Within-School Diversity and Student-Level Socioeconomic Outcomes: Evidence from Chile*

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Abstract

We exploit a natural experiment in the Chilean educational system that increased students' in-school time by 200 hours per year to identify the effect of within-school exposure to ethnic diversity on students' attitudes, educational attainment, and earnings. We create a unique individual-level panel dataset with information on various characteristics and socioeconomic outcomes for Chilean primary and high school students in 2002-13. Using an event-study design, we show that diversity improves socioeconomic outcomes among young children of ethnic groups, and has no negative impact among other young children. However, among old children the impact of within school diversity is negative.

Keywords: Ethnic diversity, educational outcomes
JEL Codes: I21, Z13

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1 Introduction

More diverse companies are more profitable and fill-in patent applications more often (Ottaviano and Peri [2005], Ottaviano and Peri [2006], Herring [2009], Parrota, Pozzoli and Pytlikova [2014*a*]). Organizational diversity increases the probability of finding novel solutions to arising problems because a group of people with different backgrounds is more likely to posses the skills required to innovate in difficult situations. But the consequences of organizational diversity are not always desirable. Diversity can negatively impact within-firm performance through disagreement and fractionalization (Alesina, Baqir and Easterly [1999]). This is documented by Hjort [2014] in a flower production plant at Kenya. Although wages were linked to total flower production, workers were willing to bear the costs of a lower own pay to favor co-ethnic individuals.

The expansion of our understanding requires to adequately control for the multiple factors affecting children long-term development and for identifying causality. The increasing availability of administrative records has improved our ability to deal with the first concern. However, most of the existing papers study short-run effects and the infeasibility of conducting large-scale interventions has interfered with the progression of our learning.

In this paper we contribute to the debate by simultaneously facing both issues. Using unique data on Chilean primary and high school student in 1991–2017, we estimate the long-term causal effect of longer exposure to more or less segregated classes on academic performance and later-life outcomes by exploiting a country wide natural experiment. Our dataset is exceptionally rich and allow us to account for various observables. We observe students' academic achievement in primary and high school; and their performance in the university admission process, including applications by university and field, offers of admission by university and field, and responses to offers of admission. Our dataset also includes socioeconomic variables such as parents' income and educational attainment; and later-life outcomes, such as earnings, workplace, and political behavior. We use administrative records of various public and private institutions.

In our natural experiment, public and private-subsidized schools (90% of total enrollment) were required to increase students' in-school time by 200 hours per year since third grade. For fully treated individuals, the intervention represented two extra schooling years. The policy was introduced in 1997 and it was aimed to be fully operational in all schools by 2002. Unexpected delays in the execution of necessary infrastructure investment forced the government to postpone the deadline to 2010. As of today, the reform remains uncompleted. Because children spend most

of their time at school, socioeconomic consequences of school segregation might be as strong and pervasive as those of spatial segregation.

Until the introduction of the full-day, the Chilean educational system operated on a two-shifts basis. Students attended schools in either a "morning shift" or an "afternoon shift." Given that morning and afternoon shifts did not overlap, classes attending in the morning and in the afternoon shared a common set of classrooms. As a result, schools facilities were unable to accommodate morning and afternoon shifts in a single day-long school day. Thus, the implementation of the full-school day required a significant investment in infrastructure.

Schools with available infrastructure entered the full-school day immediately. Remaining schools were granted with public funds for the construction of new classrooms. Variations in the difficulties to acquire the land necessary to build new facilities created unexpected delays in the start of the program.[1]

We exploit the random variation in the adoption of the full-day system to identify the effects of time exposure to more or less segregated educational environments, conditional on within-school or within-class shares of indigenous origin students, on academic performance, educational attainment, and earnings, among others.

In Chile, indigenous population earn on average 11% lower wages than the rest of the population after controlling by educational attainment (Ñopo [2012]), mostly because they perform in more precarious jobs and low-paid industries (Ministerio de Desarrollo Social [2017]). Estimating the socioeconomic repercussions of growing up in ethnically diverse environments is important from a social and policy perspective.

The focus of our study are *Mapuches*. Mapuches are the largest indigenous group in the country, representing an 84% of the total indigenous population (roughly 7.5% of total population). Our measure of diversity is the share of *Mapuche* students in a given school or class, depending the level of analysis.

Chile has multiple characteristics that make it suitable to our study. Chile is an OECD country and part of our conclusions are probably extensible to other developed countries. Second, recent large migration flows from Central America and The Caribbean and an escalation in the conflict between indigenous population and the government have increased the social awareness on issues such as diversity and discrimination. Finally, Chile has the most socio-economic segregated education system among OECD members.

[1] Due to schools' location, there were either a scarcity of land or prices were prohibitive (García-Huidobro and Concha [2009]).

In our main analysis, we calculate the effects of within-class and within-school exposure to segregation by ethnicity, and length and strength of treatment. We are able to capture the non-linearities inherent to the complex phenomenon of social interaction. We conduct multiple robustness checks and control by parents' expectations about children's educational attainment.

In an alternative exercise, we utilize within-household differentials in children exposure to segregation to calculate alternative measures of the effect of segregation on educational attainment and socioeconomic outcomes. Siblings normally attend the same school, should exhibit similar skills, and belong to the same household. Nonetheless, whenever siblings are not of the same age they will attend different classes. This feature allow us to construct alternative estimates.

