfied
1	Life	100.00	0.44	6.03	53.29	40.23
2	Health	100.00	1.30	20.01	59.23	19.46
3	Job	100.00	1.08	14.04	61.94	22.94
4	One's children's education	100.00	1.38	20.25	55.85	22.52
5	Retirement conditions	100.00	31.80	46.43	18.09	3.68
6	Self-esteem	100.00	0.47	4.28	51.57	43.68
7	Society recognition	100.00	6.29	30.68	48.26	14.77
8	Family relationships	100.00	0.41	4.68	58.00	36.91
9	Recreational activities	100.00	4.86	25.07	55.38	14.69
10	Pedagogical activity	100.00	0.10	3.43	67.05	29.42
11	Students' achievement and one's relationship with them	100.00	0.11	5.07	63.78	31.04
12	MINEDU recognition	100.00	15.73	50.71	28.73	4.84
13	Relationships with colleagues	100.00	0.73	6.83	67.09	25.35
14	Relationship with the Principal	100.00	2.46	8.31	60.31	28.92
15	Relationships with students' parents	100.00	0.69	9.87	66.17	23.27
16	School location	100.00	4.01	20.50	57.23	18.26
17	Salary	100.00	24.45	56.99	16.59	1.98
18	Community relationships	100.00	0.78	8.89	73.64	16.68

Note: The total sample size is 12,661 individuals.
Source: ENDO 2016 and 2018. Authors' calculations.

To validate our three-factor solution, we took the following steps. First, we merged the categories "not at all satisfied" and "a little satisfied", since the former occurred as a response to very few of the questions (DiStefano et al., 2021). Second, we excluded item Nº1 (satisfaction with one's own life) because it is supposed to capture life satisfaction, which is a measure of subjective well-being that comprehends all kinds of experiences (Diener et al., 2013), not only those associated with work. Therefore, we preferred to use it later as a benchmark for checking consistency. Third, in the same way, item Nº3 (satisfaction with one's current job at school) was dismissed, since it evoked another construct of subjective well-being (Hulin & Judge, 2003). In a sense, this variable encompasses more refined aspects that we were already able to capture with other items related to a teacher's work and workplace. Finally, we also excluded item Nº 10 (satisfaction with pedagogical activity) because it is ambiguous. In a sense, it can be understood both as the teacher's job (its context) and as her performance at work (the effort entailed).[14]

After this preliminary proceeding, we verified that the subsample size ($n_1 = 6,340$) was large enough.[15] With fifteen items and three anticipated factors, there were five items per factor. This ratio required a sample of 500 to establish the internal validity of the scale (Rouquette & Falissard, 2011). Likewise, the ratio of individuals to variables was 422 to 1, which was adequate according to modern recommendations (Watkins, 2022). Therefore, for EFA our sample size was satisfactory.

We followed three guidelines for the number of factors to retain: parallel analysis (PA), minimal average partials (MPA), and scree (Watkins, 2022, p.124). For our case, PA suggested 2 factors, MPA 3 factors, and the scree plot 2 to 5 factors. Therefore, models with 5 to 2 factors were evaluated in sequence. The tables of results are displayed in Appendix E.3.

First, the five-factor solution had no salient items in its last factor: none had a loading above 0.32, which is the recommended threshold for salience (Norman & Streiner, 2014). Furthermore, its fourth factor had only two items. Experts, it should be noted, point out that at least three salient item loadings (pattern coefficients) are needed to form a factor (Watkins, 2022, p.156). Second, the four-factor solution showed a pattern that was close to our theoretical proposal. Factor 1 had salient items related to living conditions, factor

[14] We confirmed that this item was problematic since it showed factor loadings in two factors for different solutions.

[15] As stated in section 4.4.1, we randomly split the sample into two subsamples. Subsample 1 was used for EFA, and subsample 2 for CFA.

2 to relationships at the workplace, and factor 3 to working conditions. However, this solution revealed a 4th factor with the same caveats as the previous solution.[16] Since factor 4 was redundant in some ways, this solution was dismissed. Third, the two-factor solution was non-optimal because it mixed items related to living conditions with items related to the workplace. This solution lacks a theoretical or conceptual interpretation, which is a key element when implementing EFA (Flora, 2018).

The three-factor solution converged properly, produced reasonable parameter estimates, and accounted for 47% of the total variance before rotation. The salient loadings were good in magnitude, and its structure was consistent with the theoretical solution proposed in section 4.2. Using the highest loadings for each factor after rotation, the ordinal alpha reliability (Viladrich, Angulo-Brunet, & Doval, 2017) was 0.82, 0.78, and 0.75 for factors 1, 2, and 3, respectively, which, as values, are acceptable to good.

Therefore, we can conclude that the results of EFA support the initial assumption that teachers' SWB in our sample is configured by three factors of satisfaction. The first factor, **satisfaction with workplace relationships**, was configured by indicators related to satisfaction with the teacher's peers, superiors, students, students' parents, and school location. At first sight, the latter variable seems to be out of place. However, a more careful consideration suggests that one's school location conditions or shapes the type of relationships that the teacher develops. Extensive evidence suggests that job relationships are critical for well-being in the workplace (Harter et al., 2003), including those in educational settings (Acton & Glasgow, 2015; Hascher & Waber, 2021; Spilt et al., 2011). The second factor, **satisfaction with living conditions**, is configured by self-esteem, family relations, health, recreation, and education for one's own children. Previous works based in Peru (although not focused on teachers) had already found in different samples that these indicators are related to subjective well-being (Yamamoto, 2017; Yamamoto et al., 2008). The third factor, **satisfaction with working conditions**, is composed of retirement conditions, wages, and the recognition by society and the Ministry of Education of the teaching profession. Monetary conditions have been a critical concern of teachers, as expressed in the most recent major strike (Vargas & Cuenca, 2018). They reflect status, just as recognition does.

[16] The two salient items in factor 4 were satisfaction with the teacher's relationships with colleagues and those with the Principal, which would correspond better to factor 2.

Subsequently, we implemented a confirmatory factor analysis (Brown, 2015) with subsample 2 ($n_2 = 6,321$). The results were in line with the exploratory analysis, suggesting that the structure of teachers' well-being was made up of three factors: workplace relationships, living conditions, and working conditions. The model fit indicators (χ^2 = 2104.98 / df =87, CFI = .904, NFI = .900, RMSEA = .060) suggest acceptable to good values[17], supporting our assumptions about the dimensions of teachers' well-being. The model represents the data and reflects the underlying theory. Its indicators are acceptable to good, but not excellent. This is understandable, since our model considers the broad dimensions of teachers' subjective well-being. The indicators of these dimensions cover different aspects of workplace relationships, living and working conditions. In this regard, the items' loadings in the different factor dimensions are also acceptable (cf. Appendix E.4), even if two of them are apparently low (< .50). In psychological research, these values for the goodness-of-fit indicators obtained from CFA were similar when scholars aimed to validate theoretical proposals that considered broad dimensions as part of their concepts, such as in our case.[18]

In the light of the results of EFA and CFA, the subjective well-being of Peruvian teachers may be summarized under three broad headings (dimensions). These dimensions are in line with the main literature, which suggests that relationships in the workplace (Harter et al., 2003) and living (Church et al., 2013; Yamamoto et al., 2008) and working conditions (Fisher, 2010; Harter et al., 2003) are critical for subjective well-being. These results contribute to expanding the evidence about a specific occupational group which is exposed to several stressors (C. Gray, Wilcox, & Nordstokke, 2017). In this regard, the results confirm that, in the case of teachers, the relationships with the school community, with students' parents, and with students themselves are relevant to their subjective well-being, in addition to the predictable relationships with peers and superiors. In the case of Peruvian teachers, who are on average 45 years old and have generally formed their own families, aspects such as children's education or family relationships are part of the evaluation of their satisfaction with life. This suggests a different approach to understanding subjective well-being, because most of these measures have individualistic indicators that do not necessarily consider family concerns (Yamamoto et al., 2008). Finally, the third dimension also suggests that society and government recognition are

[17] cf. Hooper, Coughlan, and Mullen (2008, p.58) for the acceptable thresholds of the various fit indices.

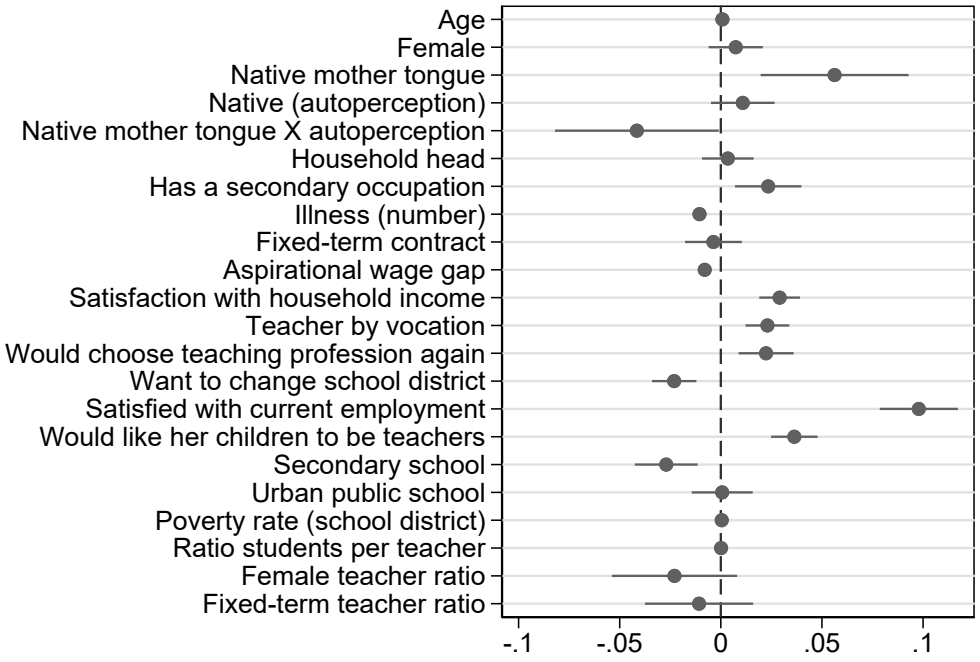
[18] See, for instance, research on values (Schwartz & Boehnke, 2004) or morality (Graham et al., 2011).

important aspects of a teacher's well-being. Moreover, these dimensions are closely interrelated, as our results suggest, which is also mentioned in the literature.

Having confirmed the structural form of TSWB, we can predict, for each teacher, her score for each TSWB factor. Larger values indicate higher levels of subjective well-being in the corresponding factor. Figure E.2 in the Appendix displays their distribution by means of box plots. By construction, they all have a mean virtually equal to zero. However, the TSWB factor 3 has the lowest variance (sd=0.229), while factor 2 has the highest (sd=0.289). This result is related to the concept of "happiness inequality", which refers to the extent that individuals differ in their reports of SWB in a given society (Goff, Helliwell, & Mayraz, 2018; Ward, 2019). Here, at least two important elements may be worth considering: the *reference effect*, i.e. the fact that individuals compare their situations or outcomes with other people's, and this affects, in turn, their SWB (Van Praag, 2011); and the *tunnel effect*, which arises when comparisons are taken as indicators of one's own future prospects (Hirschman & Rothschild, 1973). In our case, more individual differences in TSWB would be present in the second factor. Furthermore, factor 3 shows strong positive skewness, meaning that teachers are more satisfied in this TSWB dimension. In this context, a natural question arises: What determines the levels of the TSWB factors?

We address this question by regressing each TSWB factor on the covariates regarding teacher characteristics, school characteristics, and teachers' perceptions (cf. Appendix E.5). Here we discuss only the results for factor 1, since the conclusions are similar for the other factors. Figure 4.1 illustrates the coefficients for factor 1 shown in Table E.8. Concerning personal characteristics, an interesting finding is that the interaction term between native mother tongue and the self-perception of belonging to a native ethnic group shows a negative sign. This group of teachers probably have a feeling of discrimination or exclusion, which is consistent with the fact that the indigenous condition in Peru is associated with lower levels of income and access to public services (Vakis, Rigolini, & Lucchetti, 2016). The opposite sign shown by both terms alone probably indicates that some teachers do not recognize themselves as indigenous. According to R. D. Flores and Sulmont (2021), the stigmatization of these groups in Latin American societies may explain the differences between the survey indicators of indigenous self-identification.

FIGURE 4.1: Distribution of the teacher subjective well-being factors (teacher level)



R-squared = .102
Source: National Teacher Survey and School Census, 2016-2018.

Among the variables under consideration, those in the model related to teachers' perceptions are particularly relevant. For example, more satisfaction with current employment significantly increases the score in TSWB factor 1. In the same way, those teachers who chose their profession because of their vocation (and not for other pragmatic reasons), those who would choose to be a teacher again if they had the opportunity to choose again, or those who like the prospect of their children's becoming teachers positively affect TSWB. These results might seem tautological, since our measures concern satisfaction with different aspects of life and work-related well-being. However, these results can be considered as indicators of external validity for our measures of subjective well-being. With respect to school characteristics, teaching in secondary education negatively affects the scores in factor 1 relative to primary education. This implies that primary and secondary levels pose different challenges to teachers, which is consistent, for example, with evidence from the UK that secondary teachers have lower subjective indicators of well-being than primary teachers (Scanlan & Savill-Smith, 2021).

4.5.2 Teacher subjective well-being and students' learning achievement

The distributions of our main variables (math z-scores and teachers' subjective well-being factors, both at the school level), are presented in Appendix E.6. By construction, they are normally distributed and show the expected behavior. TSWB factors display a very slight positive skew, and it is noteworthy that factor 1 has lower variance.

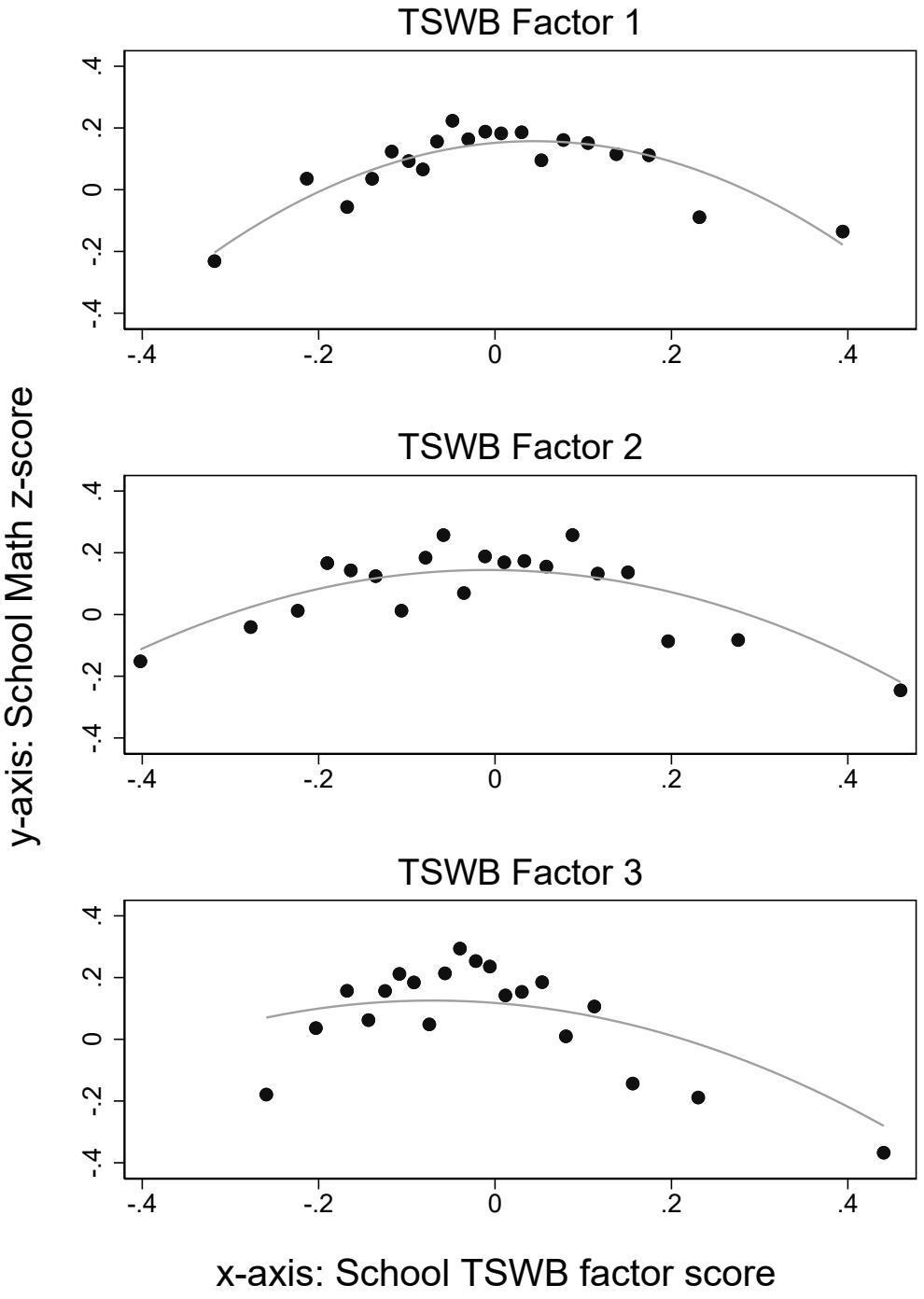
As a first descriptive approximation, Figure 4.2 presents non-parametric conditional expectation functions regarding the relationship between students' learning achievement and the TSWB factors. The curves show an inverted-U shaped pattern, meaning that there is a nonlinear relationship between our variables of interest. Students' z-scores increase with TSWB, but only up to a threshold beyond which they start to decrease. This kind of relationship is not uncommon when studying SWB or related topics: it is often the case that having only a little or having a great deal of something is not beneficial (Grant & Schwartz, 2011).[19] Speaking more generally, this issue is related to the meta-theoretical principle called the "too-much-of-a-good-thing effect" (Pierce & Aguinis, 2013), which occurs when "an initially positive relation between an antecedent and a desirable outcome variable turns negative when the underlying ordinarily beneficial antecedent is taken too far, such that the overall relation becomes nonmonotonic" (Busse, Mahlendorf, & Bode, 2016, p.131).

Let us now consider the OLS results. Appendix E.7 presents two tables. The first shows the TSWB factors and their respective squared terms, controlling for the test performance of an older cohort in the baseline (2015), urbanity, poverty, and within-school context variables (teacher absenteeism in the previous year, number of teachers, female teacher ratio, fixed-term teacher ratio, student-teacher ratio, and number of school rooms), including in addition fixed-effects for the survey year, geographic domain, and student assessment grade. The second table shows the interactions between the TSWB factors, controlling for the same covariates as mentioned above.

The beta coefficients from Table E.9 related to TSWB factors are depicted in Figure 4.3. Each factor displays the expected sign with schools' average scores in math. That

[19] For instance, recent evidence suggests that "whereas having too little time is indeed linked to lower subjective well-being caused by stress, having more time does not continually translate to greater subjective well-being. Having an abundance of discretionary time is sometimes even linked to lower subjective well-being because of a lacking sense of productivity" (Sharif, Mogilner, & Hershfield, 2021, p.1).

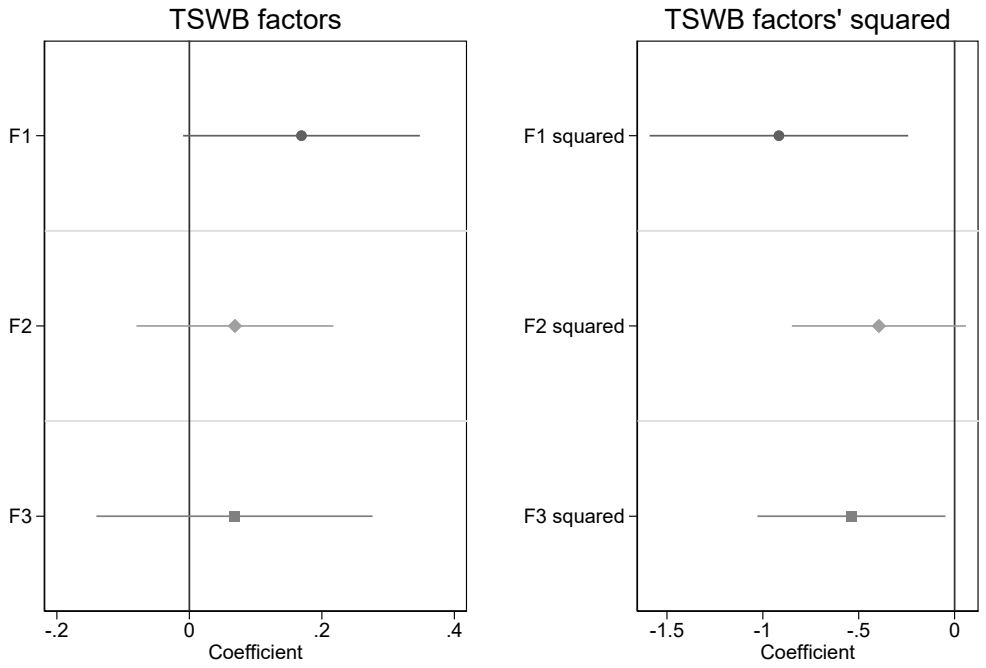
FIGURE 4.2: Students' learning achievement and teachers' subjective well-being factors: Non-parametric conditional expectation functions (school level)



Source: National Teacher Survey and Census Student Assessment, 2016 and 2018.

is, the greater the teacher SWB component, the higher the math score. The greatest impact is observed for TSWB factor 1. In contrast, the squared TSWB factors' term displays negative values, suggesting decreasing marginal effects, which confirms the first descriptive approximation previously shown in Figure 4.2. It is worth mentioning that only factor 1 shows statistical significance simultaneously for both the linear and the squared terms. Probably this fact suggests that TSWB factor 1 is the most important among the different TSWB dimensions for the educational context?

FIGURE 4.3: Beta coefficients for teachers' subjective well-being factors (OLS estimates, cf. Appendix E.7)



Source: National Teacher Survey and Student Census Assessment, 2016-2018.

When the three factors are studied together (Table E.10), the patterns are not so clear. Since, by construction, the three factors have non-negligible correlation levels[20], it seems that their relative importance competes and diminishes their effect. However, one interesting feature is that the interaction terms between factors (F1xF2, F1xF3, F2xF3) are positive (models 1 to 3). This means that there is a mutual influence in the same direction, especially between living conditions (F2) and working conditions (F3), which show consistent statistical significance (models 3 and 4). This finding is consistent with

[20] At the school level, $\hat{\delta}_{F1,F2} = 0.81$, $\hat{\delta}_{F1,F3} = 0.69$, and $\hat{\delta}_{F2,F3} = 0.80$.

the literature, showing that life satisfaction can boost job satisfaction (Diener & Tay, 2017), which in turn can improve performance (Erdogan et al., 2012; Ford et al., 2011).

All in all, the OLS models explain almost half of the total variance. Schools located in urban areas and with higher female teacher ratios positively affect the z-scores. Inversely, schools located in poorer districts and with higher fixed-term teacher ratios show poorer z-scores in math (although their coefficients are not significant). In this line, extensive evidence suggests that economic and social conditions have an impact on subjective well-being: more difficult conditions increment psychological distress (Rojas, 2011).

We suspected that the teachers' subjective well-being factors may be endogenous. Therefore, we tested for this, using instrumental variables.

The first step is shown in Appendix E.8. Each table corresponds to a particular TSWB factor, as stated in Eq.(4.2). We use the three sets of instruments discussed in subsection 4.4.2.1. Since our instrumented variables have a non-linear term in the main model, we included in the Z vector the quadratic terms of the instruments, following Wooldridge (2010). The specifications were able to explain around 9% of the total variance, changing slightly with the endogenous variable and instrument set under consideration.

Next, for each TSWB factor we performed Wooldridge (1995)'s robust score test for endogeneity. The results suggested that the TSWB factors were not exogenous, since we could not reject the null hypothesis (cf. Table 4.3).

TABLE 4.3: Teacher subjective well-being factors: Test for endogeneity, by instrument set (H0: Variables are exogenous)

TSWB	Z set	p-value	F-statistic
Factor 1			
	Z1	0.095	2.359
	Z2	0.016	4.147
	Z3	0.000	15.324
Factor 2			
	Z1	0.000	15.324
	Z2	0.073	2.620
	Z3	0.000	15.474
Factor 3			
	Z1	0.019	3.985
	Z2	0.000	15.474
	Z3	0.000	15.667

Source: National Teacher Survey and Student Census Assessment, 2016-2018.

The IV second-stage results are depicted in Tables 4.4, 4.5, and 4.6, for each TSWB factor in turn. There are at least three findings to highlight. First, the signs for the linear and quadratic terms in each TSWB factor display the expected behavior. There are only two exceptions: F1-squared and F2-squared, both under Z1. Second, the coefficients are systematically higher than the OLS estimates previously shown in Appendix E.7, regardless of the Z-set under consideration. This evidence strongly suggests that the OLS estimates were downward biased, that is, they underestimated the influence of TSWB on students' learning achievement. Finally, the IV coefficients were very high and their magnitude had a wide range. This may suggest that the populations that verified the relationships that our instruments were intended to capture were probably particular. Indeed, it should be recalled that the IV framework provides a local average treatment effect, and we cannot therefore generalize its results to the whole population of interest. However, although we are calculating effects for different complier subpopulations because of the three different Z-sets, the conclusions point to the same direction: TSWB has an inverted U-shaped effect on pupils' learning achievement, and OLS estimates are plausibly downward biased.

The conclusions drawn about the OLS estimates were only *on average*; more precisely, the effect was on the mean of schools' z-scores distribution in math (controlling for the covariates mentioned in section 4.4.2). What would happen if we looked in more detail at the whole distribution of pupils' scores?

To answer this question, we ran three quantile regression models, each with one TSWB factor as the main explanatory variable.[21] Since quantile regressions are informative about the heterogeneous effect of the variable of interest across the distribution of the outcome, we were able to disentangle the effects of the TSWB factors across the distribution of pupils' scores in mathematics. Figure 4.4 shows the results.[22]

This figure suggests that TSWB factors have differential effects across the distribution of schools' z-scores. Schools with the weakest test performance benefit from TSWB factor 1. That is, the better the teachers' relationships at school, the better the pupils' performance in math tests. However, TSWB factors 2 and 3 seem to be innocuous with regard to pupils' learning achievement in school. Another finding from this figure is

[21] Admittedly, the TSWB factors are endogenous, but it is nevertheless a useful exercise to examine in this way the tendencies of the effects across the whole distribution.

[22] The coefficients for selected deciles are presented in Appendix E.9.

Table 4.4: 2SLS estimates - Dep. variable: School z-score in math

	(1) Z1	(2) Z2	(3) Z3
F1	2.120**	4.635	11.561*
	(1.037)	(3.408)	(6.403)
F1 squared	0.077	-17.502*	-39.290
	(8.265)	(9.745)	(28.782)
Math z-score in 2015	0.448***	0.387***	0.192
	(0.029)	(0.076)	(0.161)
Urban public school	0.209	-0.015	-0.232
	(0.137)	(0.139)	(0.409)
Poverty rate	-0.171	-0.141	-0.067
	(0.113)	(0.167)	(0.401)
Absenteeism in the previous year (days per month)	0.022	0.007	-0.006
	(0.037)	(0.042)	(0.084)
Number of teachers	0.001	-0.001	-0.002
	(0.001)	(0.002)	(0.005)
Female teacher ratio	0.574***	0.715***	1.280**
	(0.114)	(0.254)	(0.564)
Fixed-term teacher ratio	-0.120	-0.014	0.376
	(0.088)	(0.120)	(0.385)
Student-teacher ratio	-0.004	-0.005	-0.013
	(0.004)	(0.006)	(0.012)
Number of rooms	0.003***	0.003**	0.001
	(0.001)	(0.001)	(0.003)
N	3,215	3,208	2,612
chi2	2,030	847	148
RMSE			

Note: Controls include survey year and student assessment grade.

Source: National Teacher Survey and Student

Census Assessment, 2016-2018.

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

Table 4.5: 2SLS estimates - Dep. variable: School z-score in math

	(1) Z1	(2) Z2	(3) Z3
F2	2.298*	5.987	10.072
	(1.270)	(6.288)	(7.298)
F2 squared	1.124	-13.780	-39.194
	(7.476)	(11.757)	(34.613)
Math z-score in 2015	0.465***	0.389***	0.227
	(0.032)	(0.102)	(0.178)
Urban public school	0.209	-0.082	-0.607
	(0.163)	(0.224)	(0.724)
Poverty rate	-0.152	0.039	0.447
	(0.147)	(0.280)	(0.750)
Absenteeism in the previous year (days per month)	0.004	0.022	0.015
	(0.033)	(0.053)	(0.099)
Number of teachers	0.001	-0.003	-0.008
	(0.002)	(0.004)	(0.011)
Female teacher ratio	0.650***	0.964*	1.375*
	(0.153)	(0.578)	(0.796)
Fixed-term teacher ratio	-0.176	-0.080	0.578
	(0.124)	(0.174)	(0.625)
Student-teacher ratio	-0.003	-0.002	0.007
	(0.005)	(0.007)	(0.017)
Number of rooms	0.004***	0.003*	0.001
	(0.001)	(0.002)	(0.004)
N	3,215	3,208	2,612
chi2	1,630	413	76
RMSE			

Note: Controls include survey year and student assessment grade.

Source: National Teacher Survey and Student

Census Assessment, 2016-2018.

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

Table 4.6: 2SLS estimates - Dep. variable: School z-score in math

	(1) Z1	(2) Z2	(3) Z3
F3	3.223*	25.925	15.067*
	(1.829)	(59.959)	(8.145)
F3 squared	-5.707	-45.198	-28.807
	(7.868)	(100.005)	(21.611)
Math z-score in 2015	0.454***	0.231	0.309***
	(0.035)	(0.597)	(0.105)
Urban public school	0.139	-0.099	0.002
	(0.113)	(0.609)	(0.279)
Poverty rate	-0.252**	-0.967	-0.449
	(0.127)	(1.992)	(0.457)
Absenteeism in the previous year (days per month)	0.030	0.204	0.133
	(0.053)	(0.472)	(0.146)
Number of teachers	0.000	-0.007	-0.002
	(0.001)	(0.018)	(0.005)
Female teacher ratio	0.551***	1.307	0.929**
	(0.126)	(2.106)	(0.383)
Fixed-term teacher ratio	-0.139	-0.385	0.096
	(0.129)	(0.822)	(0.372)
Student-teacher ratio	-0.001	-0.012	-0.004
	(0.004)	(0.034)	(0.012)
Number of rooms	0.004***	0.008	0.006*
	(0.001)	(0.013)	(0.003)
N	3,215	3,208	2,612
chi2	1,769	69	141
RMSE			

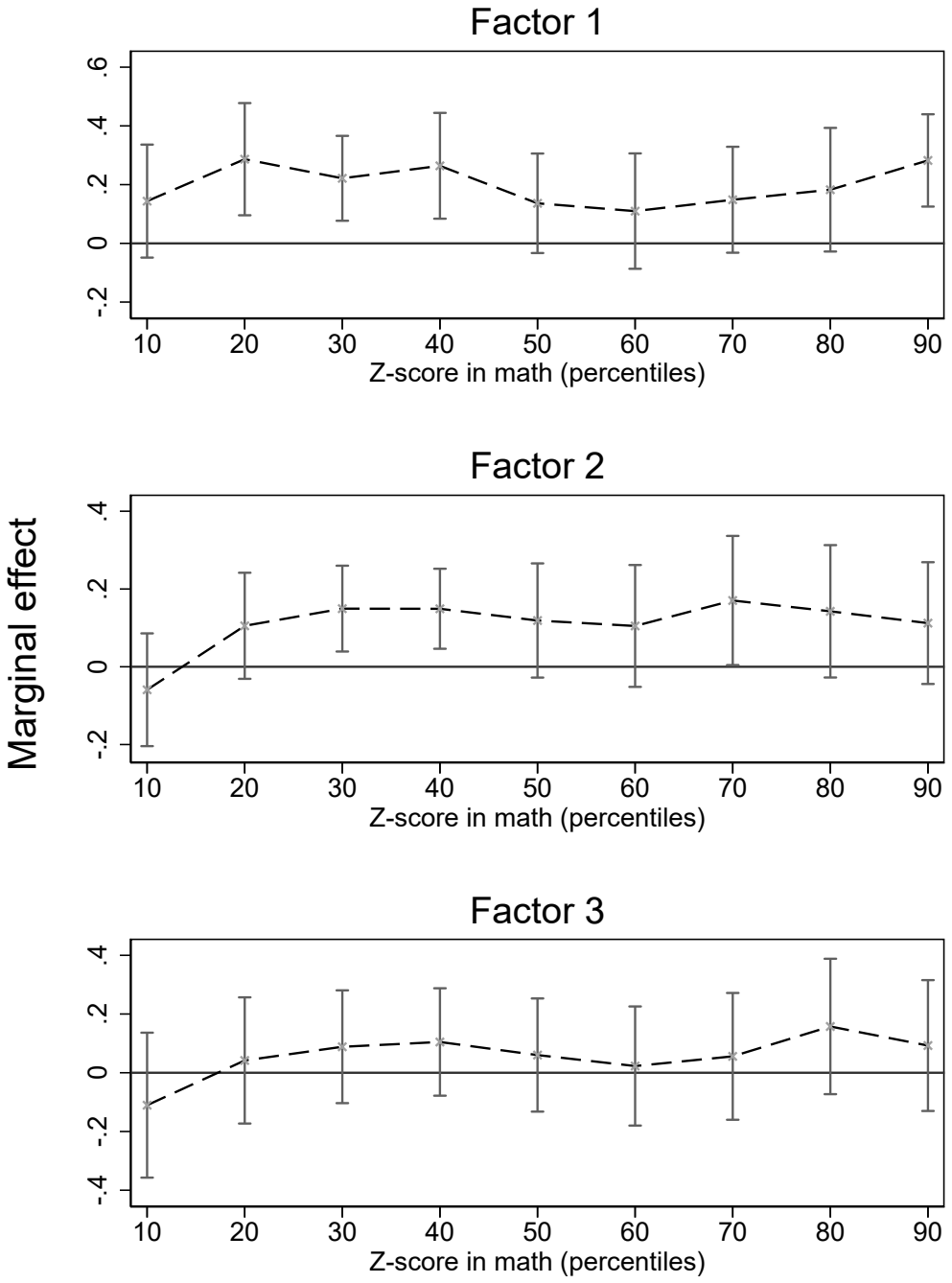
Note: Controls include survey year and student assessment grade.

Source: National Teacher Survey and Student

Census Assessment, 2016-2018.

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

FIGURE 4.4: TSWB factors marginal effect from quantile regressions



Note: Confidence intervals at the 95% level.
Source: National Teacher Survey and Student Census Assessment, 2016-2018.

that TSWB factor 3 has almost no effect for the first half of the distribution of schools' z-scores.

