Too young to quit school? Increasing the Compulsory Schooling Leaving age and students' educational paths

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EDULOG Conference

Introduction

- **Increases in Compulsory Schooling Leaving age (CSL)** as a policy to **reduce early school leaving** and its **large individual and social costs**

$\Rightarrow$ Early School Leaver: *"those aged 18 to 24 who have completed at most lower secondary education and are not involved in further education or training"*

- Still **unclear how effective raising the CSL is** as a policy instrument:
  - It can increase Graduation probabilities (Cabus & De-Witte, 2011)
  - Or make students stay in school longer but not change Graduation probabilities (Landis & Reschly, 2011)
- Impact seems to be **primarily on most "marginal" students**

Introduction

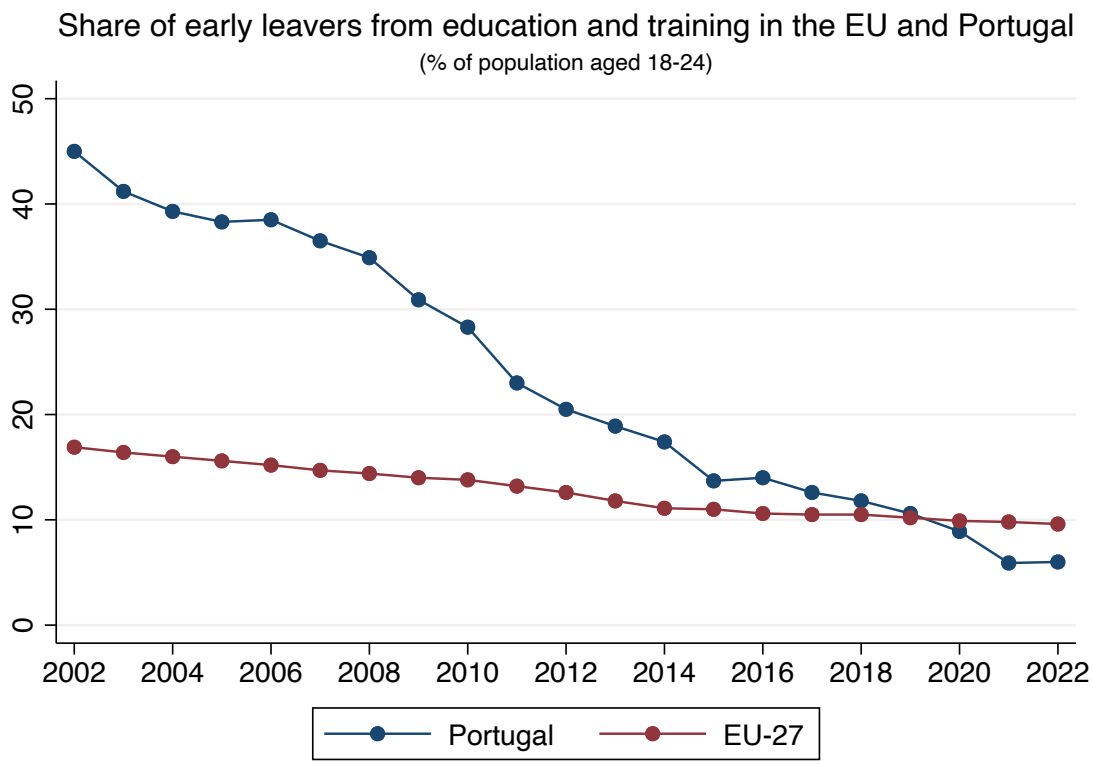
- In 2009, **Portugal** increased the CSL from **15 years old to 18 years old**, or **upon finishing the 12th grade**

- How did the new CSL change students' educational paths?
  Focus on **graduation probabilities** and **Compliance with the new CSL**

Introduction

Unique setting to study effects of CSL:

- Portugal had one of the highest early school leaving rates in Europe
- Recent policy and not common
- Detailed student population data allowing to study heterogeneous effects



Introduction

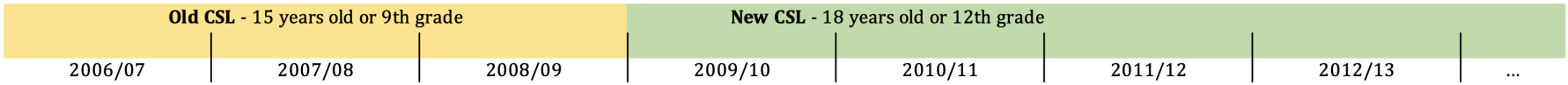
Application of new CSL $\Rightarrow$ Defined by grade-level enrollment in **2009/10**:

- Enrolled in **7th grade** (or below) $\Rightarrow$ **New CSL**
- Enrolled in **8th grade** (or above) $\Rightarrow$ **Old CSL**

- Aim to answer these questions in two ways:

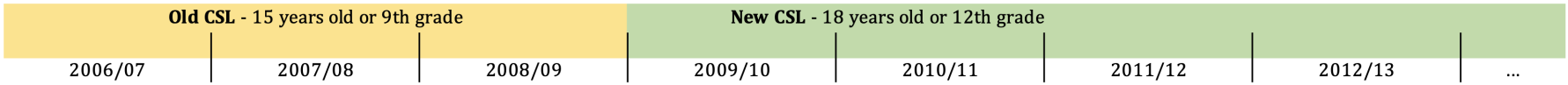
1. Event-Study

Consider the (last) academic year that a student was enrolled in the **7th grade**:

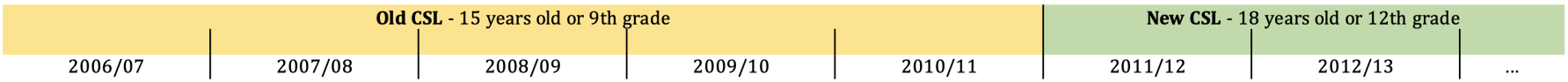


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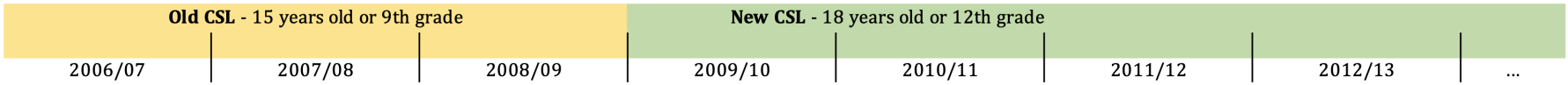


Using **9th grade** cohorts as control group:

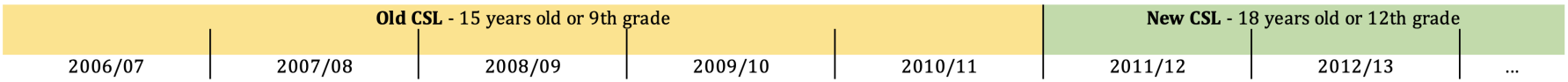


1. Event-Study

Consider the (last) academic year that a student was enrolled in the **7th grade**:



Using **9th grade** cohorts as control group:



- Identifies *Compliers*: those changing educational decisions because of the reform
- Mainly Low-SES & Low-Achieving, in line with literature (Cratty, 2012)

Event-Study

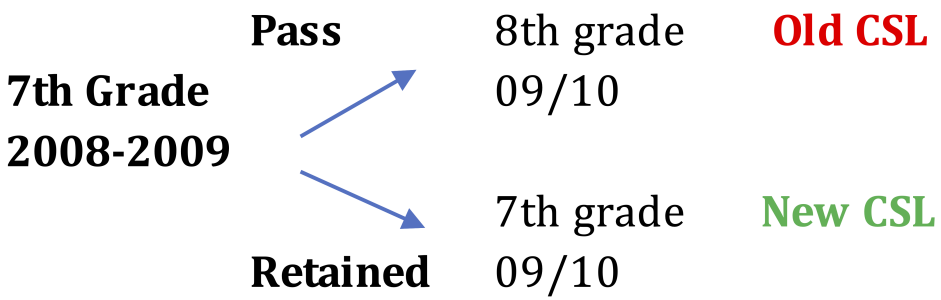
2. Local DiD

❷ Local Difference-in-Differences estimator

Grade-retention in 7^{th} grade in 2008/09 as quasi-experimental variation in exposure to the new CSL