Our results depend on ethnicity but overall they indicate that more diversity is beneficial for students who were young at the introduction of the full-day.

This paper belongs to the literature on the effects of segregation on children's attitudes and socioeconomic outcomes during adulthood (Parrota, Pozzoli and Pytlikova [2014*b*], Rao [2013], Chetty et al. [2014], Chetty, Hendren and Katz [2016], and Cook and Fletcher [2017]).

However, even though the impact of exposure to segregation during childhood is proved to be significant, the magnitude of the effects is highly heterogeneous (Almond, Currie and Duque [2018]). We contribute to identify some of the main determinants of the findings of past studies.

The rest of the article is organized as follows. Section 2 introduces the background information of Chilean education system and its ethnic groups. Section 3 describes data sources and data construction. Section 4 presents our identification strategy, empirical specifications, results, and a qualitative discussion of likely mechanisms. Section 5 concludes.

2 Background

2.1 Ethnic Groups in Chile

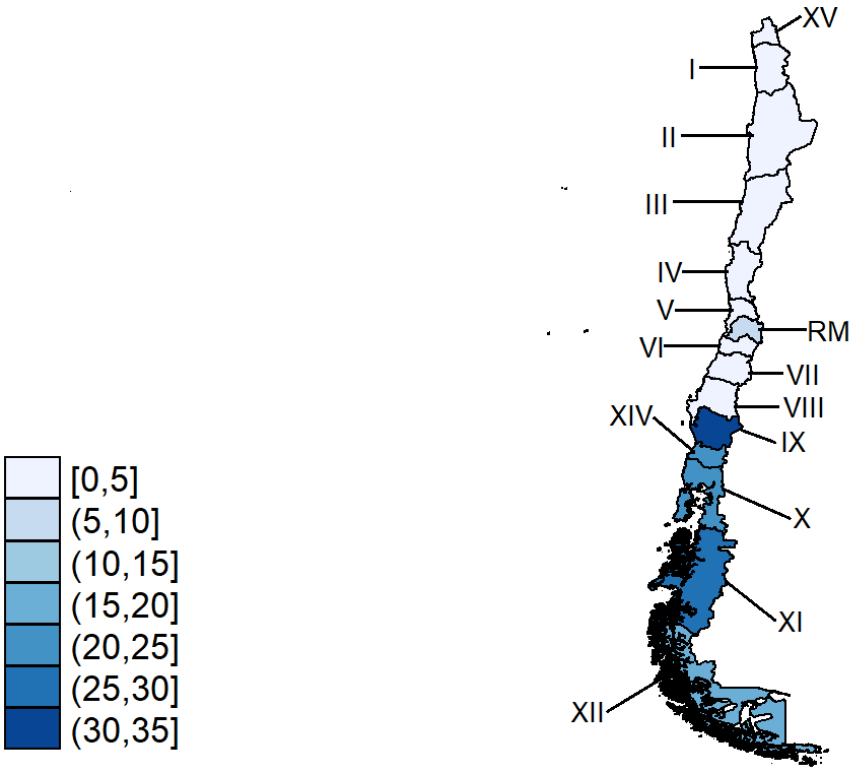
According to the last National Socio-Economic Characterization Survey (CASEN) (Ministerio de Desarrollo Social [2017]), 9% of Chilean population belong to an ethnic group.[2] Out of them, 84% are *Mapuche*.

Mapuches are concentrated in the southern regions of Chile. Regions IX (31%), XIV (20%), X (24%), XI (25%), and XII (17%) are the ones with the highest shares of *Mapuches* as percentage of

[2]The survey considers nine different ethnic groups: *Aymara*, *Rapa Nui*, *Quechua*, *Mapuche*, *Atacameño*, *Colla*, *Kawashkar*, *Yámana*, and *Diaguita*.

total population. *Mapuches* do no exceed the 6% of total population in the remaining regions of the country (Figure 1), yet they are the main ethnic group in eleven out of the fifteen regions of the country.

Figure 1: Mapuches by Region (2015, % of total population)



Notes: Ministerio de Desarrollo Social [2017].

Ethnic groups usually suffer more precarious conditions (Ministerio de Desarrollo Social [2017]). They mostly live in rural areas, have higher poverty and unemployment rates, and exhibit lower earnings. Table 1 provides summary statistics for the main socioeconomic indicators by ethnic group status.

One of the main drivers behind the socioeconomic vulnerability of ethnic groups are culturally related educational attitudes. For instance, a series of interviews to students of ethnic origin revealed that most of them only aim to finish high school and enter the labor force (Webb, Canales and Becerra [2016]). Other relevant (and worrisome) determinant of the lower educational achievement of ethnic groups is child labor. Ethnic population see child labor as a normal and beneficial tradition in which children gain important values and get useful experience for

Table 1: Socioeconomic Indicators by Ethnicity (2015)

	Ethnic Groups	Non-Ethnic Groups
Single-parent family (percentage)	29.0	27.0
Poverty rate (percentage)	18.3	11.0
Unemployment rate (percentaje)	8.3	7.4
Main occupation income (average, 2015 CLP)	372,073	551,321
Illiteracy rate (percentage)	4.7	3
Average years of schooling (years)	10.1	11.1
High-school graduates (percentage)	53.4	62
College enrollment rate (percentage)	31.3	38.1

their future (Organization [2005]). Children mainly work in the fields or as domestic workers and the long and exhausting hours prevent them from learning and pursuing further education.

