# How does Raising Retake Costs Incentive Students?

2023/11/3

# Higher education and subsidies

- **Higher education performance** matters for both economies and individuals: economic development, R&D, climate challenge, labor market outcomes,... (e.g., Hanushek and Woessman, 2015; Lovenheim and Smith, 2023)

- **Resource input** is large in Higher Education (UNESCO, 2022)
  - Per-student spending in HE tops the education system around the world
  - HE funding keeps rising faster than enrolment.
  - Public Investment in universities

- Subsidies to public universities ...

- The **efficiency** could improve, e.g., In OECD countries, only 39% HE students graduate on time and over 1/5 do not graduate after all (OECD, 2022)

# Efficiency: student outcomes and incentives

- Incentivizing students to achieve better performance is a way to improve the efficiency of the use of HE resources and hence public financial investments in HE.

- Students' performance and hence outcomes are motivated through both financial and non-financial incentives, such as:
  - **Scholarships and grants:** need-based (Murphy and Wyness, 2023; Denning et al., 2019; Castleman and Long, 2016; Fryer, 2011); merit-based (Behrman et al., 2015; Fryer, 2011; Angrist and Lavy, 2009).
  - **Student loans:**
  - **Tuition Fees:** (Bietenbeck et al., 2023; Murphy et al., 2019; Beneito et al., 2018; Garibaldi et al., 2012)
  - Others, esp. non-financial incentives: grading systems, ranking, etc. (Fidjeland, 2023; Tan, 2023; Jalava et al., 2015; Grove and Wasserman, 2006; Oettinger, 2002)

# Changes in tuition fees

- It is not uncommon to see changes in tuition fees, either over time or across groups.

- Introduction, Abolishment, and Exemption
  - England's (  )
  - Germanys (  )

- Modifications and ...
  - Italy (  )
  - a similar context in Valencia, Spain: (  )

# What could come with tuition changes?

- On the positive side:



- On the negative side:



- **Can tuition fees adjustment be a tool to achieve efficiency?**


- Our main contribution:

# Overview of our findings

# The rise in Catalonia



Evolution of the Prices - pre-Bologna (Economics)
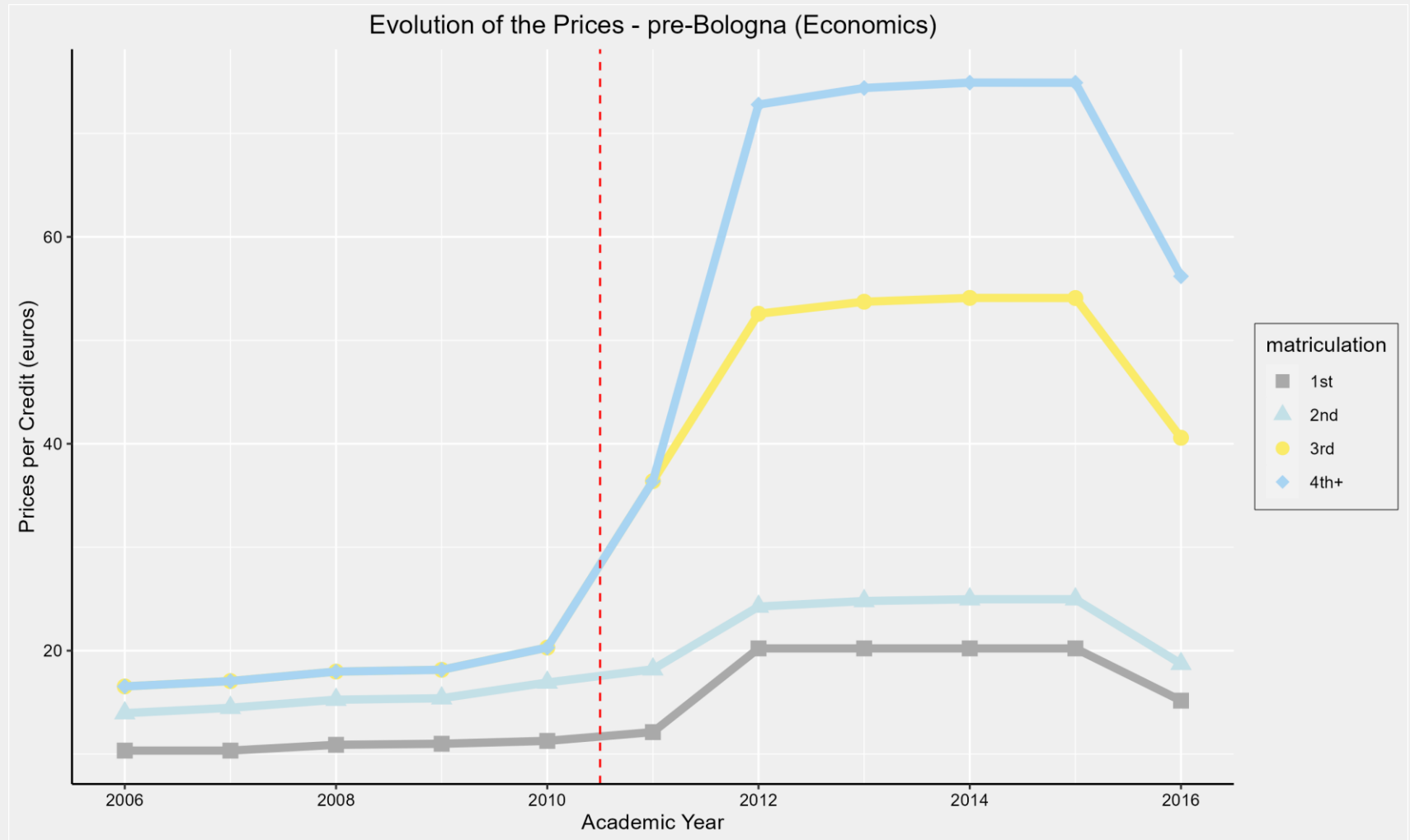
# 与其他政策变化有何不同？ （文献、贡献）

