# "The Effect of a Compulsory Schooling Leaving age increase on students' educational paths"

Afonso Câmara Leme[1]

Nova SBE

I study the effects of the increase in the Compulsory Schooling Law (CSL) leaving age from 15 to 18 years old, that happened in Portugal in 2009, on students' educational paths – namely, graduation probabilities and school track choices. The Portuguese case provides a setting to study its effects on low-achieving students – a group for whom the effects of CSL changes should be the highest. The policy determined that students enrolling in the 7th grade (or lower grades) in the academic year of 2009/10 would be subject to the new CSL - needing to stay in school until finishing the 12th grade, or turning 18 years old - while those enrolling in the 8th grade (or higher) in the same academic year would still be under the old CSL and could leave school when finishing the 9th grade or turning 15 years old. As such, there is a group of students from the same grade-cohort in the academic year of 2008/09 (the year before the policy was implemented) for which their academic achievement in that year (marginally) determined whether they were exposed to the new CSL or not. Students enrolled in the 7th grade in 2008/09 that were (marginally) retained had to repeat the 7th grade in the subsequent academic year and were, therefore, exposed to the new CSL, while students in the 7th grade in 2008/09 that were (marginally) promoted to the 8th grade still fell under the old CSL. Assuming the effect of grade retention versus promotion on outcomes remained constant in the analysis period, I use data from students at this retention margin from other grade-cohorts to isolate the causal effect of the CSL from the effect of retention on outcomes. Preliminary results suggest substantial heterogeneity in both compliance with the new CSL and other outcomes.

JEL Codes: I21, I28, C21

Keywords: Compulsory education age, Difference-in-differences, School dropout

[1] **Author's contact:** afonso.leme@novasbe.pt

**Acknowledgments:** This work was supported by POR Lisboa [Grant Number LISBOA-01-0145-FEDER-007722, Social Sciences Data Lab project 22209]; POR Norte [Grant Number Social Sciences Data Lab project 22209]; Fundação para a Ciência e Tecnologia (FCT) [Grant Numbers UID/ECO /00124/2013 and PTDC/IIM-ECO/6813/2014]; Afonso Câmara Leme gratefully acknowledges the support of the grants SFRH/BD/118966/2016 from FCT, and *"Fatores Explicativos para o Insucesso Escolar"* funded by EDULOG – Fundação Belmiro de Azevedo. No funding source had any involvement in any phase of this study. The views expressed here are those of the authors and do not necessarily reflect the views of FCT or EDULOG. Any errors are our own responsibility.

# 1. Introduction

Reducing early school leaving, defined as leaving education with at most lower secondary schooling[1], is generally considered to be one of the top priorities of educational policy. By the year 2000, the early school leaving rate in the European Union averaged about 20%. Because of the social and economic importance of decreasing these rates, the European Union set as a *Europe 2020* goal to bring this rate to under 10%, a target that has been practically met, with 2019 rates at 10.4%. While these numbers have been improving, the general consensus is that there is still substantial room for improvement. A policy that is typical applied to reduce early school leaving and dropout is to increase the compulsory schooling leaving age. By mandating that students stay longer in schools, we would expect that more of them eventually obtain an Upper-Secondary school diploma – specifically, the *marginal* students that change their educational path because of the policy.

While the effects of Compulsory Schooling Laws (CSL) on various social and economic outcomes have been widely documented in the literature - e.g., on wages, crime, voting behavior, fertility decisions, or mortality - there is a smaller body of literature studying the effects of CSL on school dropout. Cabus & De Witte (2011) show that a one year increase in the Compulsory Schooling Leaving (CSL) age decreased dropout rates in the Netherlands, while Landis & Reschly (2011) find that a higher CSL age in the US had an effect on the timing of dropping out, but not on high school completion rates. Furthermore, there is an even further lack of evidence of their effect on secondary school tracking choice school, student composition, or school quality. Adamecz-Völgyi (2018) studies the effects of increasing the CSL age from 16 to 18 in Hungary and estimates an increased probability of choosing the academic high school track instead of vocational training schools. At the same time, those choosing vocational training schools were more likely to drop out under the higher CSL age scheme, an effect the author attributes to a decrease in the quality of teaching in vocational training schools due to supply constraints, and shift in student composition to include more students from lower socioeconomic backgrounds. On the other hand, Erten & Keskin (2019) find that students were more likely to choose vocational high schools after the policy change in Turkey that increased compulsory schooling from 8 to 12 years. The literature therefore presents mixed evidence both on the effectiveness of compulsory schooling laws in decreasing dropout rates and their effects on school track choices.

The Portuguese case provides a noteworthy opportunity to study the effects of increasing the CSL age. Portugal had one of the EU's highest early school leaving rates in 2008 at 35%, increased its CSL age from 15 to 18 years old in 2009, and currently achieved a rate of 8.9% in 2020, attaining the EU 2020 target of a rate under 10%. Moreover, CSL age changes have not been frequent in Europe as of a late and these increases are usually lower than three years. It is worthwhile noting that a minority of

[1] "Early leaver from education and training, previously named early school leaver, refers to a person aged 18 to 24 who has completed at most lower secondary education and is not involved in further education or training; the indicator 'early leavers from education and training' is expressed as a percentage of the people aged 18 to 24 with such criteria out of the total population aged 18 to 24." (Eurostat, 2020)

European countries set the compulsory education requirement at the upper-secondary level, or when the student turns 18, and large changes in this age limit have not been thoroughly studied. In fact, Eurydice (2019) shows that in the 43 European education systems analyzed, only 8 have a duration of full-time compulsory education of at least 12 years (Belgium, Luxembourg, Portugal, Northern Ireland, Turkey, Hungary and Germany). Portugal increased the CSL age from 15 years old to 18 years old in 2009. Students enrolled in grades 1 to 7 from the academic year of 2009/10 onwards need to stay in school until they have finished the 12$^{th}$ grade of schooling (the last grade of schooling in either the academic or vocational tracks) or have turned 18 years old, while students enrolled in the 8th grade or above in 2009/10 are still under the old CSL and can leave school when they have finished the 9th grade or have turned 15 years old. Elementary Schooling in Portugal goes from the 1st to the 6th grade and Lower-Secondary Schooling goes from the 7$^{th}$ to the 9$^{th}$ grade. During these first two educational stages there is no ability-tracking and the general track has the vast majority of students enrolled, around 90%. Upper-Secondary schooling Portugal starts in the 10$^{th}$ grade. Students enrolling in this grade need to make the choice of whether to enroll in the Vocational track, from which students can choose one of several different fields, or the general Academic track, which is composed of 4 different specialization sub-track: Sciences and Technologies; Socio- Economic Sciences; Humanities and Languages; and Arts. Although students are not tracked by ability into their upper-secondary education paths, student and parental selection make it more likely for students coming from higher socio-economic status to pursue the academic track, and within the academic track, to choose the Sciences track. As students under the old CSL were not required to choose an upper-secondary track, a question that arises from this policy change is how did student track choices change as a result of the 3 years increase in the CSL age. Furthermore, were students under the new CSL more likely to get a high-school diploma? And is this probability intertwined with secondary school track choices taken in the 10$^{th}$ grade?

A straightforward, yet naïve, approach would simply compare track choices and dropout rates of the older cohorts (in the 7$^{th}$ grade in 2008/09) that were under the old CSL, with those of the younger cohorts (in the 7$^{th}$ grade 2009/10). However, this approach cannot account for unobservable cohort effects that may drive educational outcomes. Nonetheless, there is a group of students from the same grade-cohort in the academic year of 2008/09 (the year before the policy was implemented) for whom their academic achievement in that year (marginally) determined whether they were exposed to the new CSL or not. Students enrolled in the 7$^{th}$ grade in 2008/09 that were marginally retained had to repeat the 7$^{th}$ grade in the subsequent academic year and were, therefore, exposed to the new CSL, having to stay in school until they turn 18 years old or finish the 12$^{th}$ grade. On the other hand, students in the 7$^{th}$ grade in 2008/09 that were (marginally) promoted to the 8$^{th}$ grade still fell under the old CSL and could leave school when they turned 15 years old or finished the 9$^{th}$ grade. It is important to mention that retention levels in Portugal are quite high and a common practice - the retention rate in the 7$^{th}$ grade between 2007 and 2011 was around 15% and about 30% students in this grade had already been retained at least once. Furthermore, having at least one retention is a key predictor of early school dropout – 7$^{th}$

grade students in the analysis period with at least one retention were around 30% less likely to graduate. As such, this approach would compare 7th grade students from the same grade-cohort in 2008/09 for whom their academic performance marginally determined grade retention and hence, exposure to the higher CSL age. Yet, it assumes that marginally retained *vs* marginally promoted students are not different, on average, in terms of unobservables that may also affect the outcomes in question. To mitigate this potential issue, I use data from students from previous 7th grade cohorts that were also in the retention *vs* promotion margin, but for whom this did not determine exposure to different CSL ages, to isolate the effect of the CSL from the effect of retention on outcomes.