The described patterns lead to lower years of schooling during adulthood for ethnic groups and originate a long-term gap in socioeconomic outcomes. The former is exemplified in Ñopo [2012]. Author's calculations indicate that almost 70% of the wage gap between indigenous groups and the rest of the population can be explained by educational attainment only.

2.2 Educational Reform in Chile

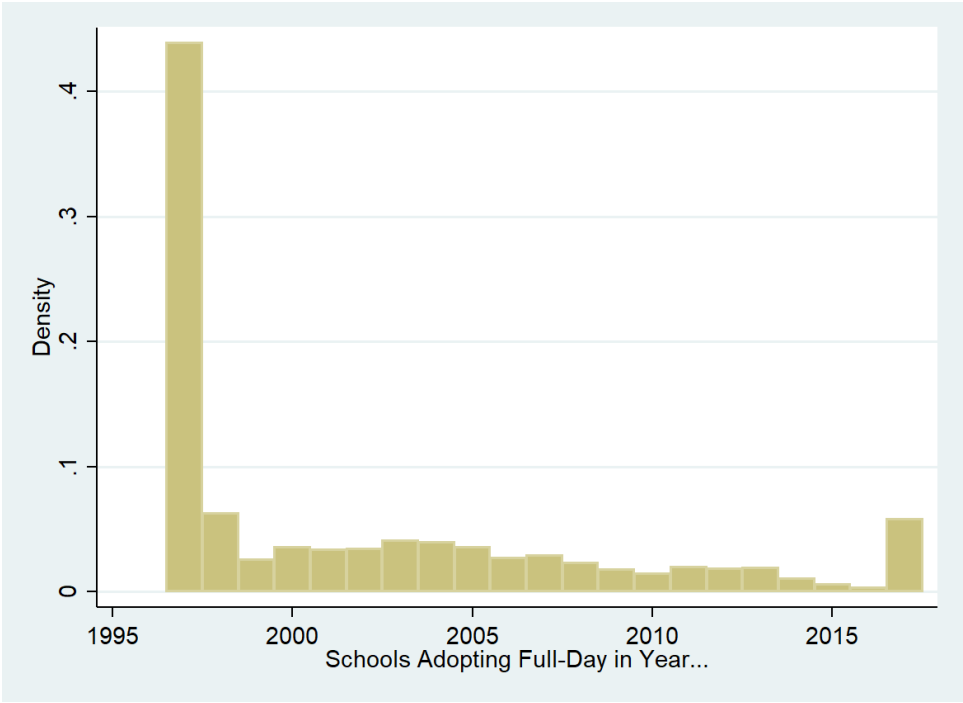
Before 1996 Chilean educational system operated on a "two-school-day system." Students attended schools in either a "morning shift" or an "afternoon shift." The morning shift usually ran between early morning until noon while the afternoon shift ran between noon until early evening. Since morning and afternoon shifts did not overlap, classes attending in the morning and afternoon shared the same facilities. As result, schools were unable to simultaneously fit both shifts of students at any moment in time.

During 1996, the Chilean government announced an educational reform aimed to "improve the quality of education and decrease inequality." The main component of the reform was the

introduction of a full school day. Beginning in 1997, schools would need to accommodate both morning and afternoon shifts together in a single school day spanning from early morning to early evening.

Since the implementation of the full-school-day required to accommodate all students simultaneously, the program meant a significant investment in infrastructure. In 1997 and 1998, schools with available infrastructure entered the program immediately. Remaining schools had to join the new regime by 2002. Public support was provided in order to fund the expenses necessary to expand schools (Bellei [2009]). Figure 2 summarizes the share of schools entering the full-school day system since 1997.

Figure 2: Schools Adopting the Full-Day System by Year of Adoption



Notes: Ministerio de Desarrollo Social [2017].

Difficulties to acquire the land needed to build new facilities created unexpected delays in the start of the program.[3] Indeed, as of today, only 70% of the schools have been able to adhere to the full school day (Sepúlveda [2017]).

[3]Due to geographical location, various schools were unable to introduce the full-day on time. There were no available land or the land was too expensive.

3 Data

We built tour dataset by merging administrative records of various public and private institutions using a common identification number. The final dataset is an unbalanced panel with information between 2002-2016 for over three million individuals. The data in our panel include academic performance for individuals at different educational levels from primary school to college, educational institutions attended, ethnicity, parents' educational attainment and income, residential address, earnings, occupations, workplaces, and electoral participation.

Below, we explain in detail the different administrative records we rely on to construct our panel and the procedure to elaborate some of the key variables utilized in our estimations.

3.1 Schooling and Educational Performance in Primary and High School

We obtain schooling and educational performance in primary and high school from the administrative records of the Ministry of Education and the Chilean Education Quality Assurance Agency (*Agencia de Calidad de la Educación*).

The records of the Ministry of Education contain student-level data on primary and high school students' date of birth, gender, schools attended, average GPA, disabilities, academic standing at the end of the school year, and ethnicity, among others. The data span the period 2002-2016.