- 可有可无（前面已经综述过了）

# Anticipation and Perception
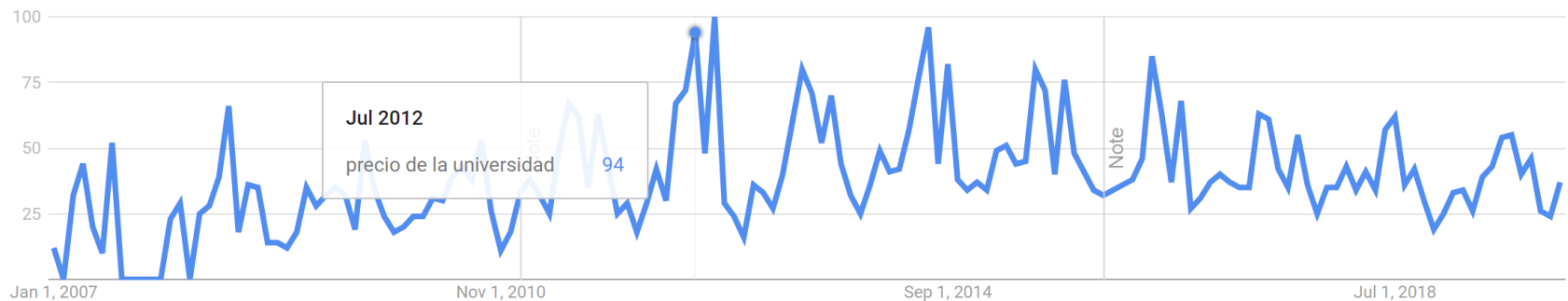
# Anticipation and Perception
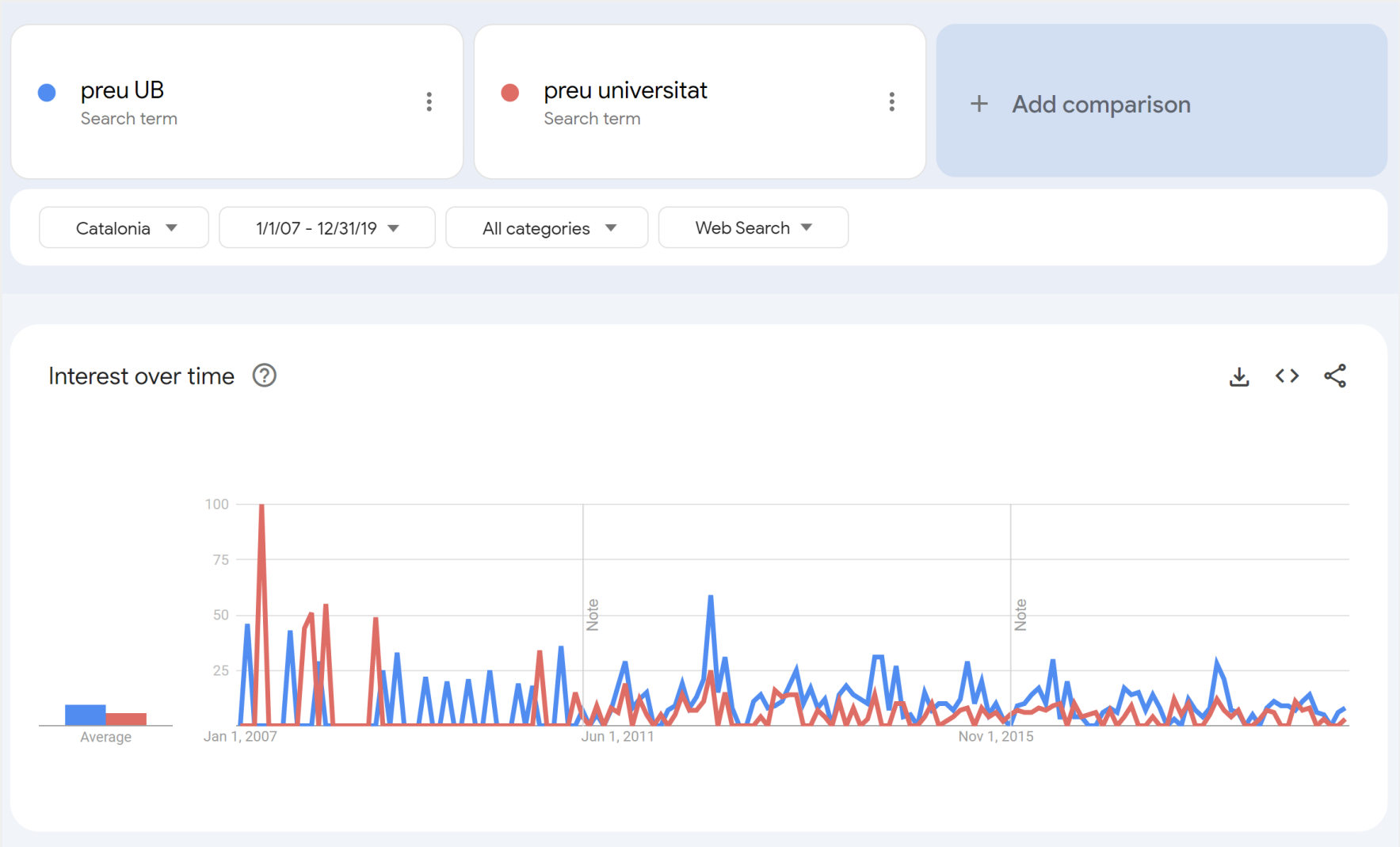
# Data