This Difference-in-Differences methodology rests on the assumption that, during the period of analysis, the effect of grade retention *vs* promotion at the margin remained constant. I identify this margin by looking at retention rules and school subject scores. Retention is decided by the student's teachers and the class committee but, as determined by national law, is only considered when a student has 3 or more failing scores in the 10 subjects taken in the 7th grade. However, in practice, grade retention is much more commonly applied when a student has 4 failing scores – only 6.3% of students with 3 failing scores were retained, while 72.4% with 4 failing scores were retained, and 94.1% of students with 5 failing scores were retained. I focus on the group of students that had between 3 and 5 failing scores, a group that is very similar in terms of pre-treatment observable characteristics, as shown by balance tests. Standardized differences in Socio-Economic status covariates between the retained and promoted groups are below the 10% threshold and specifically, differences in baseline ability - as measured by results in the 6th grade national exam scores - are very small and often, not statistically different between the two groups. A threat to the aforementioned identifying assumption would be if schools and teachers purposely changed retention practices in the academic year before the policy was implemented in the 7th grade (2008/09), or if these students changed their effort levels in response to an anticipation of different exposures to the policy. Balance tests comparing students in the retention margin in the 2008/09 academic year with students in this margin in prior and subsequent years show that these differences were in fact small. Moreover, retention rates in the 7th grade also remained stable in the 16% rate around this period.

Preliminary results suggest substantial heterogeneity in both compliance with the new CSL and in other outcomes analyzed (school track choices and graduation probabilities). While the literature presents mixed evidence on the effects of increasing the CSL age, there is a consensus that these effects are typically concentrated on the most *marginal* students. Results suggest that the main compliers from the policy – that is, those that would have left school earlier, in the absence of the higher CSL age – were students from both lower socio-economic status and lower-achieving, whereas no effects are found for higher-achieving and higher socio-economic status students.

This paper is organized as follows. Section 2 presents the Portuguese institutional setting. Next, in Section 3 the identification strategy is discussed, and Section 4 describes the data used. Finally, Section 5 presents preliminary results, while Section 6 concludes.

## 2. Institutional Setting

Portugal increased its Compulsory School Leaving (CSL) age from 15 to 18 years old in 2009. Among other reasons, the fact that the country had one of the European Union's highest early school leaving rates in 2008 at 35%, significantly above the EU rate of 14.4%, was one of the main drivers of this policy. 12 years later, in 2020, Portugal was able to achieve an early school leaving rate of 8.9%, and attained the EU 2020 target of a rate under 10% (Figure 1). While this was a very substantial improvement, it remains to analyze what contribution the CSL age policy had, as the country's rate was already on a clear downwards trajectory.

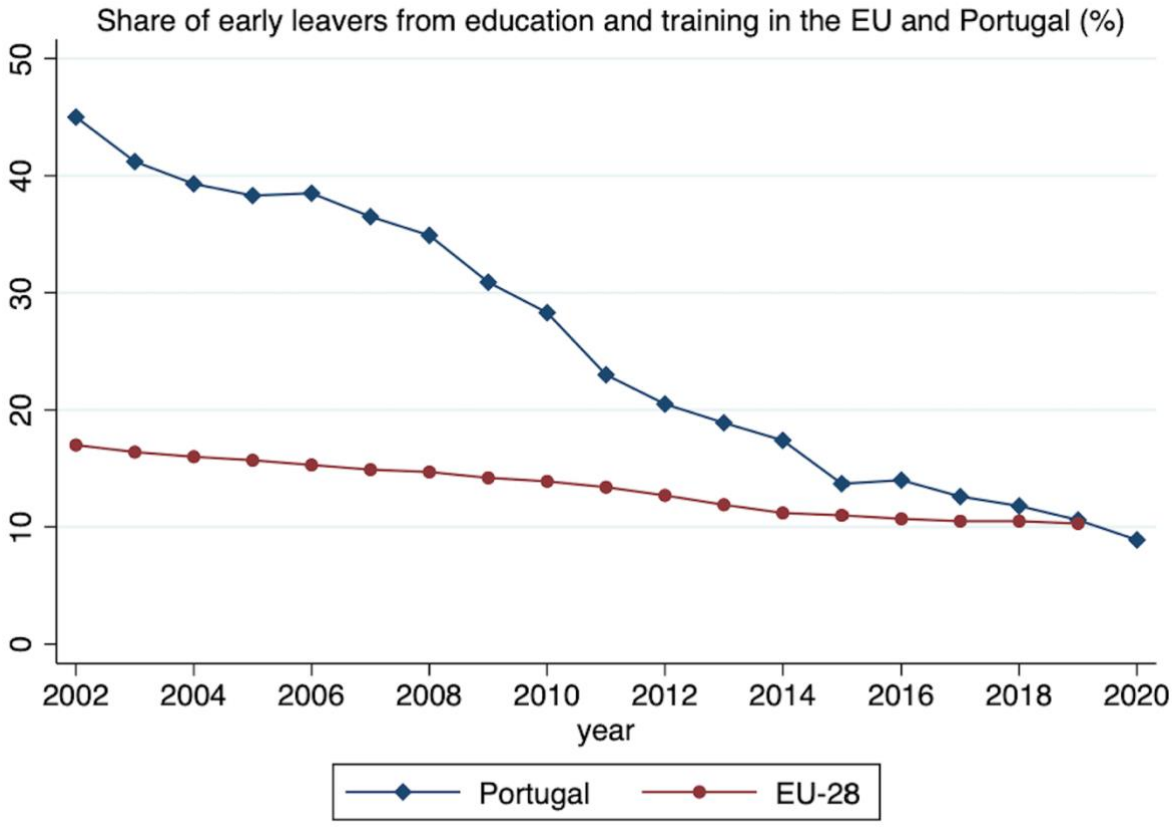



***Figure 1*** – Share of early leavers from education and training in the EU-28 and Portugal. A "*Early leaver from education and training, previously named early school leaver, refers to a person aged 18 to 24 who has completed at most lower secondary education and is not involved in further education or training; the indicator 'early leavers from education and training' is expressed as a percentage of the people aged 18 to 24 with such criteria out of the total population aged 18 to 24*." (Eurostat, 2020). Data for the EU-28 2020 average is not yet available.

The government first announced in 2007 their plans to increase the CSL age from 15 to 18 years old two years later, in April of 2009 the parliament approved the law proposal, and in August of that year the law was finally approved. Support for the policy was generally widespread and political discussions focused mostly on the details of its implementation and resources needed. The law determined that students enrolled in grades 1 to 7 from the academic year of 2009/10 onwards need to stay in school

until they have finished the 12th grade of schooling (the last grade of schooling in either the academic or vocational tracks) or have turned 18 years old, while students enrolled in the 8th grade or above in 2009/10 are still under the old CSL and can leave school when they have finished the 9th grade or have turned 15 years old. Children start school the year they turn 6 years old and private and public schools coexist in all levels of education[2]. Elementary Schooling in Portugal goes from the 1st to the 6th grade and Lower-Secondary Schooling goes from the 7th to the 9th grade. During these first two educational stages there is no ability-tracking and the general track has the vast majority of students enrolled (around 90%). Upper-Secondary Schooling Portugal starts in the 10th grade. Students enrolling in this grade need to make the choice of whether to enroll in the Vocational track, from which students can choose one of several different fields directed towards earlier integration in the labor market, or the Academic track, targeting students who want to pursue a university degree, which is composed of 4 different specialization sub-track: Sciences and Technologies; Socio- Economic Sciences; Humanities and Languages; and Arts. Although students are not tracked by ability into their upper-secondary education paths, student and parental selection make it more likely for students coming from higher socio-economic status to pursue the academic track, and within the academic track, to choose the Sciences track.

The academic year starts in September and finishes at the end of August of the following calendar year, with the summer holiday months going from July to September. The first cohort of students affected by the new CSL age reached 10th grade, the first year of Upper-Secondary Schooling, in the academic year of 2012/13, if they did not have any grade retentions since the implementation of the policy. In August of 2012, two laws were approved in light of the increase of the CSL age. The first[3] determined measures to prevent early school leaving and failure, such as better guidance and support to at-risk students, giving further emphasis to the enrollment in vocational and alternative tracks as a preventive measure. It also clarified the student's and his/her guardian's legal responsibilities in terms of school enrollment until the CSL requirements are met. The second[4] altered the Labour code to allow youngsters under 16 years old to work only if they have completed compulsory schooling (i.e., for students still under the old CSL), or if they are enrolled in Upper-Secondary Schooling.