With the objective to asses the quality of education, the Education Quality Assurance Agency carries out standardized tests to all students in second, fourth, eight, twelfth, thirteenth grades through the National Educational Assessment System (*Sistema de Medición de la Calidad de la Educación*) (SIMCE) test since 1988. The SIMCE continuously measures mathematical and verbal skills, and occasionally children's knowledge in sciences and history. The SIMCE evaluation calendar is provided in Table 1.

SIMCE tests are accompanied by complementary surveys for students, parents, and teachers. These surveys collect information on family characteristics; ethnicity; and students, parents, and teachers' attitudes; among others. SIMCE records provide rich information on both academic performance (through SIMCE scores) and socioeconomic characteristics. Student-level SIMCE data is available between 1999-2015. For this period, we merge the data in the Ministry of Education's records to the SIMCE records.

For the pre-1999 period, the SIMCE data is available only to the school- and municipality-level. After contacting the Ministry of Education and the Education Quality Assurance Agency, we were

informed that records between 1988-1994 were lost. We recovered school- and municipality-level SIMCE scores between 1992-1994 from earlier studies on the evolution of school quality (Camhi and Santander [1998] and Iruarrizaga [2010]).

Unfortunately, not all the variables are available for the whole period. In particular, the Ministry of Education documented ethnicity for the first time in 2016. Nonetheless, we are capable of determining *Mapuche* ethnicity for previous years. Further forward we thoroughly describe the procedure through which we recover students' ethnicity.

3.2 College and University Admission

The Chilean higher education system has a unified system of admission. Every year, high school graduates must decide whether to take the University Admission Test (*Prueba de Selección Universitaria*) (PSU). The PSU is a standardized test that evaluates the knowledge and skills of students in four areas: math, verbal, history, and sciences (physics, chemistry, and biology). Math and verbal exams are required in any university application, while history and science exams requirements vary by field.[4] Students apply to universities using their average score on the four subtests, adjusted by their relative within-class performance during high school.[5] The application period begins immediately after the release of PSU scores. Applicants can fill in up to ten applications listed by order of preference. The order of the applications is important because *(i)* some universities demand to be listed among the first four preferences in order to admit an applicant, and *(ii)* students only receive an offer of admission for the first preference they meet admission requirements.[6] The last step of the admission process is the acceptance or rejection of admission offers.

The *Departamento de Evaluación, Medición y Registro Educacional* (DEMRE) maintain detailed records for the process of admission to universities. The DEMRE is "responsible for the development and construction of assessment instruments and measurement of high school graduates capabilities and skills" (DEMRE [2017]).

The administrative records of the DEMRE provide information on every step of the admission process plus precise data on various socioeconomic variables used in the allocation of government-sponsored scholarships. DEMRE records also indicate whether students are entitled to government support and whether they are aware of this before filling-in university applications.

[4] For instance, a student applying to the school of medicine, must take the science subtest.
[5] The exact weights given to the subtests depend on university and field of study.
[6] The admission system have suffered minor modifications over time.

Thus, for the universe of high school graduates we know whether they take PSU or not; and for those students who take the PSU, we have their average GPA during high school, their scores in every one of the four subtests of the PSU, their applications by university and field, their offers of admission by university and field, their acceptance/rejection to offers of admission, and whether they receive government-sponsored support. Besides, we observe socio-economic parameters such as parents' educational attainment, occupation, and income, among others.

3.3 *Mapuche* Shares

To build *Mapuche* shares by class or school in 1999-2013 for 2nd, 4th, 6th, 8th, 12th, and 13th grades we resort to SIMCE and electoral records.

Using both SIMCE and electoral records we identify students' last name and declared ethnicity. We later on classify as *Mapuches* declaring to be *Mapuche* or with a last name included in a 2011 Government publication that lists *Mapuche*-origin last names (Painemal [2011]).

4 Empirical Specification and Results

4.1 Evidence from the School-Level Data

We start by analyzing the school-level data because these data allow us to rule out potential pre-trends that could be driving our results. We estimate two specifications. The first regression is:

$$\text{Score}_{s,t} = \alpha_s + \beta_t + \gamma_1 FullDay_{s,t} + \mathbb{X}'_{s,t}\Gamma + \varepsilon_{s,t}, \tag{1}$$

where $\text{Score}_{s,t}$ is average school-level test score (e.g., math score of all 4rd graders) in school s at year t. We normalize all test scores to be comparable across years. α_s and β_t represent school and year fixed effects, and $\mathbb{X}_{s,t}$ represents the matrix of school-level controls. The variable of interest $FullDay_{s,t}$ (hereafter, $T_{s,t}$) is the indicator variable that equals to one if school s switched to full day at year t.

The second specification includes the share of Mapuches in schools:

$$\text{Score}_{s,t} = \alpha_s + \beta_t + \gamma_0 \text{Mapuches}_{s,t} + \gamma_1 T_{s,t} + \gamma_2 \text{Mapuches}_{s,t} \times T_{s,t} + \mathbb{X}'_{s,t}\Gamma + \varepsilon_{s,t}, \tag{2}$$

where Mapuches$_{s,t}$ (hereafter, $M_{s,t}$) is the share of Mapuches in school s at year t.[7] Since the treatment of interest (share of Mapuches) varies at the school level, we cluster standard errors at the school-level.[8]

Equation 1 is a difference-in-differences (DD) specification, where $FullDay_{s,t}$ is the interaction of treatment and post-treatment year variables that are absorbed by school and year fixed effects. Equation 2 is a difference-in-difference-in-differences (DDD) specification where the "treatment" — full day — might have differential effect depending on the share of indigenous population in schools.