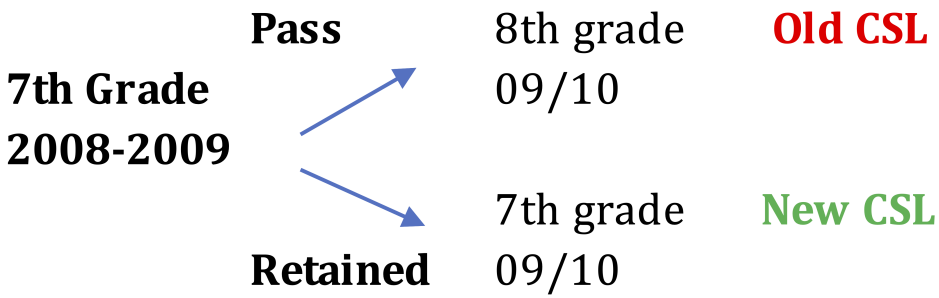
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❷ Local Difference-in-Differences estimator

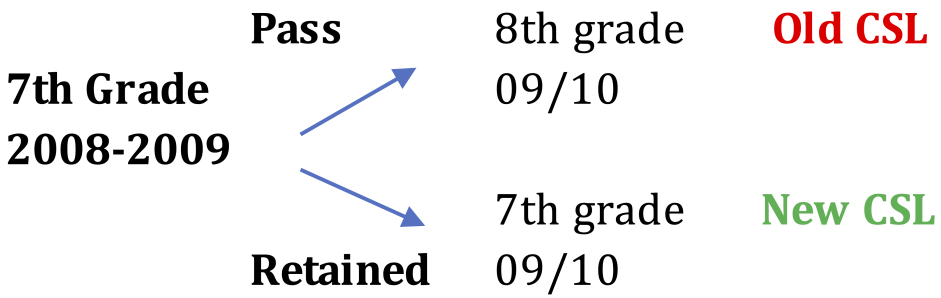
Grade-retention in 7th grade in 2008/09 as quasi-experimental variation in exposure to the new CSL



- Retained students are likely to be different from promoted students in terms of unobservables
  - Use other 7th grade cohorts in a Difference-in-Differences setting

❷ Local Difference-in-Differences estimator

Grade-retention in 7th grade in 2008/09 as quasi-experimental variation in exposure to the new CSL



- Retained students are likely to be different from promoted students in terms of unobservables
  - Use other 7th grade cohorts in a Difference-in-Differences setting
- Retained and Promoted students can be very different
  - Compare students at the grade-retention margin only (internal scores and retention rules)

Findings

I find that as a result of the CSL increase:

- Students spend more time in school
- **LATE:** 2.8 p.p. more likely to **Comply with new CSL** (stay in school until 18 years old or graduate)
- **No average effect** on **upper-secondary school graduation**

However,

- Compliance effect is driven by lower-achieving students
- Some lower-achieving sub-groups increased graduation probabilities (boys; enrolled in upper-secondary school)

Literature

Several **pecuniary and non-pecuniary CSL effects**:

- **Wages**: Positive returns (Devereux and Hart, 2010); No returns (Pischke and Von Wachter, 2008)
- **Decrease in crime** (Anderson, 2014; Bell et al., 2016)
- **Decrease teenage pregnancies** (Black et al., 2011; Adamecz-Völgyi and Scharle, 2020)
- **Mixed effects on health** (Lleras-Muney, 2005; Malamud et al., 2021)

$\Rightarrow$ Effect goes through schooling, not necessarily graduation

1. Portuguese Setting & Data

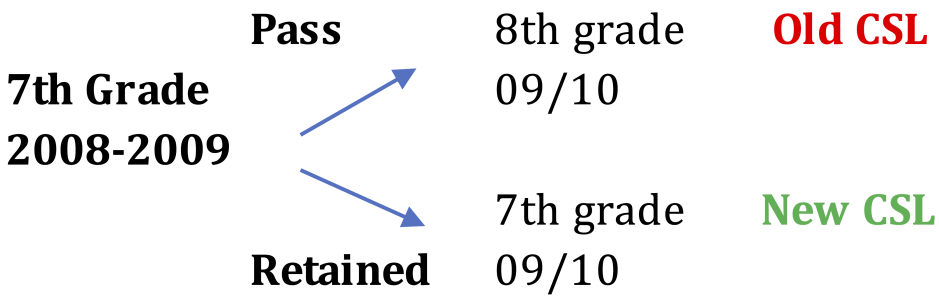
Detailed administrative dataset covering the Portuguese student population

- All students in public and private schools from the 1^{st} to the 12^{th} grade, from 2006/07 to 2017/18: $\sim$100k per grade-year
- Info on students' school path: e.g., class and school, scores by subject, track.
- Info on socioeconomic background: e.g., parental education; socioeconomic support

- Also know if a student was retained in a certain grade
- **Grade retention** is a **common practice:**
  - Around 15% in the 7^{th} grade for the analysis period
  - Around 30% of students are at least one year above reference age in the 7^{th} grade (proxy for previous grade retentions)

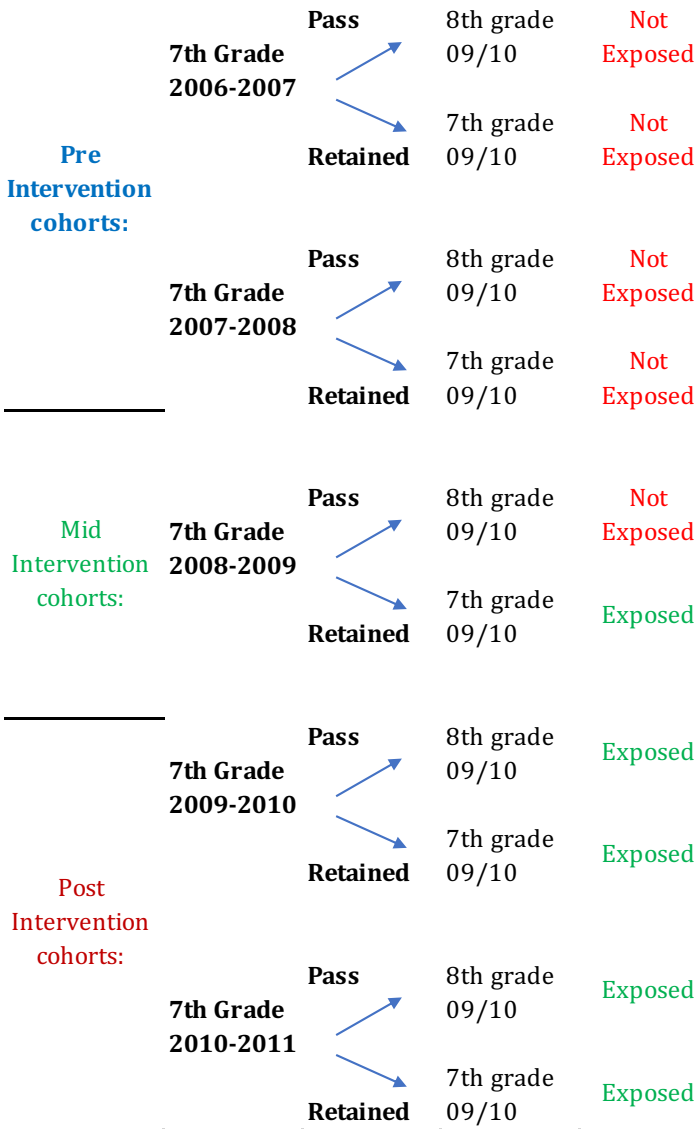
2. Local DiD Identification Strategy

Grade-retention in the 7th grade in 2008/09 as quasi-experimental variation in exposure to new CSL