4.6 Robustness checks

4.6.1 Alternative measures

As a first robustness check, we used different empirical definitions of teacher subjective well-being. First, we used the simple question that captures life satisfaction: "Taking all things together, would you say you are not at all satisfied, a little satisfied, satisfied, or very much satisfied with your life?". Certainly, this question covers a very wide area and implies a loss of the distinction between the different components of TSWB. However, life satisfaction is expected to be correlated with our measures, and therefore is a good proxy. Second, we used the first component predicted score of a principal component analysis. Again, we lost specificity in terms of the TSWB dimensions, but this measure can still be considered a conceptually meaningful one. Finally, we used the simple items average for each of the three factors that we proposed in our main analysis. The results are displayed in Table 4.7. It is immediately obvious that the five linear terms are positive, while their quadratic terms are negative, just as expected. Statistical significance is observed for our second, third, and fifth alternative TSWB measures, but the conclusions they point to are in the same direction.

4.6.2 Pseudo-panel analysis

ENDO was not designed as a panel survey. However, a number of schools appear in the sample of different editions. Fewer than 200 schools were surveyed in both 2016 and 2018. By building a pseudo-panel of repeated cross-sectional surveyed schools, we exploited this temporal dimension in order to test the robustness of our findings. Let us consider the following fixed-effects model:

$$y_{it} = \alpha_i + \beta_1 SWB_{it} + \beta_2 SWB_{it}^2 + \gamma \mathbf{X}_{it} + \mu_{it} \tag{4.6}$$

TABLE 4.7: OLS estimates (alternative measures of TSWB) - Dep. variable: School average score in math

	(1)	(2)	(3)	(4)	(5)
Life satisfaction	0.446				
	(0.356)				
Life satisfaction squared	-0.082				
	(0.077)				
PCA score (component 1)		0.052**			
		(0.022)			
PCA score (component 1) squared		-0.043**			
		(0.021)			
Mean F1 items			1.463**		
			(0.628)		
Mean F1 items squared			-0.312**		
			(0.144)		
Mean F2 items				0.652	
				(0.527)	
Mean F2 items squared				-0.149	
				(0.124)	
Mean F3 items					0.488*
					(0.288)
Mean F3 items squared					-0.166*
					(0.088)
N	3,215	3,215	3,215	3,215	3,215
r2	0.493	0.494	0.494	0.492	0.493
F	140.60	143.23	140.71	140.24	141.66

Note: All regressions include the covariates and controls as in Table E.9.
Source: National Teacher Survey and Student Census Assessment, 2016-2018.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

where each school i is observed in two years t: 2016 and 2018. y_{it} denotes the school z-score in math in year t, $\mathbf{X}_{it}$ is a vector of school time-varying characteristics, and α_i represents school-specific intercepts that capture heterogeneities across schools.

We ran this model separately for two outcomes: the math z-score in the 4th primary schools and the 2nd secondary schools. The numbers of schools were, respectively, 79 and 110. Since these numbers were modest, we had to be careful in drawing conclusions.

The results are presented in Appendix E.10. It is interesting to note that, despite the small sample size, all the TSWB factors' coefficients display the expected sign, except

for the quadratic term of F1 for the 2nd-secondary schools and F2 for the 4th-primary schools. The linear terms of the three TSWB factors were significant at the 1% level for the primary sample. The results are not conclusive, but they tentatively suggest a non-linear relationship, as well as the pertinence of the TSWB to pupils' learning achievement.

4.7 Conclusions

Few studies have been interested in measuring teachers' subjective well-being (TSWB) and its influence on students' outcomes. When teacher-related variables are taken into account in the literature, they are usually directly observed or measured; examples are pupil-teacher ratios, teachers' education, years of experience, or wages (e.g. Todd & Wolpin, 2007). As a consequence, the present paper research deserves attention not only because of the topic but also because its evidence from developing countries is still very scarce.

In this context, we first proposed a structure for TSWB based on items from the National Teacher Survey, using a representative sample of public basic education teachers. The structure considered three dimensions that were afterward validated by exploratory and confirmatory factor analysis: i) living conditions, ii) working conditions, and iii) workplace relationships. Our results expand the current literature by establishing that the well-being of teachers involves not only personal aspects but also facets of their workplace; they should therefore be borne in mind by future researchers.

Next, based on an analysis at the school level, OLS regressions show that TSWB significantly increases students' math scores according to an inverted-U shaped form, suggesting the existence of a threshold after which its effect becomes less beneficial. In other words, we are in the presence of a "too-much-of-a-good-thing effect" (Pierce & Aguinis, 2013). Furthermore, quantile regressions show that the workplace relationships dimension is beneficial for those schools where the average math performance is very poor. The effect of the three TSWB factors increases as the school performance does, at least for the first half of the math distribution. In other words, the effect of TSWB is more relevant when the average learning achievement is low (but not too low), implying that other elements are also important in such contexts. This is true at the school level,

but may also be true at the classroom level. This perspective could be an interesting starting-point for future research.

Our results question the belief according to which happy workers are always systematically more productive. While most of the research on this topic has been done at the individual level (Judge & Kammeyer-Mueller, 2011), this paper, in contrast, adopts an approach at the school level. In this sense, our findings could be conditioned by the conceptualization of well-being and the presence of mediating and moderating variables (García-Buades, Peiró, Montañez-Juan, Kozusznik, & Ortiz-Bonnín, 2020; Whitman, Van Rooy, & Viswesvaran, 2010).

Our conceptualization of well-being differs from that in the traditional literature, which is usually more focused on job attitudes. By focusing on teachers' satisfaction at the school level, and the way in which their different living and working conditions affect their job performance, we observe that these variables have a non-linear relationship. To establish this, we also considered time-lagged student achievement results (our measure of teacher performance), following recommendations in the recent literature (García-Buades et al., 2020). However, the presence of mediating or moderating variables was not addressed here; this is a topic that needs to be scrutinized in future research.

Another aspect to further explore is related to the managerial practices in the schools. In Peru, effective schools are highly influenced by the managerial skills of the principal and deputy directors; they promote teacher collaboration, positive relationships between peers, and regular teacher training (J. León, Guerrero, Cueto, & Glewwe, 2021). Furthermore, a point that needs more attention is that at the organizational level it may be possible to verify whether student achievement impacts on teachers' well-being, even though previous evidence at the individual level suggests that it does not (Kidger et al., 2016).

In this context, it is important to acknowledge that "ability gaps in both cognitive and noncognitive skills across individuals and across socioeconomic groups open up at early ages" (Cunha, Heckman, Lochner, & Masterov, 2006, p.800). However, the present paper shows that TSWB can help to reduce the former gaps at least. Our findings support the idea that TSWB may be for policymakers a variable with a high potential to exert influence. In fact, the factor "workplace relationships" appeared to be the most influential of the three subjective factors, which is consistent with organizational and educational

literature showing that positive relationships in the workplace boost performance (Harter et al., 2003; Hascher & Waber, 2021). Positive interventions for improving current teachers' relationships, including personal and professional development, and managerial skills for school principals, could be considered to improve teachers' subjective well-being and thereby boost their effectiveness in the short term.

Chapter 5

Conclusions

The present dissertation analyzed the Peruvian educational problem through the lens of three key agents: students, schools, and teachers. In this sense, it explored, respectively, the question of inequality of opportunity for learning achievement (Chapter 2), the collateral effects of the privatization of education (Chapter 3), and the role of teacher subjective well-being in the classroom (Chapter 4).

This tripartite approach is precisely the main contribution of the present work. It does not take refuge in a single vision of reality, but instead seeks to provide several. This quest explains why it also took an interdisciplinary form, relating its questions to philosophical concepts like the sense of the *just*, or with psychology and the subjective experiences and evaluations of human beings.

The attempt to offer a broader vision of reality is also reflected in the orientation of its chapters. Chapter 2 is linked more closely to a basic research approach since it mostly concerns methodology. Chapter 3, however, is more policy-oriented, while Chapter 4 is inclined more towards applied research.

In this context, the main findings of this work can be summarized as follows. First, circumstances from birth account for at least one-third of the total variance in learning achievement when children are eight years old. However, the influence of childhood circumstances declines to at least one-fifth at age fifteen. Second, the distinction between the two extreme positions of reward principles for the indirect effect of circumstances on outcomes is negligible. Third, panel data suggest that time-varying circumstances have a marginal influence on upper bound measures of inequality of opportunity. The usual

omission of this kind of variable in the current literature seems to be innocuous. Fourth, the privatization in the Peruvian educational system attributable to the "Law to Promote Investment in Educational Services" of 1996 had negative collateral effects. It did not fulfill its promise of democratizing formal education. Nor did it contribute to improving wages in the labor market, either. This evidence raises concerns about the impact of privatization on the quality of the global education system as well as the regulatory role of the State. Fifth, teachers' subjective well-being appears to have three dimensions, namely satisfaction with i) workplace relationships, ii) working conditions, and iii) living conditions. Sixth, TSWB has an inverted U-shape effect on pupils' test scores, suggesting the presence of the "too-much-of-a-good-thing effect" (Grant & Schwartz, 2011; Pierce & Aguinis, 2013) and therefore the existence of an optimal threshold after which its effect becomes detrimental. Finally, workplace relationships appear to be the most influential TSWB factor on students' academic achievement. The value of this variable for public policymakers to increase teacher effectiveness in the classroom is promising.

Concerning public policy implications, probably the most practical lessons are the following. First, the circumstances that should not affect individuals' outcomes need to be debated by any concerned society. After clarifying this issue, strategies for *leveling the field* can be conceived; they should prioritize circumstances from childhood because some of them have a long-lasting impact (Almond & Currie, 2011a, 2011b; Almond, Currie, & Duque, 2018). Specifically in the case of Peru, the school stage seems to take priority. For instance, while in Europe elites are consecrated in higher education institutions[1], in Peru the process takes place much earlier, during primary and secondary education (Grompone, Reátegui, & Rentería, 2022). In this country, "besides the combination of familiar, academic and social supports, enrolling in elite institutions in basic education is a crucial component for guaranteeing social reproduction. These institutions do not only provide an essential basis for social closure but also grant symbolic, cultural, and social advantages to their students. The benefits achieved, in turn, allow alumni to achieve privileged positions throughout their job career" (Grompone, Reátegui, & Rentería, 2020b, p.561). Another priority for dealing with inequality of opportunity is related to the differences between urban and rural areas. For example, Grompone et al. (2018); Grompone, Reátegui, and Rentería (2020a) show that students from rural areas

[1]Such as the *Grandes Écoles* in France, see Benveniste (2021).

accumulate disadvantages compared to students from the economic elite. The disadvantages are related to the need to take paid work, the unfamiliarity of their families with the educational system (and therefore the impossibility of getting help with schoolwork and guidance in decision-making), and the insufficient training received in public schools to pass from secondary to higher education.

Second, privatization is not necessarily the solution to the inefficiencies of the public sector, especially with regard to public goods. The educational sector cannot be compared to any trivial market; it has several specificities, which cannot be analyzed in the same way. Moreover, education has several monetary and non-monetary consequences, and it is crucial to the formation of citizens (McMahon, 1999; OECD, 2007). Even Milton Friedman, who advocated school vouchers, acknowledged that "a stable and democratic society is impossible without a minimum degree of literacy and knowledge on the part of most citizens and without widespread acceptance of some common set of values. Education can contribute to both" (Friedman, 2002, p.86). In this context, why should we suppose that the self-interest of education investors (i.e. those who invest on a for-profit basis) automatically leads to socially desirable ends? Their objectives are by definition incompatible: in this market, the *invisible hand* should be carefully considered. Indeed, "there is no guarantee that aggregated private benefits will constitute public ones. (...) Forms of private education that focus on personal advantage to the exclusion of the public good are inimical to the development of such vital social goods" (Sarangapani & Winch, 2010, p.502). In this context, "perhaps the single most important issue in the privatization of basic social services is regulation" (Klees, 2008, p.332).

It is, however, more important to underline that education is a human right and the obligation of the State to provide free and inclusive education is grounded in the Universal Declaration of Human Rights of 1948 (art. 26). This objective conflicts with the participation of private actors in education. In this sense, the "Abidjan Principles on the human rights obligations of States to provide public education and to regulate private involvement in education", developed and adopted in Côte d'Ivoire in 2019 by a group of 57 experts from around the world, are a promising reference point for debating the roles and responsibilities of those who pay a part in education.[2] According to those principles, States are obliged to provide free quality education to all and to regulate

[2]See https://www.abidjanprinciples.org

private actors, protecting education systems against commercialization. It is worth noting that "substantial evidence indicates that increased provision of education by private providers exacerbates inequality and discrimination on the basis of socioeconomic status, sex, and social group. As a result, scaled increases which resulted in a purely private state education system would, according to the evidence, violate rights to equality and non-discrimination" (Mowbray, 2021, p.67).

The evidence provided in Chapter 3 is a serious call to discuss the private participation in educational services in Peru. It is true that private education historically contributed in some ways to the democratization of education, the formation of national elites, and educational thought (Balarin, 2017). However, its high heterogeneity is problematic, especially when schools are brought to light that do not meet minimum standards. Nowadays families are apparently *choosing* low-fee private schools (Rodríguez & Saavedra, 2020), but the evidence indicates that the Peruvian case is similar to what has been observed in Nigeria: "essentially school choice [is made] out of desperation – a coerced choice, rather than the positive exercise of a human right" (Härmä, 2021, p.147). Furthermore, it seems that the commercialization of education has become a matter of common sense in Peru. It is stupefying to read that some theses in the business administration departments of local universities are truly business plans for opening a school (see, for instance, Cerna, Collao, Paz, & Polo, 2018; Cubas & Reinoso, 2016; L. Flores & Oviedo, 2017).

Even education conceived as a mere commodity yields troubling results. In countries like Peru meta-competition is low (i.e. there is little competition to be part of the elite), as a consequence, the economic elite is sub-optimal for the needs of the nation (Figueroa & Rentería, 2016). Thus, people who have enough capital to open private for-profit schools are not threatened; they have no endogenous incentives to provide better services.

One possible direction in which to escape from this low-level equilibrium trap is proposed by Vásquez (2022). The author maintains that one key element of the problem is the absence of mandatory educational accreditation for schools. Such a process, through decentralized evaluations and verification by an autonomous public agency, would determine whether minimum recognized standards were met. Similarly, the national agency

that was created in 2015 to deal with universities (SUNEDU)[3] with analogous objectives has already demonstrated good results within the scope of its competencies (see SUNEDU, 2021). However, basic education schools greatly outnumber higher education institutions. As a consequence, school accreditation would constitute a serious challenge to fund and operate since the dimension of the problem would be much larger.

Third, some low-cost actions have the potential to increase teacher productivity in the short term. Interventions designed to improve teachers' workplace relationships offer a promising path, as shown in Chapter 4.

If I had to acknowledge one caveat in this work, it would be that it is mostly empirical, and does not deeply discuss its implicit theoretical framework. In some parts I contrast the discussion mainly with human capital theory, for it is the most popular theory related to education. But it is not the main theory on which this thesis is built. Furthermore, regarding education, my personal view is linked more closely to the capability approach (which is not a theory). I agree with its emphasis on the "understanding of education as intrinsically valuable."(Terzi, 2010, p.197). Moreover, I also consider it important to acknowledge its empowering and distributive roles. Indeed, "education can redress injustice by facilitating the ability of disadvantaged, marginalized and excluded groups to participate in social and political arrangements. Thus, education has redistributive effects between social groups, households, and within families. Finally, education has transformative potential because people are able to use the benefits of education to help others, as well as themselves" (Rajapakse, 2016, p.6)

Another limitation of this work is that it focused on only one country. The point is, as mentioned in Chapter 1, that Peru is in a very particular situation, with an almost mystical propensity to place itself in extreme positions. Consequently, the external validity of the evidence presented here is not guaranteed. This thesis, however, tells us something of what can happen in similar circumstances to Peru's. Regardless, this case study is interesting, relevant, and has value in itself.

Moreover, this dissertation draws attention to a number of limitations in current knowledge, which at the same time gives it an opportunity to expand its frontiers. First, more precise methods for measuring inequality of opportunity are needed. This is important for guiding policy-making correctly and avoiding any suggestion of the existence of too

[3]Superintendencia Nacional de Educación Superior Universitaria - SUNEDU.

low IOp (which would not favor redistribution or opportunity-equalizing policies) nor too high IOp (which would depict a dramatic situation that is far from reality). For the moment, in the current frontier of knowledge, IOp measures need to be substantially improved. Second, more evidence and debate are needed on the extent (if any) of private sector participation in areas where human flourishing is involved, such as education and health, to say the least. The latter is just as relevant as education. For instance, during the COVID-19 pandemics, we witnessed market excesses in Peru that included exorbitant prices for purchasing masks, tests, and oxygen.[4] The educational market in this country is no less deviant. The educational services in some schools do not meet the minimum standards, compromising the future of whole generations. Third, subjective well-being needs more attention. It matters at both the individual and the societal level and can be useful and informative in the move towards a better quality of life (Stiglitz, Sen, & Fitoussi, 2009). This has the potential of providing a positive direct and indirect impact in a wide array of domains, including teacher performance and students' achievement. SWB, with a complementary picture of human progress, has also the potential to contribute because not all that matters for humanity is of the material order.

[4]Obviously, the public sector is also responsible for its long-term inefficiency in providing health services to the population.

Résumé en français

Résumé général

Le Pérou a connu des augmentations substantielles des taux et des durées de scolarisation depuis 1940. Cependant, il existe toujours un problème sérieux concernant la qualité de l'offre éducative : de nombreux élèves apprennent peu à l'école. La littérature montre qu'un tel problème peut avoir des effets négatifs à long terme sur les différentes dimensions de la vie des individus. Dans ce contexte, la présente thèse, qui consiste en trois essais traitant le cas péruvien, vise à étudier trois canaux des problématiques éducatives de ce pays. Le premier essai fournit, pour la première fois dans la littérature, des estimations des limites inférieure et supérieure de l'inégalité des chances (IOp) sur les acquis d'apprentissage. Il étudie également, pour la première fois, le rôle des circonstances qui varient dans le temps, un problème qui a été négligé jusqu'à présent dans la littérature sur l'IOp. Le deuxième essai explore les effets à moyen terme de la privatisation *par défaut* de l'éducation qui a eu lieu depuis une loi promulguée en 1996. En exploitant deux sources de variation, à savoir la localisation géographique des nouvelles écoles privées et l'année de naissance des individus, il montre que ce phénomène n'a pas contribué à accroître l'accès à l'éducation formelle ni à améliorer les salaires sur le marché du travail. Enfin, le troisième essai examine l'influence du bien-être subjectif des enseignants (TSWB) sur les résultats d'apprentissage en mathématiques des élèves des écoles publiques. Il identifie trois dimensions du TSWB : les relations au travail, les conditions de travail et les conditions de vie. Les résultats montrent que le TSWB a un effet en forme de U inversé sur les résultats des acquis des étudiants. De plus, les relations de travail sont le facteur du TSWB le plus influent sur la réussite scolaire des élèves.

Introduction générale

Il existe un paradoxe apparent concernant l'éducation et le marché du travail dans les pays en développement. D'un point de vue général, ces pays ont augmenté l'accès à l'éducation primaire, secondaire et supérieure, cependant, les résultats sur le marché du travail (tels que la proportion de travail informel, les salaires réels ou le travail décent) ne se sont pas améliorés de manière constante.

En Amérique latine, les taux de scolarisation dans le secondaire sont passés de 14% en 1960 à 95% en 2016 (Glewwe et al., 2020, p.185). Cependant, « la croissance de la productivité régionale reste inférieure à la normale et l'écart de productivité par rapport aux États-Unis s'est creusé » (Fernández-Arias & Fernández-Arias, 2021, p.1). Dans le même temps, dans cette région, la part des salaires dans le PIB est restée autour de 40% depuis 1950 (Alarco, 2014, p.46), et l'informalité représente aujourd'hui plus de 50% de l'emploi total (David et al., 2021, p.148). De plus, elle est considérée comme l'une des régions les plus inégalitaires du monde (UNDP, 2021, p.4).

Théoriquement, les améliorations notoires de l'éducation auraient dû conduire à de meilleurs résultats. En effet, selon la théorie standard, la scolarisation accroît le capital humain puisqu'elle développe les compétences. Ensuite, le capital humain augmente la productivité et donc les salaires sur le marché du travail (Becker, 1962; Mincer, 1958; Schultz, 1961). L'échec de cette chaîne causale en Amérique Latine peut provenir de différents domaines. L'omission de la notion de *classe* en tant que concept économique central (Bowles & Gintis, 1965) ou la prise en compte de la productivité en tant que caractéristique individuelle et non comme caractéristique sociale (Fix, 2018) ne sont que quelques exemples illustrant les limites de la théorie du capital humain dans sa versión la plus simple.

Quoi qu'il en soit, dans la région latino-américaine, le Pérou semble souvent être placé aux extrêmes. Par rapport à ses pairs, il affiche des taux plus élevés d'emploi informel (David et al., 2021), des inégalités de revenu plus importantes (Amarante & Colacce, 2018), une productivité plus faible (Céspedes et al., 2016), un ratio impôts/PIB moindre (OECD, 2021), entre autres spécificités. Il convient de signaler que, pendant la pandémie, dans le monde entier le Pérou a été « le pays avec le plus grand nombre de décès par COVID-19 pour 100 000 habitants » (Ramírez-Soto & Ortega-Cáceres, 2022,

p.1). Le Pérou est un pays d'extrêmes, et pas seulement sur des dimensions quantifiables.[5] Par exemple, il a appliqué l'un des plans de libéralisation les plus agressifs durant les années 1990 et c'est l'un des régimes politiques démocratiques les plus instables de la période récente (six présidents au cours des dix dernières années).

Pourquoi ce pays semble t-il avoir une vocation naturelle à se placer à des niveaux aussi extrêmes ? Sans prétendre à l'exhaustivité, son histoire permet de comprendre cela, et plus particulèrement sa naissance en tant que pays, et ses débuts dans le capitalisme. En effet, la société péruvienne est difficile à appréhender car il y a encore de forts héritages du colonialisme qui ne contribuent pas à la cohésion sociale (Cotler, 1978; Pereyra, 1993). De plus, c'est un pays avec beaucoup de diversité, au moins en termes ethniques, culturels et géographiques.

Cette thèse tente d'examiner un domaine où le Pérou n'est pas moins extrême : l'éducation. En effet, ce pays est bien connu pour être fréquemment en bas des classements sur les acquis scolaires (Schleicher, 2018), il affiche, entre autres, des niveaux élevés de ségrégation scolaire (Benavides et al., 2014), une faible équité (OECD, 2022), des dépenses publiques faibles en éducation (Ñopo, 2018), un déficit d'infrastructure élevé dans le secteur (L. Sánchez, 2020).

Dans ce contexte, je propose d'explorer le problème éducatif péruvien à travers les perspectives de trois catégories d'agents : les enfants, les écoles et les enseignants. Ce choix se justifie car ce sont des acteurs clés du processus éducatif (Barber et al., 2010; Hanushek, 2020; Unesco, 2010).

En effet, comme le note le Ministère de l'Éducation Nationale dans son plan pour la période 2016-2021 (Minedu, 2016), quatre composantes délimitent ce secteur, lesquelles sont liées à la qualité des apprentissages, à la qualité des enseignants, aux infrastructures et à la gestion.[6] Cette thèse aborde directement les deux premiers volets, mais aussi indirectement les deux derniers. Mais d'abord, développons davantage la portée du présent travail.

Le Chapitre 2 examine la mesure dans laquelle les caractéristiques qui échappent à la responsabilité des enfants affectent leurs résultats scolaires. En ce sens, l'objectif est

[5] Bien sûr, il n'y a pas que des mauvaises nouvelles. Le Pérou a également affiché des taux de croissance importants et une réduction notable de la pauvreté monétaire au cours du présent siècle (Herrera, 2017).

[6] Le processus de réforme sur lequel s'appuie ce plan est décrit en détail par Saavedra and Gutiérrez (2020).

de mesurer l'inégalité des chances en matière d'acquis scolaires. Cette question est pertinente pour établir si le *terrain de jeu* est équitable pour tous. Chaque fois que les circonstances de la naissance déterminent des résultats plus tard dans la vie, les libertés réelles sont compromises. Par exemple, il est en général admis que la couleur de la peau ou la langue maternelle sont des attributs qui ne devraient pas pénaliser les individus. Dès lors, la distance à cet idéal est une question pertinente. À cette fin, j'utilise un ensemble de données très riche et inhabituel : la *Young Lives Study* (YLS). Cette enquête suit deux cohortes d'enfants depuis 2002. La cohorte la plus jeune a été enquêtée pour la première fois lorsqu'elle avait environ un an. Par conséquent, les données YLS fournissent des informations précieuses presque depuis la naissance des individus. Dans l'exploitation de ces données, j'utilise deux méthodologies différentes, l'une conçue comme une borne inférieure (Ferreira & Gignoux, 2011) et l'autre comme une borne supérieure (Niehues & Peichl, 2014). Les résultats suggèrent que les circonstances liées à la première année de vie expliquent au moins un tiers de la variance totale des acquis scolaires lorsque les enfants ont huit ans, et que leur influence diminue à un cinquième à quinze ans. De même, le montant maximal attribuable aux inégalités *injustes* préalablement mentionnées est d'environ 70%. De plus, en raison du riche ensemble de variables disponibles, je teste pour la première fois dans cette littérature l'influence des circonstances qui varient dans le temps. Les résultats montrent qu'elles n'ont pas d'impact important sur les mesures de la limite supérieure en utilisant des données de panel.

Le Chapitre 3 se concentre sur les effets collatéraux de l'expansion des écoles privées qui a eu lieu en raison d'une loi promulguée au cours de la dernière décennie du XXe siècle. En effet, en 1996 le gouvernement a adopté une loi pour promouvoir l'investissement dans les services éducatifs, avec l'objectif que le secteur privé contribue à accroître l'offre et la couverture du système éducatif. Pour la première fois dans l'histoire du pays, il a permis aux investisseurs d'opérer sur une base lucrative et d'obtenir des crédits d'impôt. Dans ce contexte, l'objectif de ce chapitre est d'identifier les effets de la création de nouvelles écoles privées sur l'atteinte et l'achévement du niveau secondaire d'éducation, et les salaires réels des individus. Cette question est importante car les faits suggèrent que la majeure partie de l'expansion des écoles privées était constituée d'écoles à faible coût (Minedu, 2018), qui sont également liées à la fourniture de services éducatifs de faible qualité. À cette fin, j'utilise principalement l'Enquête nationale auprès des ménages (2004-2019) et le Recensement scolaire. La stratégie empirique exploite deux sources

de variation, à savoir la localisation géographique des nouvelles écoles privées et l'année de naissance des individus. Ces deux variables déterminent le degré d'exposition au processus d'expansion des écoles privées. Les résultats suggèrent que ce phénomène n'a pas contribué à accroître l'accès à l'éducation formelle ni à améliorer les salaires sur le marché du travail. Ces preuves soulèvent des inquiétudes quant à l'impact de la privatisation sur la qualité globale du système éducatif ainsi que sur le rôle régulateur de l'État.

Le Chapitre 4, co-écrit avec Dante Solano, étudie le bien-être subjectif des enseignants (TSWB) et son effet sur les résultats d'apprentissage des élèves. Avant d'apporter plus de détails sur ce sujet, il me semble important d'abord de donner quelques éléments sur le contexte et la motivation qui ont guidés ce chapitre. Entre 2015 et 2018, j'ai travaillé au « Département pour la Promotion du Bien-être et de la Reconnaissance des Enseignants », au sein du Ministère péruvien de l'Éducation (Minedu). J'étais en charge de l'Enquête auprès des enseignants (ENDO). Ce fut une expérience très enrichissante, puisque j'ai participé directement ou indirectement à presque toutes les activités de l'enquête, de la conception à la rédaction du questionnaire, de la supervision de la collecte à l'analyse des données, etc. Ce fut une belle occasion de rencontrer des enseignants d'écoles très diverses à travers le pays. Ce travail de terrain m'a donné une image très réaliste des conditions d'éducation dans des contextes difficiles, notamment en milieu rural. Ces expériences ont aiguisé ma curiosité et mon envie de comprendre le « problème éducatif péruvien » sous différents angles. A cette époque, Dante Solano travaillait également dans le même département du Minedu. Son expertise en bien-être subjectif l'a amené à proposer une batterie de questions sur ce sujet pour être pris en compte dans le questionnaire de l'ENDO, sur la base de l'état de l'art de l'époque et des travaux antérieurs d'autres chercheurs au Pérou. Nous avons fait quelques ajustements et après un test pilote réussi, ces questions ont été incluses dans le questionnaire. Pendant cette période, Dante et moi avons rédigé ensemble un programme de recherche collaboratif pour combiner nos connaissances dans nos disciplines (respectivement, psychologie et économie). Ce programme comprenait des sujets sur la vocation des enseignants, les écoles rurales, les écarts salariaux et le bien-être subjectif des enseignants. Comme cela est bien connu, les idées de recherche mettent du temps à mûrir. Il n'est donc pas étonnant qu'à travers ce chapitre, nous ayons atteint l'un des objectifs que nous nous étions fixés il y a plusieurs années. Dans ce contexte, il convient de mentionner que le fait

d'étudier les enseignants est particulièrement innovant. En effet, pendant longtemps, la littérature s'est efforcé de mettre en lumière la façon dont les familles et les pairs affectent les performances des élèves, principalement en raison du rapport pionnier de Coleman et al. (1966) sur l'égalité des chances en matière d'éducation. Cependant, des recherches récentes montrent également que les enseignants sont importants « lorsqu'ils sont évalués en termes de performances des élèves au lieu des mesures d'input plus typiques basées sur les caractéristiques de l'enseignant et de l'école » (Hanushek, 2020, p.167). Cela étant dit, l'objectif du Chapitre 4 est d'estimer l'influence du bien-être subjectif des enseignants sur les résultats d'apprentissage en mathématiques des élèves des écoles publiques au Pérou.[7] À cette fin, nous utilisons l'Enquête auprès des enseignants (ENDO) ainsi que le Recensement des acquis scolaires (ECE). Après avoir évalué les items liés à la vie des enseignants et à la satisfaction au travail avec une analyse factorielle exploratoire et confirmatoire , nous avons identifié trois dimensions du TSWB : i) les relations au travail, ii) les conditions de travail et iii) les conditions de vie. Nous mettons en œuvre une estimation par variables instrumentales et des régressions quantiles pour dégager la relation entre le TSWB et les résultats d'apprentissage des élèves. Les résultats montrent que le TSWB a un effet en forme de U inversé sur les résultats des tests, ce qui suggère la présence de l'effet « trop-d'une-bonne-chose » (Pierce & Aguinis, 2013) et donc l'existence d'un seuil optimal au-délà duquel l'effet devient préjudiciable.[8] Les relations en milieu de travail semblent être le facteur TSWB le plus influent sur la réussite scolaire des élèves. Cette variable représente un grand potentiel pour les décideurs politiques car elle leur ouvre ainsi la possibilité d'améliorer les performances des enseignants à court terme.

La contribution générale de cette thèse est d'offrir différentes perspectives, du point de vue de différents agents, sur le « problème éducatif péruvien ». Dans le même temps, elle fournit des évidences rigoureuses sur des sujets qui ont des horizons temporels différents. L'inégalité est un problème de longue date, alors que la privatisation a commencé pratiquement au XXIe siècle. De son côté, le bien-être subjectif des enseignants est abordé par la littérature depuis peu.

[7] Il convient de mentionner que le bien-être des enseignants a été identifié comme l'un des sujets prioritaires qui nécessitent une attention particulière, d'après le programme péruvien de recherche en éducation 2021-2026 (Rodríguez, 2022).

[8] Ce constat semble aller dans le sens de l'aphorisme attribué à Oscar Wilde : « Tout avec modération, y compris la modération ». Aussi avec un dicton populaire au Pérou : « Bueno es culantro, pero no tanto ».

La nature empirique de ce travail ne doit pas être comprise comme un soutien à une vision instrumentaliste de l'éducation. Au contraire, ma conception personnelle est davantage liée à l'approche des capabilités. En effet, je suis d'accord avec l'insistance de cette approche sur la « compréhension de l'éducation comme intrinsèquement précieuse. Être éduqué offre et améliore la possibilité de s'engager dans des activités qui contribuent à son épanouissement dans la vie et ne sont pas simplement instrumentales pour obtenir de meilleurs emplois ou positions dans la société » (Terzi, 2010, p.197). Ainsi, mon souhait est que cette thèse puisse, je l'espère, contribuir à la compréhension de certains aspects du problème éducatif péruvien et, ce faisant, soit utile pour améliorer l'offre éducative, en espérant qu'un jour, plus d'enfants puissent atteindre leur accomplissement en tant qu'être humains.

Résumé du Chapitre 2

Les pays en développement ont connu des augmentations substantielles des taux de scolarisation et du nombre moyen d'années de scolarisation depuis 1960 (J.-W. Lee & Lee, 2016). Cependant, la qualité de l'offre éducative reste un problème sérieux : de nombreux élèves apprennent peu à l'école (Glewwe & Kremer, 2006). L'expansion vertigineuse de l'éducation s'est accompagnée de ressources financières et humaines de plus en plus insuffisantes. En conséquence, le manque d'infrastructures, d'équipements et d'enseignants bien formés -entre autres facteurs- est devenu plus apparent.

Le Pérou n'a pas fait exception. Alors que le taux brut de scolarisation primaire était de 99% en 2016 (INEI, 2018), le recensement des acquis scolaires réalisé par le Ministère de l'Éducation la même année a montré que seuls, respectivement, 34% et 46% des élèves de deuxième année du primaire ont obtenu des résultats satisfaisants aux tests de mathématiques et de lecture (Minedu, 2017). Des études comparatives internationales telles que le Programme international pour le suivi des acquis des élèves (PISA) et le Laboratoire latino-américain pour l'évaluation de la qualité de l'éducation (LLECE) décrivent une réalité similaire (cf. OECD, 2016; Unesco, 2015). Certes, il convient de mentionner que les preuves fournies par les évaluations nationales et internationales suggèrent également que des progrès significatifs ont été réalisés ces dernières années. Néanmoins, les indicateurs sont encore loin de répondre aux normes d'un pays à revenu intermédiaire supérieur, comme c'est le cas du Pérou.

De plus, le système éducatif péruvien est considérablement inéquitable. En effet, la littérature récente a établi des faits stylisés sur ce sujet.[9] En particulier, le niveau de pauvreté, l'éducation des parents, les origines ethniques et la résidence rurale sont des variables qui sont systématiquement corrélées à la fois avec les inputs éducatifs (par exemple, les caractéristiques de l'école ou encore la connaissance du contenu pédagogique par les enseignants) ainsi qu'avec les résultats (par exemple, le taux d'achèvement, les acquis d'apprentissage).