Coefficient γ_1 in specification 1 measures two effects: the effect of a longer school day and the effect from the exposure to a more or less diverse environment in school. Specification 2 allows us to disentangle these effects: γ_1 captures the effect of a longer school day, and γ_2 measures the effect of diversity.

Panel A of Table 2 contains the results for the test scores of 4th graders. Columns I–IV are the results for the 4rd grade math test. In Columns I and II we estimate specification 1: schools that shifted to the full-day have 0.1 standard deviation higher scores in math. Result hold even under very restricting specification with municipality-year fixed effects that absorb unobserved changes in school funding. Overall, moving to a full-day (γ_1) have a positive impact on scores in all our specifications. In Columns III and IV we see that the share of Mapuches has a negative effect on math scores, consistent with evidences that Mapuches demonstrate worse educational outcomes. However, the interaction term between the share of Mapuches and a full-day dummy (γ_2) has a positive and statistically significant coefficient. These results indicate that Mapuches start from a more disadvantaged position but spending more time in more ethnically diverse environments improves average performance. This might either be a result of Mapuches impacting teaching hours and teaching effort after the reform (to level them up with the rest of the class), of classes becoming a more pleasant environment for them as result of greater interaction among students, or a mix of both. The average school-level share of Mapuche children is 0.1 (s.d. 0.19), thus a school with 10% Mapuches moving towards a full-day shows an additional 0.05 standard deviation higher math scores. Columns V–VIII contain similar results for the Spanish reading (verbal) test.

[7] We find very little changes in the shares of Mapuches in schools over time, suggesting that schools' ethnic composition does not change after the treatment. Thus, the variation in share of Mapuches come from the between-school variation rather than within school overtime.

[8] Out results also hold if we double-cluster on the school-municipality level.

Table 2: Longer School Day, Diversity and the Test Scores: School-Level

Panel A: 4th Grade

	I	II	III	IV	V	VI	VII	VIII
	Dependent variable: Average test score (4th grade)							
	Math				Verbal (Spanish)			
Full day	0.099***	0.072***	0.037**	0.037**	0.132***	0.112***	0.067***	0.083***
	(0.0000)	(0.0000)	(0.0198)	(0.0263)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Share of Mapuches			-0.412***	-0.194			-0.399***	-0.168
			(0.0015)	(0.1846)			(0.0020)	(0.2512)
Full day x			0.469***	0.253**			0.631***	0.274***
Share of Mapuches			(0.0000)	(0.0138)			(0.0000)	(0.0070)
Municipality x year FE		X		X		X		X
R-squared	0.642	0.692	0.651	0.704	0.654	0.709	0.662	0.718
Observations	31,554	31,405	26,896	26,682	31,572	31,422	26,910	26,695

Panel B: 8th Grade

	I	II	III	IV	V	VI	VII	VIII
	Dependent variable: Average test score (8th grade)							
	Math				Verbal (Spanish)			
Full day	0.060***	0.044***	0.043***	0.036**	0.069***	0.044***	0.015	0.020
	(0.0000)	(0.0038)	(0.0076)	(0.0372)	(0.0000)	(0.0025)	(0.3294)	(0.2343)
Share of Mapuches			-0.139	0.078			-0.281**	-0.035
			(0.3097)	(0.6204)			(0.0413)	(0.8344)
Full day x			0.119**	0.015			0.477***	0.228***
Share of Mapuches			(0.0462)	(0.8538)			(0.0000)	(0.0074)
Municipality x year FE		X		X		X		X
R-squared	0.686	0.731	0.674	0.723	0.713	0.755	0.705	0.748
Observations	24,761	24,577	22,315	22,085	24,764	24,581	22,320	22,091

Notes: (*a*) We report p-values for standard errors clustered on school level (6500 clusters). *** p<0.01, ** p<0.05, * p<0.1

Panel B of Table 2 shows similar patterns in results for the 8th grade tests. The interaction coefficient becomes insignificant for math scores in Column IV, after controlling for municipality-year fixed effects. This result indicates, that older children may benefit less in math, as the discipline may be easier to catch up in the younger age.

We also directly test for pre-trends in a fully dynamic specification to address the concern that our results are driven by previous trends in test scores. We estimate the following fully-dynamic difference-in-differences (FDDD) specification:

$$\text{Score}_{s,t} = \alpha_s + \beta_t + \phi M_{s,t} + \sum_{k=q}^{K} \gamma_k^T T_{s,k} + \sum_{k=q}^{K} \gamma_k^M M_{s,k} \cdot T_{s,k} + \varepsilon_{c,t}, \tag{3}$$

where q stands for the number of relative time periods before the treatment (educational reform) where we expect no effect or opposite sign of the coefficient, and K is the number of relative time periods after the treatment. For each class, the year when expansion of educational system had happened has $k = 0$, all years after are $k \in [1; K]$ while all years before are states have $k \in [q; -1]$. Joint F-tests of the null that γ_k^Ts and γ_k^Ms coefficients are equal to zero are not rejected, suggesting absence of pre-trends. The results are depicted in Figure C2.