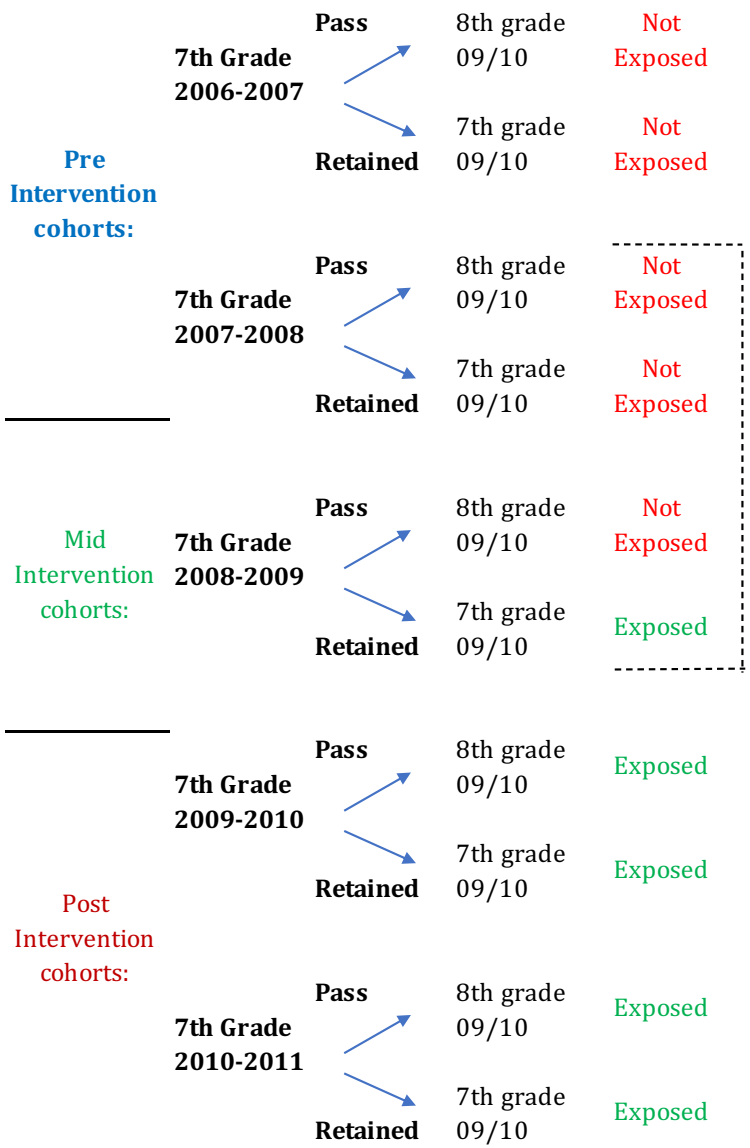
- Retained students are likely to be different from promoted students in terms of unobservables
  - Use other 7th grade cohorts in a Difference-in-Differences setting
- Retained and Promoted students can be very different
  - Compare students at the grade-retention margin only (internal scores and retention rules)

2. Local DiD Identification Strategy



- Students in grade **retention/promotion margin** only
- Students in their first 7^{th} grade (and that did not repeat this grade more than twice)
- **Identifying Assumption:** The effect of retention VS promotion on outcomes remained constant in the analysis period

2. Local DiD Identification Strategy

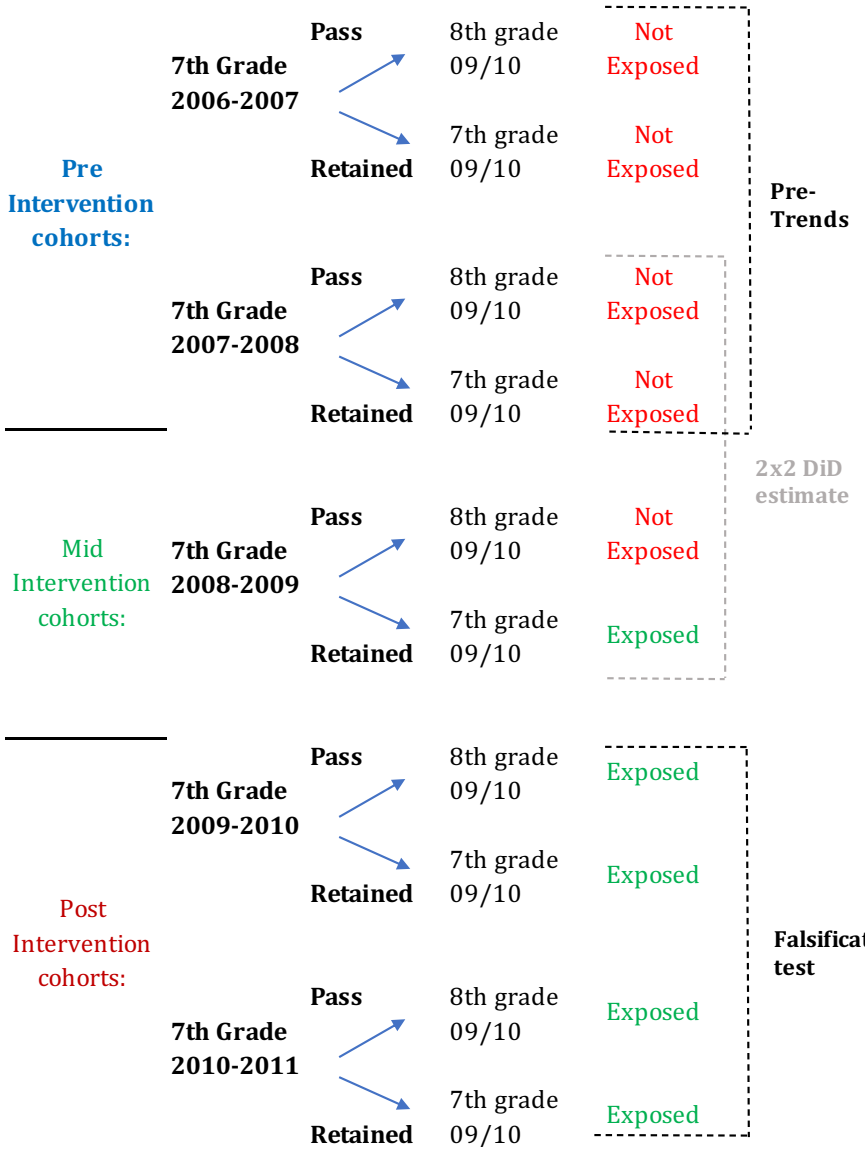


$$Y_{ist} = \alpha Retain_i + \lambda 2008/09_t + \gamma Retain_i \times 2008/09_t + X'_{ist}\beta + \epsilon_{ist}$$

with

- Y_{ist} = outcome for student i, 7^{th} grade cohort t
- $Retain_i$ = indicator for 7^{th} grade retention
- $2008/09_t$ = indicator for 2008/09 7^{th} grade cohort

2. Local DiD Identification Strategy

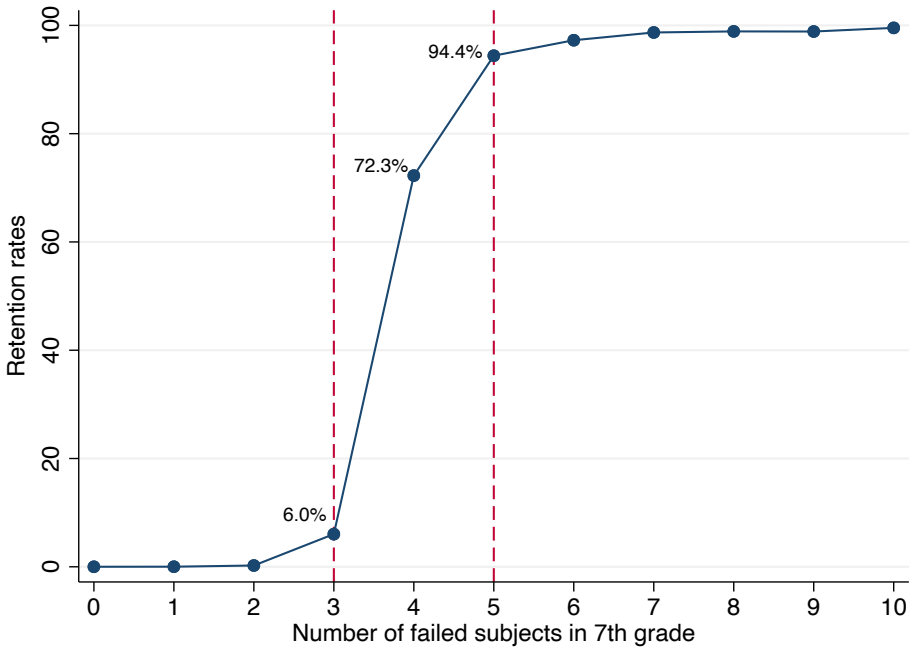


$$Y_{ist} = \alpha Retain_i + \lambda 2007/08_t + \gamma Retain \times 2007/08_{it} + X'_{it}\beta + \epsilon_{it}$$

$$Y_{ist} = \alpha Retain_i + \lambda 2010/11_t + \gamma Retain \times 2010/111_{it} + X'_{it}\beta + \epsilon_{it}$$