Students in the Portuguese school system are evaluated through teacher assessment and national exams. National exams in Portuguese Language and Mathematics are performed by every student in the system, by the end of 4th and 6th grades (until 2015), and 9th grade. Children take these exams at exactly the same time, facing the same questions. Exams are then evaluated by a randomly allocated evaluator teacher, from schools other than the school in which the student is enrolled, in an anonymous fashion. In order to complete the general academic track of upper secondary education, students must also sit

[2] The percentage of students in private schools is around 13% at all cycles of basic education and of around 20% in secondary education.
[3] Law *"Decreto-Lei n.º 176/2012"*
[4] Law *"Decreto-Lei n.º 47/2012"*

through national exams – typically completing two track-specific exams in the 11th grade and another two in the 12th grade, in most cases, Portuguese language and Mathematics exams. Students can only gain admission to tertiary education if they have a passing grade in both 12th grade exams. Teacher-assigned school grades are based on several coursework elements, that include in-class tests but also homework, oral presentations, class participation and student behavior. In the 1st to 9th grade, grades are given on 1-5 scale, where 3-5 are passing grades, while in Upper-Secondary education the 1-20 scale is used, where the passing grades range from 10-20.

Grades assigned by teachers at the end of each academic year, along with national exam scores in the grades they are taken, are used to determine whether a student is promoted to the next grade or retained, in which case the student has to repeat the same school-grade in the following academic year. Retention is decided by the student's teachers and the class committee but, as determined by national law, is only considered when a student has at least two or three subjects (depending on the school-grade) with failing scores. Retention levels in Portugal are high and a common practice (Eurydice, 2011; OECD, 2014). Although this practice has been steadily falling since around 2013, the retention rate in the 7th grade between 2007 and 2011 was around 15% and about 30% students in this grade had already been retained at least once.

## 3. Identification Strategy

As described in the previous section, exposure to the new CSL was determined by the school-grade in which the student enrolled in the academic year of 2009/2010: Students enrolled in grades 1 to 7 from the academic year of 2009/10 need to stay in school until they have finished the 12th grade of schooling (the last grade of schooling in either the academic or vocational tracks) or have turned 18 years old, while students enrolled in the 8th grade or above in 2009/10 are still under the old CSL and can leave school when they have finished the 9th grade or have turned 15 years old. As students under the old CSL were not required to choose an upper-secondary school track, a question that arises from this policy change is how did student track choices change as a result of the 3 years increase in the CSL age. Furthermore, were students under the new CSL more likely to get a high-school diploma? And is this probability intertwined with secondary school track choices taken in the 10th grade?

A straightforward, yet naïve, approach would simply compare track choices and dropout rates of the older cohorts (in the 7th grade in 2008/09) that were under the old CSL, with those of the younger cohorts (in the 7th grade 2009/10):

$$Y_{it} = \gamma . CSL_{it} + \boldsymbol{X}'_{it}\beta + \varepsilon_{it} \quad (1)$$

where $Y_{it}$ is an educational outcome (e.g., high-school graduation, school track choices) of student *i*, enrolled in the 7th grade in the academic year *t*; $CSL_{it}$ is a binary variable indicating exposure to the new CSL, i.e., it takes the value 1 if the student ever enrolled in the 7th grade in the academic year 2009/10 or later[5], and 0 otherwise; and $X_{it}$ is a vector of student background characteristics, including gender, parental education, baseline 6th grade national exam scores, and indicators for migrant status, socio-economic support, previous retentions, and resources at home. Despite its limitations in providing a credible causal estimate of the effect of the reform, the event-study approach of equation (1) is useful to understand the temporal evolution of the educational outcomes of the different cohorts, before and after the CSL change, and to understand which groups of students, identified by the background characteristics described above, changed their educational paths the most. The latter analysis is developed in Section 5.1 and focuses on understanding and identifying who were the main compliers with the CSL reform.

However, this event-study approach cannot account for unobservable cohort effects that may drive educational outcomes. Nonetheless, there is a group of students from the same grade-cohort in the academic year of 2008/09 (the year before the policy was implemented) for which their academic achievement in that year (marginally) determined whether they were exposed to the new CSL or not. Students enrolled in the 7th grade in 2008/09 that were marginally retained had to repeat the 7th grade in the subsequent academic year and were, therefore, exposed to the new CSL, having to stay in school until they turn 18 years old or finish the 12th grade. On the other hand, students in the 7th grade in 2008/09 that were (marginally) promoted to the 8th grade still fell under the old CSL and could leave school when they turned 15 years old or finished the 9th grade. As discussed in the previous section, retention levels in Portugal are high and a common practice - the retention rate in the 7th grade between 2007 and 2011 was around 15% and about 30% students in this grade had already been retained at least once. Furthermore, having at least one retention is a key predictor of early school dropout – 7th grade students with at least one retention were around 30% less likely to graduate, in the analysis period. As such, this approach would compare 7th grade students from the same grade-cohort in 2008/09 for whom their academic performance marginally determined grade retention and hence, exposure to the higher CSL age. Yet, it assumes that marginally retained *vs* marginally promoted students are not different, on average, in terms of unobservables that may also affect the outcomes in question. To mitigate this potential issue, I use data from students from other 7th grade cohorts that were also in the retention *vs* promotion margin, but for whom this did not determine exposure to different CSL ages, to isolate the effect of the CSL from the effect of retention on outcomes.

This Difference-in-Differences methodology rests on the assumption that, during the period of analysis, the effect of grade retention *vs* promotion at the margin remained constant. I identify this margin by

[5] If a student was ever retained in the 7th grade and repeated it, I consider the last academic-year in which the student enrolled in this grade.

looking at retention rules and school subject scores. Retention is decided by the student's teachers and the class committee but, as determined by national law, is only considered when a student has 3 or more failing scores in the 10 subjects taken in the 7th grade. However, in practice, grade retention is much more commonly applied when a student has 4 failing scores – only 6.3% of students with 3 failing scores were retained, while 72.4% with 4 failing scores were retained, and 94.1% of students with 5 failing scores were retained. I focus on the group of students that had between 3 and 5 failing scores, a group that is very similar in terms of pre-treatment observable characteristics, as shown by balance tests in Section 5.2. If the identifying assumptions hold, it is only possible to identify the effect of the CSL reform for a specific group of students – those in the grade retention/promotion *margin*. However, being at this margin also serves as a proxy for being a lower-achieving student – a group that CSL policies specifically target, and for whom the literature identifies the largest effects.

Figure 2 illustrates the timing of exposure to the new CSL of different 7th grade cohorts. For the Pre-Intervention cohorts, students were always under the old CSL, irrespective of retention status. However, for the Mid-Intervention cohort, retained students became exposed to the new CSL due to enrollment in the 7th grade in 2009/10, while promoted students still fell under the old CSL as they will have enrolled in the 8th grade in 2009/10. Finally, in the Post-Intervention cohorts, all students were exposed to the new CSL, regardless of retention status. For all cohorts, I consider the first time a student was enrolled in the 7th grade, and to guarantee that retained 7th grade students in the 2006/07 and 2007/08 cohorts do not end up exposed to the new CSL because of additional retentions, I focus only on students with one 7th grade retention at most, excluding around 1% of the sample.

This setting gives rise to a variation in the treatment timing of the retained and promoted student cohorts, which can be analyzed through a Difference-in-Differences (DiD) with variation in treatment timing. This methodology, also called DiD with staggered adoption, has received substantial attention in the literature recently (Callaway & Sant'Anna, 2020; Goodman-Bacon, 2018) and is appropriate in a setting with more than two time periods where different groups receive a treatment at different times. Focusing on the retained student cohorts, these change their treatment status from 2007/08 to 2008/09, while the promoted groups remain under the old CSL, and can be used a control group to calculate an "early treatment effect", with a simple 2x2 DiD (i.e., the canonical DiD with 2 time periods and 2 groups). On the other hand, focusing now on the promoted group, their treatment status changes from 2008/09 to 2009/10, while in this period the retained group remain under the new CSL and, as such, can used as control group to estimate a late "treatment effect", with another 2x2 DiD. Goodman-Bacon (2018) shows that the two-way fixed effects DiD (with "group" and "time" fixed effects) is a weighted average of all possible 2x2 DiD estimators (in this case, of the "early" and "late" treatment effects) that compare one group that changes treatment status to another group that does not. These weights are proportional to group sizes and the variance of the treatment dummy in each pair – i.e., how close to the beginning/end of the subsample window does treatment turn, which is highest for units treated in the middle of the panel.