4.2 Evidence from the Individual-Level Data

We further explore individual-level longitudinal data in the following specification:

$$y_{i(c),t} = \alpha_{i(c)} + \beta_t + \phi M_{s,t} + \gamma^T T_{s,t} + \sum_{k=q}^{K} \gamma_k^M M_{s,k} \cdot T_{s,k} + \Gamma \mathbb{X}_{i,c,t} + \varepsilon_{i(c),t}, \tag{4}$$

The outcome variable $y_{i,c,t}$ is schooling outcomes, i.e., math or verbal test score of person i, in class c, at year t; $\mathbb{X}_{c,t}$ is the matrix of class, school, or individual-level controls. Longitudinal data allows us to include individual fixed effect ($\alpha_{i(c)}$). As the treatment is to the class-level, in the baseline specification we cluster standard errors to the class-level.[9]

Such specification allows us to see how spending more time in a diverse class affected children depending on the age (i.e., grade) when they were treated. Thus, if a child was treated at 4th grade she will have $T_{s,1} = 0$ and $T_{s,2}$, $T_{s,3}$, $T_{s,4}$, and $T_{s,5}$ equal to unity.

Moreover, here we can estimate the specification separately for Mapuches and Spaniards. Thus, for the sake of interpretation the M_{c_t} defines the share of minorities-Mapuches for the subsample of Spaniards, and the share of Spaniards for the subsample of Mapuches. As in the latter specification, we are interested how Mapuches are benefiting from mixing with non-Mapuche children.

We present results in Table 3. As in the previous table, full-day has positive effect on scores. Columns I and II show results for the verbal test for Spaniards and Mapuches, respectively. Chil-

[9] Out results also hold for two-way class-school, or class-municipality double clustering.

Table 3: Longer School Day, Diversity and the Test Scores:Individual-Level

	I	II	III	IV
	Dependent variable: Average test score			
	Verbal (Spanish)		Math	
Mapuche/Spaniards	S	M	S	M
Full day	0.064***	0.072***	0.076**	0.064**
	(0.0025)	(0.0028)	(0.0223)	(0.0378)
Share of Mapuches/Spaniards	0.134***	-0.184***	0.136**	-0.017
	(0.0044)	(0.0050)	(0.0133)	(0.6298)
Share of Mapuches/Spaniards	0.126*	0.620**	0.190*	0.362
x Full day at grade 2	(0.0587)	(0.0468)	(0.9995)	(0.6613)
Share of Mapuches x	-0.054	-0.033	0.012	0.053
x Full day at grade 4	(0.4048)	(0.4332)	(0.6871)	(0.2276)
Share of Mapuches x	-0.360*	-0.010	-0.252	0.115
x Full day at grade 6	(0.0571)	(0.8652)	(0.2630)	(0.1604)
Share of Mapuches x	-0.380**	-0.110*	-0.444**	-0.036
x Full day at grade 8	(0.0117)	(0.0718)	(0.0165)	(0.3874)
Share of Mapuches x	-0.074	-0.164	-0.299	-0.176
x Full day at grade 10	(0.4301)	(0.1855)	(0.2130)	(0.1518)
R-squared	0.803	0.811	0.834	0.842
Observations	4,314,432	226,886	3,659,192	176,782

Notes: We report p-values for standard errors clustered on school level (6500 clusters). *** p<0.01, ** p<0.05, * p<0.1

dren treated at the second grade exhibit better grades. Spaniards, conditional on 10% share of Mapuches have modest but significant 0.013 standard deviation higher verbal score. At the same time, Mapuches experience 0.558 standard deviation higher scores conditional on 90% share of Spaniards. The effect, however, disappears and become negative and significant if children are treated in the 6th or 8th grade. We don't find any significant effect for children treated in 10th grade, likely, because they graduate shortly after the treatment was administrate.

We find similar results for the subsample of Spaniards for the math score in Column III. However, we found no effect for math for Mapuches (Column IV). We hypothesis, the reason is that math is a more difficult subject. In case of the verbal test Mapuche children at least could benefit

just from speaking more Spanish in class.

4.3 Evidence from the University Admission Data

We use cross-sectional individual-level variation to estimate a reduced-form specification and calculate the effect of exposure to diversity on various university-related outcomes:

$$y_{i,c} = \alpha_c + \beta_t + \gamma_1 M_{c,t} + \gamma_2 N_{i(c),t} + \gamma_3 M_{c,t} \cdot N_{i(c)} + \Gamma \mathbb{X}_{c,t} + \varepsilon_{i(c),t}, \tag{5}$$

where $N_{i(c)}$ is the number of years that student i spent under the full day. Here, we also interested in the interaction effect of $N_{i(c),t}$ and $M_{c,t}$ (γ_3). Thus the treatment is the intensity of the exposure to the diverse environment: share of Spaniards for Mapuches and share of Mapuches for Spaniards.

The results are presented in Tables 4 and 5. Neither the introduction of the full-day nor the share of Mapuches seem to have an effect on performance for Spaniard children.

Mapuche children, on the other hand, seem to have benefited from the introduction of the full-day. However, NEM, Math, and Language scores for Mapuches are negatively impacted by the interaction term. These variables are the main components of any university application, and therefore are very important.