3. Retained VS Promoted

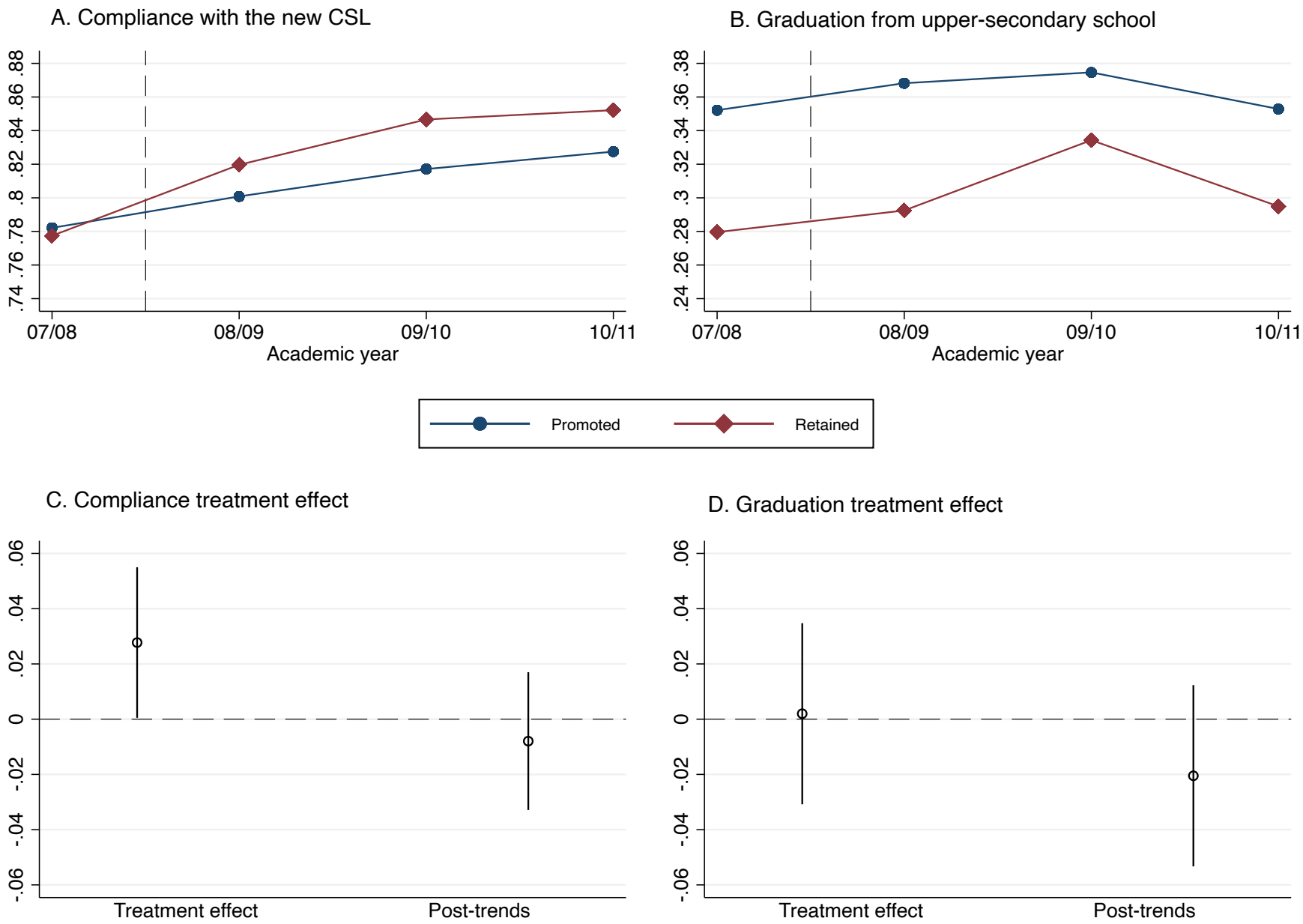
Definition of Retention Margin:



- **Retention** is considered when student has **3 or more failing scores**
- Focus on **homogeneous group** in the **retention margin**
- Retained students different from Promoted but similar across years balance
- Probability of retention does not change over time retention

4. DiD Estimates

- DiD Results
- Focus on two outcomes:
  1. **Compliance with the new CSL**: staying in school until 18 years old or Graduating
  2. **Graduation from Upper-Secondary Schooling**


A. Compliance with the new CSL
.74 .76 .78 .8 .82 .84 .86 .88
07/08
08/09
09/10
10/11
Academic year
B. Graduation from upper-secondary school
.24 .26 .28 .3 .32 .34 .36 .38
07/08
08/09
09/10
10/11
Academic year
Promoted
Retained
C. Compliance treatment effect
-.06 -.04 -.02 0 .02 .04 .06
Treatment effect
Post-trends
D. Graduation treatment effect
-.06 -.04 -.02 0 .02 .04 .06
Treatment effect
Post-trends

4. DiD Estimates

Compliance & Graduation effects

- CSL reform induced students to stay longer in school, but did not significantly change graduation probabilities, on average Point estimates
- Parallel-trends for lower-achieving students (in overall population) Parallel-trends

- Explore heterogeneity within retention margin:

4.1. Heterogeneous Effects

By Reference Age

- Results driven by **students above reference age** (proxy for previous retentions)

	Compliance		Graduation	
	(1)	(2)	(3)	(4)
A. Above reference age				
Post-period x Retained	0.054**	0.051*	0.030	0.032
	(0.027)	(0.026)	(0.024)	(0.024)
Post-period	0.023	0.023	0.004	-0.029
	(0.015)	(0.024)	(0.015)	(0.022)
Retained	-0.033*	-0.020	-0.069***	-0.019
	(0.019)	(0.023)	(0.017)	(0.023)
Constant	0.726***	0.283	0.284***	0.066
	(0.013)	(0.316)	(0.012)	(0.268)
Controls	—	Yes	—	Yes
N	5,369	5,369	5,369	5,369
R-squared	0.003	0.046	0.004	0.036
B. At reference age				
Post-period x Retained	0.002	0.010	-0.024	-0.018
	(0.017)	(0.017)	(0.022)	(0.022)
Post-period	0.011	-0.004	0.017	-0.027
	(0.011)	(0.015)	(0.014)	(0.020)
Retained	0.013	0.033**	-0.077***	-0.001
	(0.012)	(0.017)	(0.016)	(0.022)
Constant	0.823***	0.721***	0.402***	-0.078
	(0.008)	(0.188)	(0.010)	(0.246)
Controls	—	Yes	—	Yes
N	8,076	8,076	8,076	8,076
R-squared	0.001	0.047	0.008	0.039