Implicitement, les travaux antérieurs ont affirmé que l'influence des variables susmentionnées sur les résultats scolaires des enfants est *injuste*. De même, la littérature précédente a généralement étudié l'importance de ces variables de manière indépendante.

Le présent travail vise à déterminer de manière exhaustive dans quelle mesure les caractéristiques qui échappent à la responsabilité individuelle des enfants affectent leurs résultats scolaires. En d'autres termes, j'aborderai le problème de la distribution des opportunités éducatives. En ce sens, en m'appuyant sur la distinction philosophiquement significative entre *circonstances* et *efforts*, je différencierai explicitement les sources « justes » et « injustes » d'inégalité.[10] En effet, dans la littérature sur l'inégalité des chances (IOp), les *circonstances* peuvent être considérées comme les aspects qui échappent au contrôle individuel et donc pour lesquels les individus ne devraient pas être tenus responsables. Les gènes, le sexe et les antécédents ou milieux familiaux en sont des exemples. D'autre part, l'*effort* comprend des choix personnels, et donc les individus en sont tenus responsables. Dans ce contexte, les *circonstances* et les *efforts* peuvent influencer des *résultats*, tels que le revenu ou le bien-être. L'égalité des chances est atteinte lorsque les circonstances ne jouent aucun rôle dans la détermination des niveaux de résultats (Roemer, 1998).

L'analyse de la distribution des opportunités educatives est particulièrement intéressante car elle détermine les résultats futurs des enfants, en particulier (mais pas exclusivement) lorsqu'ils entreront sur le marché du travail. Néanmoins, l'éducation pourrait ne pas être

[9] Des révisions récentes incluent Cueto and Felipe (2018), Guadalupe et al. (2017), Ñopo and Kitmang (2017) et Cueto et al. (2016).

[10] Il convient de noter que la source de l'inégalité importe d'un point de vue éthique. En effet, la plupart de gens « conviendrait que les effets des circonstances, qui échappent au contrôle des individus, sur le bien-être des personnes devraient être rectifiés, alors qu'au moins certains résultats différentiels dus au choix ne sont pas indemnisables devant la barre de la justice » (Roemer & Trannoy, 2015, p.294).

considérée comme une dimension instrumentale du bien-être, mais comme un droit qui appartient à chaque enfant.[11]

Par rapport à la littérature existante sur l'inégalité des opportunités, ce document propose quatre contributions importantes. Premièrement, il étudie l'inégalité scolaire basée sur les acquis, pour cela, les disparités éducatives sont traitées au moyen de résultats de tests standardisés, censés refléter ce que les enfants ont vraiment appris. Cela permet « d'avoir une compréhension potentiellement beaucoup plus extensive des déterminants de la réussite scolaire, et pourrait donc contribuer à la conception de politiques qui augmentent les niveaux moyens d'apprentissage ou qui réduisent les disparités en matière d'éducation » (Ferreira & Gignoux, 2014, p.241). Il est à noter que dans la littérature sur l'IOp, très peu d'auteurs analysent ce type d'inégalité dans le domaine de l'éducation, et ceux qui le font se préoccupent principalement de résultats tels que le « taux d'achèvement » ou les « années de scolarité formelle ». Ces types de résultats ne permettent pas d'étudier les résultats du processus d'apprentissage.

Deuxièmement , l'originalité du présent travail reside aussi dans l'utilisation d'une riche base de données longitudinales sur les enfants, qui fournit un ensemble très inhabituel de variables « circonstances », pratiquement à partir du moment où les enfants de l'échantillon sont nés. Cette base de données offre également la possibilité d'étudier les changements de variables au fil du temps, dont certaines ont été classiquement pris dans la littérature comme invariantes dans le temps, ce qui pourrait potentiellement être une erreur non négligeable. En outre, il est important de noter que l'utilisation de données de panel a été reconnue comme une voie prometteuse pour résoudre le problème de « l'observabilité partielle des circonstances »[12] (Balcázar, 2015), ce qui entraîne un biais de sous-estimation incertain pour les mesures de la limite inférieure d'IOp lorsque des données transversales sont utilisées.

Troisièmement, je fournis des estimations des limites inférieure et supérieure d'IOp éducative. En effet, grâce à cette approche longitudinale, je suis capable de tenir compte des circonstances non observées et d'appliquer une version adaptée de la méthodologie de borne supérieure proposée par Niehues and Peichl (2014).

[11] En effet, la loi générale péruvienne sur l'éducation No. 28044 actée en 2003 stipule que l'éducation est un droit fondamental et un service public gratuit lorsqu'il est fourni par l'État, lequel garantit le droit à une éducation intégrale, de qualité et universelle pour toute personne.

[12] C'est-à-dire, le fait que l'ensemble complet des circonstances n'est pas observé dans les données.

Quatrièmement, j'aborde le problème des *circonstances qui varient dans le temps*. En effet, parce que la littérature sur l'IOp s'est traditionnellement concentrée sur une seule étape spécifique de la vie (généralement l'âge adulte), il a été implicitement tenu pour acquis que les circonstances de l'enfance ne varient pas avec le temps. Ce n'est évidemment pas un problème lorsque l'on considère des caractéristiques innées telles que l'origine ethnique ou le sexe. Néanmoins, prendre certaines autres circonstances comme invariantes dans le temps pourrait être plus controversé, comme le milieu socio-économique, l'état nutritionnel ou même les niveaux d'éducation et les professions des parents. Toutes ces variables peuvent potentiellement varier dans le temps. La riche base de données longitudinale que j'utilise nous permet d'explorer l'impact de ce type de circonstances sur les mesures d'IOp. Ainsi, j'évalue de manière critique la méthodologie de Niehues and Peichl (2014).

L'analyse empirique s'appuie sur la *Young Lives Study* (YLS). Il s'agit d'un programme de recherche longitudinal multidisciplinaire axé sur la pauvreté infantile, coordonné par l'Université d'Oxford et mené en Éthiopie, en Inde, au Pérou et au Vietnam. Cette enquête a suivi deux cohortes d'enfants pendant quinze ans à partir de 2002. Dans chaque pays, l'échantillon est composé d'environ 1000 enfants pour la cohorte la plus âgée (née vers 1994) et de 2000 enfants pour la cohorte la plus jeune (née vers 2001). Cinq tours de collecte de données ont eu lieu depuis le premier. Dans cette étude, je me concentre uniquement sur la cohorte la plus jeune, car le riche ensemble de circonstances est observé à partir de l'âge d'un an. De cette façon, je suis en mesure d'identifier sans ambiguïté l'évolution de l'influence des circonstances sur les acquis d'apprentissage des enfants tels que mesurés par des tests de lecture et de mathématiques.

Suivant Hufe et al. (2017), l'analyse repose sur des ensembles de circonstances. Ces ensembles comprennent les caractéristiques de base de l'individu, du ménage et des parents, ainsi que les conditions de la première enfance, des variables liées à la santé et aux chocs subis. Les variables d'effort sont approximées par l'allocation du temps de l'enfant, en nombre d'heures par jour allouées aux études à la maison et aux loisirs.

Pour fournir une estimation précise de l'ampleur de l'IOp sur les acquis scolaires, j'utilise deux méthodologies complémentaires. La première suit Ferreira and Gignoux (2011) et sert d'estimation de la limite inférieure de l'IOp. En effet, il est conçu de telle manière que l'ajout de nouvelles circonstances potentiellement non observées ne peut

qu'augmenter la part des inégalités injustes. Cependant, puisque l'ampleur de la sous-estimation de cette limite inférieure est inconnue, il est également pertinent de fournir une estimation de la limite supérieure. Par conséquent, en exploitant la dimension temporelle de l'ensemble de données cité ci-dessus, je fournis une estimation de la limite supérieure de l'IOp sous l'hypothèse clé selon laquelle les circonstances sont exogènes et ne varient pas dans le temps. Utilisant un modèle à effets fixes, cette méthode implique que l'effet individuel invariant dans le temps soit la mesure maximale pour laquelle un individu ne devrait pas être tenu responsable (Niehues & Peichl, 2014).

Puisque les deux méthodes ont été développées pour mesurer l'ampleur de l'IOp sur les revenus du marché du travail, j'introduis une légère variation afin de les appliquer de manière pertinente à la mesure de l'IOp sur les résultats des tests standardisés. En effet, contrairement aux méthodes originales, qui utilisent l'écart logarithmique moyen (MLD) comme indice d'inégalité, j'utilise la variance simple comme indice d'inégalité, qui est le choix le plus approprié pour étudier les scores des tests construits à partir de modèles de théorie des réponses aux items (Ferreira & Gignoux, 2014). De plus, je ne procède pas à la linéarisation logarithmique des variables dépendantes, ce qui est une pratique courante lors de l'analyse des revenus mais qui ne convient pas aux résultats des tests standardisés.

Enfin, puisque ma base de données nous permet de retracer plusieurs circonstances dans le temps, je suis en mesure d'évaluer de manière critique la méthode de la borne supérieure de Niehues and Peichl (2014). Comme indiqué ci-dessus, cette méthodologie repose fortement sur l'hypothèse selon laquelle les circonstances ne varient pas dans le temps. Pour la première fois dans la littérature, ce travail teste empiriquement l'importance de cette hypothèse à l'aide de données réelles.

Les principaux résultats suggèrent que l'effet de l'inégalité des chances sur les résultats d'apprentissage est une question importante pour le système éducatif péruvien. Un ensemble de seize circonstances (provenant presque exclusivement de la première année de vie de l'enfant) expliquent une part importante de la variance des résultats aux tests de mathématiques et de lecture : un tiers à 8 ans et un cinquième à 15 ans. De plus, le montant maximal des inégalités imputables à des sources *injustes* se situe à environ 70%. Les résultats sont robustes aux différents outcomes et mesures d'inégalité utilisés.

En ce qui concerne les questions méthodologiques, distinguer les effets indirects des circonstances sur les résultats d'apprentissage fait peu de différence pour les estimations d'IOp : le débat philosophique sur les approches de compensation des effets directs et indirects des circonstances sur les résultats ne semble pas être une préoccupation critique à des fins pratiques. De même, la méthodologie de limite supérieure de Niehues and Peichl (2014) s'est avérée robuste à l'inclusion de circonstances qui varient dans le temps. Ces preuves suggèrent que la classe particulière de circonstances variables dans le temps utilisée ici a un impact constant sur le résultat d'intérêt ou, plus généralement, que l'effet spécifique individuel est la composante la plus importante des acquis scolaires.

Résumé du Chapitre 3

La privatisation de l'éducation fait référence à la fourniture de services éducatifs par des institutions non gouvernementales, qu'elles soient à but lucratif ou non (Levin, 2001). Ce type d'offre éducative a connu une expansion significative dans les pays en développement au cours des dernières décennies, concernant tous les niveaux d'enseignement.[13]

Alors que ce phénomène constitue une tendance mondiale, le cas péruvien est considéré comme l'un des plus radicaux (Balarin & Escudero, 2019). En effet, notamment grâce à une loi promulguée au milieu des années 1990 (à savoir le décret législatif No. 882 « Loi de promotion de l'investissement dans les services éducatifs », ci-après DL882), le processus de privatisation dans ce pays s'est déroulé avec peu d'intervention de la part de l'État, sans politiques publiques claires pour promouvoir des quasi-marchés.[14] De plus, les familles ont une liberté absolue dans le choix de l'école ; cependant, elles ne sont soutenues par aucun financement public, aucune information transparente ni aucune réglementation appropriée. Cela a conduit certains chercheurs à décrire ce processus comme une « privatisation de facto » ou « par défaut » (Balarin, 2016).

[13]Cependant, il convient de noter que « les politiques envers les écoles privées dans les pays en développement varient considérablement, allant de l'interdiction pure et simple (Cuba, Sri Lanka) à de fortes subventions (Chili). Ainsi, dans certains pays (Algérie, Mongolie, Tanzanie), moins de 1% des élèves du primaire sont inscrits dans des écoles privées. Dans d'autres pays (Chili, Pakistan, Zimbabwe), près de la moitié ou plus sont inscrits dans des écoles primaires privées » (Glewwe & Kremer, 2006, p.964).

[14]Les quasi-marchés sont des formes hybrides de prestation du secteur public qui utilisent « la philosophie du marché et les pratiques du secteur privé dans la prestation de services financés par le gouvernement » (Carey et al., 2020, p.30).

Au niveau mondial, l'évidence sur les conséquences de la privatisation de l'éducation n'est toujours pas concluante et semble être spécifique à chaque cas (Urquiola, 2016). D'une part, certains ont fait valoir que l'essor de l'enseignement privé favorise l'accès universel et améliore la qualité grâce à une concurrence accrue sur le marché (Tooley, 1995; Tooley et al., 2007). En revanche, d'autres ont souligné qu'elle accroît la ségrégation, fragilise les systèmes éducatifs, voire peut générer des actions socialement indésirables (Romero et al., 2020; Sarangapani & Winch, 2010). En ce sens, elle pourrait constituer « un défi majeur à la conception de l'éducation comme un droit humain fondamental et un bien public » (Verger et al., 2016, p.3).

Il existe des lacunes importantes dans l'état des connaissances actuelles.[15] Par exemple, l'ampleur et la nature de l'hétérogénéité au sein du groupe des écoles privées sont encore largement inconnues. En outre, il n'existe pas de typologie des écoles privées prenant en compte différentes dimensions, telles que les infrastructures, les frais et les acquis des élèves.[16] En revanche, on sait peu de choses sur les raisons pour lesquelles les ménages choisissent des écoles privées peu coûteuses au lieu de l'enseignement public gratuit.

Cet article vise à estimer les effets causaux de l'augmentation de l'offre d'écoles privées sur les résultats scolaires et ultérieurs sur le marché du travail. Il exploite les réformes politiques exogènes qui ont eu lieu au Pérou dans les années 1990, dans le cadre d'un mouvement plus large vers une économie plus libéralisée.[17]

En particulier, pour la première fois dans l'histoire du Pérou, une loi (DL882) a été promulguée permettant aux écoles privées de fonctionner sur une base lucrative. Elle offrait, de plus, des crédits d'impôt aux investisseurs.

La stratégie empirique s'appuie sur l'article pionnier de Duflo (2001), qui a évalué les effets d'un programme de construction d'écoles publiques sur l'éducation et les revenus en Indonésie.[18] Cependant, il diffère de l'article de Duflo à plusieurs égards. Premièrement, il prend en compte séparément les effets de l'expansion des secteurs public et privé. Deuxièmement, il se concentre sur l'enseignement secondaire, pour lequel il y

[15] Voir Day Ashley et al. (2014) pour une révision vaste des expériences des pays en développement.

[16] Cependant, il convient de mentionner que le Ministère de l'Éducation a récemment publié un document classant les écoles privées en fonction de leur niveau de frais (voir Minedu, 2018).

[17] À l'époque, Alberto Fujimori était un candidat présidentiel prônant une stabilisation progressive au lieu de l'austérité et des réformes libérales defendues par son adversaire, Mario Vargas Llosa. Cependant, Fujimori « a abandonné pratiquement toutes les propositions économiques présentées dans [sa] campagne une fois [qu'il] a été élu et les a remplacées par des politiques proposées par [son] candidat rival de droite » (Stokes, 1997, p.210). Il s'agissait donc de réformes inattendues.

[18] Des extensions récentes incluent Akresh et al. (2022) et Mazumder et al. (2019).

avait des marges de progression quantitative pour l'accès des élèves à ce niveau, contrairement à l'enseignement primaire qui avait déjà de bons indicateurs dans le cas péruvien. Troisièmement, il observe différentes cohortes exactement au même âge en raison de l'étendue des données disponibles. Enfin, il étudie le phénomène également comme un processus continu plutôt que comme un choc unique.

La stratégie d'identification exploite deux sources de variation qui déterminent le degré d'exposition des individus au processus de privatisation : l'année de naissance et la province de naissance.[19,20] Ce type d'expérience naturelle fournit le cadre pour une étude d'ordre causale. En outre, les méthodes déployées tiennent compte d'autres mécanismes concomitants tels que le programme de transferts monétaires conditionnels « Juntos », les modifications de la réglementation du travail, ainsi que les niveaux soutenus de croissance économique et de réduction de la pauvreté.

À l'aide d'enquêtes nationales auprès des ménages, appliquées chaque année depuis 2004, le degré d'exposition au traitement et plusieurs résultats sur le plan de l'éducation et du marché du travail sont observés. Les données d'enquête sont complétées par des informations provenant du Recensement scolaire (1993, 1998-2019) et du Recensement de la population (1993, 2007, 2017).

Les résultats montrent que les provinces avec une présence initiale intense d'écoles privées sont celles où l'expansion du privé a relativement augmenté le plus. En outre, les résultats suggèrent que le traitement a un effet négatif sur les résultats analysés. Ce constat est quelque peu contre-intuitif, du moins pour l'achèvement du secondaire, car on pourrait s'attendre à ce que davantage d'écoles privées augmentent l'accès à l'éducation formelle et aussi la concurrence entre écoles , augmentant ainsi la qualité éducative et le capital humain. Cependant, ces résultats sont conformes à plusieurs études récentes (à la fois qualitatives et quantitatives) qui soulignent une expansion importante des établissements d'enseignement à faible coût (et en même temps de faible qualité) ainsi que des conséquences négatives sur le marché du travail.

[19]En décembre 2019, le territoire du Pérou était divisé en 24 départements, subdivisés en provinces (196), lesquelles sont composées de districts (1 874). Ces chiffres ont évolué au cours de l'histoire du pays, voir INEI (2020, p.23).

[20]Selon le Recensement de la population de 2017, 71% des élèves de l'enseignement primaire et secondaire fréquentent une école située dans leur district de naissance. Le pourcentage concernant la province de naissance doit être plus élevé car il s'agit d'une division administrative plus grande. Malheureusement, je n'ai pas pu calculer ce pourcentage au niveau de la province de naissance en raison des restrictions de requête avec les données en accès ouvert disponibles sur https://censos2017.inei.gob.pe/redatam.

Résumé du Chapitre 4

Les enseignants jouent un rôle fondamental dans la détermination de la qualité de l'école (Hanushek & Rivkin, 2006). Il a été montré qu'ils ont non seulement des effets causaux sur la réussite des élèves pendant la scolarité, mais aussi des effets à long terme sur les résultats à l'âge adulte (Chetty et al., 2014a, 2014b, 2017). Cependant, plusieurs pays signalent de sérieuses inquiétudes quant à l'attraction et au maintien d'une offre adéquate d'enseignants de qualité (OECD, 2005).

Les travaux faits dans le cadre des sciences du comportement (pour la plupart, en dehors du domaine éducatif) suggèrent une voie prometteuse pour répondre à ces préoccupations, au moins partiellement. En effet, les conditions de bien-être subjectif[21] semblent non seulement attirer et retenir les talents, mais aussi favoriser la performance et la productivité (Erdogan et al., 2012; Harter et al., 2003). D'un point de vue global, cette littérature a surtout exploré des variables subjectives du bien-être assez générales telles que la satisfaction de vie ou la satisfaction au travail (Caprara et al., 2006). Cependant, une telle approche ne permet pas de bien appréhender les préoccupations pertinentes de bien-être des individus (Yamamoto, 2017). Pour cette raison, certains auteurs suggèrent d'accorder plus d'attention aux besoins ou aux expériences individuels (Tay & Diener, 2011; Weiss & Rupp, 2011).

En adoptant cette dernière approche, l'objectif du présent article est double : il vise à identifier la structure subjective du bien-être des enseignants des niveaux primaire et secondaire au Pérou et à estimer son effet sur les acquis des élèves en mathématiques mesurés par des tests standardisés. À notre connaissance, il s'agit de la première tentative dans la littérature visant à aborder ces deux aspects.

Toute recherche portant sur les facteurs qui influencent l'apprentissage des élèves est difficile sur le plan conceptuel, méthodologique et empirique. La raison est que l'apprentissage des élèves est influencé par un large éventail d'acteurs (y compris eux-mêmes, leurs familles, leurs camarades de classe, leurs enseignants, etc.) ainsi que par un large éventail de circonstances contextuelles (telles que l'organisation et les ressources de l'école, la structure du programme et son contenu , etc). Dans notre cas, l'enjeu est double : nous essayons de mesurer l'impact d'une variable latente, à savoir le bien-être subjectif des

[21] i.e. les évaluations cognitivo-affectives que les gens font de leur propre vie (Diener et al., 2002).

enseignants, qui est, par ailleurs, suspectée d'endogénéité dans l'équation principale. En effet, elle est mesurée avec erreur, et elle pourrait également être corrélée avec d'autres variables omises qui configurent la qualité de l'enseignant, mais qui ne peuvent être ni mesurées ni observées dans les données. De plus, nous soupçonnons également des effets hétérogènes, ce qui rend l'identification encore plus difficile.

Notre sujet est d'un intérêt primordial car il a des implications directes sur les politiques éducatives. Il pointe le problème de la manière d'atteindre une plus grande efficacité avec des investissements réalisables, en se concentrant sur un agent clé du processus éducatif, à savoir l'enseignant. Si nous parvenons à identifier un effet significatif du bien-être subjectif des enseignants sur les performances scolaires des élèves, une nouvelle variable à fort potentiel d'influence pour les décideurs deviendrait disponible.[22] Par exemple, la satisfaction à l'égard de la vie ou les conditions individuelles pourraient être incluses comme indicateurs lors du recrutement et de la sélection des enseignants. De même, des interventions positives pour les enseignants actuels, telles que le développement personnel et professionnel, pourraient être envisagées pour améliorer leur bien-être subjectif et ainsi augmenter leur efficacité à court terme.

Par rapport à la littérature existante, cet article propose trois contributions importantes. Premièrement, il identifie la structure du bien-être subjectif (SWB) des enseignants du secteur public à l'aide d'un échantillon représentatif inhabituel et riche à l'échelle nationale. Pour le cas du Pérou, le SWB a été analysé par Yamamoto et al. (2008), Yamamoto (2014) et Yamamoto (2017) d'un point de vue émique identifiant les besoins les plus pertinents de cette société, mais cette littérature n'a pas mis l'accent sur les enseignants comme sujet d'intérêt. Deuxièmement, le présent article s'intéresse à la relation entre le bien-être subjectif des enseignants et la performance scolaire des élèves dans un pays en développement. Au niveau international, les travaux sur ce sujet sont encore rares, concentrés sur les pays à revenu élevé, basés sur de petits échantillons (souvent non réprésentatifs de la population d'intérêt), ou pas entièrement convaincants en termes de causalité (pour une révision sur le sujet, voir Hascher & Waber, 2021). De plus, une partie de la littérature connexe n'étudie que partiellement cette relation, puisqu'elle n'analyse qu'une composante du bien-être subjectif des enseignants (traditionnellement

[22] Il convient de mentionner que, bien que ce que les enfants amènent à l'école (capacités, milieu familial, etc.) explique systématiquement la plus grande variance des résultats d'apprentissage, parmi « les variables susceptibles d'être influencées par les politiques, les facteurs qui concernent les enseignants et l'enseignement sont les influences les plus importantes sur l'apprentissage des élèves » (OECD, 2005, p.26).

la satisfaction au travail). Au contraire, nous considérons un certain nombre de facettes différentes du bien-être subjectif. Enfin, cet article combine des techniques issues de la psychométrie et de l'économétrie. Sa vocation interdisciplinaire – qui la situe à la frontière de la psychologie, de l'économie et des sciences de l'éducation – constitue un intérêt non négligeable par rapport à d'autres études puisque les notions, concepts et théories qui seront mobilisées pour atteindre les objectifs apporteront des éclairages complémentaires.

Pour atteindre nos objectifs en conséquence, la stratégie empirique s'appuie principalement sur l'Enquête nationale auprès des enseignants (ENDO)[23] 2016 et 2018, réalisée par le Ministère péruvien de l'Éducation.[24] Cette enquête comprend plusieurs items liés à la satisfaction vis-à-vis des conditions de vie et de travail, et est représentative des enseignants des niveaux maternelle, primaire et secondaire, au niveau national (urbain et rural) pour les secteurs privé et public. Bien que son échantillon soit composé d'environ 10 000 enseignants pour c haque édition, nous limitons l'échantillon ENDO aux enseignants du primaire et du secondaire du secteur public (environ 12 600 observations regroupées) afin d'obtenir des mesures du bien-être subjectif agrégées au niveau de l'école. De cette façon, nous sommes en mesure de faire correspondre ces données avec les scores moyens des écoles en mathématiques, obtenus à partir du Recensement des acquis scolaires (ECE) 2016 et 2018 (qui évalue les élèves inscrits en primaire -2e et 4e année, et secondaire -2e année). Nous complétons ces informations avec les données du Recensement des écoles (2016 et 2017) pour obtenir les variables des caractéristiques de l'école, et la carte de la pauvreté (2013 et 2017) qui indique les taux de pauvreté monétaire au niveau du district.

Sur la base de la littérature théorique existante et de l'évidence empirique actuelle, nous proposons une structure du bien-être subjectif des enseignants composée de trois dimensions. Ces dernières reflètent la satisfaction des enseignants vis-à-vis de i) leurs conditions de vie, ii) leurs conditions de travail et iii) leurs relations avec leurs collègues. Pour valider cette structure, nous procédons d'abord à une analyse factorielle exploratoire sur un sous-échantillon aléatoire (la moitié de notre échantillon principal),

[23] « Encuesta Nacional a Docentes de Instituciones Educativas Públicas y Privadas » - ENDO.

[24] Même si l'ENDO est une enquête très riche (elle compte environ 100 questions réparties en 10 modules, dont la formation initiale, la trajectoire professionnelle, l'économie, la santé, la perception, entre autres), cette enquête a été peu exploitée par les chercheurs, probablement à cause d'une méconnaissance de son existence. Par conséquent, cette étude est une excellente occasion de mettre en valeur un type d'enquête qui n'est pas si courant au niveau mondial, en particulier au sein des pays en développement.

qui est ensuite testée plus rigoureusement avec une analyse factorielle confirmatoire sur l'autre moitié aléatoire de l'échantillon.

Ensuite, nous étudions l'effet du bien-être subjectif des enseignants sur la performance des élèves dans les résultats des tests standardisés. Après avoir écarté l'endogénéité, nous effectuons des régressions quantiles pour estimer les effets hétérogènes sur la distribution de la variable de réponse.

Les résultats suggèrent que les niveaux de bien-être subjectif des enseignants (TSWB) diffèrent significativement entre l'enseignement primaire et secondaire, entre les enseignants qui ont choisi leur profession par vocation ou non, et entre ceux qui voudraient ou non changer de district scolaire, entre autres. De même, le TSWB semble affecter les résultats d'apprentissage des élèves à travers un effet qui prend la forme d'un U inversé, suggérant l'existence d'un seuil optimal après lequel trop de TSWB est préjudiciable.

Une fois la totalité de la distribution examiné e, le TSWB ne semble pas augmenter de manière significative les scores en mathématiques des élèves dans les écoles où la performance moyenne est très faible, mais son effet augmente avec la performance de l'école (au moins dans la première moitié de la distribution). Le facteur TSWB 3 (conditions de travail) ne profite qu'aux meilleures écoles en termes de réussite scolaire. Enfin, le facteur le plus influent sur les scores des élèves est lié aux relations de travail des enseignants (facteur TSWB 1). Cela pourrait être une variable intéressante que les *policy makers* pourraient influencer.

Conclusion générale

La présente thèse a analysé le problème éducatif péruvien à travers trois catégories d'agents clés : les étudiants, les écoles et les enseignants. En ce sens, ce travail a exploré, respectivement, la question de l'inégalité des opportunités en matière d'acquis scolaires (Chapitre 2), les effets collatéraux de la privatisation de l'éducation (Chapitre 3), et la rôle du bien-être subjectif des enseignants dans la classe (Chapitre 4).

Cette approche tripartite est précisément l'apport principal du présent travail. Il ne se réfugie pas dans une vision unique de la réalité, au contraire, il vise à offrir différentes perspectives. C'est pourquoi j'ai souhaité donner un caractère inderdisciplinaire à cette

thèse, en empruntant des concepts à la Philosophie, notament celui du sens du *juste*, mais aussi à la Psychologie, en particulier aux expériences et évaluations subjectives de l'être humain.

La tentative d'offrir une vision plus large de la réalité se reflète également dans la vocation des chapitres de cette thèse. En effet, le Chapitre 2 est davantage lié à une démarche de recherche fondamentale puisqu'il est fortement axé sur la méthodologie. Le Chapitre 3, au contraire, est plus axé sur les politiques publiques, tandis que le Chapitre 4 se rapproche plus de la recherche appliquée.

Dans ce contexte, les principales conclusions de ce travail peuvent être résumées de la façon suivante. Premièrement, les circonstances à la naissance expliquent au moins un tiers de la variance totale des résultats d'apprentissage lorsque les enfants ont huit ans. Cependant, l'influence des circonstances de l'enfance diminue à au moins un cinquième à l'âge de quinze ans. Deuxièmement, la distinction entre les deux positions extrêmes des principes de récompense pour l'effet indirect des circonstances sur les résultats est négligeable. Troisièmement, les circonstances variables dans le temps ont une influence marginale sur les mesures de la limite supérieure de l'inégalité des chances calculées à l'aide de données de panel. L'omission habituelle de ce type de variables dans la littérature actuelle semble anodine. Quatrièmement, le processus de privatisation qui a eu lieu dans le système éducatif péruvien en conséquence de la « loi pour promouvoir l'investissement dans les services éducatifs » promulguée en 1996 a eu des effets collatéraux négatifs. Elle n'a pas tenu sa promesse de démocratiser l'éducation formelle. De plus, cela n'a pas contribué non plus à améliorer les salaires sur le marché du travail. Ces preuves soulèvent des questions quant à l'impact de la privatisation sur la qualité du système éducatif dans son ensemble ainsi que sur le rôle régulateur de l'État. Cinquièmement, le bien-être subjectif des enseignants semble avoir trois dimensions, à savoir la satisfaction à l'égard i) des relations au travail, ii) des conditions de travail et iii) des conditions de vie. Sixièmement, le TSWB a un effet en forme de U inversé sur les acquis scolaires , ce qui suggère la présence de l'effet « trop-d'une-bonne-chose » (Grant & Schwartz, 2011; Pierce & Aguinis, 2013) et donc l'existence d'un seuil optimal au-delà duquel son effet devient préjudiciable. Enfin, les relations au travail semblent être le facteur du TSWB le plus influent sur la réussite scolaire des élèves. Cette variable est donc un élément prometteur pour les décideurs publics qui s'efforceraient d'accroître l'efficacité des enseignants en classe.

En ce qui concerne les implications pour les politiques publiques, les leçons les plus pratiques sont probablement les suivantes. Premièrement, les circonstances qui ne devraient pas affecter les résultats des individus doivent être débattues par la société concernée. Après avoir clarifié cette question, des stratégies pour *niveler le terrain* peuvent être conçues, et elles devraient donner la priorité aux circonstances de l'enfance car certaines d'entre elles ont des impacts de long terme (Almond & Currie, 2011a, 2011b; Almond et al., 2018). Spécifiquement pour le cas du Pérou, le stade scolaire semble être prioritaire. Par exemple, alors qu'en Europe les élites sont consacrées dans les établissements d'enseignement supérieur[25], au Pérou ce processus a lieu beaucoup plus tôt, à savoir aux niveaux primaire et secondaire (Grompone et al., 2022). Dans ce pays, « outre la combinaison de soutiens familiaux, académiques et sociaux, l'inscription dans des institutions d'élite d'éducation est un élément crucial pour garantir la reproduction sociale. Ces institutions fournissent non seulement une base essentielle à la fermeture sociale , mais accordent également des avantages symboliques, culturels et sociaux à leurs étudiants. Les avantages obtenus, à leur tour, permettent aux diplômés d'accéder à des positions privilégiées tout au long de leur carrière professionnelle » (Grompone et al., 2020b, p.561). De même, une autre priorité pour lutter contre l'inégalité des opportunités est liée aux différences entre les zones urbaines et rurales. Par exemple, Grompone et al. (2018, 2020a) montrent que les étudiants issus des zones rurales cumulent des désavantages par rapport aux étudiants issus de l'élite économique. Celles-ci sont liées à la nécessité de travailler, à la méconnaissance de leurs familles du système éducatif (et donc à l'impossibilité d'aider aux travaux scolaires et de les guider dans leur prise de décisions), et à la formation insuffisante reçue à l'école publique pour passer du secondaire à l'enseignement supérieur.

Deuxièmement, la privatisation n'est pas nécessairement la solution aux inefficacités du secteur public, notamment en ce qui concerne les biens publics. Le secteur de l'éducation a plusieurs spécificités, il ne peut être comparé à aucun marché trivial, on ne peut les analyser de la même manière. De plus, l'éducation a plusieurs conséquences monétaires et non monétaires, et elle est cruciale pour la formation des citoyens (McMahon, 1999; OECD, 2007). Même Milton Friedman, qui a plaidé pour les *vouchers* scolaires, a reconnu qu'« une société stable et démocratique est impossible sans un degré minimum d'alphabétisation et de connaissances de la part de la plupart des citoyens et sans

[25] Comme les Grandes Écoles dans le cas de la France, voir Benveniste (2021).

l'acceptation généralisée d'un ensemble commun de valeurs. L'éducation peut contribuer aux deux » (Friedman, 2002, p.86).

Dans ce contexte, pourquoi penser que l'intérêt personnel des investisseurs en éducation (je fais référence à ceux qui investissent dans un but lucratif) conduit mécaniquement à des fins socialement désirables ? Leurs objectifs sont par nature incompatibles, sur ce marché, la *main invisible* doit être soigneusement évaluée. En effet, « il n'y a aucune garantie que les bénéfices privés agrégés constitueront des bénéfices publics. (...) Les formes d'enseignement privé qui privilégient l'avantage personnel à l'exclusion du bien public sont contraires au développement de ces biens sociaux vitaux » (Sarangapani & Winch, 2010, p.502). Dans ce contexte, « la question la plus importante de la privatisation des services sociaux de base est peut-être la réglementation » (Klees, 2008, p.332).

Il est cependant plus important de souligner que l'éducation est un droit humain et que l'obligation des États à fournir une éducation gratuite et inclusive est fondée sur la Déclaration universelle des droits de l'homme de 1948 (art. 26). Il existe plusieurs tensions entre cet objectif et la participation des acteurs privés dans l'éducation. En ce sens, les « Principes d'Abidjan sur les obligations des États en matière de droits de l'Homme de fournir un enseignement public et de réglementer la participation du secteur privé dans l'éducation », élaborés et adoptés en Côte d'Ivoire en 2019 par un groupe de 57 experts du monde entier , sont une référence prometteuse pour le débat sur les rôles et les responsabilités des différents acteurs de l'éducation.[26] Selon ces principes, les États ont l'obligation de fournir gratuitement de l'éducation pour tous et réglementer les acteurs privés, en protégeant les systèmes éducatifs contre la commercialisation. Il convient de noter que « des preuves substantielles indiquent qu'une offre accrue d'éducation par des prestataires privés exacerbe les inégalités et la discrimination sur la base du statut socio-économique, du sexe et du groupe social. En conséquence, des augmentations graduelles aboutissant à un système éducatif public purement privé violeraient, selon les preuves, les droits à l'égalité et à la non-discrimination » (Mowbray, 2021, p.67).