**Data Source: Administrative data from UB, 2007 to 2017.**

- Whole Sample: students who enrolled from **2007 to 2017** in all **undergraduate programs** at UB.

- Information contained
  - **pre-enrolment characteristics:** entrance exam performance, districts(?), parental education and occupation, etc.
  - academic records: degree program, grades, retakes, subject selection, graduation dates, etc.
  - fees: total amounts (gross and net) each AY, total credit prices each AY, scholarship applied, scholarship status, etc.

- **Sample selection:** We (first) **limit our analysis sample to the cohorts of 2007 to 2009**, as cohort 2007 was not affected by the policy change during their first four years of study, and 2008 and 2009 cohorts were affected from their fourth and third years of study, respectively. We (plan to) include later cohorts in subsequent analysis.

# Dataset: Student-year records

**Student-Year Balance Panel:** We keep the observations for students in the 1st to 4th years of study to construct a balanced panel of the student-year records (<mark>27,712 student-year pairs</mark>). In construction, we exclude recognized courses. For the first analysis, we include only three cohorts (<mark>8,776 student-year pairs</mark>)

| ID_ALUM | COHORT | YS (Year of Study) | Calendar Year | Background Variables X | Outcome Variables Y |
|---|---|---|---|---|---|
| 1000001 | 2007 | 1 | 2007 | $x_1$ | $y_{11}$ |
| 1000001 | 2007 | 2 | 2008 | $x_1$ | $y_{12}$ |
| 1000001 | 2007 | 3 | 2009 | $x_1$ | $y_{13}$ |
| 1000001 | 2007 | 4 | 2010 | $x_1$ | $y_{14}$ |
| ... | ... | ... | | ... | ... |
| 1000007 | 2009 | 1 | 2009 | $x_7$ | $y_{71}$ |
| 1000007 | 2009 | 2 | 2010 | $x_7$ | $y_{72}$ |

# Dataset: Student-year records

We focus on the following student outcomes:

- **Passing rates:** Proportion of courses a student passes each year(out of all the courses enrolled & out of courses whose exams they attend).

- **Excellence rates:** Proportion of courses a student obtains a good grade (i.e. Excellent and Honor, out of all the courses enrolled & out of courses whose exams they attend) each year.

- **Exam absence:** Proportion of courses whose exams a student skips each year(out of all the courses).

- **Number of credits** enrolled each year (normalized to ECTS).

- **Retakes:** Proportion of courses enrolled for more than one time.

- **Persistence**: whether the student continues their study in uni.

- Graduation and duration of study.

- The pre-enrollment characteristics between the control cohort (2007) and the two treated cohorts (2008 and 2009) are largely **comparable**.

**Panel A:**
**background variables**

| Variable (% of) | Control group Cohort 2007 | Treatment group 1 Cohort 2008 | Treatment group 2 Cohort 2009 |
|---|---|---|---|
| foreigner | 0.059 (0.236) | 0.052 (0.223) | 0.05 (0.218) |
| gender (female=0) | 0.481 (0.5) | 0.503 (0.5) | 0.536** (0.499) |
| internet access | 0.973 (0.162) | 0.975 (0.156) | 0.969 (0.174) |
| Economics major | 0.4 (0.49) | 0.361 (0.481) | 0.408 (0.492) |
| Higher Education (father) | 0.26 (0.439) | 0.292 (0.455) | 0.298 (0.458) |
| Higher Education (mother) | 0.198 (0.399) | 0.241** (0.428) | 0.25** (0.433) |
| No Education(father) | 0.02 (0.14) | 0.018 (0.132) | 0.014 (0.118) |
| No Education(mother) | 0.024 (0.154) | 0.017 (0.128) | 0.017 (0.13) |
| Public sector (father) | 0.328 (0.47) | 0.366 (0.482) | 0.347 (0.476) |
| Public sector (motther) | 0.225 (0.418) | 0.257 (0.437) | 0.25 (0.433) |
| Unemployed (father) | 0.005 (0.065) | 0* (0) | 0.003 (0.056) |
| Unemployed (mother) | 0.014 (0.119) | 0.022 (0.149) | 0.022 (0.146) |
| Low skilled job (father) | 0.033 (0.178) | 0.02 (0.141) | 0.036 (0.186) |
| Low skilled job (mother) | 0.097 (0.296) | 0.088 (0.283) | 0.083 (0.276) |
| Students with parttime jobs | 0.897 (0.303) | 0.896 (0.306) | 0.898 (0.303) |
| Number of students | 713 | 841 | 640 |

- Here we compare the background characteristics among the three groups in the freshman & sophomore years.