4.1 Heterogeneous Graduation Effects

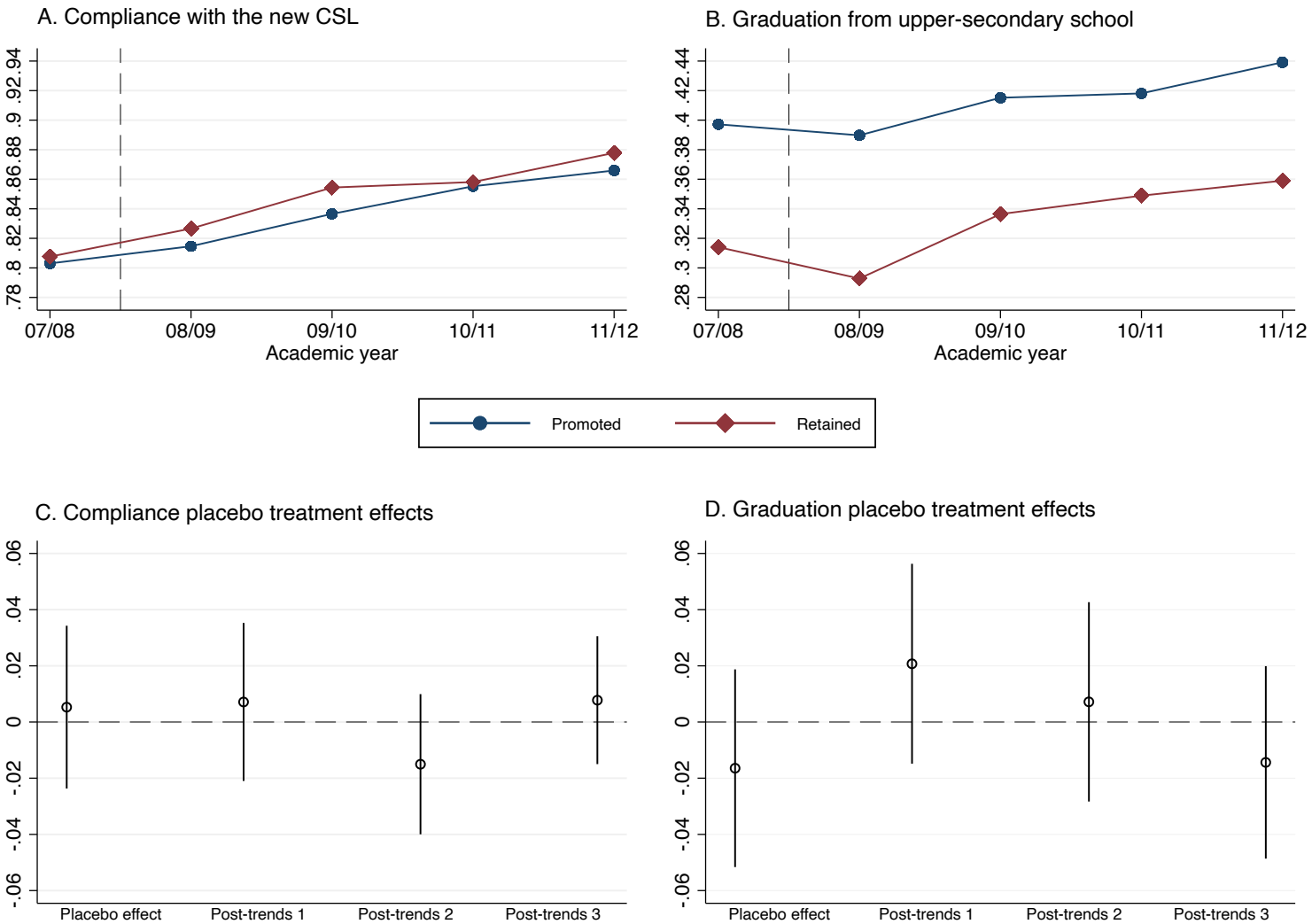
Above reference age sub-groups

- Some sub-groups could have benefited in terms of **Graduation probabilities**
- e.g., **Students enrolling in Upper-Secondary School, and Boys**

	All Above Ref Age	Enroll Upper-Sec School	Boys	Girls	Enroll Upp-Sec Boys	Enroll Upp-Sec Girls
	(1)	(2)	(3)	(4)	(5)	(6)
Post-period x Retained	0.032	0.061*	0.057*	-0.002	0.091**	0.024
	(0.024)	(0.032)	(0.030)	(0.041)	(0.040)	(0.052)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	5,369	3,807	3,191	2,178	2,244	1,563
Percent of Sample	100%	70.9%	59.4%	40.6%	41.8%	29.1%
R-squared	0.044	0.048	0.036	0.057	0.046	0.054

4.2 Placebo Test

8^{th} grade cohorts $\Rightarrow$ retention did not lead to different CSL exposure



5. Conclusions

- **CSL effects** are **widely heterogeneous** $\Rightarrow$ **Lower-Achieving** students seem to **benefit more**
- Students stay longer in school (**positive and modest effects for Compliance**)
- ...but **Graduation probabilities not affected**, on average
- Still, positive Graduation effects for some lower-achieving students $\Rightarrow$ **Students enrolling in Upper-Secondary School, and Boys**

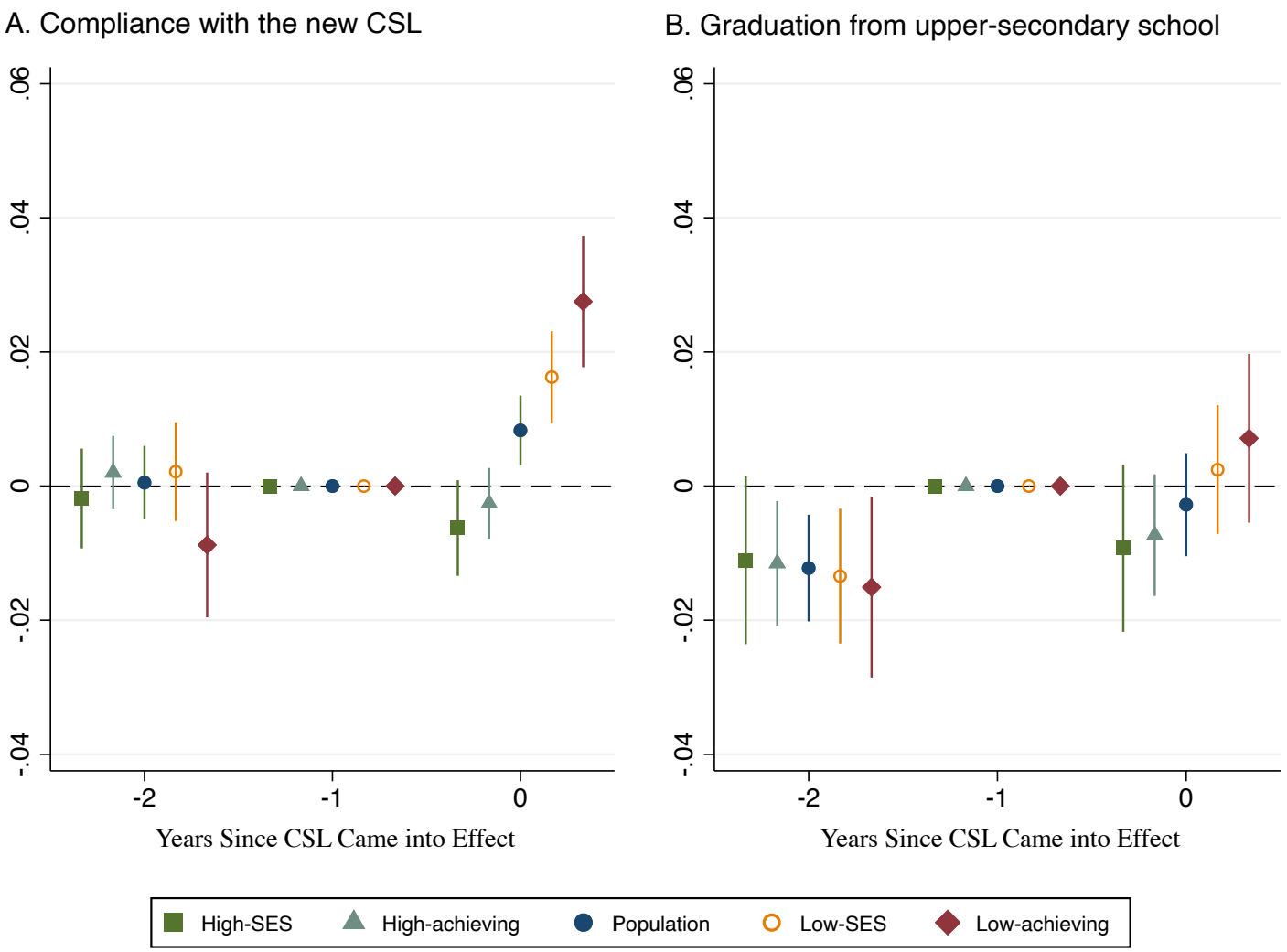
5. Conclusions

Why wasn't there an unequivocal effect on Upper-Secondary graduation?