Les preuves fournies dans le Chapitre 3 sont un sérieux appel au débat sur la participation privée dans les services éducatifs au Pérou. Il est vrai que l'enseignement privé a historiquement contribué à certains égards à la démocratisation de l'enseignement, à la

[26] Voir https://www.abidjanprinciples.org

formation des élites nationales et au développement de la pensée pédagogique (Balarin, 2017). Cependant, sa grande hétérogénéité est problématique, surtout si l'on considère les écoles qui ne répondent pas aux normes minimales de qualité. De nos jours, les familles sont apparemment en train de *choisir* des écoles privées à prix faibles (*los-cost*) (Rodríguez & Saavedra, 2020), cependant, les fait indiquent que le cas péruvien est similaire à ce qui a été observé au Nigeria : « essentiellement le choix de l'école par désespoir - un choix contraint, plutôt que l'exercice positif d'un droit de l'homme » (Härmä, 2021, p.147). De plus, il semble que la commercialisation de l'éducation soit devenue du bon sens au Pérou. Il est stupéfiant que certaines thèses dans les départements de gestion des universités locales soient de véritables business plans pour ouvrir une école (voir, par exemple, Cerna et al., 2018; Cubas & Reinoso, 2016; L. Flores & Oviedo, 2017).

Même si l'on considère que l'éducation doit être considérée comme une simple marchandise, les résultats sont ennuyeux. En effet, dans des pays comme le Pérou, il existe de faibles niveaux de méta-concurrence (c'est-à-dire une faible concurrence pour faire partie de l'élite), par conséquent, l'élite économique est sous-optimale pour les besoins de la nation (Figueroa & Rentería, 2016). Les personnes qui ont suffisamment de capital pour ouvrir des écoles privées à but lucratif ne sont pas menacées, elles n'ont aucune incitation endogène à fournir de meilleurs services.

Une étape possible pour échapper à ce piège d'équilibre de bas niveau est proposée par Vásquez (2022). Selon cet auteur, un élément clé du problème est l'absence d'accréditation obligatoire des écoles. Un tel processus déterminerait, par le biais d'évaluations décentralisées et d'une vérification par un organisme public autonome, si les normes minimales reconnues sont respectées. Dans le même ordre d'idées, l'agence nationale créée en 2015 pour s'occuper des universités (SUNEDU)[27] ayant des objectifs analogues a déjà donné de bons résultats dans le cadre de ses compétences (voir SUNEDU, 2021). Cependant, dans le cas des écoles, les ampleurs sont beaucoup plus importantes que dans l'enseignement supérieur. Cet effort constituerait donc un véritable défi tant sur le plan financier qu'opérationnel.

Troisièmement, il existe des actions peu coûteuses qui ont le potentiel d'augmenter la productivité des enseignants à court terme. Les interventions visant à améliorer les

[27]Superintendencia Nacional de Educación Superior Universitaria - SUNEDU.

relations professionnelles des enseignants sont une voie prometteuse, comme le montre le Chapitre 4.

Si je devais reconnaître un point faible de ce travail, ce serait qu'il est essentiellement empirique, il ne discute pas en profondeur son cadre théorique implicite. Dans certaines parties, je m'efforce d'établir des comparaisons avec la théorie du capital humain car c'est la théorie la plus populaire liée à l'éducation. Pourtant, ce n'est pas la théorie principale sur laquelle cette thèse est construite. Par ailleurs, concernant l'éducation, mon point de vue personnel est plus lié à l'approche des capabilités (qui n'est pourtant pas une théorie). Je partage l'accent qu'elle met sur la « compréhension de l'éducation comme valeur intrinsèque » (Terzi, 2010, p.197). De plus, je considère également important de reconnaître ses rôles distributifs et d'agence. En effet, « l'éducation peut réparer l'injustice en facilitant la capacité des groupes défavorisés, marginalisés et exclus à participer aux arrangements sociaux et politiques. Ainsi, l'éducation a des effets redistributifs entre les groupes sociaux, les ménages et au sein des familles. Enfin, l'éducation a un potentiel de transformation parce que les gens sont capables d'utiliser les avantages de l'éducation pour aider les autres, ainsi qu'eux-mêmes » (Rajapakse, 2016, p.6).

Une autre limite de ce travail est qu'il s'est concentré sur un seul pays. Le point critique est, comme mentionné au Chapitre 1, que le Pérou est un pays très particulier, avec une vocation presque mystique à se placer dans des positions extrêmes. Par conséquent, la validité externe de l'évidence présentée ici n'est pas garantie. Il est cependant informatif de ce qui peut arriver dans des circonstances qui ressemblent au contexte péruvien. Quoi qu'il en soit, cette étude de cas est intéressante, pertinente et a de la valeur en soi.

Par ailleurs, la présente thèse met en évidence un certain nombre de limites dans l'état de l'art actuel, ce qui est en même temps une opportunité pour élargir ses frontières. Premièrement, des méthodes plus précises pour mesurer l'inégalité des opportunités sont nécessaires. Ceci est important pour orienter correctement l'élaboration des politiques et éviter de suggérer l'existence d'un IOp trop faible (qui ne favoriserait pas les politiques de redistribution ou d'égalisation des chances) ni trop élevé (qui dépeindrait une situation dramatique éloignée de la réalité). Pour le moment, à la frontière actuelle de la connaissance, les mesures d'IOp doivent être considérablement améliorées. Deuxièmement, davantage de preuves et de débats sont nécessaires sur l'étendue (le cas échéant)

de la participation du secteur privé dans les domaines où l'épanouissement de l'être humain rentre en jeu. Cela comprend, au moins, l'éducation et la santé. Cette thèse traite de la première, mais la seconde est tout aussi pertinente. Par exemple, lors de la pandémie de COVID-19, nous avons été témoins de situations aberrantes au Pérou causées par le marché, notamment des prix exorbitants pour l'achat de masques, de tests et d'oxygène.[28] Le marché de l'éducation dans ce pays n'est pas moins déviant. Certaines écoles n'offrent pas des conditions minimales permettant de fournir des services éducatifs, compromettant l'avenir de générations entières. Troisièmement, le bien-être subjectif nécessite plus d'attention. Il est important tant au niveau individuel que sociétal et peut être utile et informatif pour progresser vers une meilleure qualité de vie (Stiglitz et al., 2009). Cela a le potentiel de fournir des impacts positifs directs et indirects dans un large éventail de domaines, y compris la performance des enseignants et la réussite des élèves. Le SWB a aussi le potentiel de contribuer avec une image complémentaire du progrès humain parce que tout ce qui compte pour l'humanité n'est pas forcément d'ordre matériel.

[28] Évidemment, le secteur public est également responsable pour son inefficacité de long terme dans la fourniture de services de santé à la population.

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Appendix A

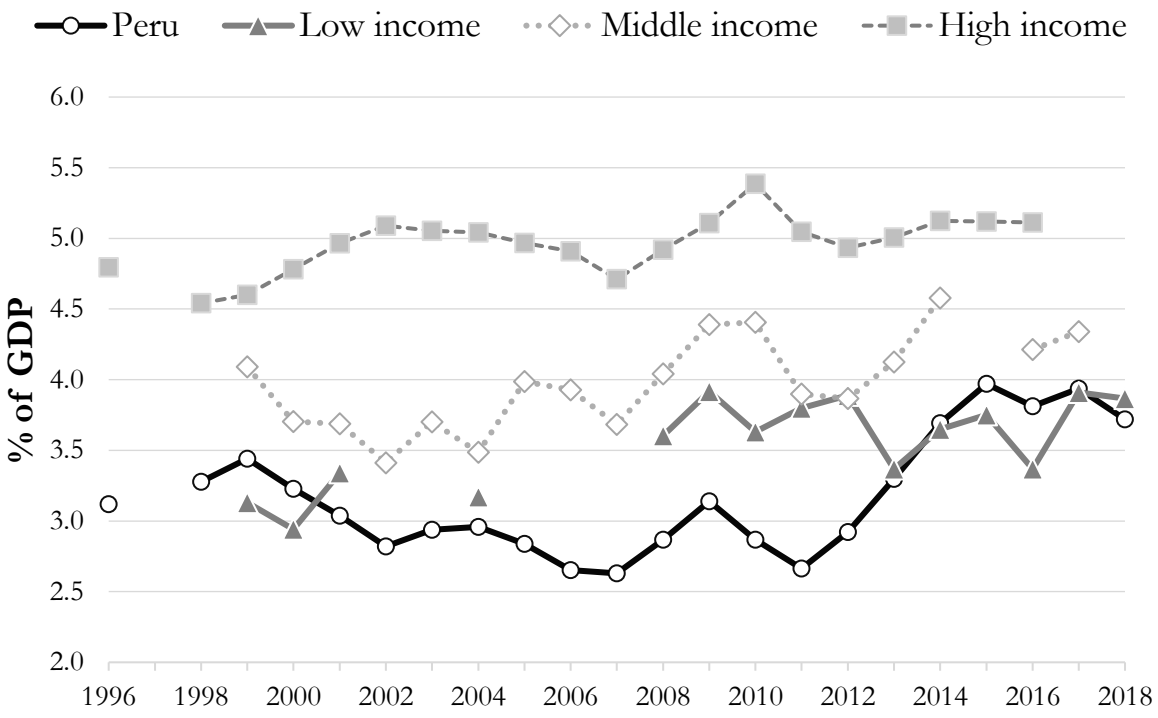
The Peruvian educational system

Table A.1: Peru: Basic educational system structure

Ages	**Local name**	**Typical duration (years)**	**Mandatory**	**ISCED 2011 equivalence**
0-2	Educación inicial (primer ciclo)	3	No	ISCED 0 Early childhood education
3-5	Educación inicial (segundo ciclo)	3	Yes	ISCED 0 Pre-primary education
6-11	Educación Primaria	6	Yes	ISCED 1 Primary education
12-16	Educación Secundaria	5	Yes	ISCED 2 and 3 Lower and upper secondary education
17+	Educación Superior	1+	No	ISCED 4+

Own elaboration based on Guadalupe et al. (2017, p.43) and Unesco (2012).

FIGURE A.1: Government expenditure on education (% of GDP)



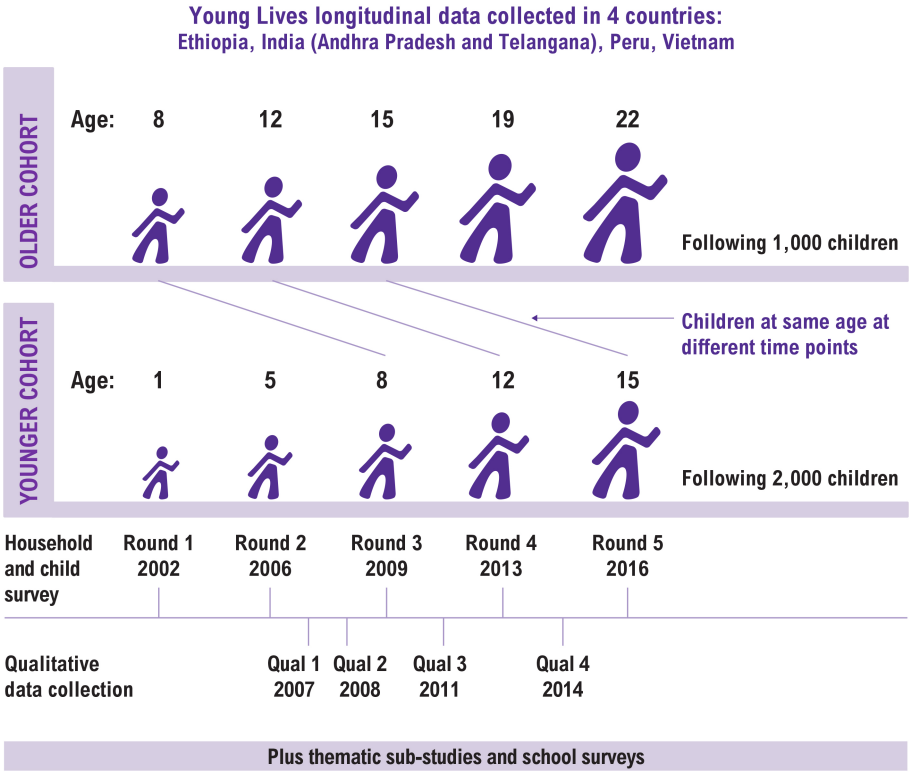
Source: World Bank Open Data. Own elaboration.

Appendix B

IOp Appendix

B.1 The Young Lives Study

FIGURE B.1: The Young Lives Study



Source: http://younglives.org.uk/content/our-research-methods

B.2 Variables detail

TABLE B.1: Circumstance variables used for lower bound estimates

Variable	Description	Values taken from
Gender	0 = Male; 1 = Female	Round 1
Birth order	Order the child is born in his family: 1 = first-born, 2 = second-born, and so on.	Round 1
Area	0 = Urban; 1 = Rural	Round 1
Region	Dummies for Costa (reference), Sierra, and Selva	Round 1
Household size	Number of members of the household	Round 1
Dependency ratio	Ratio of household members aged 0 to 14 and 65 or more, and those aged 15 to 64	Round 1
Wealth index	Ranges from 0 to 1, a higher value indicates a higer socio-economic status. It is constructed from three indices: housing quality, access to services, and ownership of consumer durables. All the details are provided in Briones (2017).	Round 1
Mother's education	Continous variable from 0 (none) to 16 (complete undergraduate)	Round 1
Mother's age at birth	Mother's age at child's birth	Round 1
Mother has indigenous tongue	0 = Spanish; 1 = Quechua, Aymara, Nomatsiguenga, Other native from jungle	Round 1
Stunting	Short height for age (z-score): 0 = not stunted (2 sd or more), 1 = moderately stunted (-3 to -2 sd), 2 = severly stunted (less than -3 sd)	Round 1
Vaccination	Number of vaccines the child received from the following list: BCG, Measles, Polio, DPT, HIB, and tetanus (mother during pregnancy)	Round 1
Attended pre-school	Child ever attended pre-school between 3 and 5 years-old	Round 2
First school public (proxy)	The school the child attended at 8 years old was public	Round 3
Age at start of grade 1	Child's age at start of grade 1	Round 3
Community's population (log)	Size of the child's local community in log	Round 1

Own elaboration.

TABLE B.2: Some circumstance variables used for upper bound estimates

Variable	**Description**
Food security	Household's declared food situation in the last 12 months: 1 = "We always eat enough of what we want", 2 = "We eat enough but not always what we want"; 3 = "We sometimes do not eat enough"; 4 = "We frequently do not eat enough"
Shock - crime*	Destruction/theft of tools for production, housing/consumer goods; theft of cash, crops, livestock; crime that resulted in death/disablement
Shock - regulation*	Land redistribution, resettlement or forced migration, forced contributions, eviction, invasion of property
Shock - economic*	Increase in input prices, decrease in output prices, death of livestock, closure place of employment, loss of job / source of income / family enterprise, industrial action, contract disputes, disbanding credit, confiscation of assets, disputes abouth assets, decrease in food availability
Shock - environment*	Drought, flooding, erosion, frost, pests on crops/storage/livestock, crop failure, natural disaster, earthquake, forest fire, pollution caused by mining
Shock - house*	Fire or collapse affecting house/building
Shock - family*	Death/illness of a household member, divorce or separation, imprisonment, discrimination

* Measured as the total number of events.
Note: The values taken of each variable are from rounds 3, 4, and 5.
Own elaboration.

B.3 Descriptive statistics

TABLE B.3: Younger cohort: Descriptive statistics, Rounds 1 to 5

	Frequency					Percentage				
	Round 1	**Round 2**	**Round 3**	**Round 4**	**Round 5**	**Round 1**	**Round 2**	**Round 3**	**Round 4**	**Round 5**
Area										
Total	**2,052**	**1,963**	**1,943**	**1,902**	**1,860**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Urban	1,406	1,360	1,390	1,393	1,385	68.52	69.28	71.54	73.24	74.46
Rural	646	603	553	509	475	31.48	30.72	28.46	26.76	25.54
Region										
Total	**2,052**	**1,963**	**1,943**	**1,902**	**1,860**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Costa	709	719	718	760	774	34.55	36.63	36.95	39.96	41.61
Sierra	1,035	948	924	828	796	50.44	48.29	47.56	43.53	42.80
Selva	308	296	301	314	290	15.01	15.08	15.49	16.51	15.59
Gender										
Total	**2,052**	**1,963**	**1,943**	**1,902**	**1,860**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Male	1,027	990	980	957	938	50.05	50.43	50.44	50.32	50.43
Female	1,025	973	963	945	922	49.95	49.57	49.56	49.68	49.57
Ethnic origin										
Total	**2,052**	**1,963**	**1,943**	**1,902**	**1,860**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
White	117	110	109	107	100	5.70	5.60	5.61	5.63	5.38
Mestizo	1,881	1,800	1,781	1,743	1,711	91.67	91.70	91.66	91.64	91.99
Native	44	44	44	43	41	2.14	2.24	2.26	2.26	2.20
Other	10	9	9	9	8	0.49	0.46	0.46	0.47	0.43

Source: Young Lives Study 2002-2016. Own elaboration.

TABLE B.4: Mathematics scores by circumstances

	Score in Mathematics					
	Round 3		**Round 4**		**Round 5**	
	Mean	**s.d.**	**Mean**	**s.d.**	**Mean**	**s.d.**
Total	**0.000**	**1.000**	**0.000**	**1.000**	**0.000**	**1.000**
Gender						
Male	0.069	0.988	0.027	1.004	0.103	1.040
Female	-0.069	1.008	-0.028	0.996	-0.105	0.946
Area (R1)						
Urban	0.238	0.915	0.226	0.906	0.184	0.991
Rural	-0.504	0.985	-0.500	1.018	-0.394	0.901
Region (R1)						
Costa	0.331	0.873	0.221	0.902	0.161	0.994
Sierra	-0.202	1.033	-0.113	1.055	-0.066	1.018
Selva	-0.063	0.966	-0.130	0.941	-0.150	0.903
Mother's tonge						
Spanish	0.173	0.952	0.148	0.936	0.111	0.980
Indigenous	-0.399	1.001	-0.356	1.062	-0.255	0.989
Stunting (R1)						
Not stunted	0.129	0.960	0.130	0.959	0.117	0.990
Moderately stunted	-0.238	1.025	-0.277	1.008	-0.212	0.960
Severly stunted	-0.504	0.975	-0.452	1.066	-0.474	0.967
Attended pre-school (R2)						
No pre-school	-0.551	0.962	-0.434	1.009	-0.354	0.961
Pre-school	0.103	0.975	0.078	0.978	0.067	0.988
First school (R3)						
Private	0.716	0.797	0.561	0.816	0.544	1.030
Public	-0.129	0.974	-0.105	0.998	-0.092	0.947

Source: Young Lives Study 2002-2016. Own elaboration.

Table B.5: Reading scores by circumstances

	Score in Reading					
	Round 3		Round 4		Round 5	
	Mean	s.d.	Mean	s.d.	Mean	s.d.
Total	**0.000**	**1.000**	**0.000**	**1.000**	**0.000**	**1.000**
Gender						
Male	0.006	0.977	-0.017	0.982	0.002	1.010
Female	-0.007	1.023	0.018	1.018	-0.002	0.990
Area (R1)						
Urban	0.281	0.857	0.228	0.915	0.203	0.922
Rural	-0.596	1.021	-0.503	0.997	-0.452	1.020
Region (R1)						
Costa	0.316	0.813	0.310	0.907	0.205	0.928
Sierra	-0.221	1.076	-0.193	1.005	-0.121	1.029
Selva	0.029	0.927	-0.067	1.014	-0.074	0.988
Mother's tonge						
Spanish	0.219	0.888	0.178	0.949	0.129	0.934
Indigenous	-0.505	1.060	-0.420	1.006	-0.310	1.089
Stunting (R1)						
Not stunted	0.139	0.956	0.151	0.948	0.115	0.962
Moderately stunted	-0.226	0.997	-0.317	1.043	-0.238	1.053
Severly stunted	-0.641	1.015	-0.522	0.979	-0.425	0.991
Attended pre-school (R2)						
No pre-school	-0.572	0.990	-0.463	1.044	-0.385	1.039
Pre-school	0.106	0.965	0.085	0.971	0.067	0.978
First school (R3)						
Private	0.564	0.702	0.613	0.787	0.543	0.809
Public	-0.102	1.011	-0.113	0.994	-0.107	1.000

Source: Young Lives Study 2002-2016. Own elaboration.

TABLE B.6: Panel time-varying circumstances: Descriptive statistics

	Mean	Std. Dev.	Min	Max
Stunting				
overall	0.22	0.49	0.00	2.00
between		0.43	0.00	2.00
within		0.24	-1.11	1.55
Food security				
overall	1.75	0.66	1.00	4.00
between		0.49	1.00	4.00
within		0.46	-0.25	3.75
Rural				
overall	0.27	0.44	0.00	1.00
between		0.43	0.00	1.00
within		0.13	-0.40	0.94
Sierra				
overall	0.45	0.50	0.00	1.00
between		0.48	0.00	1.00
within		0.13	-0.22	1.11
Selva				
overall	0.16	0.37	0.00	1.00
between		0.36	0.00	1.00
within		0.08	-0.51	0.83
Household size				
overall	5.30	1.87	2.00	18.00
between		1.60	2.00	14.33
within		0.98	-0.70	12.30
Dependency ratio				
overall	0.25	0.17	0.00	0.75
between		0.15	0.00	0.70
within		0.09	-0.17	0.62
Household wealth index				
overall	0.59	0.20	0.00	0.95

Continues on next page...

Table B.6 – *...Continued from previous page*

	Mean	Std. Dev.	Min	Max
between		0.18	0.03	0.94
within		0.08	0.17	1.03
Public school				
overall	0.83	0.38	0.00	1.00
between		0.33	0.00	1.00
within		0.18	0.16	1.49
Commuting time to school				
overall	15.12	16.35	0.00	420.00
between		11.63	0.67	150.00
within		11.76	-119.88	285.12
Shock: crime				
overall	0.16	0.44	0.00	4.00
between		0.28	0.00	2.00
within		0.35	-1.50	2.50
Shock: regulation				
overall	0.01	0.09	0.00	2.00
between		0.05	0.00	0.67
within		0.07	-0.66	1.34
Shock: economic				
overall	0.19	0.48	0.00	5.00
between		0.30	0.00	2.00
within		0.38	-1.81	3.53
Shock: environment				
overall	0.42	0.90	0.00	7.00
between		0.67	0.00	4.67
within		0.61	-3.25	4.42
Shock: house				
overall	0.01	0.17	0.00	2.00
between		0.09	0.00	1.00
within		0.14	-0.99	1.35
Shock: family				

Continues on next page...

Table B.6 – *...Continued from previous page*

	Mean	**Std. Dev.**	**Min**	**Max**
overall	0.42	0.66	0.00	4.00
between		0.42	0.00	2.00
within		0.52	-1.58	3.08

Source: Young Lives Study, 2002-2016 - Rounds 3, 4, and 5.

Own elaboration.

B.4 Regressions for the analysis of time-varying circumstances

B.4.1 Upper bound first approach

TABLE B.7: Mathematics and reading FE estimates including time-varying circumstances: First approach (cf. equation 2.15)

	(1)	(2)
	Mathematics	Reading
Hours/day studying outside school	0.020	0.044***
	(0.012)	(0.013)
Hours/day leisure activities	-0.019*	-0.005
	(0.008)	(0.008)
Stunting	-0.035	-0.050
	(0.036)	(0.040)
Food security	0.035	0.005
	(0.018)	(0.020)
Rural	-0.087	-0.176*
	(0.073)	(0.081)
Sierra	-0.240***	-0.149
	(0.071)	(0.079)
Selva	0.095	-0.053
	(0.114)	(0.128)
Household size	0.010	-0.008
	(0.009)	(0.010)
Dependency ratio	-0.410***	0.048
	(0.094)	(0.105)
Wealth index	0.015	-0.049
	(0.117)	(0.130)
Public school	-0.018	0.015
	(0.046)	(0.052)
Commuting time to school	0.001	0.002*
	(0.001)	(0.001)

Shock: crime	0.013	-0.065*
	(0.024)	(0.027)
Shock: regulation	-0.093	-0.124
	(0.110)	(0.123)
Shock: economic	0.011	0.049*
	(0.022)	(0.025)
Shock: environment	0.006	-0.022
	(0.014)	(0.016)
Shock: house	0.055	0.037
	(0.060)	(0.067)
Shock: family	0.019	-0.044*
	(0.017)	(0.018)
Constant	0.196	0.163
	(0.117)	(0.131)
Time fixed effects	Yes	Yes
N	4,872	4,872
N_g	1,624	1,624
rho	0.656	0.580
r2_w	0.021	0.015
r2_o	0.046	0.130
r2_b	0.055	0.195
F	3.516	2.505

Standard errors in parentheses

Source: Young Lives Study 2002-2016. Own elaboration.

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

B.4.2 Upper bound second approach

TABLE B.8: Mathematics FE estimates including time-varying circumstances: Second approach (cf. equations 2.16, 2.17, and 2.18)

	(1)	(2)	(3)	(4)
	Maths	Hours study	Hours leisure	Maths
Stunting	-0.034			-0.034
	(0.036)			(0.036)
Food security	0.036*			0.035
	(0.018)			(0.018)
Rural	-0.082			-0.085
	(0.073)			(0.073)
Sierra	-0.244***			-0.236***
	(0.071)			(0.071)
Selva	0.086			0.094
	(0.115)			(0.114)
Household size	0.009			0.010
	(0.009)			(0.009)
Dependency ratio	-0.409***			-0.404***
	(0.094)			(0.094)
Wealth index	0.037			0.015
	(0.117)			(0.117)
Public school	-0.024			-0.018
	(0.046)			(0.046)
Commuting time to school	0.001			0.001
	(0.001)			(0.001)
Shock: crime	0.016			0.013
	(0.024)			(0.024)
Shock: regulation	-0.097			-0.091
	(0.110)			(0.110)
Shock: economic	0.009			0.011
	(0.022)			(0.022)
Shock: environment	0.007			0.006
	(0.014)			(0.014)

Shock: house	0.056			0.054
	(0.060)			(0.060)
Shock: family	0.018			0.019
	(0.017)			(0.017)
Individual effect from col.(1)		0.172***	0.047	
		(0.016)	(0.026)	
Time-varying circumstances prediction		0.613***	1.442***	
		(0.075)	(0.119)	
Residuals from col.(2)				0.020
				(0.012)
Residuals from col.(3)				-0.019*
				(0.008)
Constant	0.154	1.958***	4.269***	0.154
	(0.109)	(0.024)	(0.037)	(0.109)
Time fixed effects	Yes	Yes	Yes	Yes
N	4,872	4,872	4,872	4,872
N_g	1,624			1,624
rho	0.655			0.657
r2_w	0.018			0.021
r2_o	0.045			0.042
r2_b	0.055			0.049
F	3.275	71.517	94.452	3.516

Standard errors in parentheses

Source: Young Lives Study 2002-2016. Own elaboration.

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

TABLE B.9: Reading FE estimates including time-varying circumstances: Second approach (cf. equations 2.16, 2.17, and 2.18)

	(1)	(2)	(3)	(4)
	Read.	Hours study	Hours leisure	Read.
Stunting	-0.049			-0.051
	(0.040)			(0.040)
Food security	0.005			0.005
	(0.020)			(0.020)
Rural	-0.173*			-0.180*
	(0.081)			(0.081)
Sierra	-0.154			-0.152
	(0.079)			(0.079)
Selva	-0.057			-0.054
	(0.128)			(0.128)
Household size	-0.010			-0.009
	(0.010)			(0.010)
Dependency ratio	0.046			0.049
	(0.105)			(0.105)
Wealth index	-0.027			-0.050
	(0.130)			(0.130)
Public school	0.010			0.015
	(0.052)			(0.052)
Commuting time to school	0.002**			0.002**
	(0.001)			(0.001)
Shock: crime	-0.062*			-0.066*
	(0.027)			(0.027)
Shock: regulation	-0.139			-0.127
	(0.123)			(0.123)
Shock: economic	0.043			0.050*
	(0.025)			(0.025)
Shock: environment	-0.022			-0.023
	(0.016)			(0.016)
Shock: house	0.037			0.038

	(0.067)			(0.067)
Shock: family	-0.044*			-0.045*
	(0.018)			(0.019)
Individual effect from col.(1)		0.172***	0.070*	
		(0.018)	(0.028)	
Time-varying circumstances prediction		0.716***	1.365***	
		(0.096)	(0.152)	
Residuals from col.(2)				0.044***
				(0.013)
Residuals from col.(3)				-0.005
				(0.008)
Constant	0.231	2.030***	4.378***	0.229
	(0.121)	(0.028)	(0.045)	(0.121)
Time fixed effects	Yes	Yes	Yes	Yes
N	4,872	4,872	4,872	4,872
N_g	1,624			1,624
rho	0.581			0.583
r2_w	0.011			0.015
r2_o	0.121			0.111
r2_b	0.180			0.164
F	2.068	76.257	82.393	2.505

Standard errors in parentheses

Source: Young Lives Study 2002-2016. Own elaboration.

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

B.5 Robustness checks material

TABLE B.10: PPVT z-scores in Rounds 3 to 5 and circumstances (OLS estimates)

	(1)	(2)	(3)
	PPVT R3	PPVT R4	PPVT R5
Female	-0.079*	-0.180***	-0.158***
	(0.038)	(0.041)	(0.043)
Birth order	-0.067**	-0.082***	-0.073**
	(0.021)	(0.023)	(0.024)
Rural (R1)	-0.271***	-0.214**	-0.152*
	(0.062)	(0.067)	(0.070)
Sierra (R1)	0.013	0.041	0.104
	(0.050)	(0.054)	(0.056)
Selva (R1)	0.083	0.060	0.119
	(0.063)	(0.068)	(0.070)
Household size (R1)	0.006	-0.003	-0.000
	(0.009)	(0.010)	(0.010)
Dependency ratio (R1)	0.020	0.013	-0.012
	(0.146)	(0.158)	(0.164)
Wealth index (R1)	0.844***	0.757***	0.715***
	(0.120)	(0.130)	(0.135)
Mother education (R1)	0.041***	0.044***	0.038***
	(0.006)	(0.007)	(0.007)
Mother age at birth	0.013**	0.017***	0.014**
	(0.004)	(0.004)	(0.005)
Mother has indig. tongue	0.021	0.060	0.034
	(0.053)	(0.057)	(0.059)
Stunting (R1)	-0.120**	-0.137***	-0.070
	(0.037)	(0.040)	(0.041)
Vaccins (R1)	0.103***	0.091***	0.065*
	(0.025)	(0.027)	(0.028)
Attended pre-school (R2)	0.124*	0.143*	0.187**
	(0.063)	(0.068)	(0.071)

First school public (R3)	-0.213***	-0.259***	-0.245***
	(0.055)	(0.060)	(0.062)
Age at start of grade 1	-0.210***	-0.121**	-0.125**
	(0.037)	(0.040)	(0.042)
Com. population log (R1)	-0.049*	-0.044	-0.053*
	(0.021)	(0.022)	(0.023)
Constant	0.698*	0.198	0.365
	(0.322)	(0.349)	(0.361)
N	1,401	1,401	1,401
R2	0.355	0.315	0.241
R2-adj.	0.347	0.307	0.231

Standard errors in parentheses

Source: Young Lives Study 2002-2016. Own elaboration.

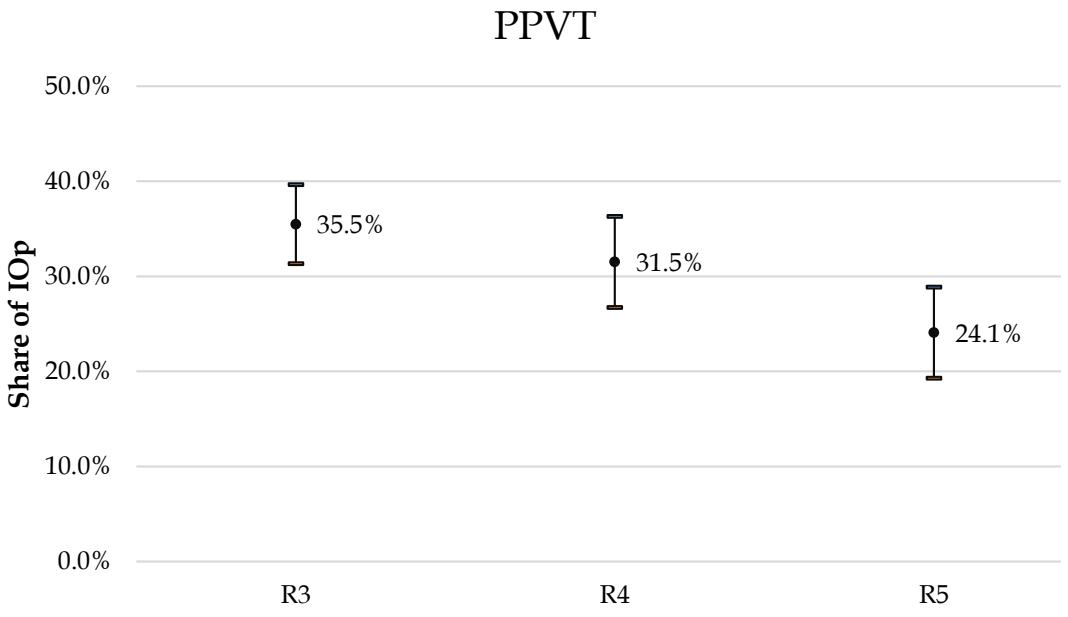
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

TABLE B.11: PPVT FE estimates: First approach (cf. equation 2.9)

	(1) PPVT
Hours/day studying outside school	-0.005
	(0.011)
Hours/day leisure activities	-0.016*
	(0.007)
Constant	0.121**
	(0.041)
Time fixed effects	Yes
N	4,773
N_g	1,591
rho	0.720
r2_w	0.002
r2_o	0.012
r2_b	0.056
F	1.601

Standard errors in parentheses
Source: Young Lives Study 2002-2016. Own elaboration.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

FIGURE B.2: PPVT: Lower bound estimates of inequality of educational opportunity



Note: Confidence intervals at the 95% level, based on 1,000 replications bootstraps.
Source: Young Lives Study 2002-2016. Own elaboration.