**Panel A:**
**background variables(YS==1)**

| Variable (% of) | Control group Cohort 2007 | Treatment group 1 Cohort 2008 | Treatment group 2 Cohort 2009 |
|---|---|---|---|
| foreigner | 0.059 (0.236) | 0.052 (0.224) | 0.049 (0.216) |
| gender (female=0) | 0.481 (0.5) | 0.504 (0.5) | 0.535** (0.499) |
| internet access | 0.973 (0.162) | 0.975 (0.157) | 0.969 (0.175) |
| Economics major | 0.4 (0.49) | 0.361 (0.481) | 0.407 (0.492) |
| Higher Education (father) | 0.26 (0.439) | 0.29 (0.454) | 0.297 (0.458) |
| Higher Education (mother) | 0.198 (0.399) | 0.24* (0.427) | 0.247** (0.432) |
| No Education(father) | 0.02 (0.14) | 0.018 (0.133) | 0.013 (0.112) |
| No Education(mother) | 0.024 (0.154) | 0.017 (0.128) | 0.015 (0.125) |
| Public sector (father) | 0.328 (0.47) | 0.366 (0.482) | 0.344 (0.475) |
| Public sector (motther) | 0.225 (0.418) | 0.255 (0.436) | 0.251 (0.434) |
| Unemployed (father) | 0.005 (0.065) | 0* (0) | 0.003 (0.056) |
| Unemployed (mother) | 0.014 (0.119) | 0.023 (0.149) | 0.022 (0.147) |
| Low skilled job (father) | 0.033 (0.178) | 0.021 (0.141) | 0.035 (0.183) |
| Low skilled job (mother) | 0.097 (0.296) | 0.088 (0.284) | 0.082 (0.274) |
| Students with parttime jobs | 0.897 (0.303) | 0.895 (0.307) | 0.899 (0.301) |
| Number of students | 702 | 835 | 635 |

**Panel A:**
**background variables(YS==2)**

| Variable (% of) | Control group Cohort 2007 | Treatment group 1 Cohort 2008 | Treatment group 2 Cohort 2009 |
|---|---|---|---|
| foreigner | 0.054 (0.226) | 0.048 (0.213) | 0.05 (0.218) |
| gender (female=0) | 0.493 (0.5) | 0.509 (0.5) | 0.539 (0.499) |
| internet access | 0.972 (0.166) | 0.977 (0.15) | 0.968 (0.176) |
| Economics major | 0.422 (0.494) | 0.375* (0.485) | 0.406 (0.491) |
| Higher Education (father) | 0.265 (0.441) | 0.3 (0.459) | 0.3 (0.459) |
| Higher Education (mother) | 0.194 (0.396) | 0.231 (0.422) | 0.253** (0.435) |
| No Education(father) | 0.019 (0.138) | 0.013 (0.11) | 0.014 (0.119) |
| No Education(mother) | 0.026 (0.161) | 0.015 (0.123) | 0.018 (0.132) |
| Public sector (father) | 0.33 (0.471) | 0.372 (0.484) | 0.344 (0.475) |
| Public sector (motther) | 0.226 (0.418) | 0.254 (0.436) | 0.245 (0.431) |
| Unemployed (father) | 0.002 (0.042) | 0 (0) | 0.002 (0.042) |
| Unemployed (mother) | 0.016 (0.125) | 0.018 (0.134) | 0.022 (0.145) |
| Low skilled job (father) | 0.036 (0.185) | 0.018* (0.134) | 0.037 (0.19) |
| Low skilled job (mother) | 0.095 (0.294) | 0.098 (0.298) | 0.082 (0.274) |
| Students with parttime jobs | 0.899 (0.301) | 0.897 (0.304) | 0.895 (0.307) |
| Number of students | 576 | 653 | 562 |
| | 17.95% | 21.80% | 11.50% |

# Descriptive Statistics: Panel A by Year of Study (2)

- Here we compare the background characteristics among the three groups in the junior & senior years.

**Panel A:**
**background variables(YS==3)**

| Variable (% of) | Control group Cohort 2007 | Treatment group 1 Cohort 2008 | Treatment group 2 Cohort 2009 |
|---|---|---|---|
| foreigner | 0.055 (0.228) | 0.049 (0.216) | 0.049 (0.216) |
| gender (female=0) | 0.498 (0.5) | 0.511 (0.5) | 0.548 (0.498) |
| internet access | 0.969 (0.173) | 0.981 (0.139) | 0.967 (0.179) |
| Economics major | 0.418 (0.494) | 0.373 (0.484) | 0.415 (0.493) |
| Higher Education (father) | 0.266 (0.442) | 0.307 (0.462) | 0.296 (0.457) |
| Higher Education (mother) | 0.194 (0.396) | 0.224 (0.417) | 0.247** (0.432) |
| No Education(father) | 0.021 (0.144) | 0.011 (0.107) | 0.013 (0.116) |
| No Education(mother) | 0.027 (0.162) | 0.015 (0.121) | 0.018 (0.131) |
| Public sector (father) | 0.335 (0.472) | 0.373 (0.484) | 0.343 (0.475) |
| Public sector (motther) | 0.231 (0.422) | 0.26 (0.439) | 0.241 (0.429) |
| Unemployed (father) | 0.002 (0.044) | 0 (0) | 0.002 (0.044) |
| Unemployed (mother) | 0.018 (0.131) | 0.018 (0.133) | 0.019 (0.138) |
| Low skilled job (father) | 0.038 (0.192) | 0.018** (0.133) | 0.035 (0.184) |
| Low skilled job (mother) | 0.1 (0.3) | 0.097 (0.296) | 0.082 (0.274) |
| Students with parttime jobs | 0.897 (0.303) | 0.897 (0.304) | 0.895 (0.307) |
| Number of students | 520 | 611 | 513 |
|  | 9.72% | 6.43% | 8.72% |