- Higher probability of $\sim$5pp to stay in school for at least 5 years more (enough to graduate)
- Further grade-retentions probably play a role
- Also, higher probability to graduate Lower-Secondary school and enroll in Upper-Secondary school

- Several non-pecuniary benefits from increased schooling
- Only possible to estimate effects for first-affected cohort $\Rightarrow$ effects could be larger over time, as schools become better prepared to receive these students

Event-Study



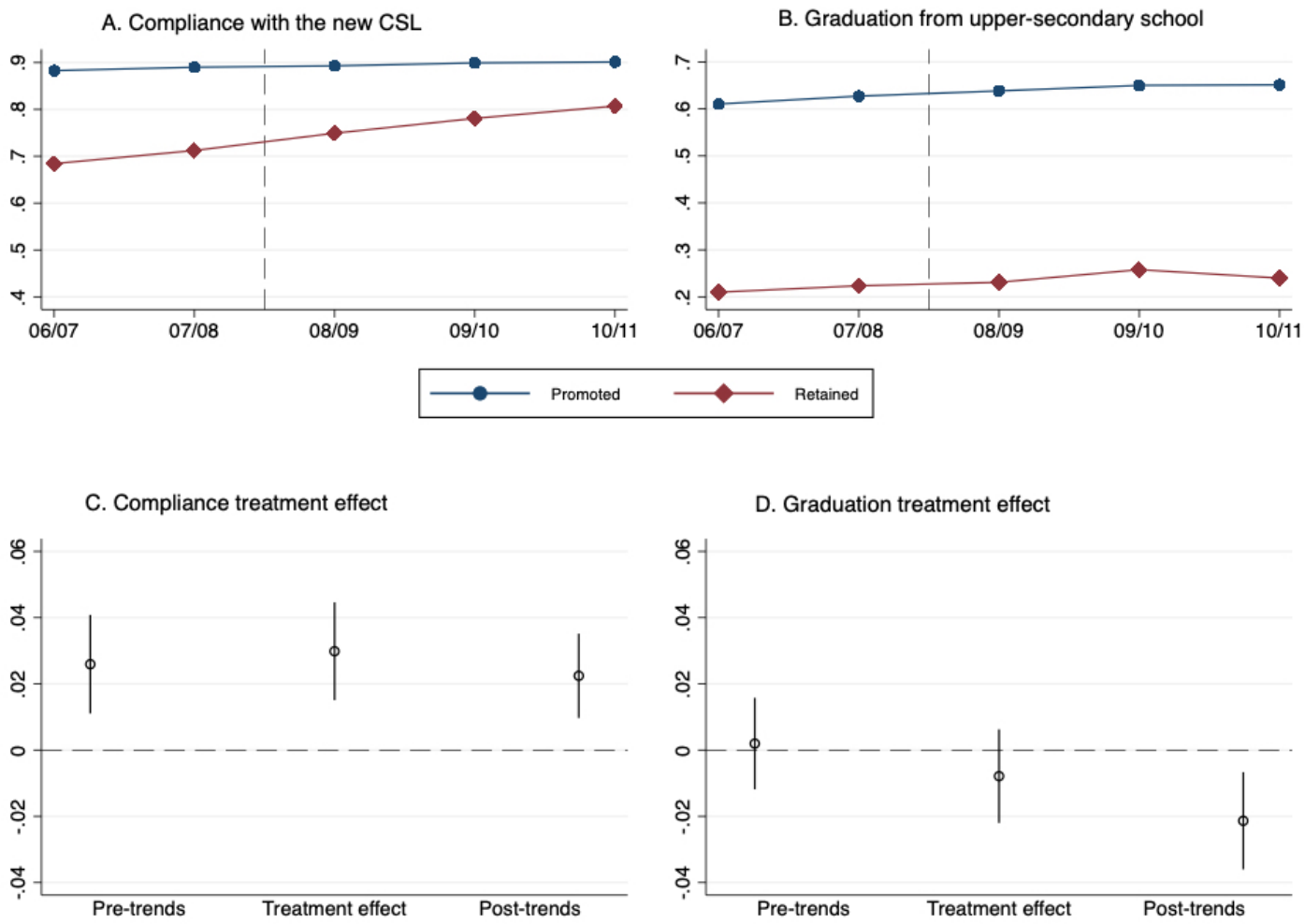
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DiD Results

	Compliance		Graduation	
	(1)	(2)	(3)	(4)
Post-period x Retained	0.024*	0.028**	-0.003	0.002
	(0.014)	(0.014)	(0.017)	(0.017)
Post-period	0.019**	0.006	0.016	-0.028
	(0.009)	(0.015)	(0.012)	(0.018)
Retained	-0.005	0.010	-0.073***	-0.011
	(0.012)	(0.015)	(0.013)	(0.018)
Constant	0.782***	0.583***	0.352***	0.009
	(0.008)	(0.186)	(0.009)	(0.201)
Controls	—	Yes	—	Yes
N	13,445	13,445	13,445	13,445
R-squared	0.001	0.059	0.006	0.054

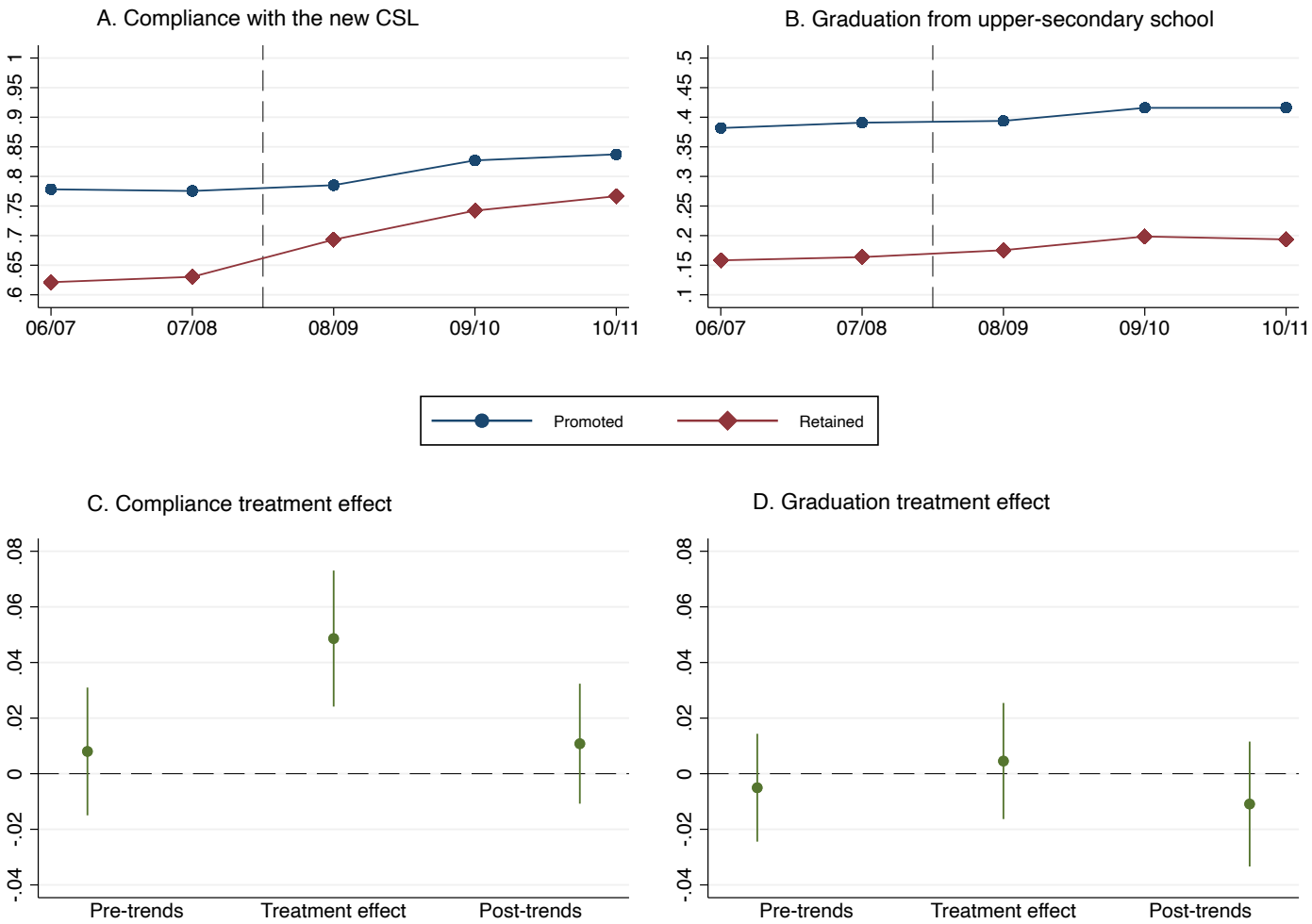
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Parallel-trends