TABLE B.12: PPVT FE estimates: Second approach (cf. equations 2.10, 2.11, and 2.12)

	(1) PPVT	(2) Hours study	(3) Hours leisure	(4) PPVT
Individual effect from col.(1)		0.235***	0.188***	
		(0.015)	(0.025)	
Residuals from col.(2)				-0.005
				(0.011)
Residuals from col.(3)				-0.016*
				(0.007)
Constant	0.045***	1.899***	4.133***	0.045***
	(0.014)	(0.023)	(0.037)	(0.014)
Time fixed effects	Yes	Yes	Yes	Yes
N	4,773	4,773	4,773	4,773
N_g	1,591			1,591
rho	0.718			0.718
r2_w	0.000			0.002
r2_o	0.000			0.000
r2_b	.			0.000
F	0.466	114.219	88.023	1.601

Standard errors in parentheses

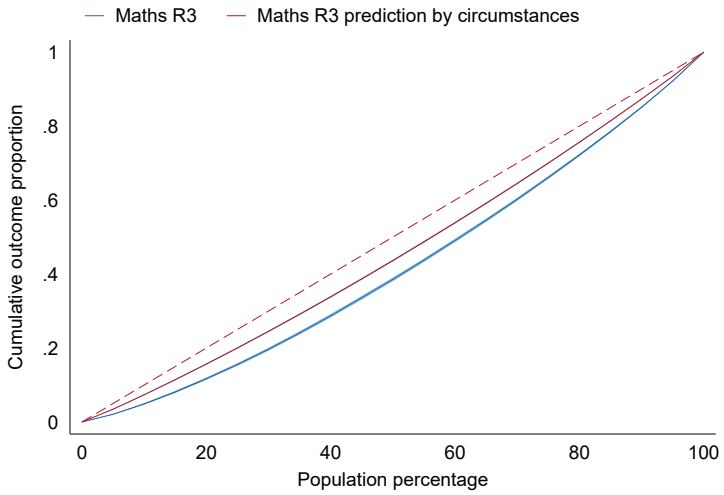
Source: Young Lives Study 2002-2016. Own elaboration.

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

B.6 Ranking analysis

FIGURE B.3: Lorenz curves for mathematics test scores

(A) Matematics Round 3



(B) Matematics Round 5

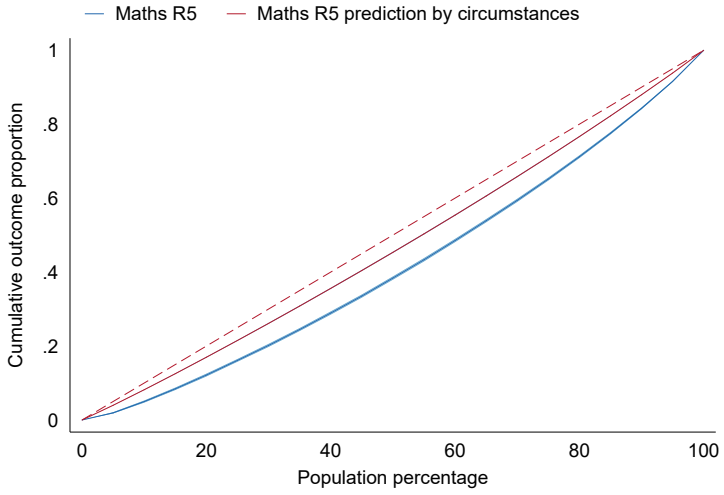


TABLE B.13: Mathematics: Spearman's rank correlation for different inequality measures (lower bound IOp)

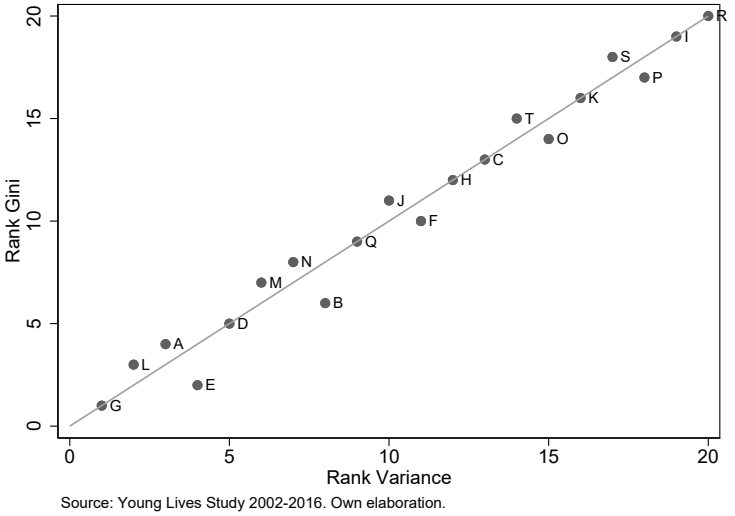
	Variance	**Gini**	**GE(-1)**	**GE(0)**	**GE(1)**	**GE(2)**
Variance	1					
Gini	0.9865*	1				
GE(-1)	0.9714*	0.9789*	1			
GE(0)	0.9820*	0.9880*	0.9940*	1		
GE(1)	0.9895*	0.9895*	0.9880*	0.9955*	1	
GE(2)	0.9955*	0.9925*	0.9774*	0.9865*	0.9955*	1

* Significant at the 0.05 level.

Source: Young Lives Study 2002-2016. Own elaboration.

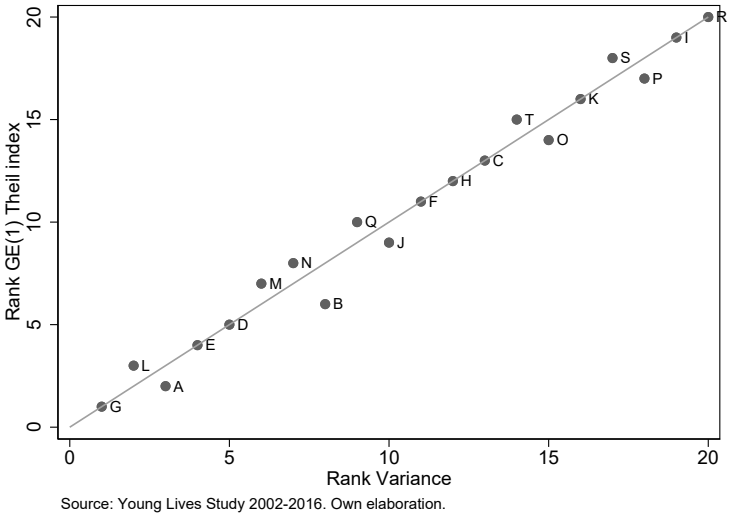
FIGURE B.4: Mathematics: Cluster's ranking for some inequality measures

(A) Variance vs Gini



Source: Young Lives Study 2002-2016. Own elaboration.

(B) Variance vs Theil index



Source: Young Lives Study 2002-2016. Own elaboration.

TABLE B.14: Mathematics: Spearman's rank correlation for different inequality measures (upper bound IOp)

	Variance	**Gini**	**GE(-1)**	**GE(0)**	**GE(1)**	**GE(2)**
Variance	1					
Gini	0.8135*	1				
GE(-1)	0.7985*	0.9609*	1			
GE(0)	0.8120*	0.9895*	0.9820*	1		
GE(1)	0.8090*	0.9925*	0.9759*	0.9970*	1	
GE(2)	0.8075*	0.9895*	0.9639*	0.9880*	0.9940*	1

* Significant at the 0.05 level.

Source: Young Lives Study 2002-2016. Own elaboration.

Appendix C

Privatization Appendix

C.1 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).[1,2]

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.[3] Indeed, 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 C.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

[1]This scheme is pertinent for societies with a strong colonial legacy and large native populations, such as the Peruvian case. The scheme is also correlated with language inequality because there exists a hierarchy of languages (Figueroa, 2015b, chap. 2). In this country, there exist several native languages (which act as social markers), but Spanish is dominant. Different accents of Spanish also act as social markers.

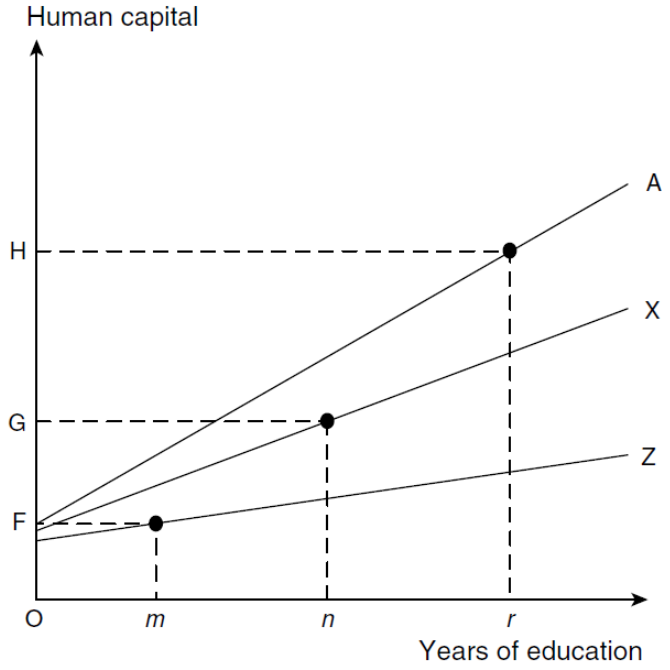
[2]According to the question on self-ethnic identification of the 2017 Population Census, 5.89% of the population self-identifies as white, 60.20% as mixed, and 25.80% as native.

[3]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).

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 C.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 C.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 the whole economy.

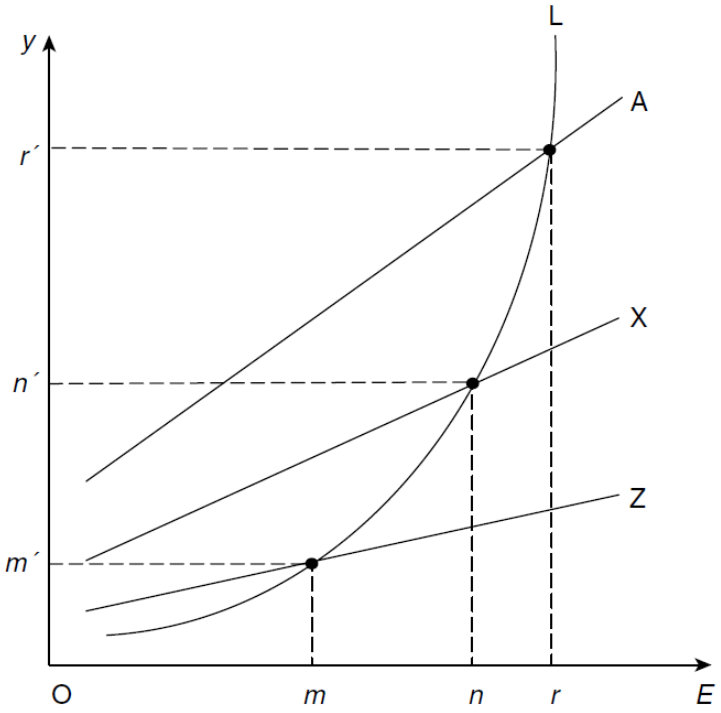
FIGURE C.1: Relations between education and human capital, by social groups A, X, and Z



Source: Figueroa (2015b, p.17).

The structural equations are as follows:

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



Source: Figueroa (2015b, p.22).

$$h = F(E, S), \quad F_i > 0, \quad where\ S = (A, X, Z) \tag{C.1}$$

$$y = G(h, S), \quad G_i > 0 \tag{C.2}$$

$$y = \Phi(E, S), \quad \Phi_i > 0 \tag{C.3}$$

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)

C.2 Labor market regulation

Labor market regulation deserves some discussion for 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. Indeed, 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. Especially, "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 that confounds with the reforms in the educational market.

C.3 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, 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.[4] Second, 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, define **"private intensity change"** (ΔPI) as the change in private intensity between years t and $t-1$. Finally, define **"basal private intensity change"** (ΔBPI) 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 (ΔPI)	Change in PI between $t-1$ and t	
Basal private intensity change (ΔBPI)	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 strongly 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.[5] There are 21 provinces, out of 191, whose private intensity remained constant over the whole period of study.

[4]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 3.2.2 and Table 3.1.

[5]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) Until 2004	(2) Until 2008	(3) Until 2012	(4) Until 2016	(5) Until 2019
Population in 1993	1.352***	1.943***	2.255***	2.732***	2.905***
	(0.072)	(0.108)	(0.134)	(0.178)	(0.198)
Nb. of public schools in 1993	-0.350***	-0.509***	-0.624***	-0.704***	-0.749***
	(0.074)	(0.110)	(0.137)	(0.182)	(0.202)
Constant	-1.485	-1.734	-1.783	-3.183	-3.962
	(1.297)	(1.938)	(2.408)	(3.201)	(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.

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

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 fourth quartile in 1993 according to their PI, are those that experienced the largest 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.3 and C.4). 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 3.5.9.

Table C.4 depicts 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.5 shows the relationship between net attendance rate and private intensity. Two findings are worth noting. First, provinces that had the largest private intensity in the baseline (Q4) are those that experienced the largest increases in PI between 1993

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**
Total	**191**	**13.9 (23.4)**	**13.5 (26.0)**	**9.3 (35.3)**	**26.7 (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)

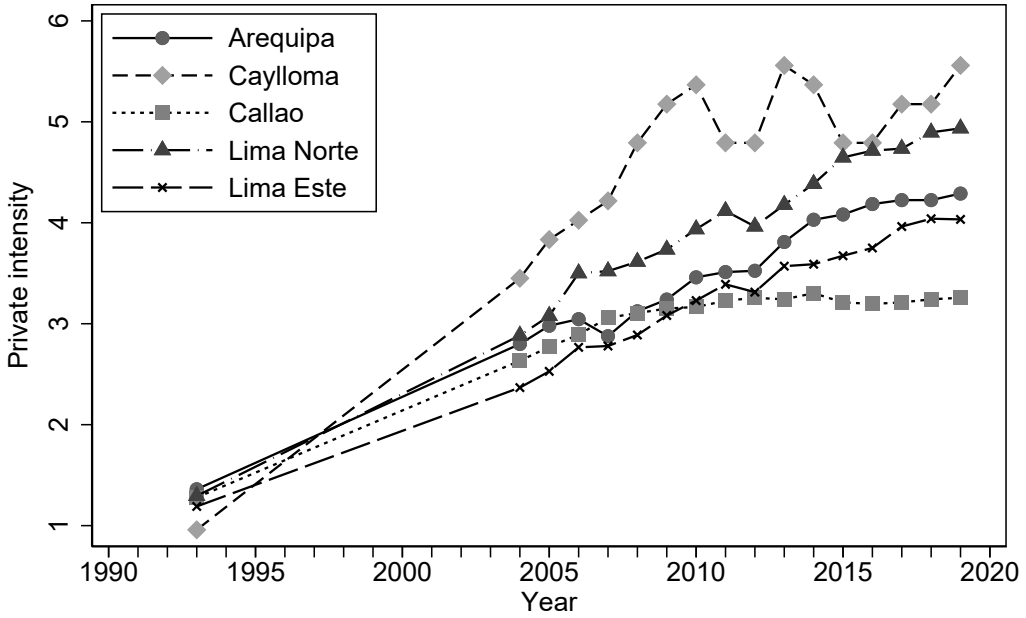
Note: Standard deviations in parenthesis.
Source: Population Census (INEI) and School Census (MINEDU), 1993 and 2017.
Own elaboration.

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

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

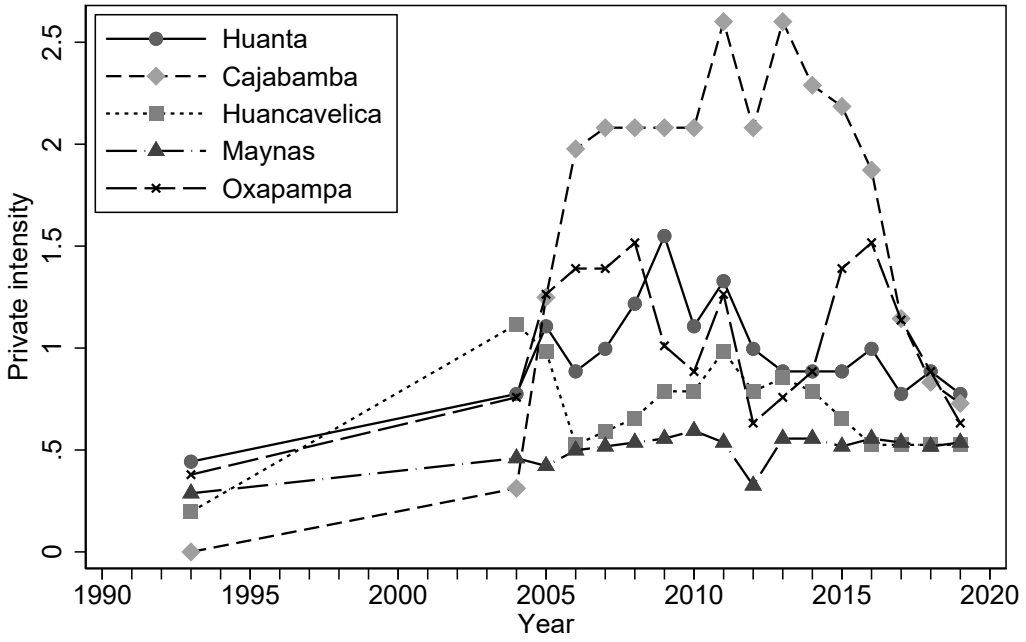
Source: School Census 1993 and 2019 (MINEDU), Population Census 1993 (INEI).
Own elaboration.

FIGURE C.3: Provinces with high average private intensity, 1993-2019



Note: Private intensity is the number of private secondary schools in year N, per 1,000 age-group population of 1993.
Source: School Census 1993-2019 (MINEDU) and Population Census 1993 (INEI). Own elaboration.

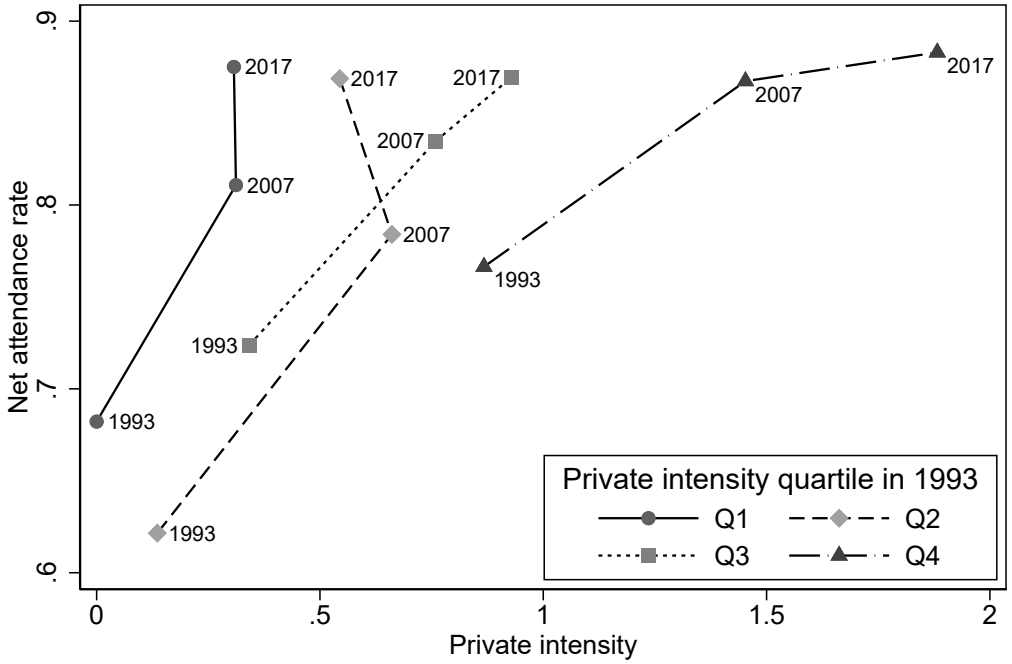
FIGURE C.4: Provinces with at least six periods of decreasing private intensity, 1993-2019



Note: Private intensity is the number of private secondary schools in year N, per 1,000 age-group population of 1993.
Source: School Census 1993-2019 (MINEDU) and Population Census 1993 (INEI). Own elaboration

and 2017. More generally, the extent of PI seems to be correlated with the initial PI. Second, no matter 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 conditional cash transfer program Juntos) have played an important role in the democratization of education, at least in those regions with relatively few private schools.

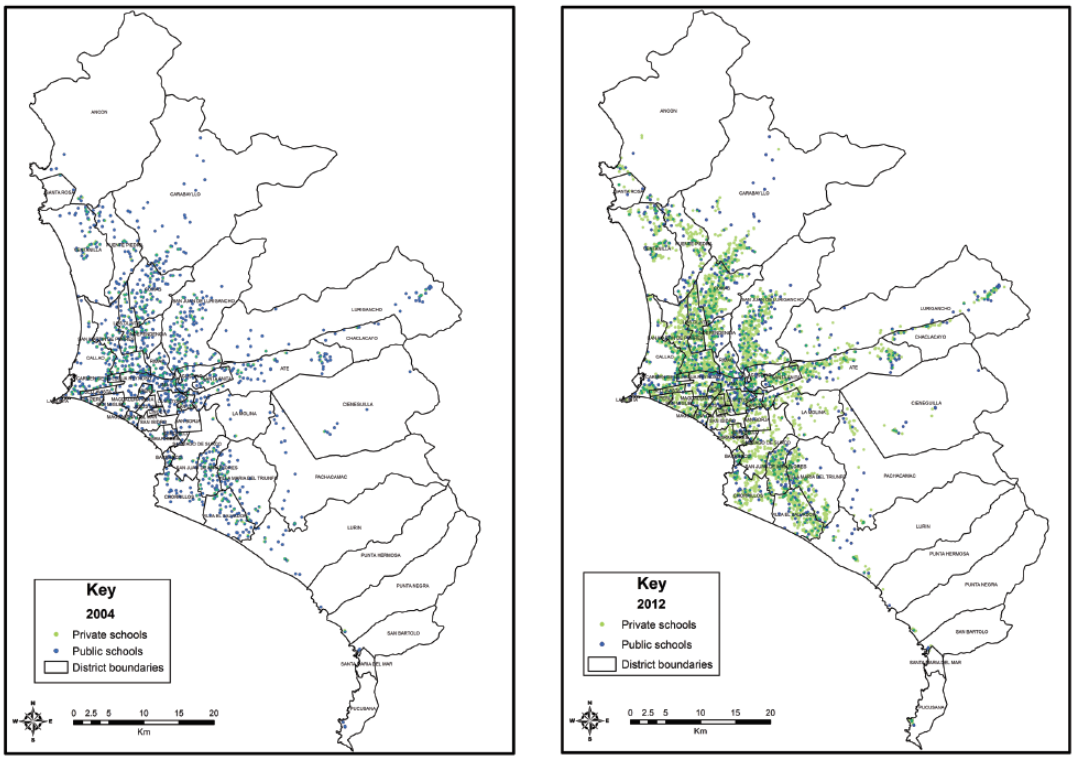
FIGURE C.5: Provinces: Net attendance rate by private intensity, 1993-2017 (secondary education)



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

C.4 Metropolitan Lima: Public and private schools, 2004-2012

FIGURE C.6: Privatization in Metropolitan Lima

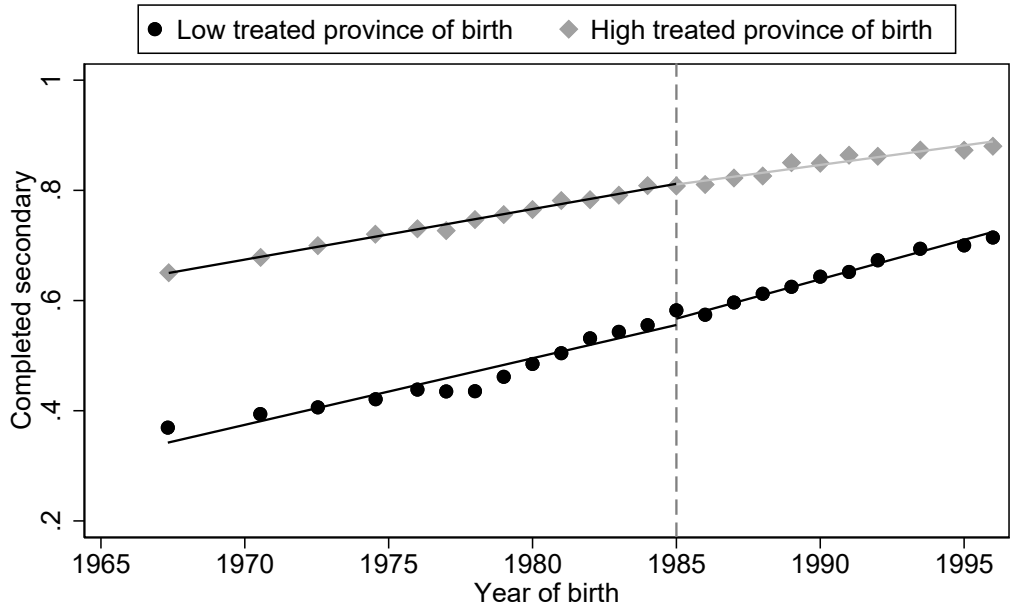


Source: Balarin (2015, p.10).

C.5 Robustness checks - Additional material

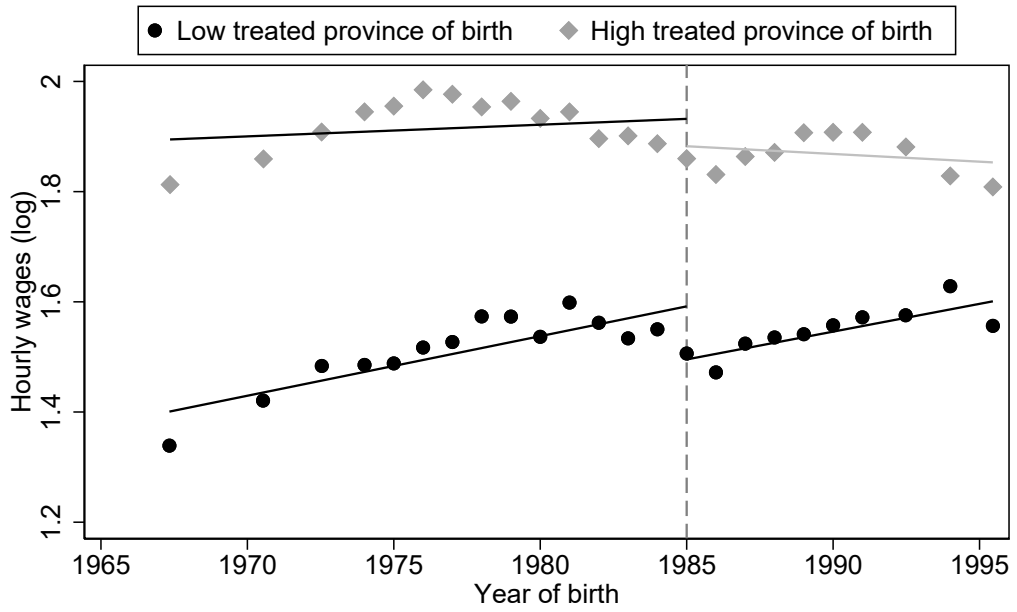
C.5.1 Pre-trends

FIGURE C.7: 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.

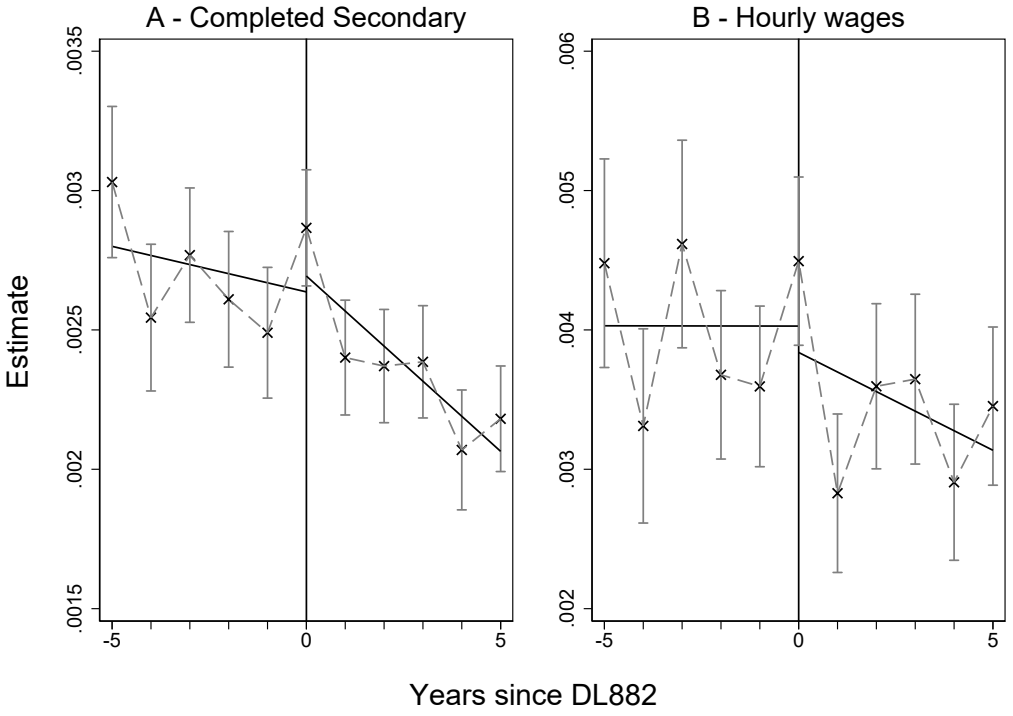
FIGURE C.8: Pre-trends in hourly wages



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.

C.5.2 The "exhaustion effect"

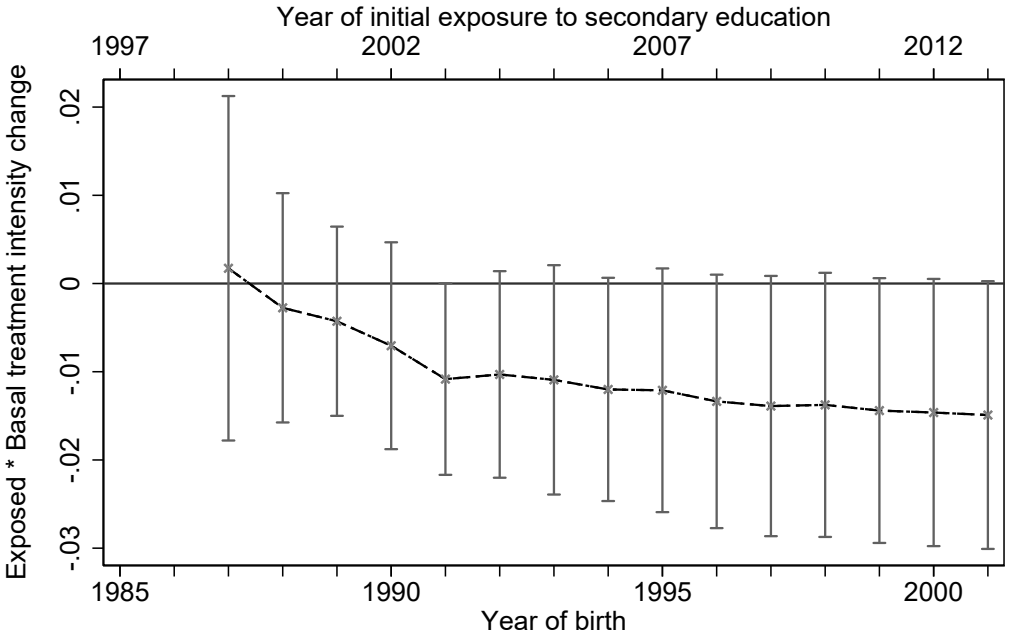
FIGURE C.9: Graphical event study



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.

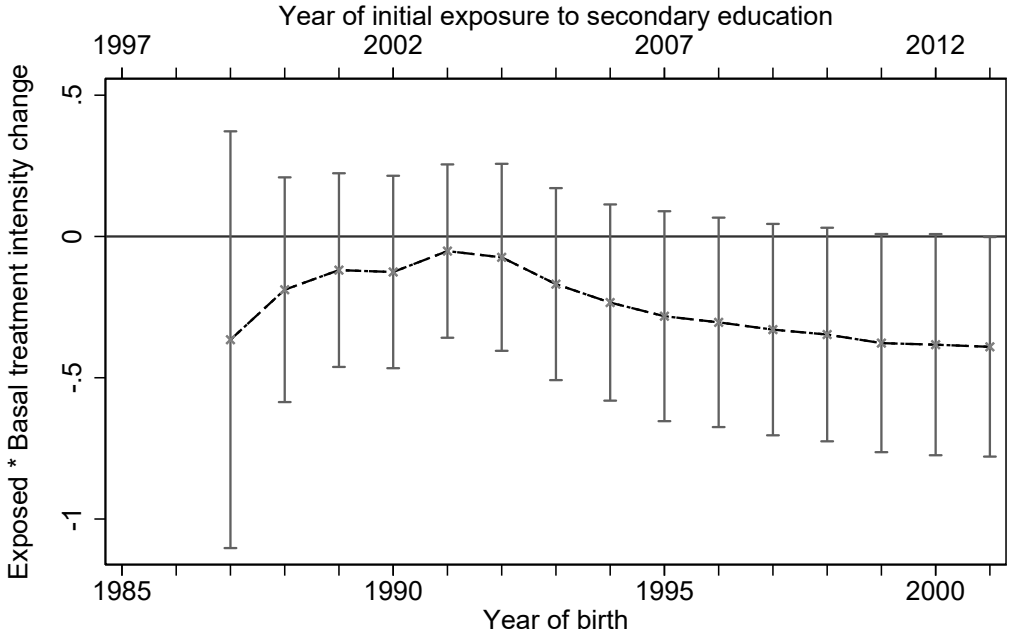
C.6 Privatization as a process results

FIGURE C.10: Coefficients of the interactions Exposed * private' in the province of birth (Dependent variable: Completed secondary education)



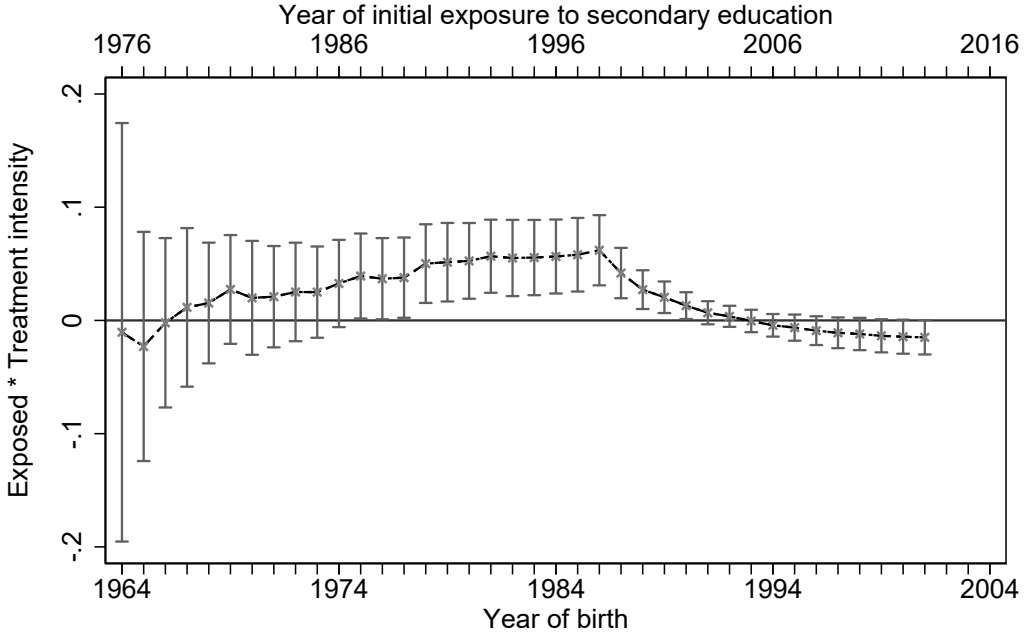
Note: Shaded area shows 95% confidence intervals.
Source: National Household Survey (2004-2019) and School Census (1993, 2010).
Own elaboration.