**Panel A:**
**background variables(YS==4)**

| Variable (% of) | Control group Cohort 2007 | Treatment group 1 Cohort 2008 | Treatment group 2 Cohort 2009 |
|---|---|---|---|
| foreigner | 0.052 (0.222) | 0.048 (0.213) | 0.05 (0.218) |
| gender (female=0) | 0.496 (0.5) | 0.502 (0.5) | 0.552* (0.498) |
| internet access | 0.972 (0.166) | 0.978 (0.147) | 0.966 (0.181) |
| Economics major | 0.41 (0.492) | 0.37 (0.483) | 0.412 (0.493) |
| Higher Education (father) | 0.269 (0.444) | 0.313 (0.464) | 0.302 (0.46) |
| Higher Education (mother) | 0.199 (0.4) | 0.229 (0.42) | 0.254** (0.436) |
| No Education(father) | 0.018 (0.134) | 0.012 (0.109) | 0.014 (0.118) |
| No Education(mother) | 0.029 (0.166) | 0.015 (0.123) | 0.018 (0.133) |
| Public sector (father) | 0.336 (0.473) | 0.376 (0.485) | 0.344 (0.476) |
| Public sector (motther) | 0.226 (0.418) | 0.263 (0.441) | 0.244 (0.43) |
| Unemployed (father) | 0.002 (0.045) | 0 (0) | 0.002 (0.045) |
| Unemployed (mother) | 0.017 (0.127) | 0.017 (0.13) | 0.018 (0.133) |
| Low skilled job (father) | 0.03 (0.172) | 0.017 (0.13) | 0.038 (0.191) |
| Low skilled job (mother) | 0.098 (0.297) | 0.094 (0.292) | 0.084 (0.278) |
| Students with parttime jobs | 0.898 (0.303) | 0.894 (0.308) | 0.892 (0.311) |
| Number of students | 492 | 586 | 500 |
|  | 5.38% | 4.09% | 2.53% |
|  | 29.91% | 29.82% | 21.26% |

# Descriptive Statistics: key outcomes

**Panel B:**
**outcome variables**

| Variable name | | Control group Cohort 2007 | Treatment group 1 Cohort 2008 | Treatment group 2 Cohort 2009 |
|---|---|---|---|---|
| % of exams absent | | 0.215 | 0.172*** | 0.086*** |
| | | (0.264) | (0.239) | (0.186) |
| | obs | 2317 | 2685 | 2210 |
| % of courses passed | | 0.574 | 0.61*** | 0.726*** |
| | | (0.318) | (0.315) | (0.281) |
| | obs | 2317 | 2685 | 2210 |
| % of courses with good grades | | 0.056 | 0.056 | 0.061 |
| | | (0.139) | (0.137) | (0.13) |
| | obs | 2317 | 2685 | 2210 |
| total credits taken | | 65.661 | 65.7 | 64.479*** |
| | | (14.78) | (14.137) | (10.952) |
| | obs | 2317 | 2685 | 2210 |
| participation | | 0.813 | 0.8 | 0.865*** |
| | | (0.39) | (0.4) | (0.342) |
| | obs | 2852 | 3355 | 2555 |
| graduation or not | | 0.371 | 0.499*** | 0.71*** |
| | | (0.484) | (0.5) | (0.454) |
| | obs | 713 | 841 | 640 |
| duration of study | | 5.788 | 5.031*** | 4.392*** |
| | | (1.873) | (1.408) | (1.514) |
| | obs | 713 | 841 | 640 |

# Identification strategy

**Identification Strategy: the "student-year" specification (1)**

$$y_{ics} = \alpha_c + \gamma_s + \beta D_{ics} + \theta X_i + \varepsilon_{ics}$$

- **Parallel trends** among cohorts across years of study (YS) in the absence of treatment

- $\alpha_c$ and $\gamma_s$: cohort ($c$, 2007 to 2017) and year-of-study ($s$, 1 to 4) FEs;

- $y_{ics}$: outcome of student $i$ in the $s$-th year of study: exam passing rate, exam absence rate, persistence in college, etc;

- $D_{ics}$: treatment dummy taking 1 if $i$ in $c$ exposed to the rise in the $s$th YS.

**Control group:** 2007 cohort—not exposed to the fee rise until the 5th YS

**Treated group 1:** 2008 cohort—exposed to the first rise in 2011 (4th YS)

**Treated group 2:** 2009 cohort—exposed to the first rise in 2011 (3rd YS) and the second in 2012 (4th YS)

# Identification strategy

**Identification Strategy: the "student-year" specification (2)**

To avoid the confoundedness of composition changes resulting from non-random attrition, we modify the specification to:

$$y_{is} = \alpha_i + \gamma_s + \beta D_{ics} + \varepsilon_{is}$$

- $\alpha_i$ and $\gamma_s$: individual ($i$) and year-of-study ($s$) FEs;

- $y_{ics}$: outcome of student $i$ in the $s$-th year of study;

- $D_{ics}$: treatment dummy taking 1 if $i$ exposed to the rise in the $s$-th YS.