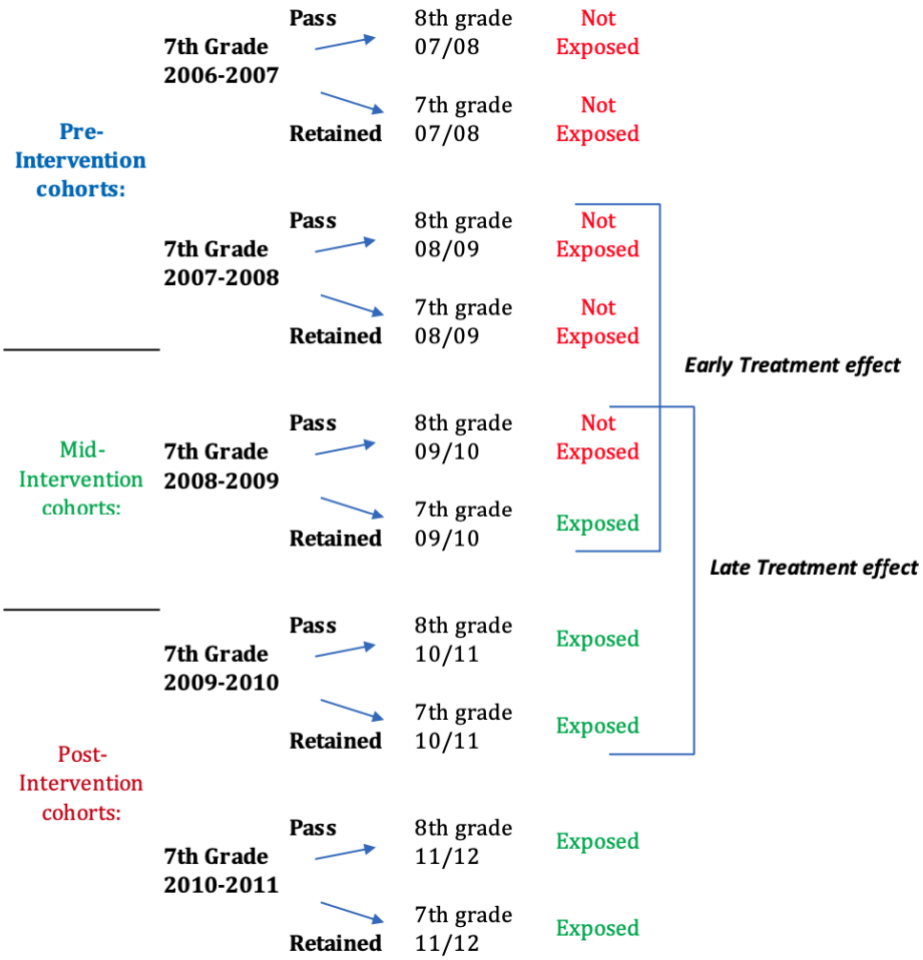



**Figure 2** – Difference-in-Differences Identification Strategy

This approach is, in practice, implemented through equation (2):

$$Y_{it} = \alpha_t + \delta . Retain_i + \boldsymbol{X}'_{it}\beta + \gamma . CSL_{it} + \varepsilon_{it} \quad (2)$$

where $Y_{it}$ is once again an educational outcome (e.g., high-school graduation, school track choices) of student *i*, enrolled in the 7th grade in the academic year *t*; $\alpha_t$ are the 7th grade academic year cohort fixed effects (i.e., the *time* fixed effects); $Retain_i$ indicates retention in the 7th grade versus promotion (i.e., the *group* fixed effects); $X_{it}$ is a vector of the student background characteristics listed above; $CSL_{it}$ indicates exposure to the new CSL; and $\varepsilon_{it}$ is the error term. The parameter of interest is $\gamma$, which under the identifying assumptions previously discussed, identifies the effect of the new CSL on students' educational paths.

I analyze the following educational outcomes: compliance with the new CSL – i.e., staying in school until reaching at least 18 years old or graduating Upper-Secondary School; enrollment in Upper-Secondary School; Graduating Lower-Secondary School; Upper-Secondary School Track choice -

Vocational vs Academic Track; and Graduation from Upper-Secondary School. Results for each set of outcomes are presented in Section 5.3 both through estimates of equation (2), and graphical representations of the evolution of these outcomes for the retained and promoted groups. The latter approach has the advantage of making it possible to visualize the two simple 2x2 DiD treatment effects (the *early* and *late* treatment effects) and inspecting the plausibility of the identifying assumptions. As shown in Figure 2, from the 2009/10 7th grade cohort onwards, both retained and promoted groups are exposed to the new CSL. As such, the evolution of outcomes for the two groups from 2009/10 should be parallel. This condition can be thought of as a falsification test – the trend in the outcome variables between retained and promoted groups should not be different if both are under the new CSL. It is not possible to perform a pre-treatment falsification test (i.e., an inspection of pre-treatment parallel-trends) because data for school subject scores, which is used to guarantee an appropriate comparison between retained and promoted students, is not available for the academic year of 2006/07 (the first year of the dataset used).

# 4. Data

## 4.1 Data description

To analyze the question at hand, I use the administrative dataset MISI[6] containing detailed information on every student enrolled in public and private schools in mainland Portugal from the academic year 2006/07 to 2017/18. MISI contains relevant data on personal and socioeconomic characteristics of each student – such as gender, birthday, home neighborhood and school attended, country of origin, parents' education, parents' employment status, eligibility for social support, access to computer or Internet at home – with minimum measurement error or missing information. A unique student identifier allows us to track students throughout grades and gather additional information about their educational pathway. We thus have a panel dataset of students since they are first observed in the Portuguese education system. A student's track is lost when he/she moves abroad, drops from the education system altogether, or dies. We may also lose track of students if these move to a different public or private school and the matching algorithm is unable to correctly assign the unique identifier to new instances of the same student in the system. We merge MISI data with a two other administrative datasets (ENEB and ENES) containing comprehensive information on student achievement in the standardized national exams of the 4th, 6th, 9th, 11th, and 12th grades.

## 4.2 Analysis samples

[6] MISI data is collected and maintained by the Directorate General of Education and Science Statistics (*Direcção-Geral de Estatísticas da Educação e Ciência* - DGEEC), a department under the indirect administration of the Ministry of Education in Portugal.

MISI also includes data on students' school subject scores. As the identification strategy proposes to compare students near the 7th grade promotion/retention margin, determined by the number of failing scores, I use these data to identify these students in each cohort. Students in the 7th grade across all Portuguese schools take 10 subjects – Portuguese Language, Mathematics, Natural Sciences, Physics and Chemistry, History, Geography, English Language, a second Foreign Language (usually French), Visual Arts, and Physical Education – and grade retention is considered when a student has 3 or more failing scores (i.e., Scores of 1 or 2 in a scale of 1-5). Data on these school subject scores is only available for Public Schools, from the academic year of 2007/08 (i.e., the first academic year of the dataset does not include them), and within Public Schools, we have subject scores data for around 73% of 7th students. Because these data on school subjects are central to the DiD identification strategy, I restrict the main sample of analysis to students who attended a Public School in the 7th grade[7]. Event-Study results presented in Section 5.1 are not subject to this data availability restriction and therefore include all students, in Public or Private schools, and also in the academic year of 2006/07.

Furthermore, in all analysis presented in Section 5, only students aged at most 15 years old in their last 7th grade are considered. Under the old CSL, students reaching 15 years old could drop out of school at the end of the academic-year. As such, to make sure that retention in the 7th grade lead to an exposure of the new CSL for the 2008/09 cohort, I have to make sure that students were at most 14 years old in their first enrollment in the 7th grade (and hence, at most 15 years old in their last 7th grade). The reference age at the end of the 7th grade – i.e., under a regular school starting age and with no accumulated retentions – is 13 years old, if a student's birthday is between the 1st of January and the 31st of August , or 12 years old if the birthday if after that date. This means, that the main sample of analysis includes students who are at most two years above the reference age in the 7th grade.

Finally, because different educational outcomes are observed in different time horizons, analysis in Section 5 differ in the amount of academic years included to make sure that more recent cohorts are comparable with older cohorts. Specifically, because Upper-Secondary school graduation and compliance with the new CSL need more time to be observed, the academic years from 2006/07 to 2010/11 are included. For all other outcomes, involving Upper-Secondary school choices, the academic years from 2006/07 to 2012/13 are included.

### 4.3 Main variables

Section 5 analyzes the effect of the new CSL on the following binary outcome variables presented in Table 1.

[7] Students included in the main sample of analysis for the DiD estimates may have enrolled in a Private School before or after their first enrollment in 7th grade. The only condition of inclusion is therefore, that the enrollment in 7th grade was in Public School.

| | |
|---|---|
| **Compliance with the new CSL:** | takes the value of 1 if the student is observed in the dataset until reaching the age of 18 years old, or graduating from an Upper-Secondary school program |
| **Enroll in 10$^{th}$ grade:** | takes the value of 1 if the student has enrolled in the 10$^{th}$ grade, the first year of Upper-Secondary school programs, in either the Academic or Vocational track |
| **Finish 9$^{th}$ grade:** | takes the value 1 if the student completes the 9$^{th}$ grade, the last year of Lower-Secondary schooling |
| **Vocational track choice:** | takes the value 1 if the student enrolls in the 10$^{th}$ grade in a Vocational program, and the value 0 if a student enrolls in the general academic track |
| **Graduation:** | takes the value 1 if the student completes the 12$^{th}$ grade, the last year of both vocational and academic Upper-Secondary School programs |

**Table 1 –** outcome variables analyzed

The control variables included are presented in Table 2. For variables that change across time (e.g. parental employment status), the mode of this variable until the year a student is enrolled in the 7$^{th}$ grade is used.