FIGURE C.11: Coefficients of the interactions Exposed * private' in the province of birth (Dependent variable: Real wage)



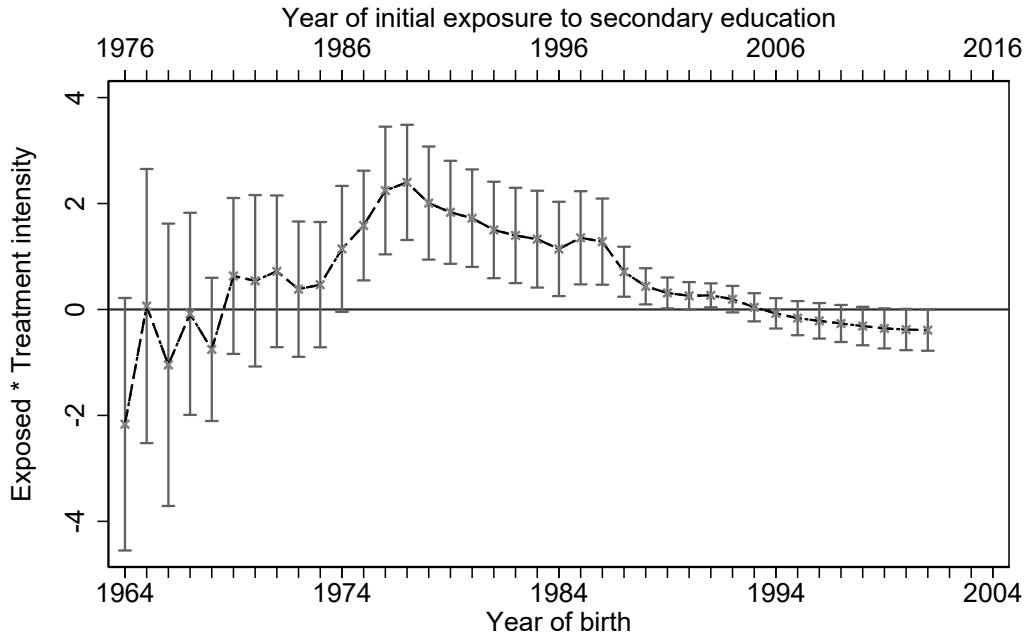
Note: Shaded area shows 95% confidence intervals.
Source: National Household Survey (2004-2019) and School Census (1993, 2010).
Own elaboration.

FIGURE C.12: 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 C.13: 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 C.5: Treatment intensity: Effect of the educational privatization expansion on secondary completion (cf. Eq. 3.5)

	Exposed=1 if born before		
	(1) 1990	(2) 1995	(3) 2000
Exposed X Intesity	-0.007	-0.012*	-0.015*
	(0.006)	(0.007)	(0.008)
Female	-0.056***	-0.056***	-0.056***
	(0.007)	(0.007)	(0.007)
Indigenous mother tongue	-0.314***	-0.314***	-0.314***
	(0.012)	(0.012)	(0.012)
Migrated from province of birth	0.044***	0.044***	0.044***
	(0.008)	(0.008)	(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 C.6: Treatment intensity: Effect of the educational privatization expansion on real wages (cf. Eq. 3.5)

	Exposed=1 if born before		
	(1) 1990	(2) 1995	(3) 2000
Exposed X Intesity	-0.126	-0.282	-0.383*
	(0.173)	(0.188)	(0.198)
Female	-3.993***	-3.993***	-3.992***
	(0.087)	(0.087)	(0.087)
Indigenous mother tongue	-2.070***	-2.071***	-2.070***
	(0.174)	(0.174)	(0.174)
Migrated from province of birth	1.346***	1.346***	1.347***
	(0.151)	(0.151)	(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 C.7: Treatment intensity: Effect of the educational privatization expansion on secondary completion (cf. Eq. 3.6)

	Exposed=1 if born before			
	(1) 1970	(2) 1980	(3) 1990	(4) 2000
Exposed X Intesity	0.020	0.053***	0.013**	-0.014*
	(0.025)	(0.017)	(0.006)	(0.008)
Female	-0.056***	-0.056***	-0.056***	-0.056***
	(0.007)	(0.007)	(0.007)	(0.007)
Indigenous mother tongue	-0.314***	-0.313***	-0.314***	-0.314***
	(0.012)	(0.012)	(0.012)	(0.012)
Migrated from province of birth	0.044***	0.044***	0.044***	0.044***
	(0.008)	(0.008)	(0.008)	(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 C.8: Treatment intensity: Effect of the educational privatization expansion on real wages (cf. Eq. 3.6)

	Exposed=1 if born before			
	(1) 1970	(2) 1980	(3) 1990	(4) 2000
Exposed X Intesity	0.541	1.724***	0.257*	-0.379*
	(0.820)	(0.466)	(0.132)	(0.197)
Female	-3.993***	-3.994***	-3.993***	-3.992***
	(0.087)	(0.087)	(0.087)	(0.087)
Indigenous mother tongue	-2.069***	-2.049***	-2.067***	-2.071***
	(0.174)	(0.173)	(0.173)	(0.174)
Migrated from province of birth	1.346***	1.346***	1.347***	1.347***
	(0.151)	(0.151)	(0.151)	(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

Appendix D

Qualitative fieldwork in Lima[1]

D.1 Introduction

During the last year of my doctoral studies, I went to Peru on a research visit. Exchanging ideas with other scholars whose research focuses on education was very helpful. At this time, I also did qualitative fieldwork, with the co-author of this Appendix, to study in greater detail the underlying mechanisms of the educational privatization process.

The present Appendix seeks to deepen the understanding of the privatization process of the education sector, exploring it from the perspective of a sample of both experts and policymakers. In particular, we are interested in the process that led to the law on private schools which was finally enacted in 2021, by means of the Supreme Decree Nº005-2021-MINEDU (hereafter, SD2021).[2] Our aim is to provide insights into the different motivations and interests that were defended by the concerned agents, shedding light on the stakes that may also have been present in the very origins of liberalization.

Our focus is SD2021, and not DL882, because the people who directly participated in the latter are very difficult to locate, are elderly, or are no longer alive. Consequently, we considered that SD2021 was more viable for the fieldwork and equally informative about the main issues that surround the privatization process. The findings presented in this

[1] This Appendix is co-authored with Diana Safra, MA in Public Policy at the University of Paris Dauphine-PSL.

[2] Supreme Decree No. 005-2021 that passed the "Regulation of private basic education institutions", promulgated on February 28, 2021.

Appendix are important for understanding the context in which the treated individuals analyzed in Chapter 3 had their schooling.

The rest of this Appendix is organized as follows. First, we describe the methodological approach. Second, we analyze the nature of the problems that emerged after DL882. Third, we provide details regarding the process that led to SD2021 and the points that were at stake. Finally, we give some information about the current work of Minedu regarding private schools and offer some concluding remarks.

D.2 Methodology

D.2.1 Approach

Here we rely on a qualitative approach to identify the perspective of the actors who participated in the process of the elaboration of the SD2021 legal device. Through this approach, we are committed to "understanding social phenomena from the actor's own perspective and examining how the world is experienced. The important reality is what people perceive it to be" (Taylor, Bogdan, & DeVault, 2016, p.3). In this sense, our approach is part of a comprehensive logic, which prioritizes the description of the process rather than an explanation of the causes (Imbert, 2010).

The data collection technique was by semi-structured interview. This was appropriate for our purposes since it "asks informants a series of predetermined but open-ended questions" (Given, 2008, p.810). The semi-structured interview was appropriate because we were making an exploratory study, and we did not have much information beforehand. For this purpose, we developed a written interview guide in advance. All the interviews were held during the first semester of 2022.

D.2.2 Participants

The participants, ten in total, were selected by snowball sampling because a priori it was not easy to contact the potential informants. All the participants had at some point worked in the Ministry of Education (Minedu). Eight of them were directly involved in the process of regulating private schools, the rest only indirectly. We tried to balance

the sample according to the periods for which they worked at Minedu: whether 1995-2000, 2000-2010, or 2010-2022. Therefore, we were able to deal with different moments of the regulatory process: the origins, the formulation, and the execution of the legal devices. Likewise, we tried to balance the sample according to their rank in the Minedu's hierarchy: low (specialist or equivalent), mid (team leader or equivalent), and high (director or higher). Some of the participants moved to academia after their experience at Minedu. Therefore, they have also studied the privatization phenomenon as researchers and were expected to make an impartial assessment. The profile of all the participants is presented in Table D.1:

TABLE D.1: List of interviewees

No.	**Interviewee (alias)**	**Previous or current experience in**	
		Academia	**Ministry of Education**
1	Tania	Yes	Yes (low rank)
2	Kusi	Yes	Yes (low rank)
3	Tupac	No	Yes (low rank)
4	Lara	No	Yes (low rank)
5	Iris	Yes	Yes (mid rank)
6	Lucas	No	Yes (mid rank)
7	Ada	No	Yes (mid rank)
8	Greta	No	Yes (high rank)
9	Axel	No	Yes (high rank)
10	Enzo	No	Yes (high rank)

D.3 The problems

To understand how SD2021 was included in the public agenda, it is important to identify the different aspects of the problem of privatizing education. For this purpose, we first review the main legislative precedent on private education: DL882. Next, we present two examples of the complications that emerged as a result of this law (the informality and growing heterogeneity of private schools) together with two institutional limitations of Minedu (information gaps and a deficient internal organization).

D.3.1 Precedent: DL882

In the last three decades, the major legislative change regarding private education occurred in the mid-1990s. At the time, the political, social, and economic context was

still difficult. The country was emerging from a frontal war against terrorism and trying to recover from unprecedented hyperinflation. In the education realm, private schools were already serving mainly the middle and upper classes, but public sector participation was still dominant. However, there was an increasing demand from society for education and the State's incapacity to meet this demand was manifest. This incapacity was accentuated by long-standing deficiencies in the education sector: constant policy discontinuities, the lack of a national educational project, insufficient investment, and a rigid bureaucracy, among other factors (Balarin, 2005, p.130). It is illustrative to mention that the immediately preceding decade was called the "lost decade for education".

In this context, the government of Alberto Fujimori advocated neoliberal policies as the solution to the problems of the country. The education sector was no exception. After some unsuccessful attempts at liberalization, the DL882 "Law for the promotion of investment in education" was finally enacted in 1996. This law "was concomitant with the government's conviction that there needed to be more participation from the private sector in the provision of educational services" (Balarin, 2005, p.132). At the time, it was publicized as the solution to the inadequate supply and coverage.

It is worth noting that DL882 was emerged as a response to the demand for higher education. The interests behind this legislation were mainly represented by a group of businessmen close to Fujimori's regime. They actively promoted the privatization of education despite the vehement opposition of other actors. In this regard, an interviewee states:

> "It was very clear, **it was a group of close people**... Let's say, in **Fujimori's government** there had been several attempts to carry out a Chilean-style process, which faced a lot of political opposition from different organized groups including the church, but also from the educational forum and different groups (...) But at that time it was very clear that the minister, Domingo Palermo, who was the owner of TV channel 9, was very close to Fujimori and was a close friend of a group of people who were the... let's say, there was Raúl Diez Canseco (who later formed the San Ignacio [University], the San Ignacio institutes, the San Ignacio schools); and there was Alfredo Miró-Quesada, and there was David Fischman, who were the ones who formed the UPC [Peruvian University of Applied Sciences], who had Cibertec. (...) Of course, they were part of the regular clientele, let's say, of Minedu's court of that time. You would see them coming and going, etc., (...) And the UPC, together with San Ignacio, are among the first universities founded and formed, let's say, in the context of the [DL] 882." (Iris)

According to our informant, those businessmen professed a liberal-libertarian ideology. Their economic interests were intertwined with an idealistic vision, where, in view of the incapacity of the State, they would be the ones called to assume the responsibility of generating changes to improve education in the country:

> "I mean, obviously there were interests, but **those interests are not unique, and they are not that simple either**. Obviously, there was an **economic interest**, and there are people who have made a lot of money in the context of that liberalization of investment in private education. But I think they were also mixed, I mean, they were people who were also **idealistic**, they also **wanted to support the development of the country**. We lived in a context where there was a growing and **unsatisfied demand** for higher education in a completely bankrupt State, which had no money at all, which could not even finance the universities that already belonged to the State. By no means could it have created the supply that was needed. So, I remember that many of the discussions had to do precisely with: "Well, there is all this demand for higher education, people deserve to access higher education and the State has no way to satisfy that demand because, first, they haven't the money, and second, they do not have the management skills. **We, the entrepreneurs of education, have a proven ability to manage education**, we have these experiences, we want to do these things, etc." They made a law very closely tailored to them. To what extent is that...? Look, **it was obviously a lobby**, but I think that, probably, if you talked to the people, with those people, you would meet people who did have a conviction of, let's say, of contributing, of helping the country, people like Luis Bustamante, for example, who was dean of the UPC for a long time. They were **liberals, libertarian liberals, they wanted to contribute to the development of the country from that perspective**. I think that the narrative of "they made a law to suit them" needs to be nuanced a little bit. In a way yes. But, in a certain way, that was also the thing to do." (Iris)

Although the interests behind the DL882 were focused on higher education, its scope was much broader due to the generality of its design. Consequently, it had an impact at all educational levels, not just on universities. After liberalizing the market, the State applied a de facto laissez-faire policy:

> "The State gives that law and the idea of superintendence that supervises quality remains completely in the pipeline (...) But it starts up, this law is decreed, the market is opened and that is it. And **the State**, let's say, **resigns, or abdicates**. I believe that the State abdicates its responsibility because they never look at the subject again." (Iris)

In this way, the DL882 meant opening the way not only to universities but also to schools that start operating under a business logic, something never seen before in

Peruvian history. At the same time, there was no or in any case minimal intervention from Minedu, during the period between 1996 and the 2010s.

Beyond the debate on whether or not education should be private, the social reality accounts for a series of problems that emerged as a result of this political program and its normative instruments. Some of these problems are detailed below.

D.3.2 Heterogeneity

First, the privatization of education has led to a substantial increase in the heterogeneity of private schools. Specifically, a segment of low-cost schools has appeared that did not exist before, and they usually provide poor-quality educational services (Minedu, 2018).

One of the interviewees highlights that this type of school is mainly aimed at a public that comes from the lower-middle and lower classes, whose families are characterized by having "very ingrained this idea of the myth of education, that education is an element of social mobility (...), especially in urban areas" (Tania).

In contrast to the common sense shared in society, the results of the Student Census Evaluation show that private schools do not always perform better than public schools:

> "When we compared the census evaluations of private schools in urban areas, with the census evaluation of public schools in urban areas, we saw that public schools had much better results than private ones." (Greta)

These differences, however, are not necessarily so easily identified by society. On the one hand, public schools have tended to have a strong negative symbolic value in the social imaginary; on the other, the extremely high heterogeneity of the private sector has not yet been sufficiently revealed in the public debate.

D.3.3 Informality

The problem of the proliferation of private schools is not only quantitative. A second problem that we found, and that all the interviewees agree on highlighting, is the informal nature of a segment of schools, which has consequences even capable of harming students. One of the interviewees relates:

> "We went out with about 100 people to do a census of private schools in Lima; we got up to do it physically, with a knock on the door (...) What we found was that around 10% of the schools that we could reach **were informal, they were not even on the register of Minedu**." (Axel)

A segment of the informal schools that appeared were cataloged as "garage-schools" by one of the interviewees:

> "There were **garage-schools**, that is, a family that decides to open up a school and that basically is in an area where you probably either have a public school that is oversubscribed or in a more peripheral area... I mean, they were **totally informal**." (Tupac)

The private schools that emerge and spread in this context do so without a minimum of the conditions that guarantee quality education:

> "...yes, very good [the educational provision] in some [private] schools, but the vast majority of schools were very small, they are very small, very few students, the quality of private education was not good, rather they were **scam-schools, they swindled the parents**." (Greta)

The problem of informality is not exclusive to low-cost schools. It is also present in middle-class schools and is not strictly linked to their size, material conditions, or infrastructure, but rather to respect for the rules. A representative case is that of the Trilce school:

> "When an informal school is mentioned, you think of a school that does not have any authorization, but an informal school was also, for example, this school [Trilce] (...). You [the school] are authorized to operate from first to fourth [grade] of primary, but you also offered fifth and sixth of primary, for which you are not authorized." (Tupac)

Likewise, another interviewee expresses how this informality was also reflected in the ease of violating the use of the official modular codes[3] provided by Minedu:

> "What a school has is a modular code (...) The modular codes represent a level of service: preschool, primary, secondary, technical education, EBA [Alternative Basic Education], and everything that can differentiate them. These services [the modular codes] are for sale or rent, so much so that you can enter Mercado Libre.[4] I did it, I went to Mercado

[3]The "modular code" (código modular) is a number that identifies each school-education level. It consists of 7 digits randomly generated by the Ministry of Education and is non-transferable.

[4]Online marketplace dedicated to e-commerce.

> Libre and called by phone. [The advertisement] said: "I sell or rent a modular code for secondary school or primary school, San Borja" (...) and they answered, and they said: "Well, yes, you want preschool in San Borja, 30 thousand soles".[5] And what did the school that rented the code do? What it did was: it received your order, you paid, and it gave you your list of students, so that certificates could be issued. (...) [For instance,] When the day came to deliver the grades, a father who enrolled his child in Miguel Grau school received the certificates from Bolognesi school. Those schools did not appear formally in the register of the Ministry of Education, they never went through any revision, either of infrastructure, or teachers, or anything." (Axel)

D.3.4 Information gap

Third, the informal operation prevailing in some private schools, as well as the risks that this entails, compel one to bear in mind that the country suffered for a long time from incomplete, inconsistent, and non-systematic information systems. Indeed, at the beginning of the proliferation of private schools, there was no system for collecting data on them. This lack of knowledge led to ignoring the magnitude and nature of the problem that was brewing. One of the interviewed researchers precisely states: "We did not know how many (...) teachers, how many teachers per student, types of vision, we had no idea of anything" (Iris). However, the mere fact of having these data at some point would not be enough either:

> "We did a sweep of the informal schools in Lima, yes. You have the data, yes. We closed a few [schools], yes. Are they still closed? I have no idea. How many are there in the regions? I have no idea. Do you understand?" (Tupac)

The information gaps also affected the teaching staff hired by the school. This reflects the labor informality that is also present in the school-teacher relationship: "You had schools with a thousand students who did not have a worker [officially declared] and that was almost normal" (Axel).

But the situation becomes even more critical when the lack of information generates a risk for the students, since it was not possible to identify the teachers who stand in front of them. In this regard, one of our interviewees tells us about the danger that this meant for the educational community:

[5] The average exchange rate in 2021 was 3.88 soles to 1 US dollar.

> "You understand that a entire mass of teachers was expelled from the public sector, due to a history of sexual violence, as a result of a rule that was passed in 2017, which began to operate more and more widely in the following two years. What it did was that these expelled teachers migrated to the private sector, where, in addition, because of the very high level of informality, the possibility of following up on these harassers and rapists of children, of girls, was almost nil." (Axel)

In short, the mere fact of not having a primary source of information on private schools generated a domino effect for Minedu, since it did not allow it to identify, supervise, follow up, guide, and still less report teachers in situations as critical as the one described above.

D.3.5 Limitations in the internal organization and sector functioning

The problem of the lack of an information system implied a greater problem at the level of the internal organizational structure of Minedu, since there was no office, area or staff in Minedu with designated responsibility for private schools: "For decades, decades... yes, almost... there was not an office within the Ministry of Education that at least generated data on private education" (Iris).

Likewise, from the State, one of our interviewees points out: "There was no protocol at that time [to deal with private schools]. The most the Ministry [of Education] could do was to recommend" (Tania), but it had no major influence. As a consequence, Minedu did not assume its lead role in the sector and other institutions intervened:

> "For a long time, especially due to the privatization law [DL882] and everything that came out in the 1990s, Minedu increasingly backed away from the issue of private education, allowing other actors to enter with much more force, such as Indecopi mainly, but also other more local ones, the municipalities, etc." (Enzo)

In fact, the functions of supervising and sanctioning private schools were not clearly defined or delimited between Indecopi and Minedu. In this context, Indecopi then gained enough prominence to address complaints from parents, as consumers of the educational service. At the same time, issues related to infrastructure or security fell within the purview of INDECI[6] and the municipality where the school was located.

[6]INDECI is the acronym for the National Institute of Civil Defense (Instituto Nacional de Defensa Civil).

Furthermore, after the decentralization process of 2003, the responsibility regarding private schools fell on the UGEL.[7] However, their capacity to assume their new responsibilities was (and still is) very limited:

> "Within the UGEL, which are the instances... which are responsible for supervising public and private education, there were no specialists in the supervision of private schools, whose regulations are different from the public schools', and not only were there no specialists who knew the regulations well, but they couldn't cope either, because the same supervisors who had to do, let's say, supervision, in public schools, also had to do it in private ones, but they didn't have time, they didn't have enough time because they already had enough work worrying about the public schools." (Greta)

This is how the organizational and functional problem that was already observed in Minedu was extended to the UGEL. Moreover, the limitations of the UGEL in assuming responsibility for the regulation of private schools were taken by some actors as their opportunity to profit by corruption.

According to Law No. 26549 "Law of Private Educational Centers" of 1995, Minedu is responsible, through its competent bodies, for registering the operation of schools. As a consequence, those interested in opening a school must apply by complying with the stipulated requirements and documentation. It is also specified that after 60 days without response from the competent authority, the applicant is assumed to have the authorization. This legal figure is known as the "positive administrative silence". It should be noted that this responsibility was transferred to the UGEL after the decentralization process of 2003:

> "Let's say, the arrangement behind closed doors was: 'Hey -for the UGEL- I'll propose that I send you the requirement to open the school. We know between us that it is not going to comply, but you do not answer me or [send] anything else and that way you cover yourself and I obtain the authorization by positive administrative silence'." (Enzo)

D.3.6 Confusing regulations and legal loopholes

The problems mentioned above, among others, generated the intervention of other actors with the capacity to pass legal regulations. For example, upon verifying that private

[7] UGEL is the Local Educational Administration Unit (Unidad de Gestión Educativa Local). In general (but not always) its jurisdiction spans the province. Currently, there are 220 UGELs in Peru.

schools suspended the educational service to students who were not up to date with their tuition payments, the Congress enacted in 2002 the "Law to protect the family economy regarding the payment of fees in private educational centers and programs" (Law No. 27665), which prohibited this practice. Indecopi did the same with the different kinds of complaint that came to its offices. In this way, gradually the legislation on private schools was configured as an accumulation of "patching up" the problems that were emerging. This legislation came not only from Minedu, but also from such actors as Congress and Indecopi, as noted above.

> "[The legislation on private schools] has a lot of patches also elaborated by the Congress, raised by the Congress, regarding specific questions, things that could sound very good in theory, but in practice, they were very populist measures that ended up being counterproductive." (Iris)

> "For a long time, there was this talk about: "Ah! Public schools are the responsibility of Minedu and private schools are the responsibility of Indecopi", which also denotes a very particular perspective." (Iris)

The multiplicity of actors and the lack of a unified approach made the regulations on private schools mediocre and left notable gaps:

> "Part of this problem was that the regulations were very confusing, very out of date, there were many rules that contradicted each other, there was no clarity on how they [the private schools] had to be regulated." (Greta)

> "They [Minedu staff] realize that the regulations are extremely partial, cumbersome, overlapping, there are regulations that contradict one another, that there are gaps, well, there is an enormous regulatory disorder." (Iris)

> "The regulations were completely out of date or there were no regulations for basic procedures in the school, on how the provision of educational services should be regulated in a private school." (Enzo)

Based on the problems mentioned in this section, Minedu took actions such as the creation of the "Coordination for articulation with private schools"; the creation of the NEXUS system (to manage, administer and control information on teaching positions); the collection of mandatory information declared by the directors; the Census Evaluation of Students; and operations to identify informal schools. Similarly, an important

achievement was the creation of the Identicole platform, an open system to identify schools formally.[8] In this regard, one of the interviewees explains the benefits of this platform: "You, as the father or mother of the family, entered the number, the name of the school and with that you verified if it was there or not" (Tupac).

Beyond these initiatives, during this time, perhaps one of the most important decisions has been to carry out SD2021, which will be the focus of the discussion in the following section.

D.4 The road to regulation

The concern to regulate private schools emerged mainly from the moment when unanticipated negative consequences and perverse effects appeared, such as the examples cited in the previous section. It was then motivated, above all, by extrinsic rather than intrinsic conditioning factors.

Although this set of problems had been identified by the Ministry of Education, this was not enough for the issue to become part of the public agenda. It was clear that DL882 could not be modified by Minedu, since it had the status of a law. Achieving a modification at this level would imply more than an effort at the level of mid- or high- ranking public servants (directors, coordinators, specialists) or even ministers. It implied a much stronger and more sustained political will, involving the President of the Republic himself, because the initiative would also need to be well received by the Parliament. Therefore, support at the highest political level was required. Given the difficulties that the sector had faced in regulating higher education[9], it was already clear to Minedu that passing a reform of DL882 to regulate private schools would be very difficult, considering the economic and political positions and interests.

Thus, the team that was formed within Minedu focused mainly on designing the regulation, since there was political will to do so at the Ministry's high command level, with support for the development of such a regulation. Despite this internal political will, the road to the regulation of private schools was long and faced much opposition. In

[8] https://identicole.minedu.gob.pe

[9] In 2014, the University Law No. 30220 was enacted, which regulates the creation, operation, supervision and closure of universities. At the same time, it created the National Superintendency of Higher University Education (SUNEDU).

the following sections, we first show how the political will was key to giving continuity to the first efforts; second, we describe some points that were at the center of the debate during the elaboration of the regulation; and third, we analyze how the political context facilitated the publication of a first effort to reform DL882, as well as the final publication of SD2021.

D.4.1 Political will and continuity: first steps

The insertion of the topic on the public agenda was a long-term process that cannot be understood without considering the political context at the time. In fact, all the interviewees highlighted how important the continuity of missions within Minedu was in spite of a very unstable political context. Although this continuity was facilitated by the efforts of mid-level civil servants, it was the political will of the senior management authorities that sustained it.

Regarding the intense political instability, this is reflected by the number of Presidents of the Republic who took office between 2011 and 2021: six in total. Nevertheless, in this period only two governments were anticipated (according to Peruvian law, the President serves for five years without the possibility of immediate reelection). The reasons for these crises are outside the scope of this Appendix, but the permanent conflicts between the powers of the Executive and the Legislature can be highlighted.[10] As a consequence, in the same period, there were nine ministers of education (see Figure D.1).

[10] More details are provided by Dargent and Rousseau (2021).

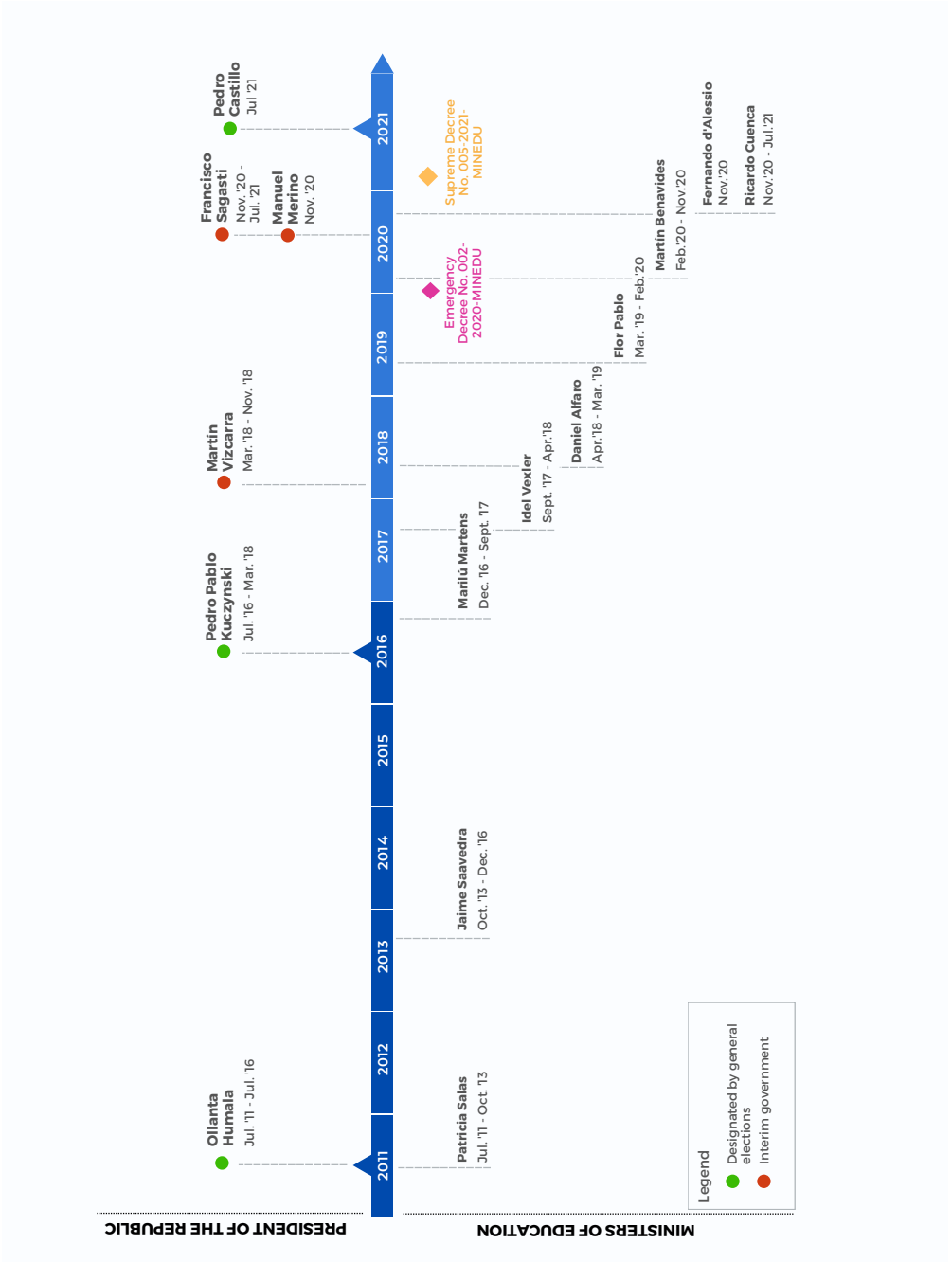


FIGURE D.1: Political timeline, 2011-2021

Authors' elaboration.

In spite of this, and against all the odds, the testimonies show a continuity in the work on regulating private schools within Minedu. The first step was to place it as a priority issue for the sector, and then more openly on the public agenda. All the interviewees agree that for this purpose the political will was key:

> "There was an internal work of the technocrats, of the people within the ministry, to set it as a topic that had to be relevant (...) There are certain people who try to put private education on the agenda as an important issue. That begins with Patricia Salas as Minister, then with Jaime Saavedra and the following ministers, but within the ministerial terms there are people who begin with this agenda setting." (Kusi)

> "Since (...) the Salas period and continued for a while with Minister Saavedra, and then (...), there started this work of somehow resetting Minedu as the rector in the delivery of educational services, regardless of who provides the service, whether public or private, state or non-state."(Enzo)

The continuity of work regarding the SD2021 was possible because the people who took office had the same vision as their predecessors. While this continuity among high-level decision-makers was crucial, it was also crucial in the team itself.

However, political will not only implied setting private education as a priority but was also reflected in the initiative to change the organizational structure of Minedu to respond more efficiently to the challenge.

In the first stage, during Patricia Salas' term as Minister[11], an office was created to support educational institutions:

> "So, we began to rethink the links between the sector, the ministry, the state structure, and the private school, and to recover the relationship with the private school, which was totally lost; there was no relationship at all. In other words, the relationship was limited to: "You, private school, you come to ask for a license, you get it approved, denied or whatever". But besides, it was basically a relationship of bureaucratic procedures." (Iris)

Later on, under the administration of Jaime Saavedra[12], the Organization and Functions Regulations (ROF) of Minedu were reformed, marking one of the first milestones in the creation of the General Directorate of School Management Quality (Dirección General de Calidad de la Gestión Escolar - DIGC) . In this regard, an interviewee explains:

[11] Minister of Education from July 28, 2011 to October 31, 2013
[12] Minister of Education from October 31, 2013 to December 18, 2016.

"Before, there was no division [in Minedu] that dealt with private issues; this has been fought from the inside" (Kusi).

In this context, it was essential for Minedu to seek the support and advice of experts and academics from independent institutions (in the form of consultancies and international cooperation), whose research provided evidence that allowed them to better understand the different aspects of the problem of private schools, and thus recommend a formulation of regulations that would be more relevant to this situation.

Once the problem of private schools had been brought to the attention of high-level authorities and was part of the public agenda, the objective was to design a regulation:

> "The priority was the regulation, to come out with a single regulation that would put into order this whole tangle of rules that existed at the same time and that would bring order, that would set clear rules, that would provide a minimum quality level for private schools that did not yet exist." (Greta)

By 2017, four versions of the regulation for private schools had been drafted. To be precisely, the fourth version was being drafted at the time Marilú Martens[13] became minister:

> "In 2017, with Minister Martens, a review of this 4th version was made. A 5th version was elaborated but there really wasn't much support then — there were other priorities." (Enzo)

The situation did not significantly change with the entry of Idel Vexler[14] in 2017 when he took office in the Ministry. Many projects were at a standstill. Among them was the regulation of private education: "Minister Vexler simply did nothing, for better or for worse" (Enzo).