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Parallel-trends

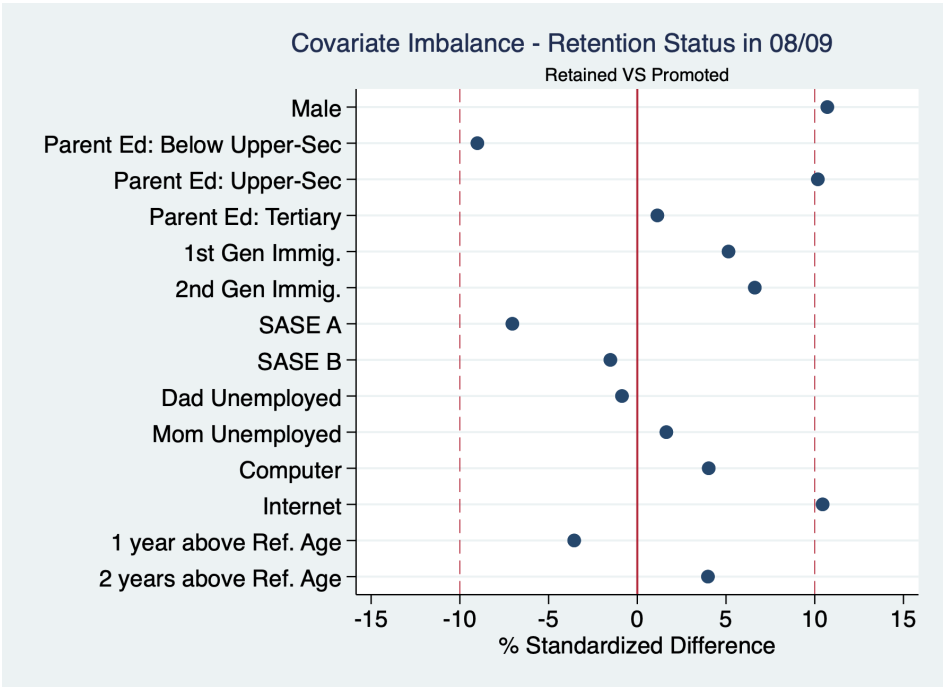


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Retained VS Promoted in 2008/09

Differences in Covariates - Retained VS Promoted in 2008/09

	Retained	Promoted	% Std Diff
Male	0.61	0.55	10.7
Parent Ed: Below Upper-Sec	0.68	0.72	-9.0
Parent Ed: Upper-Sec	0.17	0.13	10.2
Parent Ed: Tertiary	0.03	0.03	1.1
1st Gen Immig.	0.06	0.05	5.1
2nd Gen Immig.	0.04	0.03	6.6
SASE A	0.29	0.33	-7.0
SASE B	0.12	0.13	-1.5
Dad Unemployed	0.06	0.06	-0.9
Mom Unemployed	0.11	0.11	1.6
Computer at home	0.51	0.49	4.0
Internet at home	0.32	0.27	10.4
1 year above Ref. Age	0.35	0.36	-3.6
2 years above Ref. Age	0.07	0.06	4.0
Mean School Retention rate	0.20	0.17	37.8
Math 7g School Course	2.17	2.34	-36.0
PT 7g School Course	2.34	2.64	-61.3
GPA 7g School scores	2.62	2.78	-149.9
Observations	4,547	2,900	7,475