| | |
|---|---|
| **Scores in the 6$^{th}$ grade National Exams of Portuguese and Mathematics:** | discrete variables on a scale of 1-5, where 3-5 are passing scores. |
| **Male:** | binary variable taking the value 1 if the student's sex is male, 0 if female. |
| **Parental Education:** | dummy variable categories for the highest level of education by either of the student's parents. The categories are: lower than Upper-Secondary School (used as the reference group), at most Upper-Secondary School, Tertiary education. |

| | |
|---|---|
| **Migrant status:** | dummy variable categories for the migrant status of a students. The categories are: native students (used as the reference group), 1st generation immigrant, and 2nd generation immigrant. |
| **SASE support:** | dummy variable categories indicating the type of social support (SASE – *Serviço de Ação Social Escolar*), given in case of low family income. The categories are: no support (used as the reference group), SASE B, and SASE A (the category for the lowest family income). |
| **Parental employment status:** | indicators for the employment status of a student's father and mother, taking the value 1 if unemployed. |
| **Resources at home:** | indicator for whether the student has a computer at home, and another indicator for whether the student has a computer at home. |
| **Years above reference age:** | dummy variable categories indicating how many years above the reference age in the 7th grade a student is. The categories are: on reference age (used as the reference group), one year above the reference age, and two years above reference age. |

**Table 2 –** Control variables included

# 5.Results

## 5.1 Who are main compliers of the new CSL?

The CSL literature suggests that effects from these policies tend to be concentrated on specific groups of the student population, and are from homogeneous. Low-Achieving and Low-Socioeconomic Status (SES) are typically identified as the groups most affected by increases in the CSL age. It is therefore most important to identify who the *compliers* from the new CSL policy are – i.e., the students who would have left school without a high-school diploma, or without reaching 18 years old, in the absence of the policy. In this sub-section, I provide some suggestive evidence through Event-Study estimates that, in line with the literature, compliers with the new CSL are mainly students that are both Low-Achieving and Low-SES.

Figure 3 presents Event-Study estimates of the effect of the CSL reform on its compliance, estimated through equation 2, for different groups of the student population. Specifically, I compare 7th grade

cohorts that were under the old CSL with those that were under the new CSL, in terms of their predicted probabilities of complying with the new CSL – i.e., staying in school until reaching 18 years old, or graduating Upper-Secondary school. While, as argued in Section 3, these estimates should not be interpreted as causal estimates of the effect of the CSL reform, their main purpose lies in identifying who the main compliers of the policy may be. Moreover, because the DiD estimates of section 5.3 that attempt to recover causality are restricted to low-achieving students as a consequence of the Identification Strategy, it is relevant to check whether Event-Study estimates identify this group as a main complier from the policy.

Estimates in Figure 3 are plotted through 95% Confidence Intervals for 5 different groups: for all students; only for Low-SES students; for High-SES; for Low-Achieving; and for High-Achieving. A Low-SES student is defined as being a beneficiary of socioeconomic support (SASE), or with neither parent having completed Upper-Secondary schooling or higher; while a Low-Achieving student is defined as having a grade point average in the 6$^{th}$ grade exams below 3 (on a 1-5 scale, where 1-2 are failing scores), or more than one failing score in the 7$^{th}$ grade[8]. All estimates are conditional on the covariates described in Section 4.3, which control for personal characteristics of the student, their socioeconomic background, and baseline achievement. Standard errors are clustered at the municipality level.

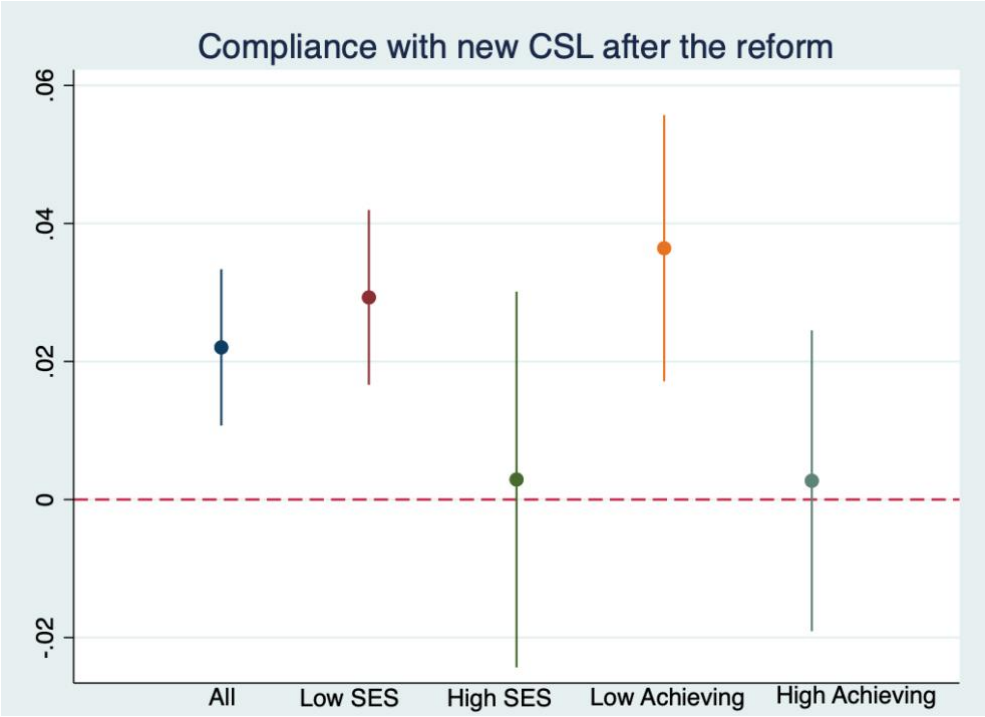



***Figure 3*** **–** Event-Study estimates for the new Compulsory Schooling Law (CSL) compliance rate change in percentage points for the student population, and four different groups of the student population. Dots represents point estimates, while lines represent 95% Confidence Intervals.

[8] Slightly changing the definitions of Low-SES & Low-Achieving does not alter results meaningfully.

Results suggest substantial heterogeneity in the compliance rate change of different student groups. A statistically significant increase of 2.2 percentage points in the compliance rate is estimated for the population. However, while estimates are not statistically different at a 95% confidence level between the 4 sub-groups analyzed, point estimates are higher and statistically significant for Low-SES and Low-Achieving students, but very close to zero and not statistically significant for High-SES and High-Achieving students. It is important to note that the pre-reform compliance rate in the 3 included cohorts averaged 83%, and 87% in the 2 post-reform cohorts, but there was also considerable heterogeneity in these rates across groups. For example, the compliance rate varied from an average of 81% to 85% in the Low-SES group, but there was very little change for the High-SES group, whose rate changed from 91.8% to 92.2 %. A similar pattern is observed for students with different levels of baseline achievement – Low-Achieving students experienced an increase in their compliance rate, from 76.6% to 81.5%, whereas High-Achieving students' compliance remained unaltered around the 91% rate. Finally, in order to get a further understanding of who the main compliers of the new CSL are, I analyze the heterogeneity in compliance rate changes across crossed-categories of the above groups: i.e., Low-SES & Low-Achieving, Low-SES & High-Achieving, High-SES & Low-Achieving, and High-SES & High-Achieving. Figure 4 plots 95% Confidence Interval estimates for these 4 groups and shows that results are much more precisely estimated, and only statistically significant for the group of students that is simultaneously Low-SES & Low-Achieving. For this group, I estimate that cohorts after the CSL reform had a compliance rate that was 4.5 percentage points higher than pre-reform cohorts, conditional on the included covariates – a sizeable effect. For the other groups, we cannot exclude a null effect, nor sizable negative or positive effects, suggesting substantial heterogeneity in these groups' compliance rate change. It is therefore reasonable to assume that enforcement of the new CSL played a more predominant role for Low SES & Low-Achieving students, who left the education system at very high rates before the reform.

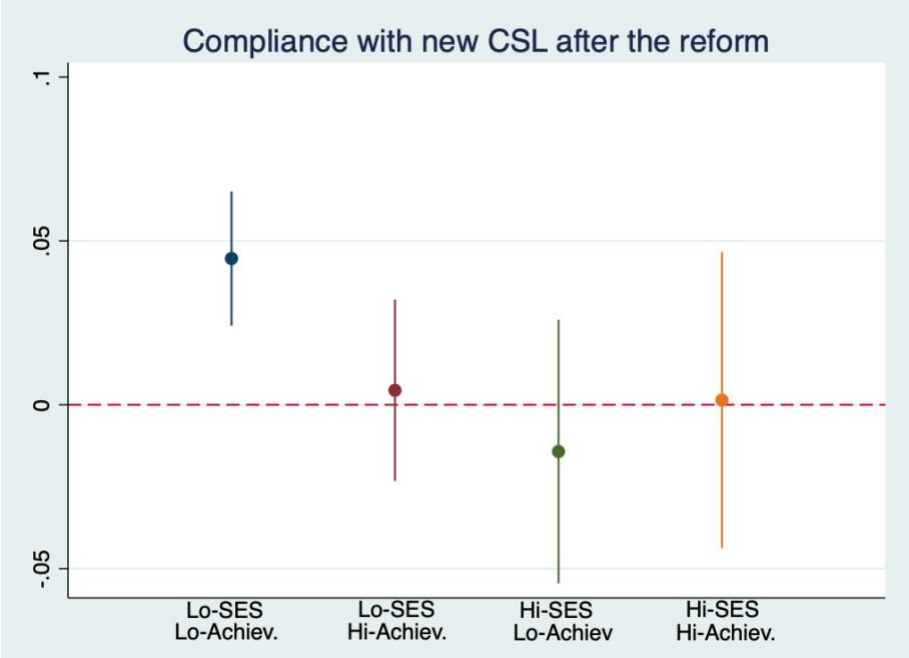



***Figure 4*** **-** Event-Study estimates for the new Compulsory Schooling Law (CSL) compliance rate change in percentage points for four different sub-groups of the student population. Dots represents point estimates, while lines represent 95% Confidence Intervals.