Then, according to one of the interviewees, starting the administration of Daniel Alfaro[15] in 2018, the concern and efforts to regulate private schools resumed with greater force. This continued during the administration of his successor, Flor Pablo[16]:

> "Then with Minister [Daniel] Alfaro and finally with Flor [Pablo], this issue found a lot of strength. Minister Alfaro had just come from a very successful campaign for his law on

[13]Minister of Education from December 18, 2016 - September 17, 2017.
[14]Minister of Education from September 17, 2017 - April 02, 2018.
[15]Minister of Education from April 02, 2018 - March 11, 2019.
[16]Minister of Education from March 11, 2019 - February 13, 2020

> institutes and the regulations of institutes of higher education, where he had established technical goals and developed these normative documents. He asked us to do something similar and in fact we did it." (Enzo)

It is important to highlight the previous experience that both Alfaro and Pablo had had in matters related to the problem of legislating in the private sector. On the one hand, Daniel Alfaro assumed the education portfolio after having been General Director of Technical-Productive and Higher Technological and Artistic Education of Minedu (between October 2016 and November 2017), where he had promoted the elaboration of the new Law of Institutes. This previous experience was relevant since it would have allowed him to understand the issues involved in the elaboration of this kind of regulation, such as the one required for the private school sector. Similarly, Flor Pablo was also sensitive to this topic, since she had observed several flaws during her directorship of the Regional Directorate of Education of Metropolitan Lima.

> "Minister Alfaro, more participative; Minister Pablo, we are going strong to the governing body. And I think that much of Flor's previous experience, what she has experienced firsthand in her time as director of the DRELM [Regional Directorate of Education of Metropolitan Lima], all the perceptions that she had to do something in the private schools [area] (...) They were two very marked dynamics, very different, but fortunately, the team she led was able to adapt and Martín [Benavides], I think he continued Flor's work." (Enzo)

Consequently, the political will and leadership of some ministers were key to mobilizing the issue on the public agenda, as well as to continuing the process of drafting the regulations.

D.4.2 Roundtables: actors, dynamics, and negotiation

D.4.2.1 The actors

During Daniel Alfaro's term as minister, roundtables were initiated with representatives of private school associations to discuss the fifth draft version of the regulation. Those roundtables were held mainly with representatives of private schools to inform them and discuss the content of the regulation:

> "Between 2018 and the beginning of 2019, there were about 9 technical roundtables where we discussed each of the articles of the regulation. In the same period, the vice minister and

> the minister at the time, (well, with the ministers, because they changed) were working to incorporate private school issues in their agenda setting. They were having a more articulated relationship with the private sector." (Kusi)

The objective of Minedu was to elaborate the regulations according to a democratic and participatory process. This required gathering the voices of the private sector. The selection of participants for the roundtables implied great difficulty for Minedu in terms of the representativeness of schools, due to their vast heterogeneity and different levels of formality. As some interviewees reported, this was an important bias to consider since not all voices could necessarily be heard:

> "**Who are the ones who really have the voice of the private school?** Because at one point we already had a list of almost 80 people (...) And at the same time (...) [we also invited] parents to balance it a little. It was very difficult to differentiate, to know who to invite and who really brings in the important voices, isn't it? (...) There are known actors that represent the good private schools, I am going to say it, from a certain segment, mainly Lima." (Enzo)

This imbalance in representativeness was also reflected in the ability of stakeholders to assert their position throughout the process. Schools with medium or high economic and symbolic capital had more resources to make themselves heard:

> "The [private schools] with the greatest acquisitive power came, as we say, lawyered up, right? That is, they came with their team of lawyers and obviously with very legal arguments of what cannot be done, unconstitutional, etc., etc. (...) For example, Innova [Schools][17] or similar who had a super strong, super good team of lawyers." (Enzo)

The smaller schools (including those that had been called "garage-schools"), in contrast, were less represented because most of them were not organized, were not part of any block or guild, and it was difficult to identify valid representatives of this segment:

> "The [private schools] that are not organized in associations, we did not listen to them much (...) There were 14 thousand private educational services, it was impossible to sit in front of 14 thousand, so we sat down to talk with the associations, those that were grouped together." (Greta)

[17] Innova Schools are a chain of schools belonging to the Intercorp economic group, which includes multinational companies of Peruvian origin present in sectors such as banking, insurance, health, cinemas, etc.

> "But we tried to find representation in what mattered most to us, which was the emerging private school sector and that is where **it was very difficult** to find these associations, but we found some interesting voices, with [Edgardo] Palomino, [President of the Association of Private Schools of Lima], who is in the news every day, and others. With them, we made, let's say, a dynamic of five dates where we reviewed all the five, at that time, the five or six big chapters of the regulations." (Enzo)

Besides, economic capital was not the only marker of difference between the various voices that were heard. There was also heterogeneity based on political affiliation, as well as the type of education provided, such as secular or religious. In fact, in addition to the associated Catholic religious schools, there was also a group of schools led by evangelical groups:

> "Evangelical groups in the private school are very strong on political matters. Obviously connected to issues such as "Don't mess with my children".[18] The Acuña group is very strong in the private school, because it has big participation in the alternative private basic schools, especially in the north. There were also quite a few representatives of Fujimori's interest, in fact, in the last two sessions. Congresswoman Milagros Salazar was there and she demanded to be at the roundtables" (Enzo).

In this way, politics and religion were embedded and could have an influence on the process of public policy-making. This is how those people, known for their conservative point of view, also participated in the discussions on the content of what would be the SD2021. As the roundtables developed, the way in which the participants organized themselves, their interests, and the resources they were able to mobilize became explicit.

In addition, other actors also participated; for instance, Indecopi, the Ombudsman's Office (Defensoría del Pueblo), and the Parents' Associations (Asociación de Padres de Familia). In this regard, two interviewees state that this allowed for a more pluralistic dialogue:

> "We also brought Indecopi and the Ombudsman's Office to the table, so we made it less of a dialogue within an elite group (...) and turned it into a more plural, more open dialogue." (Iris)

> "The Ombudsman's Office was there so that they could give their opinions. There were parents, parents' associations that have also participated, because they had their point of

[18] "Don't mess with my children" ("Con mis hijos no te metas") is an ultra-conservative movement that appeared in 2016, as opposition to the gender perspective that Minedu sought to include in the 2017 National Curriculum.

> view regarding the regulation and because finally it is about their children, and they are the ones who are using this service." (Ada)

D.4.2.2 Socialization of the draft regulation and dynamics

From the interviewees' narratives, it is very clear that the main objective of the roundtables was to socialize the draft regulation (already in its 5th version) to receive feedback. In other words, during the sessions, the draft content of the regulations was read to the representatives of the private schools, and it was an opportunity to gather recommendations:

> "The idea of the roundtables was not to compose the regulations together. It was to review together the regulation that was going to be approved in case there were any relevant comments from our main stakeholders (...) There were cases in which they made us review it because they had very good legal or technical arguments. Or because of the political issue, we tried to offer them some things that would satisfy them, but we knew that this was not going to be enough. But the plan was always that we, that is, Minedu creates the regulation and socializes it. Then Minedu makes the final decision." (Enzo)

In this way, regarding the dynamics of the roundtables, all the interviewees agreed that it was a participatory and open process:

> "It was a participatory process, it was never an imposition by Minedu nor a closed process, we have had many roundtables in which we presented a version of the regulation and received inputs and feedback, there were even open and public consultations, where anyone could comment on the regulation from Minedu's web page. Public consultations were opened twice, in addition to the roundtables." (Greta)

In the words of the interviewees, the process consisted of the interaction of reading the regulations and receiving comments:

> "(...) the chapter was presented, and the articles were read one by one. For example, we would read five articles and then comment on all of them. And we had to listen to them all." (Enzo)

> "We made them aware and received their opinions because it is always healthy to be able to have all points of view because it is enriching in a regulatory process. Even more so in the case of a regulation" (Ada)

In this way, Minedu was able to have feedback from those who would be directly affected by the regulation, but it was also important for them to have an expert view:

> "We also had roundtables with experts, recognized experts in education studies (...) [feedback] not only about the regulations but also about this broader proposal of what we were thinking of doing with this issue of private education, the issue of supervision (...) Because it was important for us to make them aware of what we were doing, what they thought we could improve or change so that this reform could make sense and be sustainable over time." (Greta)

From the interviewees' testimonies, we identified that the objective sought by the Ministry of Education through the regulation could be summarized in the following points: (i) Unify in a single regulation all the regulations concerning private schools, including sanctions and establishing minimum quality conditions for the opening and operation of these schools, as well as delimiting the responsibilities of private schools; (ii) Recover governance, generate monitoring and supervision mechanisms, as well as giving support and guidance.

The process of socialization of the fifth version of the regulation, however, generated points of friction between counterparts during the roundtable discussions. A former public servant describes it as a very difficult process because "there is great resistance from the private schools to regulation" (Greta). This point is developed in the following section.

D.4.2.3 Interests at stake and negotiation

At the roundtables, a diversity of interests was evident among the participants, according to the type of school or association. Regarding the schools with the highest economic capital, one of the interviewees stated:

> "You had the bilingual [schools], which are the most expensive in Lima and Peru. The big ones, the schools of this type instead asked: "Free me, reward me by freeing me from supervision to spot issues that really, for me, at this level, don't make sense." So we said: "Yes, but there are things we can't stop to look at, cases of [sexual] violence." At one point, there was a well-known case at Markham High School." (Greta)

On the other side of the table were the schools with less economic capital:

> "Then there are the schools that, going from higher cost to lower cost, were halfway between – medium cost schools. There, the big ones are the chains, such as the Interbank group, which has the Innova Schools. There is also Saco Oliveros. These are chains, which have schools all over Peru. Their interest was more like: "Make life easy for me to open more schools, don't complicate the process of opening a school, because right now it is a problem for me – the UGEL tells me one thing, the DRE tells me another – it takes a lot of work to open a school"." (Greta)

In this sense, due to the points of tension at the roundtables, the socialization of the regulation document also involved a process of negotiation with the representatives of the private schools. Nonetheless, given the nature of the actors involved and their interests, this negotiation process was also tinged with politics:

> "I think that there were, indeed, moments of negotiation. But those moments of negotiation are very complicated because they end up being trapped in major turbulent political currents." (Iris)

At this point, we should consider the influence of the dominant power groups, which is discussed below.

The weight of the dominant power groups

One of the interviewees affirms that pressure from other actors was evident:

> "We have been working on this normative document since Saavedra was Minister. However, so many ministers have passed and it has never materialized. And the fact is that **there was a lot of pressure from certain sectors**, which is why it could not materialize. This regulation was really still out of sight." (Ada)

> "Moreover, **associated with these schools there were also important dominant power groups**. I believe that, because of their fears, they also greatly distorted the intention of this reform." (Greta)

These dominant power groups, then, may have been the large corporations that own the media or newspapers:

> "It was an effort to inspect the low-cost private schools. But the big schools, especially the bilingual ones, **the big ones that have much more... I mean, [the ones] owned by the wealthy people in Peru. They set up very big lobbies** to prevent this [the reform] from happening because, in some ways, it would affect their autonomy." (Tania)

> "I think that the Interbank group was also a bit afraid. They have the Innova Schools, well – and I think that the largest associations of schools (...) [also exerted] political pressure." (Greta)

The influence of the dominant power groups was also linked to the realm of politics and its legislative representatives, as reflected in the following remarks: "Political pressure was clearly evident" (Greta), and

> "Some allies who were obviously at the roundtables, they were voting, they were talking to congressmen, they were talking to opinion leaders, they were going out... they wanted to be in the newspapers, they wanted to go on strike. And just at that moment, Congresswoman Milagros Salazar proposes a draft law to modify certain articles of the regulation, of the private schools' law, which came to nothing." (Enzo)

All this reaffirms that political will and support at the highest level were important for the progress of the regulation, since the subject generated a great deal of political noise. On the part of the private unions, there was a strong counterweight, especially from those representing the dominant economic power groups and owners of important private schools, who were against the reform. This, added to their powerful economic, political and media influence, made it difficult to push forward a reform such as the one needed in the education sector. In this regard, one of the interviewees mentions:

> "If there is no support from the highest level, because this issue has an impact, that is to say, it has a strong political impact, that is the truth... It was important, this support not only at ministerial level but also from the president (...) If there is no defense at the highest level, because the press will come, and the media, the Interbank group will come out to attack, [the newspaper] Gestión will also come out to attack. So, there must be a political and academic counterweight." (Greta)

Despite the possible influence of actors, according to those interviewed, negotiations took place only on very specific issues, and if Minedu deemed them it pertinent. Below follows a collection of testimonies on the most critical points of this process.

Tensions and points of conflict

Our interviewees highlighted six aspects of the regulations that were particularly tense: i) oversight, ii) sanctions and their amounts, iii) a pension moratorium, iv) pedagogical issues, v) teachers' working conditions, and vi) admission to schools. We do not go into

the details of all these points here, but we give some examples of the most discussed issues below.

The first of these is related to sanctions. In this regard, two of the former public servants comment:

> "The issue of sanctions was a very controversial issue. I mean, "how many UIT[19] you are going to charge me for this"." (Tupac)

> "On the side of the smaller ones [private schools] it was: "The amount of the sanctions is very high, the sanctions are very high, with one of those sanctions you can close me down". But the idea is that the sanctions are dissuasive, not that you fall under a sanction (...) We made it clear that it was not that they were going to be penalized, but that it has to be dissuasive. The idea is that nobody need be liable to a penalty, but that the rules are clear and you don't fall into breaking them; you don't break them." (Greta)

Since the fines are determined by UITs, what caused the greatest stir was the amount of the penalties. The determination of the amount of the UIT is beyond the competence of Minedu, so the typification of the seriousness of the offenses was a way to generate consensus:

> "The range of fines was too high (...) So, [the representatives of the private schools] were saying: "we need to lower those UITs" (...) So, by law, there was not much we could do, but we worked on the typification. So, we came there to try for some agreement. Obviously, everyone [the private schools] wanted it to be mild, but there were things that were undeniable (...) So, yes, yes there were these... a lot of these "pills", these "candies" that we were obviously willing to give up to get somewhere." (Enzo)

Despite the sanctions contemplated, one of the interviewees explains that the perspective that Minedu sought to convey was that the regulation did not have a punitive intent, but rather one of guidance and accompaniment:

> "And the approach we took was not only punitive, it was not: "I'm going to punish you, I'm going to close you down". No. The idea was also to help and guide in the regulations that we set up, it also had that approach, orientative and also supervisory: "OK, I'm going to give you a deadline to regularize the conditions, but I'm also going to help you and guide you in what you have to do to be able to meet those minimum conditions as a private school"." (Greta)

[19] The UIT are tax units (Unidades Impositivas Tributarias), a value in soles established by the Peruvian State to determine taxes, infractions, fines and other tax aspects. This amount may be updated by the exclusive decision of the Executive. In 2021, the value of one (1) UIT was 4,400 soles.

Another much discussed issue was the pension moratorium. Private schools were interested in removing the benefit granted by the family protection law that obliges the schools to continue providing educational services despite families' unpaid fees. In this regard, a former public servant explains that this aspect, for example, would not be subject to modification:

> "They wanted the regulation to give the private school the power to withdraw a student from the educational service for non-payment. That was a red line for us. There was no way we could accept it because the right to education is above everything else, above any other rules or regulations they might consider making." (Enzo)

This point in particular was a recurring demand. Minedu took a position in which it was not closed to dialogue, but this did not imply accepting a negotiation or modification of this point in the regulations. On the contrary,

> "Our response [as Minedu] was: "Show me evidence and data that your delay in paying is indeed long", because they [the private schools] told us: "My level of defaulting is 80%, I cannot pay, I cannot survive". Eh..., but they never showed us a single figure." (Enzo)

Regarding teachers' working conditions, one of the researchers commented: "They [the private schools] crossed out the whole teaching conditions issue, so everything that bothered them the most [so that the regulation could prosper] was taken out". (Iris)

And concerning school admissions, another of the researchers explains the controversy that it generated:

> "Then another controversial issue was the admission of students. Private [schools] wanted to select students with certain characteristics and the regulation proposed banning this. For example, in some private schools they selected [candidates] based on whether the parents of the students were married or divorced, this happened in Catholic schools. Or in other schools, students take an entrance exam to be selected. The new regulation, which applies to all, for example, says that there cannot be a selection process for students entering pre-school or first grade. That was an issue that was also debated a lot." (Kusi)

The discussion on the content of the fifth version of SD2021 also had a media and social impact that need to be considered when analyzing the negotiation process.

Lack of credibility

First, the political will was sorely tried because Minedu had a negative image among those whom it was intended to regulate and supervise. This is evidenced in the following testimonies:

> "Another strong criticism that private schools used to make to us [was]: "You are regulating me, and the public school that depends on you, look how it is. **Public education is very bad**, and you come here to regulate me when you can not even provide the service"." (Greta)

> "Jorge Yzusqui [general manager] of Innova Schools, at one point said, "**Why don't you give me the public schools? And I can do a better job**". Of course, then it was, like: "Do not audit me". I mean, they had these little things, like reluctance on some points." (Tupac)

> "90% of what they were saying was sentimental, such as "It [the regulation] infringes on autonomy, and you [Minedu] should not regulate, you should not do that. Why don't you first take charge of making the public schools function and then look at us"." (Enzo)

In other words, Minedu had already lost legitimacy and credibility in the eyes of education businessmen. While on the one hand there was a critical and negative view, on the other, these businessmen proposed themselves as savior figures, capable of solving what the State could not. This limitation is even acknowledged by one of the former public servants:

> "We were four people. Minedu had about 1,000 and only those four dealt with private schools (...) [Minedu] already had enough to do with trying to guarantee the quality of the public school (...) to say, "Well, I'm going to get into the lawsuit to see private schools"." (Tupac).

> "That people are probably going to say to you "Hey, I mean, are you coming to audit me? Look at your school that's falling apart"." (Tupac)

While recognizing their limits, however, the interviewees were clear that this was no justification for giving in to certain demands from the private schools:

> "We are rectors of both [public and private education]; we are rectors of education. Yes, we know that there are issues that, of course, we need to work on, they are urgent too, but that does not mean that I am not going to put a blindfold on and let private education continue in whatever way [they please]." (Greta)

The search for consensus

In addition to this deteriorating and weak institutional image of Minedu, the problems mentioned in the previous section and the negotiation process systematically generated media coverage. Obviously, there were the power groups whose interests could be affected by the regulation.

Indeed, an anecdote that was recurrently recalled by the interviewees was related to the moment when a draft version of the regulation was leaked to the media, which involved specifically the newspaper Gestión:

> "[The headline] had nothing to do with the content of the regulation (...) They [Gestión] published [a headline] of this kind: "The regulation of private educational institutions is going to get private school teachers fired"." (Greta)

Probably due to these problems, the testimonies reveal a negotiation dynamic that implied a search for consensus to avoid this type of impact in the media, but also a search for approval. In this regard, before setting up the roundtables, a former public servant states:

> "...we produced a version. The draft came out and I remember that it was leaked, that is, someone leaked the draft and when they [the private schools] read it, it was like "No, Minedu is *regulatorist*". There was a column by León Trahtemberg, I think in [the newspaper] La República (...) So, basically, the biggest and most important schools got together and said: "Well, no, we don't want to get together [with Minedu] anymore because if this is going to be your regulation, take it out if you want, but I don't agree". So, again it is like, well, **we have to bring them together because the idea was to have something agreed by all of them**. And the validation could only be given by those who were members of associations and unfortunately, the schools that were associated were those that were also sometimes against it." (Tupac)

In addition to the search for validation and consensus, they claimed that there was a need to avoid conflict:

> "From Minedu, what they really wanted – and it has all the logic – they wanted an instrument to get consensus with the majority or the validation of the majority of the private schools in order to have something harmonious. In other words, they did not want conflict between them. And for the same reason that they did not want a conflict, at times it [the regulation project] was put on the back burner." (Tupac)

D.4.3 Opportunism, imposition, or a democratic process?

As mentioned at the beginning of section D.4, political will was important in the first efforts of Minedu to draft the regulations on private schools. But political will was also important throughout the process of socializing the draft document, as well as for its final publication. Indeed, the final version of the regulation was obtained thanks to the political will and support of those at the head of the ministry, and this is reflected in the words of all the interviewees:

> "Fortunately, we had (...) **the support of the highest level to carry out these reforms**, both in the regulatory part and in the supervisory part, so by having that support we were able to move forward to obtaining all these results (...)." (Greta)

> "This would not have been achieved without the involvement of Minister Daniel [Alfaro] himself, at the time, and then Flor [Pablo], who got personally involved to provide a counterweight... because it was the only way." (Enzo)

It was precisely in the transition between the two terms (Alfaro's and Pablo's) that the final version of the regulation was drafted. After Alfaro's departure, former Minister Pablo made some additional modifications, but she also identified some limitations in the content that she asked to change:

> "As she [Flor Pablo] had been regional director of Metropolitan Lima, she had seen some problems that the regulation could not solve (...) The law of 1996 [DL882], which was later amended with many patches over the course of 20 years, had many limitations. So, at the time, she asked to see ways to, for example, put an end to the positive silence for the creation of schools, and the issue of the entrance fee, which was not given back [to the pupils' parents]; several things that were at the level of a law." (Enzo)

Although the main objective of this whole process of roundtables was the publication of SD2021, along the way, in parallel, other fortuitous variables in the form of political events appeared that played in favor of an important modification of DL882.

The political crisis between the Legislative and Executive branches was at its apogee. When the Congress denied a vote of confidence to President Martín Vizcarra's cabinet for the second time, he decided to dissolve the Congress on September 30, 2019, based on Article 134 of the Constitution, and to call for extraordinary parliamentary elections.

In legal terms, this led it to dissolve its legislative competence until it had a new conformation of its members. In this transition, until the new Congress took office in March 2020, the Executive Power had legislative competence (Article 135 of the Constitution) with the power to issue extraordinary Emergency Decrements[20], whose respective reports were prepared for the Permanent Commission of the Congress. This continued to function during the parliamentary interregnum.

Thus, this new political scenario (which ensued unexpectedly) favored Minedu's introduction of modifications with the weight of law, something that, as we noted above, was very difficult to achieve. One of the interviewees describes it in terms of a window of opportunity:

> "There was the opportunity of the Emergency Decree and something we knew was that there was going to be huge opposition. And that was Flor [Pablo]'s decision with President Vizcarra at the time (...) So, yes, it is a really good story about the Peruvian public sector, with many twists and turns, uses of the opportunities at hand, very strong political issues (...) This is the type of regulation that without the political weight does not come out." (Enzo)

As a result, the Emergency Decree No. 002-2020 "Emergency Decree that establishes measures to fight against informality in the provision of educational services by basic private schools, and to strengthen the education provision of private schools "(hereafter, DU002) was published. The main issue that was introduced in that decree had to do precisely with the problem of the positive administrative silence explained in section D.3. That is, given that the UGEL had a limited capacity to review all the requests for opening private schools, as well as a high level of corruption in such instances, the UGEL did not respond to these requests. In the absence of a response, it was assumed that the request was approved. In addition, the decree also stated a maximum time limit for teachers who did not have a professional degree to regularize their situation. In this regard, two interviewees pointed out:

> "In this Emergency Decree, what we included was that the positive administrative silence was over, so the flow of new schools would be stopped (...) and we also included the issue of the teachers, giving them 5 years to regularize their degree situation." (Greta)

[20] Decreto de Urgencia (DU).

> "And it is there where, for example, the issue of positive silence comes in, so that after so many days, if there is no response from the UGEL, in this case, the school is not created by default, which was the big problem of the proliferation of low-quality schools." (Enzo)

As the reader may have noticed, once again this legislative act functioned as a "patch" for the confusing and disordered regulations on private schools. However, the DU002 was used as an opportunity to anticipate future changes, including the publication of the SD2021:

> "What we announced in the DU002 [Emergency Decree] is that there would be a single regulation that would specify the basic conditions for the operation of private schools (...) It was more orderly to say that **there would be a single regulation** that would order everything, so it would be clearer and more organized" (Greta)

Without this window of opportunity (Kingdon, 1984), implementing changes at the level of law would not have been possible or would have taken much longer, since it would have implied going through a debate in the Congress, which had been mainly composed of dominant groups which opposed Minedu's vision, as mentioned at the beginning of this Appendix.

However, it needs to be clarified whether this type of amendment would be a democratic action or not, given the nature of the way in which it was carried out. As one of the interviewees recounted, two days before the publication of the DU, the groups participating in the roundtables were informed of its publication:

> "I believe that two days before it was published in El Peruano [the national official newspaper], we invited them [the representatives of private schools] to Minedu's office. We told them: "This is going to come out". It was a very ugly meeting, led by Flor [Pablo], and it came out. In fact, we even had Intercorp's most important lawyer that same day, saying that he was going to make a contestation." (Enzo)

As already mentioned, the course followed by the normative instruments of private schools is embedded in political phenomena, which makes it very complex to understand. This view was also shared by one of the interviewees:

> "There was also a lot of political lobbying and that is important. As in universities, maybe it's not so visible, but the political action on the private school issue was very strongly felt." (Enzo)

Through having roundtables, the process had tended to be democratic in one way or another. But it certainly seems very difficult to believe that a change of this magnitude could have taken place without DU002, which was issued practically unilaterally.

Given the changes introduced to the law, it was also necessary to adapt the regulations. In this new context, after the publication of DU002, the political turbulence continued. As mentioned above, after the closing of the Congress, the democratic process involved the calling of new representatives. With this change, there were also modifications at the ministerial cabinet level.

In this context of crisis and political instability, it could be assumed that placing the issue of private education on the public agenda was not only a major challenge in view of the actors and interests at stake. But it could also imply a lack of continuity in the progress that was being made to elaborate the regulation because cabinet changes also led to changes in the internal structure of the ministry, and staff turnover.

Despite this high political volatility, those who assumed the positions continued in the same line of work. Moreover, the person who assumed the direction of the DIGC is the one who was previously in one of its line directorates. Thus, the continuity in promoting the Regulation Decree was almost guaranteed. In fact, with the change of cabinet, Minister Martín Benavides took over in February 2020:

> "With Minister Benavides, who led the University Reform and I think that is why he has been super committed to the issue, we were able to make much more progress in this area. With him [Martín Benavides], we left almost everything ready. By the time he left, the regulation was ready and Minister Cuenca, fortunately, chose to continue with this initiative; he did not stop it." (Greta)

Once again, at this point, the political crisis continued its course. President Vizcarra was removed from his position in November 2020, and Francisco Sagasti assumed the presidency in a "transitional and emergency government". He named Ricardo Cuenca as Minister, and they finally signed the SD2021. In this long journey, the President's support was absolutely crucial:

> "The regulation is even signed by the president; it is a supreme decree – it is a supreme decree that is countersigned by the minister and countersigned by the president. So, if it had to be a decision at that level anyway, we had no way out of it." (Greta)

To conclude this section, it is worth mentioning that the interviewed public servants refer to the regulation as an "everlasting" and "exhausting" process, which was "constant paused" due to the heavy dependence on the political situation. A clear example of this can be found in the following narrative:

> "[While I was in Minedu], we worked for about two years going back and forth reviewing together with the legal area, reviewing all this so that in the end Saavedra happened and again they sent the regulation to the back burner (...) SUNEDU happened, and Saavedra happened and they said "I think this is not the time to take out the regulation"." (Tupac)

Similarly, another interviewee who attended some of the roundtables said:

> "It was really hard, really, really hard, because the position of those leaders [of the private schools], especially the more traditional ones, was: "But the State already makes my life impossible, it fills me with bureaucracy, it doesn't give me anything, and now they want to regulate us? Stop annoying us"." (Iris)

D.5 What comes after SD2021

The creation of an autonomous agency with the function of supervising the provision of basic education, such as Sunedu had as regards higher education, does not seem to be under discussion at the moment. In the meantime, it is the UGEL that is responsible for overseeing compliance with the regulations on private schools. Through the interviews, we confirmed that Minedu is fully aware of the limited capacity of the UGEL to address this issue. In response, Minedu has devised a strategy that consists of providing technical assistance and support to the UGEL to fulfill its functions. In this regard, one of the interviewees stated:

> "We began to implement a strategy to gradually provide sufficient personnel to the UGEL in Peru with the largest number of private schools (...) We made a plan to do it gradually, first starting with the ones with the most [private] schools and then providing staff. And this provision of staff was accompanied by **technical assistance**. That is, a team from Minedu trained this staff and accompanied them throughout the **supervision process** throughout the year, evaluated them, followed them up, taught them how to select which schools they had to supervise randomly and then installed a **monitoring system**. A whole plan was put together, a system to make this really work." (Greta)

The strategy also involved a monitoring plan, as Greta stated:

> "We have developed a supervision strategy, which is a decentralized strategy at the national level. We are currently focusing only on 11 regions, with which we are working in an articulated process in 29 UGELs. We are doing capacity-building training for specialized personnel in supervision issues." (Ada)

Furthermore, one of the expectations following the publication of the regulation is that it will be accompanied by other regulatory instruments that should be developed and approved in the medium and long term:

> "The regulation [SD2021] is, I believe, one of the first milestones, the "mother" of several other reforms that have to accompany this larger one. There are regulations that must come out that I have already seen coming out." (Greta)

D.6 Conclusions

One of the most astonishing aspects of the whole process regarding SD2021 is related to the attainment of its publication despite recurrent changes at the organizational level of the Ministry of Education and the constant political crises. This has probably been possible only because the key public servants who assumed functions shared the same vision. Among other factors, this can be explained by the fact that in Peru a proper civil servant career structure does not exist.

It is common that civil servants in high positions of the hierarchy call people who are close to work with them (either because they knew them previously or based on recommendation). In general, there is no public competition (or if any are advertised, they are usually fictitious) and there is no clear career path to advance to higher-level positions. Hiring from within a closed circle people at least ensures a certain degree of trust and obedience. Of course, this is not always the case, but it is often seen in the way that the internal organization of the public sector operates.

On this occasion, there was a convergence of actors who shared a vision, and who were in the right place at the right time to push this reform forward. Furthermore, these visions converged on an objective that seemed to be disinterested and positive for the development of the Peruvian educational system. Nevertheless, this same dynamic with actors with other subordinate interests or more mercantilist visions of education could probably have led to important setbacks for the sector.

The interviews allowed us to learn in more detail about the legal and regulatory situation to which the individuals analyzed in Chapter 3 were exposed. Liberalization, regulatory disorder, and the absence of supervision by the Ministry of Education led to the greater heterogeneity of private schools, greater informality, and the appearance of unexpected problems in the family-school, teacher-school, and even pupil-teacher relationships.

At all events, the analysis conducted in this Appendix is illustrative of the interests that are at stake regarding private education. Furthermore, the points of conflict that emerged during the elaboration of the regulation show the different agents' contradicting ways of seeing education. "The debate reveals that the predominant discourse contains both market and industrial orders of worth. On the one hand, education is equated to a service to be sold, students and parents are equated to consumers, and private schools to companies. On the other hand, the value of efficiency within private schools allows arguments such as the selection and expelling of students. These are positioned so that they do not contradict civic order of worth values, or as a means that would lead to them" (Rodríguez, 2020, p.57).

Finally, the main limitation of this Appendix is that we have not collected the voices of any actors from the private sector. Although we have tried to take an external view, especially by giving weigh to the perspectives of the participants who are currently outside the public sector, this is not necessarily a sufficient distance. This limitation, however, constitutes an excellent opportunity for future research.

Appendix E

TSWB Appendix

E.1 Peruvian teachers' labor conditions

In 2012, the Peruvian Congress approved the Law of Magisterium Reform which establishes the current labor conditions of teachers in public schools. According to this Law, teachers can be hired through two different types of work contracts in the public sector. In the first one, they are contracted for an academic year by the government to work at a particular school. They are usually called contracted teachers ("docentes contratados")[1], who have a regime of 30 working hours per month and their base salary is S/ 2,400.30 soles (around US$ 686 in 2020). These teachers can obtain monetary bonuses depending on the type and geographical location of their working school. In addition, it is possible to extend this type of contract for another year. Usually, these positions are opened when the local administrations cannot assure enough teachers for the educational service provision. According to the National Council of Education[2], in 2016 there were around 152,804 contracted teachers out of 396,771 in basic education.

In the second type of contract, teachers are hired in a permanent position ("docentes nombrados") .[3] In this regime, there are eight remuneration scales which go from S/ 2,400.30 – S/ 3,200.40 soles (US$ 686 – US$ 914) according to the number of working hours per month, 30 or 40 hours respectively. To advance among these scales, teachers must pass other national evaluations and complete several years in the service. At the

[1] https://www.minedu.gob.pe/reforma-magisterial/docentes-contratados.php
[2] https://www.edugestores.pe/wp-content/uploads/2016/10/Estadisticas-docentes-2016.pdf
[3] https://www.minedu.gob.pe/reforma-magisterial/docentes-nombrados.php

top of this remuneration scale, they can perceive a salary up to S/ 5,040.63 – S/ 6,720.84 soles (US$ 1,440 – US$ 1,920). These teachers can also obtain bonuses based on their schools' geographic or special academic conditions, but also for assuming managerial positions in the schools. In 2016, the National Education Council suggested that there were around 226 307 permanent teachers, 86.4% of which were in the first three scales of remuneration.

Both types of teachers are recruited through a national decentralized process of evaluation implemented by the Peruvian government. At the beginning of this process, the Ministry of Education (MINEDU) establishes a number of positions that will be opened in each Local Administrative Education Unit ("Unidad de Gestión Educativa Local - UGEL"). Then, MINEDU announces the hiring process at the national level and the requirements for teachers to pass the different examination stages. In the first step of this evaluation process, MINEDU applies a Unique National Test ("Prueba Única Nacional – PUN") to all teachers registered in this contract process. The teachers that achieve the minimum score can apply to the available positions. Then, these teachers are evaluated at a decentralized stage, in which schools implement evaluation committees to examine them. After this stage, successful applicants obtain a permanent contract. The empty positions are occupied by contracted teachers, which apply directly to the UGEL's. In October 2015, the first national teacher recruitment process was developed.

In the private sector, the hiring process is different and heterogeneous. Teachers are directly contracted by the private institution and on average their salary is around S/ 1330 soles (US$ 380) (Cuenca, 2017). The specifications of their contracts are not related to the Law of Magisterium Reform. They have standard laborer arrangements as any other worker in a private company. According to the National School Census, 30% of basic education teachers worked in private schools in 2018.