- It doesn't seem like the law significantly changed the final amount paid by students and the fees associated with credits taken, **except for** the 2009 cohort in their last year (2012, 2nd rise)



2009 Cohort vs 2007 Cohort: fees paid
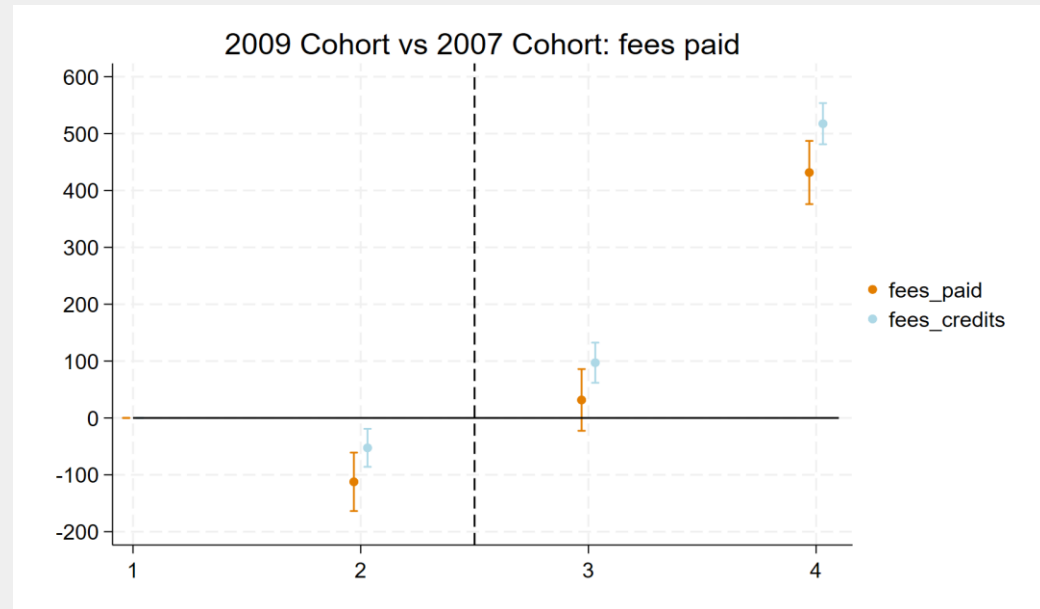
# "First Stage": most frequent retakers

We take the top 25% **(most frequent) retakers** in the second year of study. In terms of tuition fees, we find that:

1) Students from the 2009 cohort faced the first shock in their third year. The total credit fees of the most frequent retakers from the 2009 cohort **increase by 190.73 euros** compared to the most frequent retakers from the 2007 cohort. The actual fees paid by them increase by **157.56 euros**.



2009 Cohort vs 2007 Cohort: fees paid

2) In the fourth year, the credit fees of the most frequent retakers from the 2009 cohort increase **by 707.63 euros** compared to those from the 2007 cohort, and the actual fees paid increase **by 573.90 euros**.



2009 Cohort vs 2007 Cohort: fees paid
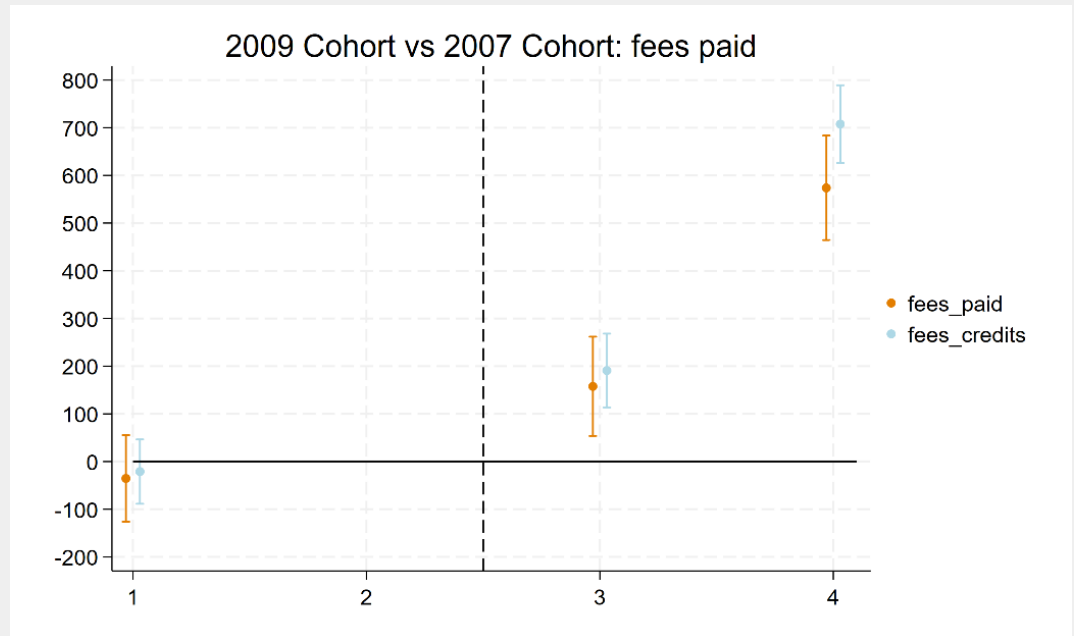
We will see that these increases are a result of
1) a positive "price effect", which outweighs
2) a negative "credit effect".