## 5.2 Retained and Promoted students

As discussed in Section 3, the Difference-in-Differences methodology applied in this paper compares retained with promoted students in the 7th grade at the retention margin, as retention in the 2008/09 academic year lead to an exposure of the new CSL, while promoted students remained exposed to the old CSL. To capture the effect of retention vs promotion at the margin on the outcomes analyzed and separate it from the effect of the policy, I use data from other 7th grade cohorts for whom the retention or promotion status did not lead to different exposure of CSL policies. This identification strategy therefore, rests on the assumption that, during the period of analysis, the effect of grade retention *vs* promotion at the margin remained constant. I identify this margin by looking at retention rules and school subject scores. Retention is decided by the student's teachers and the class committee but, as determined by national law, is only considered when a student has 3 or more failing scores (also known as "negative" scores) in the 10 subjects taken in the 7th grade. However, in practice, grade retention is much more commonly applied when a student has 4 failing scores – only 6.3% of students with 3 failing scores were retained, while 72.4% with 4 failing scores were retained, and 94.1% of students with 5 failing scores were retained, as seen in Figure 5.

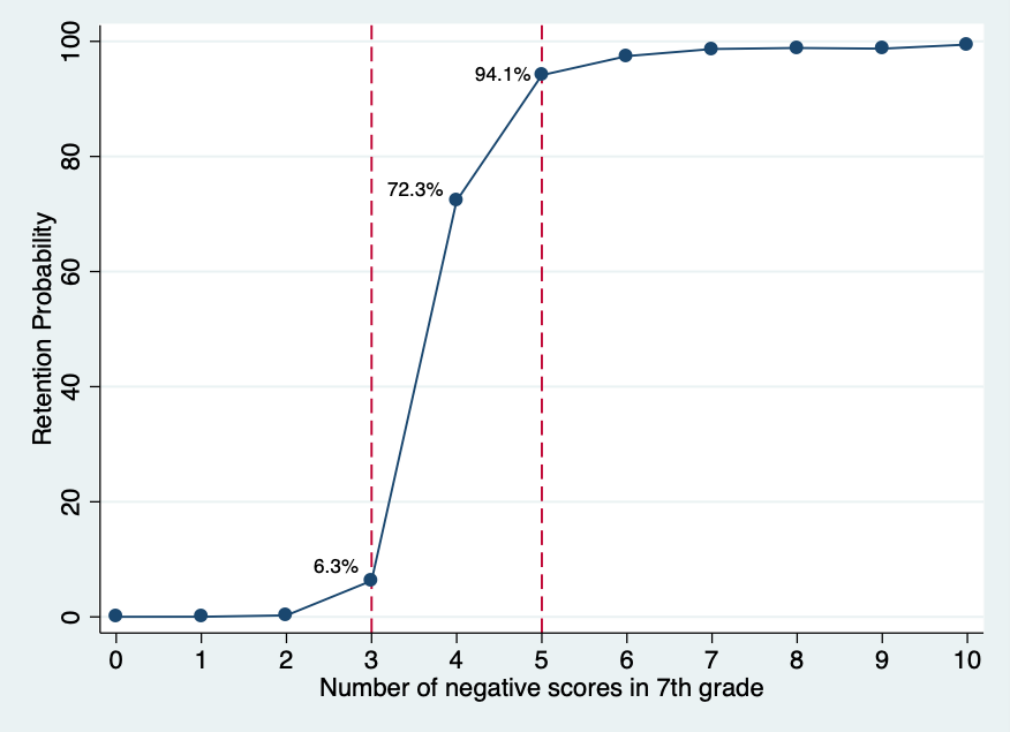



**Figure 5 –** Retention probability and number of failing/negative scores in the 7th grade

I focus on the group of students that had between 3 and 5 failing scores. First of all, we would like that the group of students identified in this retention margin is as comparable as possible and consequently, differences in covariates observed before the 7th grade, should be small. Table 3 shows that while differences in the observed covariates are often statistically significant, the magnitude of the differences is small and does not show a clear pattern in terms of a more favorable socio-economic status for either retained or promoted students – e.g., parental education is slightly higher for retained students but retained students come from immigrant backgrounds more often; the retained group shows better conditions of resources at home (measure by the presence of a computer and internet connection) but also presents a higher proportion of students with the highest level of socio-economic support (SASE A). Perhaps more importantly, differences in terms of baseline 6th grade National Exam scores are either not statistically significant, in the case of the Portuguese Language exam, or almost undistinguishable in terms of magnitude for the Mathematics exam, in which case they are 0.015 points higher, on a 1-5 scale, for promoted students.

| | Promoted | Retained | R-P |
|---|---|---|---|
| Math Score - 6g exam | 2.432 | 2.417 | -0.015*** |
| | | | (0.006) |
| PT Score - 6g exam | 2.748 | 2.747 | -0.001 |
| | | | (0.005) |
| Male | 0.558 | 0.601 | 0.043*** |
| | | | (0.006) |
| Parent Ed: Upp-Secondary | 0.149 | 0.179 | 0.031*** |
| | | | (0.004) |
| Parent Ed: Tertiary | 0.033 | 0.037 | 0.004** |
| | | | (0.002) |
| 1st Gen. Immigrant | 0.033 | 0.044 | 0.011*** |
| | | | (0.002) |
| 2nd Gen. Immigrant | 0.027 | 0.034 | 0.006*** |
| | | | (0.002) |
| SASE A | 0.352 | 0.322 | -0.030*** |
| | | | (0.006) |
| SASE B | 0.184 | 0.194 | 0.010** |
| | | | (0.005) |
| Dad Unemployed | 0.070 | 0.062 | -0.008*** |
| | | | (0.003) |
| Mom Unemployed | 0.122 | 0.121 | -0.001 |
| | | | (0.004) |
| Computer at home | 0.518 | 0.575 | 0.057*** |
| | | | (0.006) |
| Internet at home | 0.300 | 0.372 | 0.073*** |
| | | | (0.006) |
| One year above reference age | 0.353 | 0.369 | 0.016*** |
| | | | (0.006) |
| Two years above reference age | 0.054 | 0.061 | 0.007** |
| | | | (0.003) |
| Observations | 17,476 | 12,128 | 29,661 |

**Table 3 –** Balance test for the sample of retained and promoted students. The first and second column present averages for each of the covariates included, for promoted and retained students, respectively, while the last column presents differences between the averages of retained and promoted students, with standard errors in parentheses. Significance levels for testing whether the difference is equal to zero or not: ***p < 0.01, **p < 0.05, *p < 0.1.

Still, because sample sizes are large – around 17 and 12 thousand promoted and retained students, respectively, from the academic years of 2007/08 to 2012/13 – differences between the two groups are likely to be statistically significant, even if the magnitude of these differences is not economically meaningful. A common way in the literature to deal with this caveat of standard balance tests, and provide a way to a scale and sample size free way of assessing overlap, is to analyze standardized (also known as normalized) differences (Imbens, 2015). The literature typically considers that having standardized differences <10% is a good balance. Figure 6 shows that all included covariates are below this threshold, expect for the presence of internet and computer at home, in which case these are favorable to the retained group.