Despite the efforts to standardize the public hiring process, teachers' salaries are below those of other comparable professional groups. As a consequence, a substantial percentage of teachers have to work in secondary occupations to improve their income. Mizala and Ñopo (2016) report that, between 1997 and 2007, Peru was one of the Latin American countries where teachers' salaries were the most lagged compared to those of other professionals and technicians. This wage gap, measured after controlling for observable characteristics concerning their professional and technical peers, was the second-highest,

only after Nicaragua. Previously, Saavedra (2004) had already shown that the real wage of teachers had a long-term decreasing trend. In a more recent study, Díaz and Ñopo (2016) report that there has been a relative deterioration in the salary of teachers between 2004 and 2014. Indeed, teachers' relative salaries have passed from being in the 30th percentile of the distribution of salaries for professionals and technicians in the country to being placed in the 20th percentile in the same period. It is worth mentioning that this trend has been reversing slightly in recent years due to the increase in teacher salaries. However, this improvement was not enough for teachers who developed several strikes in 2017, demanding that their salaries increase.

E.2 National Teacher Survey: Descriptive statistics

TABLE E.1: Public sector teachers: Pooled sample, 2016-2018

	Percentage		Percentage
Survey year		**Type of contract**	
Total	100.0	Total	100.0
2016	47.0	Fixed-term	34.6
2018	53.0	Permanent	65.4
School area		**Gender**	
Total	100.0	Total	100.0
Rural	31.8	Male	44.2
Urban	68.2	Female	55.8
Teaching level		**Age**	
Total	100.0	Total	100.0
Primary	50.6	<=29	4.9
Secondary	49.4	30-39	23.0
		40-49	36.0
		50-59	29.8
		>=60	6.2

Source: National Teacher Survey 2016 and 2018.
Own elaboration.

TABLE E.2: Sample of teachers per cluster

Number of teachers per cluster	Nb of clusters	Percentage
Total	**3,720**	**100.00**
1	815	21.91
2	826	22.21
3	468	12.58
4	557	14.98
5	471	12.66
6	249	6.70
>=7	333	8.96

Source: National Teacher Survey 2016-2018.
Own elaboration.

TABLE E.3: School sample: Main characteristics

	Nb schools	Percentage	Maths z-score
Survey year			
Total	3,310	100.00	0.073
2016	2,106	63.63	0.123
2018	1,204	36.37	-0.014
Educational level			
Total	3,310	100.00	0.073
Primary	2,034	61.45	0.151
Secondary	1,276	38.55	-0.052
Area			
Total	3,310	100.00	0.073
Rural	1,279	38.64	-0.348
Urban	2,031	61.36	0.338
Natural region			
Total	3,310	100.00	0.073
Costa	1,141	34.47	0.437
Sierra	1,384	41.81	0.052
Selva	785	23.72	-0.419

Source: National Teacher Survey and Census Student Assessment, 2016 and 2018.
Own elaboration.

E.3 Exploratory Factor Analysis

TABLE E.4: Two-factor solution for TSWB: Factor loadings and unique variances after Promax rotation

	SWB item code	Factor1	Factor2	Uniqueness
2	Health	0.136	0.446	0.711
4	Own children education	0.134	0.496	0.657
5	Retirement conditions	-0.198	0.826	0.473
6	Self-esteem	0.444	0.244	0.614
7	Society recognition	0.178	0.488	0.627
8	Family relationships	0.502	0.201	0.587
9	Recreational activities	0.114	0.556	0.603
11	Students' achievement and relat.	0.504	0.084	0.689
12	MINEDU recognition	0.011	0.629	0.597
13	Colleagues relationships	0.778	-0.114	0.487
14	Principal relationship	0.720	-0.120	0.570
15	Students' parents relationships	0.804	-0.062	0.409
16	School location	0.414	0.097	0.772
17	Salary	-0.091	0.682	0.601
18	Community relationships	0.735	0.005	0.455

Note: The item code corresponds to Table 4.1.
Source: National Teacher Survey 2016 and 2018. Own elaboration.

TABLE E.5: Three-factor solution for TSWB: Factor loadings and unique variances after Promax rotation

	SWB item code	Factor1	Factor2	Factor3	Uniqueness
2	Health	-0.053	0.490	0.180	0.664
4	Own children education	-0.083	0.555	0.198	0.589
5	Retirement conditions	-0.106	0.040	0.764	0.444
6	Self-esteem	0.095	0.791	-0.150	0.405
7	Society recognition	0.155	0.174	0.393	0.631
8	Family relationships	0.191	0.692	-0.135	0.445
9	Recreational activities	-0.082	0.530	0.265	0.552
11	Students' achievement and relat.	0.397	0.202	0.030	0.693
12	MINEDU recognition	0.147	-0.145	0.733	0.469
13	Colleagues relationships	0.684	0.096	-0.063	0.489
14	Principal relationship	0.675	0.010	-0.030	0.553
15	Students' parents relationships	0.812	-0.038	0.047	0.341
16	School location	0.389	0.050	0.118	0.764
17	Salary	0.029	-0.088	0.732	0.512
18	Community relationships	0.690	0.060	0.058	0.432

Note: The item code corresponds to Table 4.1.
Source: National Teacher Survey 2016 and 2018. Own elaboration.

TABLE E.6: Four-factor solution for TSWB: Factor loadings and unique variances after Promax rotation

	SWB item code	Factor1	Factor2	Factor3	Factor4	Uniqueness
2	Health	0.502	-0.102	0.190	0.025	0.660
4	Own children education	0.560	-0.066	0.198	-0.039	0.592
5	Retirement conditions	0.037	-0.086	0.767	-0.024	0.444
6	Self-esteem	0.811	0.022	-0.146	0.047	0.404
7	Society recognition	0.172	0.249	0.369	-0.086	0.616
8	Family relationships	0.710	0.127	-0.137	0.048	0.446
9	Recreational activities	0.535	-0.054	0.263	-0.050	0.555
11	Students' achievement and relat.	0.210	0.411	0.001	0.011	0.679
12	MINEDU recognition	-0.140	0.112	0.728	0.051	0.472
13	Colleagues relationships	0.131	0.146	-0.015	0.606	0.409
14	Principal relationship	-0.011	-0.037	0.044	0.919	0.178
15	Students' parents relationships	-0.048	0.798	0.002	0.105	0.299
16	School location	0.056	0.340	0.103	0.076	0.766
17	Salary	-0.090	-0.026	0.746	0.062	0.502
18	Community relationships	0.024	0.871	-0.016	-0.058	0.287

Note: The item code corresponds to Table 4.1.
Source: National Teacher Survey 2016 and 2018. Own elaboration.

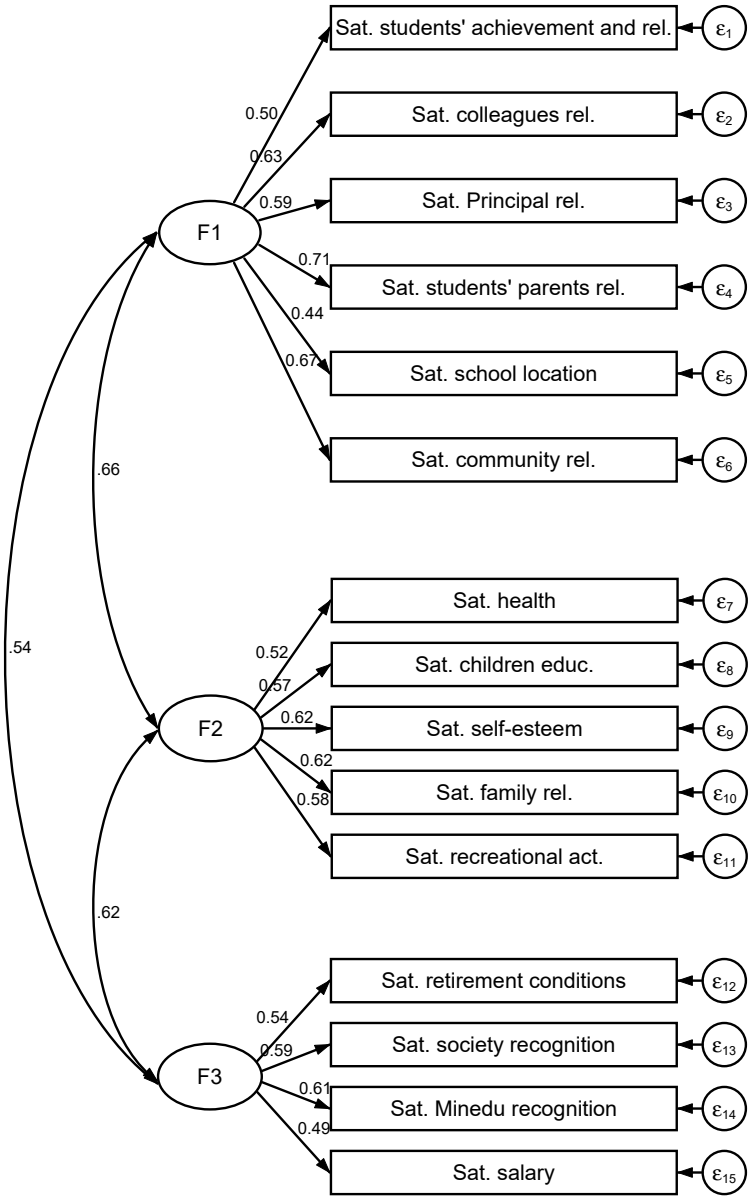
Table E.7: Five-factor solution for TSWB: Factor loadings and unique variances after Promax rotation

	SWB item code	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
2	Health	0.476	-0.087	0.180	0.027	0.105	0.663
4	Own children education	0.485	0.024	0.145	-0.035	0.242	0.566
5	Retirement conditions	0.048	-0.110	0.763	-0.028	0.040	0.453
6	Self-esteem	0.907	-0.096	-0.105	0.042	-0.091	0.343
7	Society recognition	0.234	0.144	0.428	-0.096	-0.137	0.583
8	Family relationships	0.670	0.143	-0.134	0.056	0.083	0.458
9	Recreational activities	0.449	0.049	0.205	-0.046	0.269	0.519
11	Students' achievement and relat.	0.283	0.302	0.060	0.004	-0.195	0.643
12	MINEDU recognition	-0.097	0.015	0.787	0.049	-0.106	0.438
13	Colleagues relationships	0.136	0.122	-0.005	0.617	-0.026	0.402
14	Principal relationship	-0.008	-0.029	0.041	0.904	0.002	0.197
15	Students' parents relationships	-0.062	0.797	-0.007	0.118	-0.035	0.304
16	School location	0.019	0.377	0.080	0.083	0.058	0.760
17	Salary	-0.154	0.038	0.708	0.068	0.178	0.482
18	Community relationships	-0.021	0.928	-0.047	-0.057	0.012	0.262

Note: The item code corresponds to Table 4.1.
Source: National Teacher Survey 2016 and 2018. Own elaboration.

E.4 Confirmatory Factor Analysis

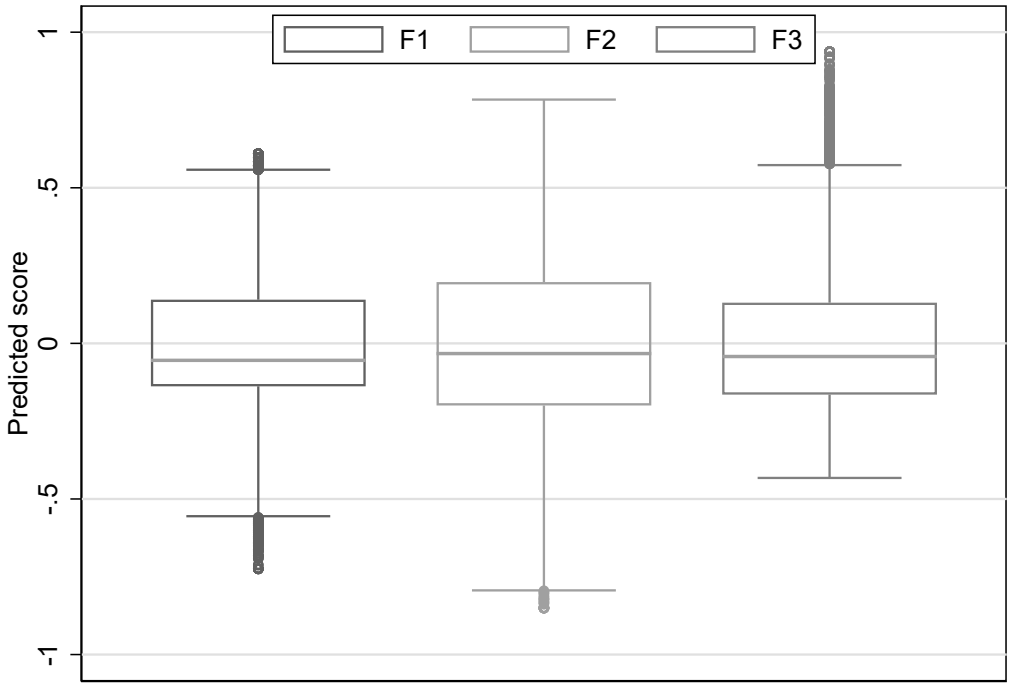
FIGURE E.1: Teacher subjective well-being: Confirmatory Factor Analysis path diagram



Note: Paths' values display standardized parameters.

Source: National Teacher Survey 2016 and 2018. Own elaboration.

FIGURE E.2: Teacher subjective well-being factors' distributions (teacher level): Predicted values from CFA



Source: National Teacher Survey, 2016-2018. Own elaboration.

E.5 Determinants of teacher subjective well-being factors, at the individual level

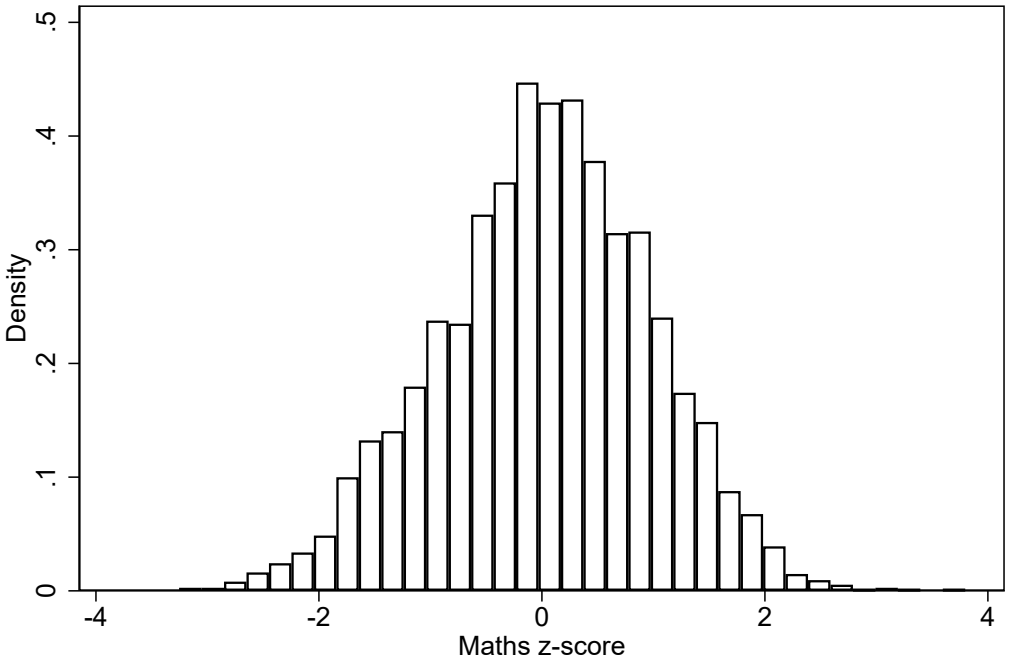
Table E.8: OLS estimates - Dep. variable: TSWB factors

	F1	F2	F3
Age	0.001*	0.001***	0.002***
	(0.000)	(0.000)	(0.000)
Female	0.007	-0.017*	-0.003
	(0.007)	(0.008)	(0.006)
Native mother tongue	0.056**	0.022	0.015
	(0.019)	(0.019)	(0.016)
Native	0.011	0.019*	0.011
(autoperception)	(0.008)	(0.009)	(0.007)
Native mother tongue	-0.042*	-0.018	0.002
X autoperception	(0.021)	(0.022)	(0.018)
Household head	0.003	-0.008	-0.001
	(0.007)	(0.007)	(0.006)
Has a secondary	0.023**	0.026**	0.011
occupation	(0.008)	(0.010)	(0.007)
Illness (number)	-0.011***	-0.019***	-0.014***
	(0.001)	(0.001)	(0.001)
Fixed-term contract	-0.004	0.013	0.013*
	(0.007)	(0.009)	(0.007)
Aspirational wage	-0.008***	-0.009***	-0.018***
gap	(0.001)	(0.002)	(0.002)
Satisfaction with	0.029***	0.082***	0.054***
hosehold income	(0.005)	(0.006)	(0.005)
Teacher by vocation	0.023***	0.035***	0.025***
	(0.006)	(0.006)	(0.005)
Would choose	0.022**	0.041***	0.030***
teaching profession again	(0.007)	(0.008)	(0.006)
Want to change	-0.023***	-0.007	-0.009
school district	(0.006)	(0.007)	(0.005)
Satisfied with	0.098***	0.081***	0.042***
current employment	(0.010)	(0.012)	(0.008)
Would like her	0.036***	0.048***	0.047***
children to be teachers	(0.006)	(0.007)	(0.006)
Secondary school	-0.027***	-0.006	-0.024**
	(0.008)	(0.009)	(0.007)
Urban public school	0.001	0.003	-0.004
	(0.008)	(0.009)	(0.007)
Poverty rate (school	0.000*	0.001*	0.001***
district)	(0.000)	(0.000)	(0.000)
Ratio students per	0.000	0.000	0.000
teacher	(0.001)	(0.001)	(0.001)
Female teacher ratio	-0.023	-0.024	-0.022
	(0.016)	(0.018)	(0.016)
Fixed-term teacher	-0.011	-0.017	0.019
ratio	(0.014)	(0.016)	(0.013)
Constant	-0.157***	-0.301***	-0.204***
	(0.036)	(0.043)	(0.033)
No. of obs.	12,752	12,752	12,752
R-squared	0.102	0.146	0.164
F	25.39	38.90	46.12

Note: All regressions include survey year and geographic domain fixed-effects.
Source: National Teacher Survey and Student Census Assessment, 2016-2018. Own elaboration.

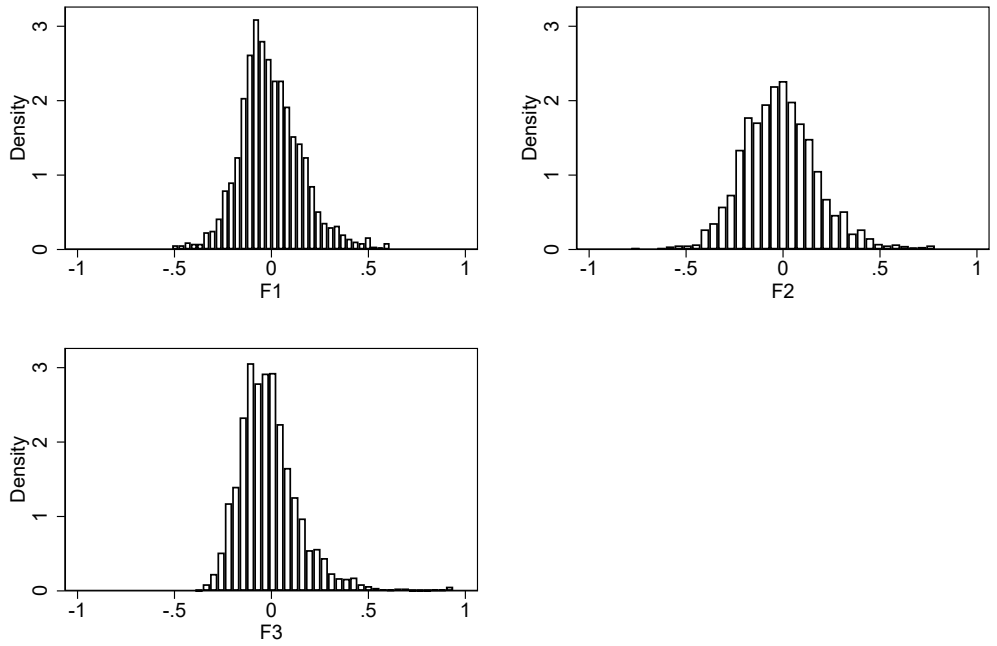
E.6 Main variables distribution

FIGURE E.3: Basic education schools: Average pupils' maths z-scores



Source: National Teacher Survey and Census Student Assessment, 2016 and 2018.
Own elaboration.

FIGURE E.4: Basic education schools: Average teacher subjective well-being factors' predicted values



Source: National Teacher Survey and Census Student Assessment, 2016 and 2018.
Own elaboration.

E.7 OLS estimates

TABLE E.9: OLS estimates - Dep. variable: School average score in maths

	(1)	(2)	(3)
F1	0.169*		
	(0.091)		
F1 squared	-0.916***		
	(0.344)		
F2		0.069	
		(0.076)	
F2 squared		-0.395*	
		(0.231)	
F3			0.068
			(0.106)
F3 squared			-0.538**
			(0.250)
Maths z-score in 2015	0.482***	0.484***	0.484***
	(0.021)	(0.021)	(0.021)
Urban public school	0.163***	0.166***	0.167***
	(0.036)	(0.036)	(0.036)
Poverty rate	-0.149	-0.146	-0.150
	(0.097)	(0.098)	(0.098)
Absenteeism in the previous year (days per month)	0.004	0.005	0.008
	(0.026)	(0.026)	(0.026)
Total nb teachers	0.001*	0.001*	0.001*
	(0.001)	(0.001)	(0.001)
Female teacher ratio	0.455***	0.451***	0.442***
	(0.084)	(0.084)	(0.084)
Fixed-term teacher ratio	-0.101	-0.103	-0.099
	(0.063)	(0.063)	(0.062)
Student-teacher ratio	-0.000	0.000	0.000
	(0.002)	(0.002)	(0.002)
Nb rooms	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)
N	3,215	3,215	3,215
r2	0.494	0.493	0.493
F	141.17	140.66	141.83

Standard errors in parentheses

Note: All regressions include survey year, geographic domain, and student assessment grade fixed-effects.

Source: National Teacher Survey and Student Census Assessment, 2016-2018. Own elaboration.

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

TABLE E.10: OLS estimates - Dep. variable: School average score in maths

	(1)	(2)	(3)	(4)
F1	0.213	0.285**		0.165
	(0.154)	(0.126)		(0.157)
F2	-0.044		0.165	0.042
	(0.132)		(0.122)	(0.156)
F3		-0.139	-0.077	-0.145
		(0.143)	(0.165)	(0.168)
F1 squared	-1.165	-1.181*		-0.858
	(0.866)	(0.625)		(0.869)
F2 squared	-0.143		-1.399**	-1.449
	(0.744)		(0.650)	(1.054)
F3 squared		-0.611	-2.204**	-2.223**
		(0.629)	(0.876)	(0.901)
F1xF2	0.400			0.845
	(1.459)			(1.572)
F1xF3		0.976		-1.827
		(1.174)		(1.589)
F2xF3			3.206**	3.976**
			(1.427)	(1.745)
F1xF2xF3				1.453
				(1.115)
Constant	-0.160*	-0.162*	-0.163*	-0.146
	(0.092)	(0.091)	(0.091)	(0.093)
N	3,215	3,215	3,215	3,215
r2	0.494	0.495	0.495	0.497
F	123.03	123.34	123.02	101.44

Standard errors in parentheses

Note: All regressions include the same covariates and fixed-effects as from Table E.9.

Source: National Teacher Survey and Student Census Assessment, 2016-2018.

Own elaboration.

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

E.8 IV first stage by TSWB factor

TABLE E.11: OLS estimates - Dep. variable: TSWB Factor 1

	(1) Z1	(2) Z2	(3) Z3
Commuting time to school (Z1)	-0.055**		
	(0.023)		
Z1-squared	0.005		
	(0.003)		
Electoral participation in 2016 (Z2_a)		-0.385	
		(0.525)	
Z2_a squared		0.251	
		(0.365)	
Electoral support to conservative party in 2016 (Z_2b)		0.002	
		(0.002)	
Z2_b squared		-0.000*	
		(0.000)	
School maths score trend 2012-2016 (Z3)			0.013
			(0.020)
Z3-squared			0.159***
			(0.052)
Math z-score in 2015	0.017***	0.017***	0.015***
	(0.004)	(0.004)	(0.005)
Urban public school	-0.026***	-0.017*	-0.016
	(0.009)	(0.009)	(0.011)
Poverty rate	0.025	0.008	0.003
	(0.025)	(0.029)	(0.029)
Absenteeism in the previous year (days per month)	-0.008	-0.009	-0.010
	(0.006)	(0.006)	(0.006)
Total nb teachers	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
Female teacher ratio	-0.063***	-0.062***	-0.068***
	(0.018)	(0.019)	(0.021)
Fixed-term teacher ratio	0.017	0.008	-0.013
	(0.017)	(0.016)	(0.019)
Student-teacher ratio	0.002**	0.002***	0.002***
	(0.001)	(0.001)	(0.001)
Nb rooms	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Constant	0.172***	0.125	0.018
	(0.054)	(0.191)	(0.026)
N	3,215	3,208	2,612
r2	0.094	0.088	0.099
F	11.48	9.60	9.37

Standard errors in parentheses

Note: All regressions include survey year and student assessment grade fixed-effects.

Source: National Teacher Survey and Student Census Assessment, 2016-2018. Own elaboration.

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

TABLE E.12: OLS estimates - Dep. variable: TSWB Factor 2

	(1) Z1	(2) Z2	(3) Z3
Commuting time to school (Z1)	-0.045		
	(0.028)		
Z1-squared	0.004		
	(0.004)		
Electoral participation in 2016 (Z2_a)		-0.749	
		(0.736)	
Z2_a squared		0.494	
		(0.509)	
Electoral support to conservative party in 2016 (Z_2b)		0.001	
		(0.002)	
Z2_b squared		-0.000	
		(0.000)	
School maths score trend 2012-2016 (Z3)			0.008
			(0.025)
Z3-squared			0.203***
			(0.060)
Math z-score in 2015	0.010*	0.010*	0.008
	(0.005)	(0.005)	(0.006)
Urban public school	-0.015	-0.006	-0.001
	(0.011)	(0.011)	(0.013)
Poverty rate	0.010	-0.009	-0.023
	(0.031)	(0.036)	(0.037)
Absenteeism in the previous year (days per month)	-0.000	-0.000	-0.002
	(0.008)	(0.009)	(0.009)
Total nb teachers	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Female teacher ratio	-0.091***	-0.090***	-0.091***
	(0.022)	(0.022)	(0.024)
Fixed-term teacher ratio	0.035*	0.024	0.001
	(0.020)	(0.020)	(0.024)
Student-teacher ratio	0.001	0.001	0.002**
	(0.001)	(0.001)	(0.001)
Nb rooms	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Constant	0.157**	0.282	0.016
	(0.065)	(0.266)	(0.033)
N	3,215	3,208	2,612
r2	0.094	0.091	0.099
F	11.95	10.38	10.07

Standard errors in parentheses

Note: All regressions include survey year and student assessment grade fixed-effects.

Source: National Teacher Survey and Student Census Assessment, 2016-2018. Own elaboration.

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

TABLE E.13: OLS estimates - Dep. variable: TSWB Factor 3

	(1) Z1	(2) Z2	(3) Z3
Commuting time to school (Z1)	-0.074***		
	(0.026)		
Z1-squared	0.008**		
	(0.003)		
Electoral participation in 2016 (Z2_a)		-1.141	
		(0.768)	
Z2_a squared		0.736	
		(0.523)	
Electoral support to conservative party in 2016 (Z_2b)		0.001	
		(0.002)	
Z2_b squared		-0.000	
		(0.000)	
School maths score trend 2012-2016 (Z3)			0.015
			(0.022)
Z3-squared			0.126**
			(0.056)
Math z-score in 2015	0.005	0.006	0.002
	(0.004)	(0.004)	(0.005)
Urban public school	-0.025***	-0.018**	-0.017
	(0.009)	(0.009)	(0.010)
Poverty rate	0.052**	0.031	0.035
	(0.026)	(0.029)	(0.031)
Absenteeism in the previous year (days per month)	0.003	0.003	0.001
	(0.010)	(0.011)	(0.011)
Total nb teachers	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Female teacher ratio	-0.056***	-0.056***	-0.053**
	(0.019)	(0.019)	(0.021)
Fixed-term teacher ratio	0.049***	0.042**	0.028
	(0.018)	(0.017)	(0.021)
Student-teacher ratio	0.001*	0.001**	0.002**
	(0.001)	(0.001)	(0.001)
Nb rooms	-0.000**	-0.000*	-0.000
	(0.000)	(0.000)	(0.000)
Constant	0.152**	0.399	-0.020
	(0.061)	(0.279)	(0.026)
N	3,215	3,208	2,612
r2	0.087	0.086	0.087
F	11.26	9.87	9.08

Standard errors in parentheses

Note: All regressions include survey year and student assessment grade fixed-effects.

Source: National Teacher Survey and Student Census Assessment, 2016-2018. Own elaboration.

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

E.9 Quantile regression estimates

TABLE E.14: TSWB Factor 1: Quantile regression estimates - Dep. variable: School average score in maths

	(1) Q10	(2) Q30	(3) Q50	(4) Q70	(5) Q90
F1	0.139	0.213***	0.127	0.142	0.273***
	(0.099)	(0.073)	(0.085)	(0.091)	(0.079)
F1 × F1	-0.553	-1.033***	-1.089***	-0.810**	-1.169***
	(0.362)	(0.241)	(0.287)	(0.327)	(0.273)
N	3,215	3,215	3,215	3,215	3,215
r2_p	0.377	0.355	0.330	0.302	0.253

Standard errors in parentheses

Note: All regressions include the same controls and fixed-effects as from Table E.9.

Source: National Teacher Survey and Student Census Assessment, 2016-2018.

Own elaboration.

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

TABLE E.15: TSWB Factor 2: Quantile regression estimates - Dep. variable: School average score in maths

	(1) Q10	(2) Q30	(3) Q50	(4) Q70	(5) Q90
F2	-0.070	0.133**	0.094	0.158*	0.117
	(0.075)	(0.057)	(0.073)	(0.084)	(0.081)
F2 × F2	-0.364	-0.548***	-0.846***	-0.437	0.151
	(0.248)	(0.137)	(0.243)	(0.310)	(0.264)
N	3,215	3,215	3,215	3,215	3,215
r2_p	0.376	0.354	0.330	0.301	0.251

Standard errors in parentheses

Note: All regressions include the same controls and fixed-effects as from Table E.9.

Source: National Teacher Survey and Student Census Assessment, 2016-2018.

Own elaboration.

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

TABLE E.16: TSWB Factor 3: Quantile regression estimates - Dep. variable: School average score in maths

	(1) Q10	(2) Q30	(3) Q50	(4) Q70	(5) Q90
F3	-0.120	0.080	0.048	0.048	0.086
	(0.123)	(0.096)	(0.096)	(0.108)	(0.111)
F3 × F3	-0.498	-0.458	-0.673***	-0.412	-0.367*
	(0.505)	(0.328)	(0.259)	(0.390)	(0.198)
N	3,215	3,215	3,215	3,215	3,215
r2_p	0.377	0.353	0.329	0.301	0.251

Standard errors in parentheses

Note: All regressions include the same controls and fixed-effects as from Table E.9.

Source: National Teacher Survey and Student Census Assessment, 2016-2018.

Own elaboration.

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

E.10 Pseudo-panel fixed-effects models

TABLE E.17: Panel data fixed-effects model - Dep. variable: School average score in maths by grade

	(1) 4th primary	(2) 2nd secondary
F1	1.076**	0.051
	(0.417)	(0.292)
F1 squared	-1.526	0.681
	(1.469)	(1.601)
Total nb teachers	-0.025	0.004
	(0.026)	(0.009)
Female teacher ratio	-0.099	-0.164
	(0.764)	(0.397)
Fixed-term teacher ratio	1.132**	-0.643*
	(0.480)	(0.345)
Student-teacher ratio	0.037	-0.000
	(0.030)	(0.008)
Nb rooms	0.004*	-0.000
	(0.002)	(0.002)
Poverty rate	-0.649	-0.080
	(0.727)	(0.615)
Constant	-0.001	0.497
	(1.023)	(0.472)
N_clust	79	110
r2_w	0.233	0.041
r2_b	0.036	0.032
r2_o	0.014	0.033
sigma_u	0.978	0.816
sigma_e	0.381	0.352
rho	0.868	0.843

Standard errors in parentheses

Source: National Teacher Survey and Student Census Assessment, 2016-2018. Own elaboration.

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

TABLE E.18: Panel data fixed-effects model - Dep. variable: School average score in maths by grade

	(1) 4th primary	(2) 2nd secondary
F2	0.719***	0.153
	(0.244)	(0.244)
F2 squared	0.385	-0.428
	(1.023)	(0.918)
Total nb teachers	-0.028	0.004
	(0.025)	(0.009)
Female teacher ratio	-0.412	-0.159
	(0.746)	(0.381)
Fixed-term teacher ratio	1.159**	-0.681*
	(0.554)	(0.346)
Student-teacher ratio	0.033	-0.001
	(0.026)	(0.007)
Nb rooms	0.004**	-0.000
	(0.002)	(0.002)
Poverty rate	-0.581	-0.011
	(0.704)	(0.659)
Constant	0.295	0.518
	(0.890)	(0.446)
N_clust	79	110
r2_w	0.215	0.045
r2_b	0.071	0.032
r2_o	0.038	0.033
sigma_u	1.015	0.817
sigma_e	0.385	0.351
rho	0.874	0.844

Standard errors in parentheses

Source: National Teacher Survey and Student Census Assessment, 2016-2018. Own elaboration.

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

TABLE E.19: Panel data fixed-effects model - Dep. variable: School average score in maths by grade

	(1) 4th primary	(2) 2nd secondary
F3	0.936***	0.222
	(0.323)	(0.298)
F3 squared	-0.012	-0.434
	(1.592)	(0.786)
Total nb teachers	-0.038	0.003
	(0.027)	(0.009)
Female teacher ratio	-0.332	-0.140
	(0.708)	(0.392)
Fixed-term teacher ratio	1.182**	-0.680*
	(0.590)	(0.371)
Student-teacher ratio	0.026	-0.002
	(0.026)	(0.007)
Nb rooms	0.004**	-0.001
	(0.002)	(0.002)
Poverty rate	-0.502	0.021
	(0.710)	(0.675)
Constant	0.599	0.528
	(0.925)	(0.445)
N_clust	79	110
r2_w	0.231	0.045
r2_b	0.078	0.027
r2_o	0.045	0.028
sigma_u	1.083	0.819
sigma_e	0.381	0.351
rho	0.890	0.845

Standard errors in parentheses

Source: National Teacher Survey and Student Census Assessment, 2016-2018. Own elaboration.

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