The way in which we interpret these results is as follows. Since most of the students in the university sample were already old at the introduction of the full-day, the extra time at school is mostly relevant for those students that were in a more disadvantage position (i.e., Mapuche children). Additionally, among older children more diversity might be disruptive because they need to spend more time in an hostile environment. These results mirror our former estimations, were only young children benefited from the reform.

Table 4: Graduation Exams

Panel A: For Spaniards

	I	II	IV	V	VI	VII
	Dependent variable: Average test scores in logs (Spaniards)					
	High school grades	NEM score	Language	Math	Humanities	Science
Full day	0.002	0.001	0.006	0.006	-0.023	-0.014
	(0.6932)	(0.6876)	(0.3248)	(0.3189)	(0.3043)	(0.5252)
Full day x	-0.245***	-0.026	0.015	-0.050	0.204	0.404
Share of Mapuches	(0.0018)	(0.5113)	(0.8693)	(0.6252)	(0.4568)	(0.1485)
R-squared	0.686	0.731	0.723	0.713	0.755	0.705

Panel B: For Mapuches

	I	II	III	IV	V	VI
	Dependent variable: Average test scores in logs (Mapuches)					
	High school grades	NEM score	Language	Math	Humanities	Science
Full day	0.055	0.725**	0.717***	0.447**	0.401	0.983
	(0.8691)	(0.0450)	(0.0058)	(0.0128)	(0.6987)	(0.3799)
Full day x	-0.057	-0.772**	-0.715**	-0.390*	-0.556	-1.045
Share of Spaniards	(0.8726)	(0.0440)	(0.0111)	(0.0533)	(0.6243)	(0.3936)
R-squared	0.482	0.221	0.131	0.157	0.229	0.304

Notes: (*a*) We report p-values for standard errors clustered on school level (6500 clusters). *** p<0.01, ** p<0.05, * p<0.1

Table 5: University Outcomes

Panel A: For Spaniards

	I	II	III	IV	V
	Dependent variables (for Spaniards):				
	Ever applied	Application score (log)	Admitted to top choice	Admitted to second choice	Admitted to university
Full day	0.002	0.002	0.000	0.004*	0.004*
	(0.5548)	(0.9360)	(0.6630)	(0.0979)	(0.0979)
Full day x	-0.070	-0.356	-0.005	-0.049	-0.049
Share of Mapuches	(0.1299)	(0.3857)	(0.6611)	(0.1199)	(0.1199)
R-squared	0.245	0.085	0.015	0.096	0.096

Panel B: For Mapuches

	I	II	III	IV	V
	Dependent variables (for Mapuches):				
	Ever applied	Application score (log)	Admitted to top choice	Admitted to second choice	Admitted to university
Full day	0.139*	-0.400	-0.003	0.035	0.035
	(0.0710)	(0.9271)	(0.9177)	(0.5572)	(0.5572)
Full day x	-0.118	0.367	0.007	-0.015	-0.015
Share of Spaniards	(0.1880)	(0.9370)	(0.8278)	(0.8305)	(0.8305)
R-squared	0.418	0.291	0.149	0.249	0.249

Notes: (*a*) We report p-values for standard errors clustered on school level (6500 clusters). *** p<0.01, ** p<0.05, * p<0.1

5 Conclusion

Our paper tries to disentangle the effects of within-school and within-class diversity on children long-term socioeconomic outcomes.

We are able to show that the impact of diversity depends on ethnicity and the age of children.

Young children benefit from more diverse environment at school, but older children do not. This supports other studies were disruption effects seem to kick in for older children.

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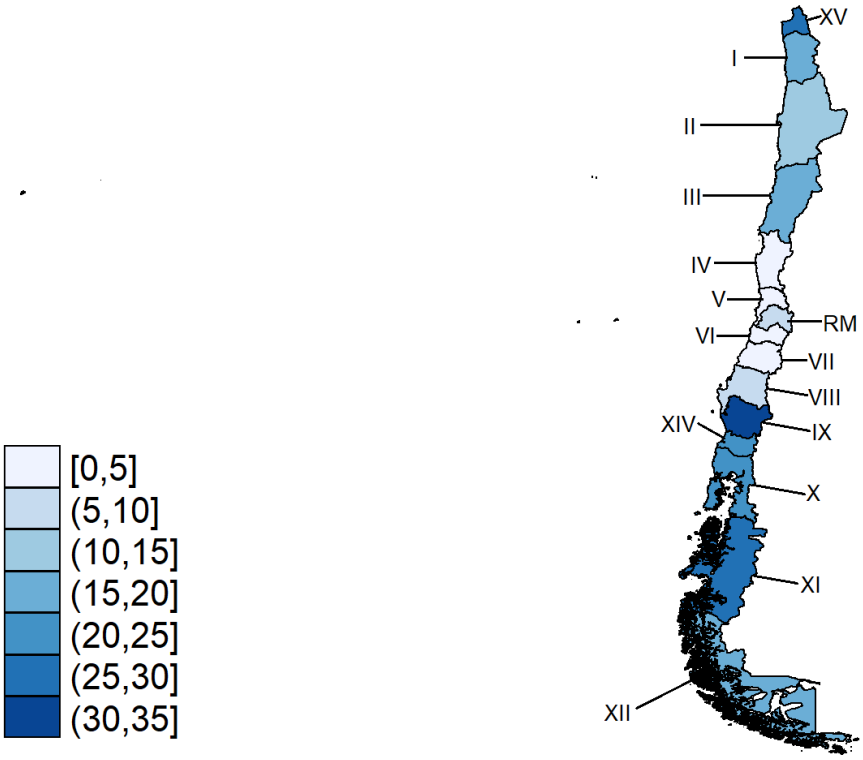
Online Appendix

to

"Within-School Diversity and Student-Level Socioeconomic Outcomes: Evidence from Chile"

A Additional Background Information

Online Appendix Figure 1: Ethnic Groups by Region (2015, % of total population)



Notes: Ministerio de Desarrollo Social [2017].