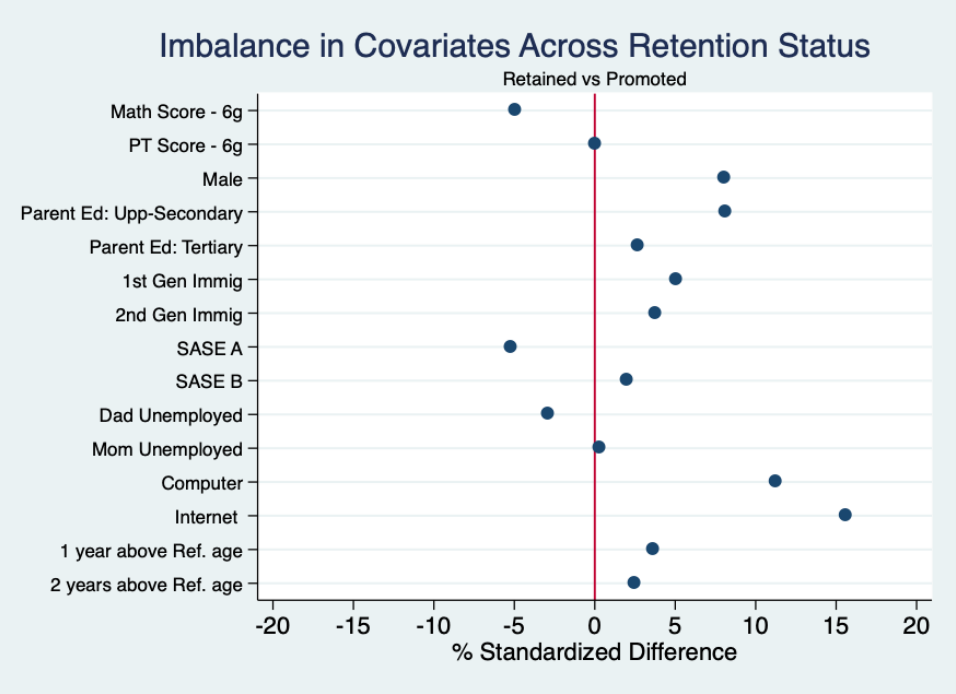



**Figure 6 –** Standardized differences between retained and promoted students

Furthermore, if we are to consider that the assumption that the effect of retention at the margin remained constant across years is plausible, we would also want to make sure that this group is homogeneous across cohorts. A threat to the aforementioned identifying assumption would be if schools and teachers purposely changed retention practices in the academic year before the policy was implemented in the 7th grade (2008/09), or if these students changed their effort levels in response to an anticipation of different exposures to the policy. Balance tests comparing students in the retention margin in the 2008/09 academic year with students in this margin in prior and subsequent years show that these differences were in fact small. Figure 7 shows that there are potentially worrisome standardized differences above 30% in the Portuguese and Mathematics National exam scores. However, the distribution of exam scores varies across years due to the different levels of difficulty and grading criteria, which could be driving these differences. In fact, the proportion of grade 2 (a failing score) in Mathematics decreased from around 31% to 15% from the 2007 to the 2008 exams, and the proportion of grade 4 scores increased from 15% to 26%, with a similar pattern in the Portuguese Exams[9].

Finally, Figure 8 shows that retention rates in the 7th grade remained stable in the 16% rate around the period of the change in the CSL, further suggesting that schools and teachers did not purposely change retention practices in response to the reform.

[9] Full results available upon request.

| | (1) Retained 07/08 | (2) Retained 08/09 | (2)-(1) | Std. Diff |
|---|---|---|---|---|
| Math Score - 6g exam | 2.228 | 2.656 | 0.428*** | 0.468 |
| | | | (0.020) | |
| PT Score - 6g exam | 2.793 | 3.009 | 0.216*** | 0.329 |
| | | | (0.014) | |
| Male | 0.583 | 0.615 | 0.032** | 0.046 |
| | | | (0.014) | |
| Parent Ed: Upp-Secondary | 0.162 | 0.165 | 0.003 | 0.006 |
| | | | (0.011) | |
| Parent Ed: Tertiary | 0.032 | 0.034 | 0.003 | 0.010 |
| | | | (0.005) | |
| 1st Gen. Immigrant | 0.050 | 0.062 | 0.012* | 0.036 |
| | | | (0.007) | |
| 2nd Gen. Immigrant | 0.038 | 0.036 | -0.002 | -0.008 |
| | | | (0.006) | |
| SASE A | 0.289 | 0.321 | 0.032** | 0.050 |
| | | | (0.013) | |
| SASE B | 0.101 | 0.186 | 0.085*** | 0.173 |
| | | | (0.010) | |
| Dad Unemployed | 0.055 | 0.059 | 0.005 | 0.014 |
| | | | (0.007) | |
| Mom Unemployed | 0.103 | 0.129 | 0.025*** | 0.056 |
| | | | (0.009) | |
| Computer at home | 0.559 | 0.589 | 0.030** | 0.042 |
| | | | (0.014) | |
| Internet at home | 0.332 | 0.386 | 0.054*** | 0.080 |
| | | | (0.014) | |
| One year above reference age | 0.405 | 0.369 | -0.036** | -0.052 |
| | | | (0.014) | |
| Two years above reference age | 0.072 | 0.080 | 0.008 | 0.021 |
| | | | (0.008) | |
| Observations | 2,833 | 2,040 | 4,873 | |

**Figure 7 –** Balance test for retained students in the academic years 2008/09 and 2007/08

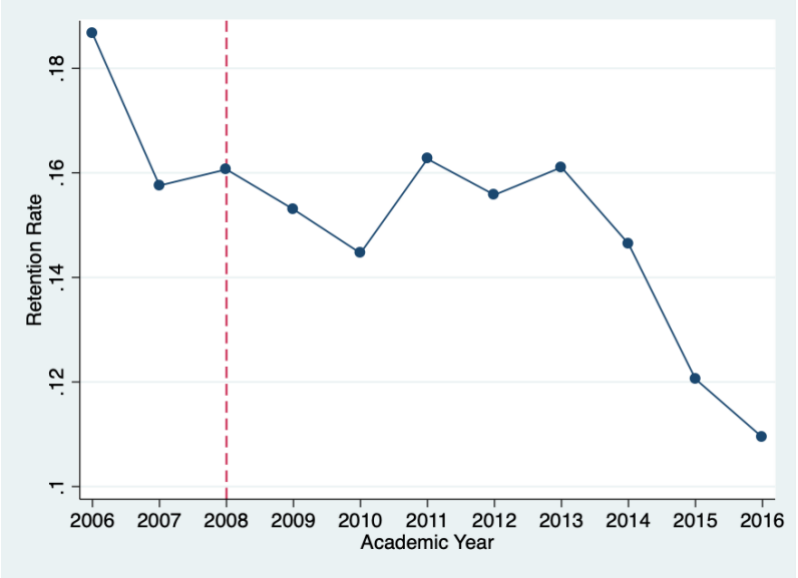



**Figure 8** –Retention rates in the 7th grade across years

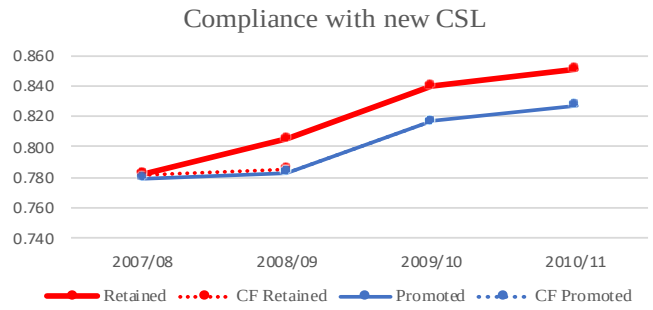
### 5.3 Main DiD Results

This section presents the main preliminary results of the DiD identification strategy discussed in section 3. Results are presented for the following outcomes, described in section 4.3: Compliance with the new CSL (i.e., staying in the school system until 18 years old or graduating from Upper-Secondary school); Enrollment in 10$^{th}$ grade; Finishing 9$^{th}$ grade; Vocational vs Academic track; and Graduation probability. For each outcome analyzed, results are presented both through estimates of equation (2), in the right panel of Figure 9, and graphical representations of the evolution of these outcomes for the retained and promoted groups across 7$^{th}$ grade cohorts, in the left panel. The latter approach has the advantage of making it possible to visualize the two simple 2x2 DiD treatment effects (the *early* and *late* treatment effects) and inspecting the plausibility of the identifying assumptions. The temporal evolution of outcomes across cohorts is presented for retained students in red, and promoted students in blue. In dashed red color, the counterfactual (CF) evolution of retained students is presented – i.e., the evolution of outcomes for retained students, had they experienced the same evolution as the promoted group – and in dashed blue, the CF evolution for the promoted students. This CF representation allows for a visualization of the magnitude of the early and late treatment effects. Regression estimates for the parameter of interest, the effect of the new CSL, are presented both with and without the inclusion of the covariates described in Section 4.3, with standard errors clustered at the municipality level, in parentheses, in all specifications. The estimates of the covariates have their expected sign and magnitude and for the sake of simplicity are omitted but available upon request.