**To make sense of these differences**, below are the **per-credit fees** they face each YS:

| YS | 1st attempt | 2nd attempt | 3rd attempt | 4th attempt | Curs |
|----|-------------|-------------|-------------|-------------|------|
| *Cohort 2007* | | | | | |
| **1** | 12.93 | 18.10 | 21.33 | 21.33 | 2007 |
| **2** | 13.63 | 19.08 | 22.48 | 22.48 | 2008 |
| **3** | 13.75 | 19.25 | 22.69 | 22.69 | 2009 |
| **4** | 14.10 | 21.15 | 25.38 | 25.38 | 2010 |
| *Cohort 2009* | | | | | |
| **1** | 13.75 | 19.25 | 22.69 | 22.69 | 2009 |
| **2** | 14.10 | 21.15 | 25.38 | 25.38 | 2010 |
| **3** | 15.16 | 22.75 | 45.49 | 45.49 | 2011 |
| **4** | 25.28 | 30.33 | 65.71 | 90.99 | 2012 |

For example, in the 4th YS, students in the 2009 cohort pay about 10 euros more per credit for their 1st and 2nd attempts.

# Decomposing the "First Stage": credits effect

- Further analyzing the behavioral differences, in terms of the credits taken ("Ordinary" type):

  - Compared to the second YS, in the third YS, the most frequent retakers (as defined before) in the 2009 cohort take about **3 ECTS credits fewer** than the corresponding subsample from the 2007 cohort, although this difference is not statistically significant.

  - In their fourth year, they significantly take about **11 ECTS credits fewer** than the students from the 2007 cohort.



2009 Cohort vs 2007 Cohort: credits taken

- Note: Students take around 50 to 70 ECTS credits (equivalent) in these years.
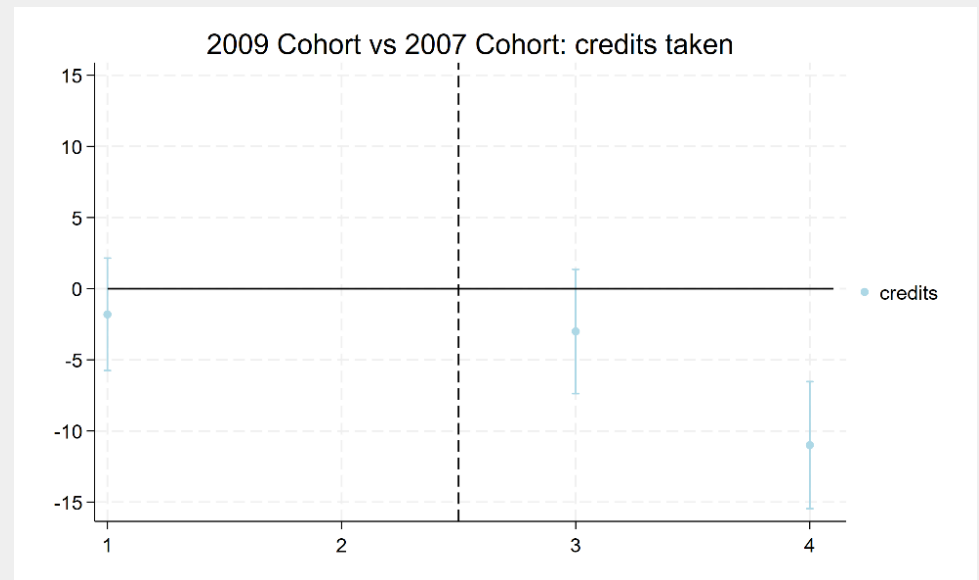
# "First Stage": least frequent retakers

I also take the bottom 25% **(least frequent) retakers** in the second year of study. In terms of tuition fees, we find that:

Compared to the difference between the most frequent retakers, here the magnitude of differences between the two cohorts:

- **drops by about a half**, in the 3th YS, with the actual paid fees being insignificant;

- **drops by about 200 euros**, in the 4th YS.