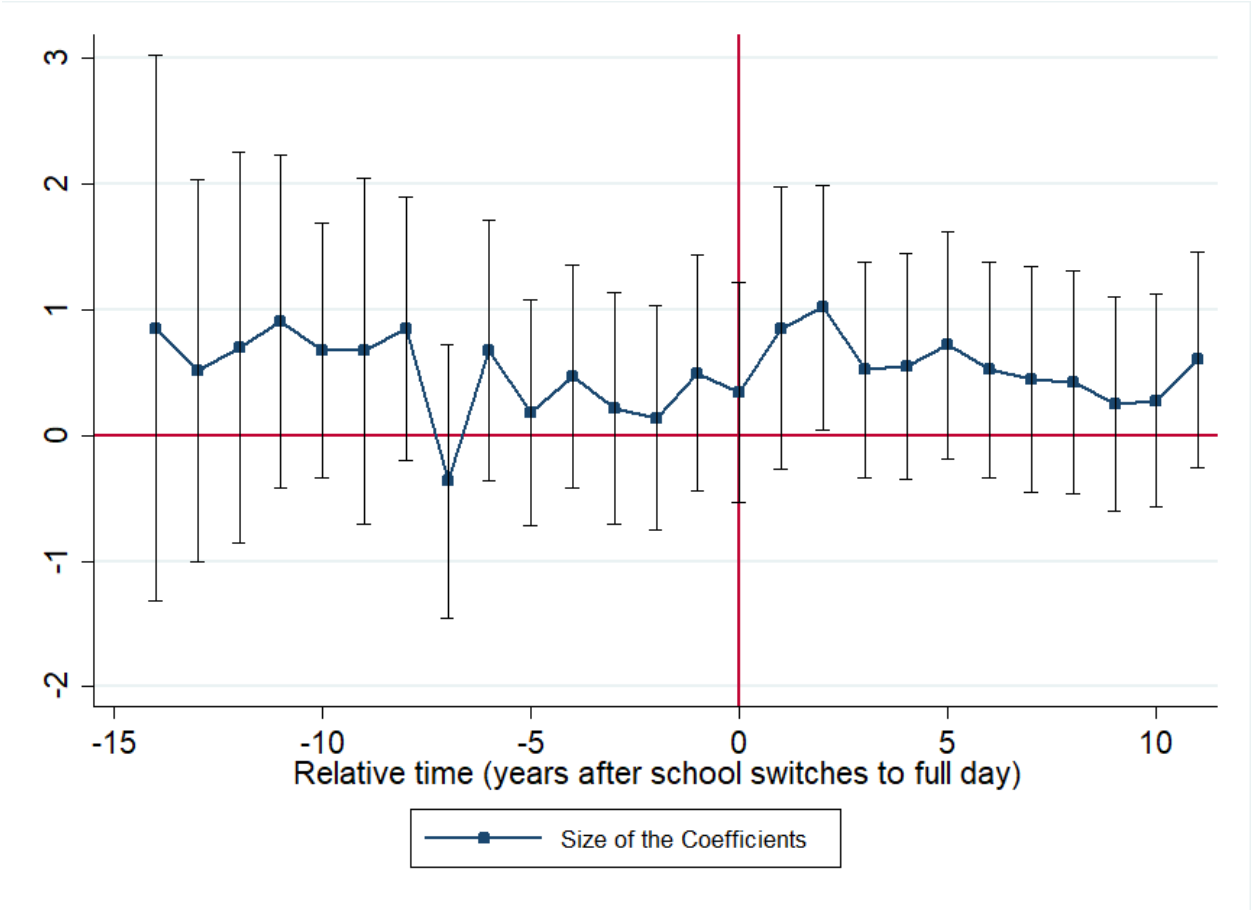
B Data Appendix

Online Appendix Table 1: SIMCE Evaluation Calendar

	2nd grade	4th grade	6th grade	8th grade	12th grade	13th grade
1988		X				
1989						
1990		X				
1991						
1992		X				
1993				X		
1994		X			X	
1995			X			
1996		X				
1997						
1998					X	
1999		X				
2000				X		
2001					X	
2002		X				
2003					X	
2004				X		
2005		X				
2006		X			X	
2007		X		X		
2008		X			X	
2009		X		X		
2010		X			X	X
2011		X		X		
2012	X	X			X	X
2013	X	X	X	X	X	
2014						
2015						
2016		X	X	X	X	
2017		X	X	X	X	
2018		X	X		X	
2019		X		X	X	
2020		X	X		X	

C Additional Results

Online Appendix Figure 2: Triple-Differences Coefficients Over Time



Notes: (*a*) Each point is a coefficient γ_k^M from the specification 3. (*b*) Standard errors clustered on school level; we show 95% confidence intervals.