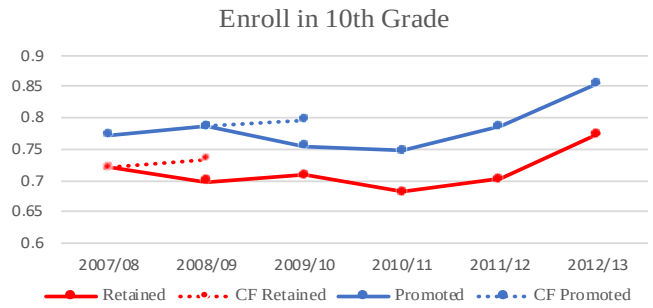
The evolution of the compliance outcome appears to be parallel and although an early treatment effect of around 2 percentage points (pp) is estimated, the regression estimates suggest no effect of the new CSL on this outcome. Regarding the probability to enroll in the 10$^{th}$ grade, the first year of Upper-Secondary schooling, and the probability to finish the 9$^{th}$ grade, the last year of Lower-Secondary schooling, results are somewhat contradicting. The evolution of both outcomes appears to be parallel between promoted and retained students but while results suggest a higher probability of graduating Lower-Secondary schooling, they also suggest a lower probability of enrolling in Upper-Secondary schooling (although not statistically significant). This contradicting result may be due to the fact that students at the margin of retention, and lower-achieving students in general, may have been induced to enroll in alternative vocational and professional Upper-Secondary school tracks as a result of the reform. However, these alternative tracks were not initially considered in the data treatment phase of this work and only the main academic and vocational tracks were included. As such, these preliminary results on the probability of Upper-Secondary enrollment may be biased downwards due to the exclusion of these tracks, and demand a revision. This source of bias may also be present in the Upper-Secondary school track choice and Graduation outcomes. Results suggest a lower probability of enrollment in the vocational track versus the academic track (although not statistically significant), but may be biased due to the original exclusion of alternative vocational tracks. In the same way, while results suggest that the new CSL may have decreased the probability of graduation, if the change in the proportion of

students enrolling in alternative vocational and professional tracks after the CSL reform was very relevant, these results may be reversed. Results on Upper-Secondary schooling outcomes are currently being updated and as such, the results discussed above should be viewed as preliminary[10].

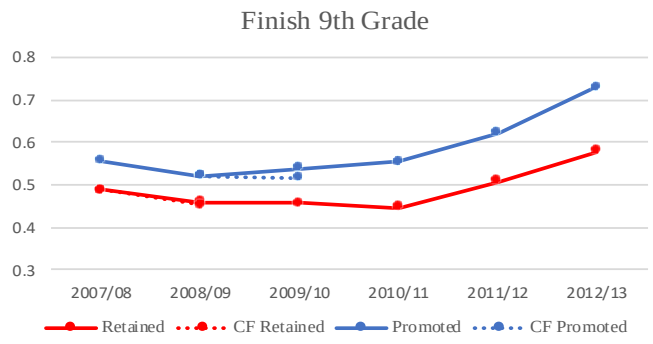
[10] The most up to date results are available upon request.



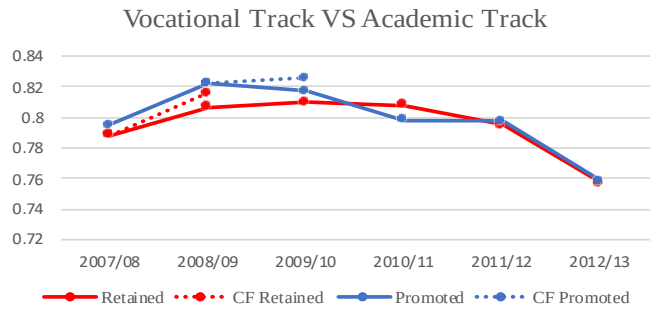

| | No Covariates | With Covariates |
|---|---|---|
| CSL | 0.001 | 0.002 |
| | (0.014) | (0.014) |
| N | 19,174 | 19,174 |
| $^2$ | 0.005 | 0.048 |



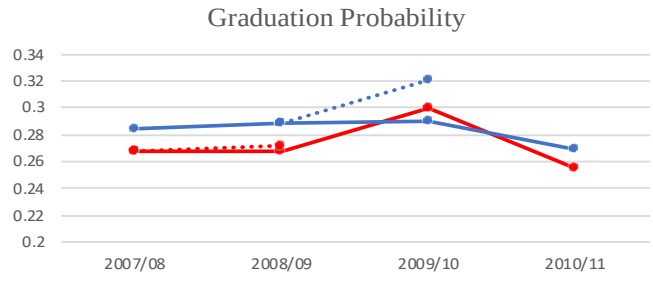

| | No Covariates | With Covariates |
|---|---|---|
| CSL | -0.023 | -0.023 |
| | (0.015) | (0.017) |
| N | 29,604 | 29,604 |
| $^2$ | 0.013 | 0.049 |




| | No Covariates | With Covariates |
|---|---|---|
| CSL | 0.039** | 0.037* |
| | (0.017) | (0.020) |
| N | 29,604 | 29,604 |
| $^2$ | 0.027 | 0.123 |




| | No Covariates | With Covariates |
|---|---|---|
| CSL | -0.011 | -0.012 |
| | (0.016) | (0.019) |
| N | 22,548 | 22,548 |
| $^2$ | 0.004 | 0.077 |




| | No Covariates | With Covariates |
|---|---|---|
| CSL | -0.026 | -0.028* |
| | (0.018) | (0.016) |
| N | 22,548 | 22,548 |
| $^2$ | 0.004 | 0.077 |

**Figure 9 –** The left panel plots the temporal evolution of the outcomes analyzed for retained and promoted students, as well as the counterfactual evolutions in the years when treatment effects are estimated. The right panel presents regression estimates of the effect of the new CSL on each of the outcomes. The first column does not include the covariates described in Section 4.3, while in the second column these are included. Significance levels: *** 1%, ** 5%, * 10%.

# 6. Conclusion

This paper presents preliminary results on the effect of a Compulsory Schooling Leaving age (CSL) increase, from 15 to 18 years old, on students' educational paths. The Portuguese case provides a noteworthy opportunity to study the effects of increasing the CSL age as the country had one of the EU's highest early school leaving rates in 2008 at 35%, increased its CSL age from 15 to 18 years old in 2009, and currently achieved a rate of 8.9% in 2020, attaining the EU 2020 target of a rate under 10%. Moreover, CSL age changes have not been frequent in Europe as of a late and these increases are usually lower than three years.

Students enrolled in grades 1 to 7 from the academic year of 2009/10 onwards were required by law to stay in school until they have finished the 12$^{th}$ grade of schooling (the last grade of schooling in either the academic or vocational tracks) or have turned 18 years old, while students enrolled in the 8th grade or above in 2009/10 still under the old CSL and could leave school when they had finished the 9th grade or turned 15 years old. As such, grade-retention in 7$^{th}$ grade in the 2008/09 academic year determined exposure to the new CSL, while for other 7$^{th}$ grade cohorts, retention did not lead to an exposure to different CSL. The Difference-in-Differences identification strategy applied takes advantage of the way the legislation was set to estimate causal effects of the reform on students' educational outcomes. To ensure comparability between retained and promoted students, only students at the margin of retention are considered. At the same time, these results are complemented with Event-Study estimates that help us understanding and identifying who the main compliers with the CSL reform were – that is, those who would have dropped out of the school system earlier, in the absence of the new policy.

Preliminary results suggest substantial heterogeneity in the compliance rate change after the new CSL. I estimate that the reform increased compliance with the new CSL – i.e., staying in school until 18 years old, or graduating Upper-Secondary schooling – by 2.2 percentage points, but no statistically significant effects are found for high socioeconomic status and higher-achieving students. Results suggest that, in line with the literature, the main compliers are both lower-achieving and lower socioeconomic status students. The Difference-in-differences estimates focusing on secondary schooling outcomes presented may be downward biased because of the original exclusion of alternative vocational and professional Upper-Secondary school tracks in the data treatment phase of this study. While early results suggest that the new CSL may have decreased the probability of graduation, if the change in the proportion of students enrolling in alternative vocational and professional tracks after the CSL reform was very relevant, these results may be reversed. An updated analysis taking into account this aspect is currently underway.

## References:


Adamecz-Volgyi, A. (2018). Increased Compulsory School Leaving Age Affects Secondary School Track Choice and Increases Dropout Rates in Vocational Training Schools. *Budapest Working Papers on the Labour Market*. https://ideas.repec.org/p/has/bworkp/1801.html

Cabus, S. J., & De Witte, K. (2011). Does school time matter?-On the impact of compulsory education age on school dropout. *Economics of Education Review*. https://doi.org/10.1016/j.econedurev.2011.07.003

Callaway, B., & Sant'Anna, P. H. C. (2020). Difference-in-Differences with multiple time periods. *Journal of Econometrics*. https://doi.org/10.1016/j.jeconom.2020.12.001

Erten, B., & Keskin, P. (2019). Compulsory schooling for whom? The role of gender, poverty, and religiosity. *Economics of Education Review*. https://doi.org/10.1016/j.econedurev.2019.06.001

Eurydice. (2011). Grade retention during compulsory education in Europe: Regulation and statistics. *Revista Española de Educación Comparada*, *18*.

Eurydice. (2019). Compulsory education in Europe – 2018/19. *Eurydice Facts and Figures*, *163*(2).

Goodman-Bacon, A. (2018). Difference-in-Differences With Variation in Treatment Timing. *National Bureau of Economic Research*, *17*(5).

Imbens, G. W. (2015). Matching methods in practice: Three examples. *Journal of Human Resources*, *50*(2). https://doi.org/10.3368/jhr.50.2.373

Landis, R. N., & Reschly, A. L. (2011). An examination of compulsory school attendance ages and high school dropout and completion. *Educational Policy*. https://doi.org/10.1177/0895904810374851

OECD. (2014). Are disadvantaged students more likely to repeat grades? *PISA in Focus*, *09*.