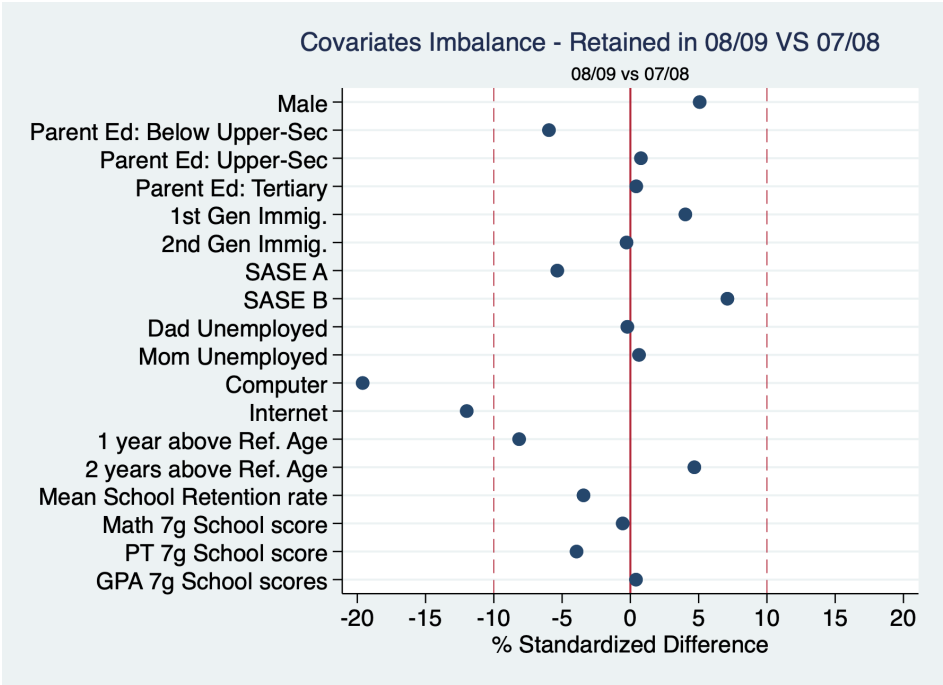


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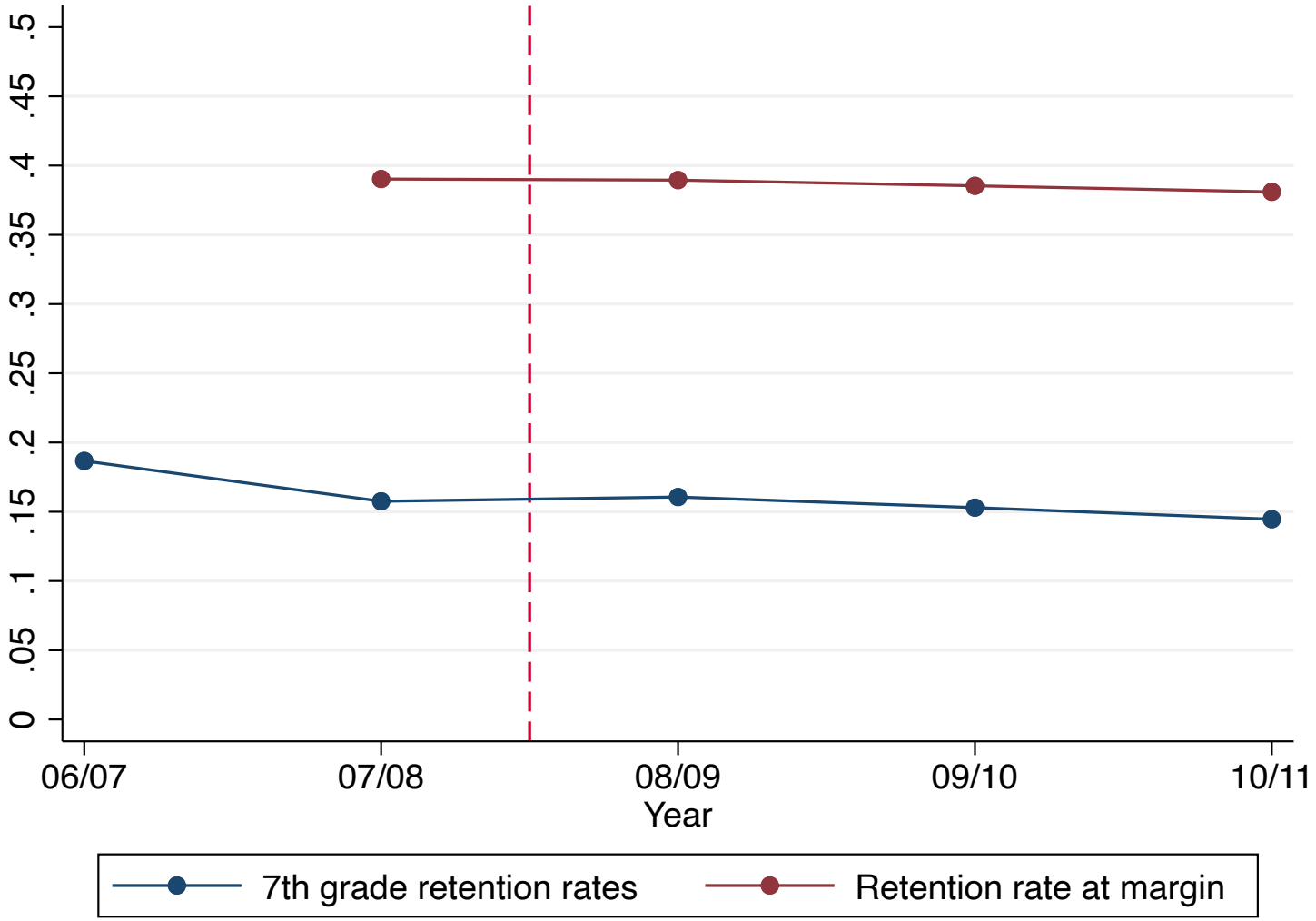
Retained in 08/09 VS 07/08

Differences in Covariates - Retained in 08/09 VS in 07/08

	08/09	07/08	% Std Diff
Male	0.61	0.58	5.1
Parent Ed: Below Upper-Sec	0.68	0.71	-6.0
Parent Ed: Upper-Sec	0.17	0.16	0.8
Parent Ed: Tertiary	0.03	0.03	0.4
1st Gen Immig.	0.06	0.05	4.0
2nd Gen Immig.	0.04	0.04	-0.3
SASE A	0.29	0.32	-5.4
SASE B	0.12	0.10	7.1
Dad Unemployed	0.06	0.06	-0.2
Mom Unemployed	0.11	0.11	0.6
Computer at home	0.51	0.60	-19.6
Internet at home	0.32	0.38	-12.0
1 year above Ref. Age	0.35	0.39	-8.1
2 years above Ref. Age	0.07	0.06	4.7
Mean School Retention rate	0.20	0.21	**-3.4**
Math 7g School Course	2.17	2.18	**-0.6**
PT 7g School Course	2.34	2.36	**-3.9**
GPA 7g School scores	2.62	2.62	**0.4**
Observations	4,547	~4,000	

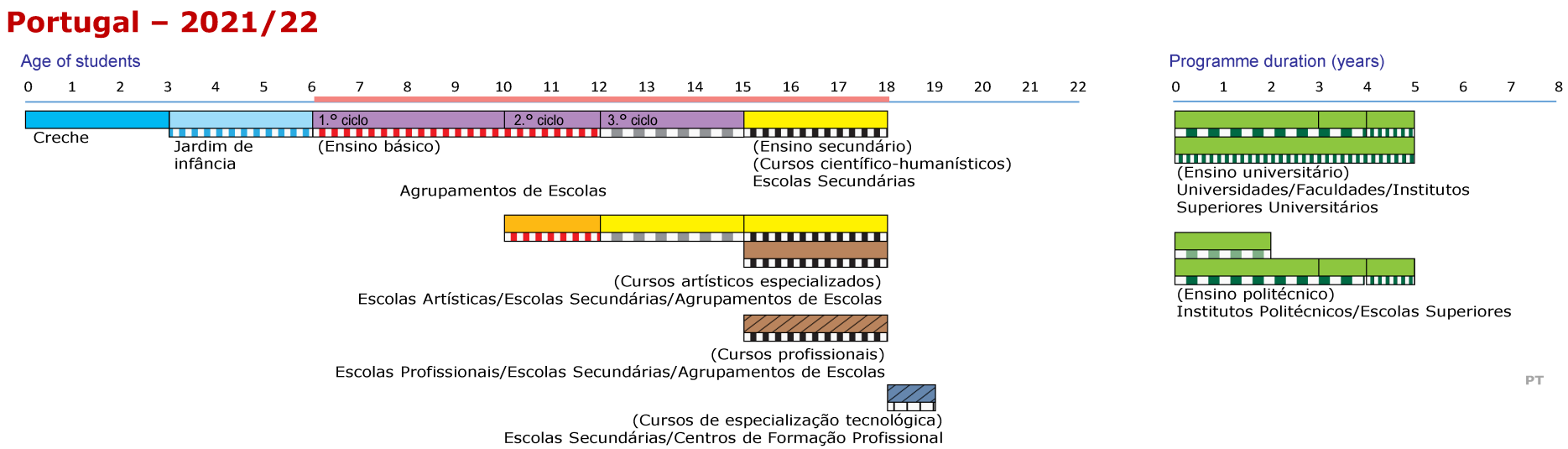


Retention rates



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1. Portuguese Setting & Data



Note: *Agrupamentos de Escolas* (School Clusters) are organisational units that can encompass several schools and learning cycles, from kindergarten to upper secondary education.
The institutions in the diagram are examples of some of the learning spaces where each type of education is offered; the diagram does not indicate all educational institutions existing in the Portuguese system.

- Early childhood education and care (for which the Ministry of Education is not responsible)
- Early childhood education and care (for which the Ministry of Education is responsible)
- Primary education
- Single structure
- Secondary general education
- Secondary vocational education
- Post-secondary non-tertiary education
- Tertiary education (full-time)

Allocation to the ISCED levels: ISCED 0 | ISCED 1 | ISCED 2 | ISCED 3 | ISCED 4 | ISCED 5 | ISCED 6 | ISCED 7

- Compulsory full-time education/training
- Compulsory part-time education/training
- Additional year
- Study abroad
- Combined school and workplace courses
- -/n/- Compulsory work experience + its duration
- →I Years
- Programme being phased out during (year)

1. Portuguese Setting & Data

CSL change

CSL change of 2009:

- Government plans to increase CSL to 18 years old in 2007
- Parliament approved the law proposal in April of 2009
- August of 2009 the law was finally approved

First affected cohort (7^{th} grade in 2009/10) starts upper-secondary in 2012/13:

- Measures to prevent early school leaving, such as better guidance and support to at-risk students, in August 2012
- Change in Labour code at same time: Minors can only work if enrolled in school

CSL enforcement through potential consequences for parents/guardians:

- Lose socio-economic support
- Enact child protection policies
- Fines