2009 Cohort vs 2007 Cohort: fees paid
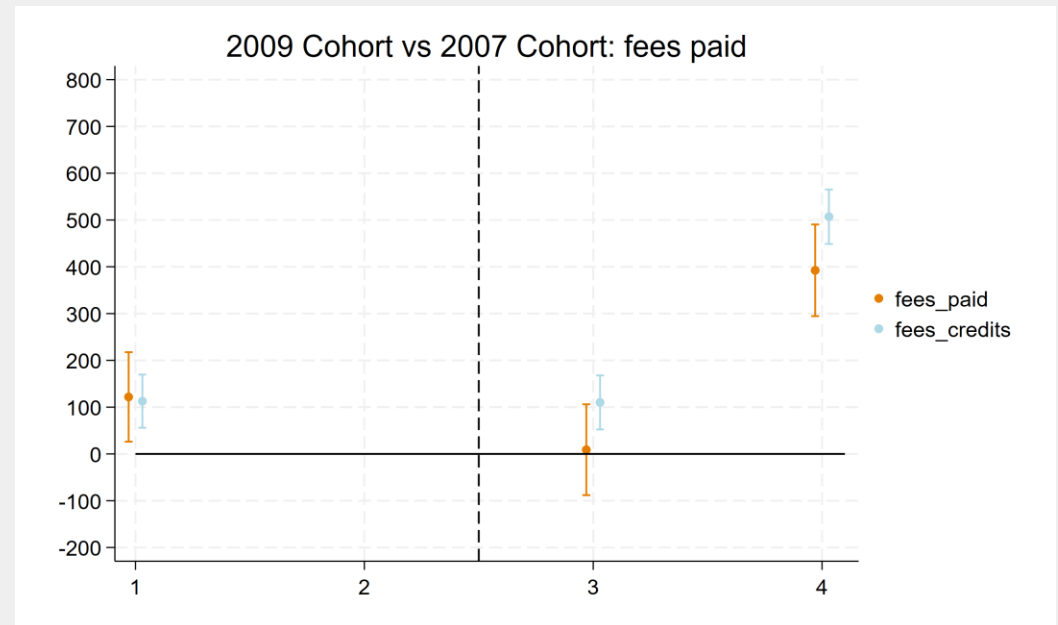
# "First Stage": least frequent retakers

- The least frequent retaker **exhibit a different behavioral pattern** in terms of credits taken

- In the first year of study, the 2009 cohort students already take about 15 ECTS credits more than the corresponding subsample from the 2007 cohort.

- In their **fourth year**, they significantly take about **5 ECTS credits fewer** than the students from the 2007 cohort, while this difference with the most frequent retakers is 11. This explains most of the variation in the fees pattern between the two sub-groups.
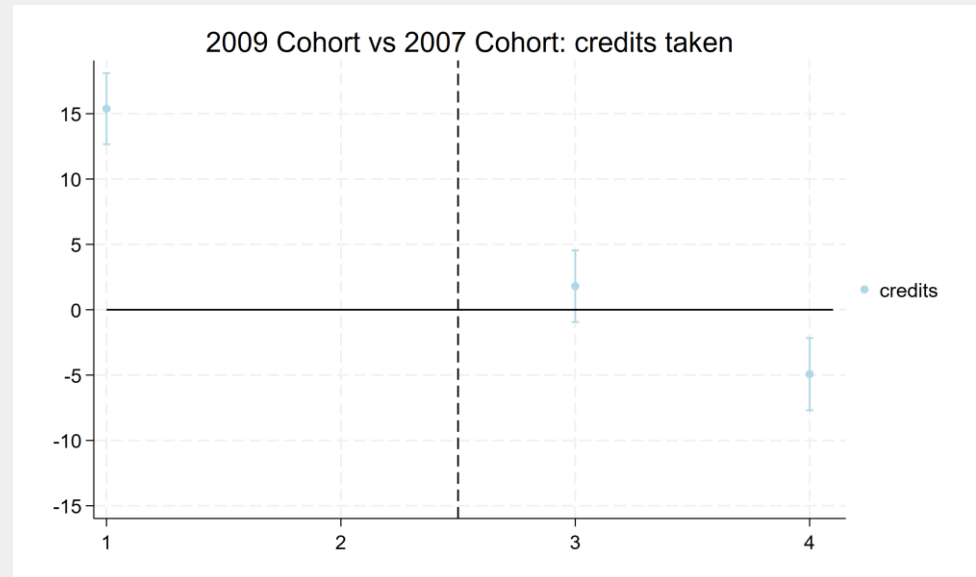


2009 Cohort vs 2007 Cohort: credits taken

# The base: what does the magnitude mean?

**To make sense of these differences**, we also provide some descriptive statistics for these two cohorts:

1) The credits they take (by YS)

| YS | N | mean | sd |
|---|---|---|---|
| *Cohort 2007* | | | |
| **1** | 713 | 59.29 | 9.86 |
| **2** | 576 | 66.70 | 15.03 |
| **3** | 528 | 65.55 | 14.93 |
| **4** | 500 | 71.49 | 18.25 |
| *Cohort 2009* | | | |
| **1** | 635 | 56.47 | 10.85 |
| **2** | 562 | 54.90 | 12.21 |
| **3** | 513 | 55.84 | 16.13 |
| **4** | 500 | 51.80 | 14.70 |

2) The actual tuition fees paid (by YS)

| YS | N | mean | sd |
|---|---|---|---|
| *Cohort 2007* | | | |
| **1** | 713 | 506.25 | 268.87 |
| **2** | 579 | 734.68 | 315.33 |
| **3** | 500 | 740.20 | 330.26 |
| **4** | 453 | 793.15 | 389.65 |
| *Cohort 2009* | | | |
| **1** | 634 | 631.18 | 343.05 |
| **2** | 435 | 739.42 | 442.34 |
| **3** | 380 | 881.54 | 470.68 |
| **4** | 360 | 1328.12 | 701.87 |

That is, the 2007 cohort students normally take 60+ credits, while the 2009 cohort students normally take 50+ credits.

# The base: what does the magnitude mean?

**To make sense of these differences**, we also provide some descriptive statistics for these two most frequent retaker sub-samples:

1) The credits they take (by YS)

| YS | N | mean | sd |
|---|---|---|---|
| *Cohort 2007* | | | |
| **1** | 145 | 59.50 | 9.10 |
| **2** | 145 | 62.20 | 13.62 |
| **3** | 113 | 64.74 | 15.71 |
| **4** | 105 | 67.63 | 22.62 |
| *Cohort 2009* | | | |
| **1** | 142 | 51.96 | 8.35 |
| **2** | 142 | 56.47 | 16.06 |
| **3** | 108 | 56.20 | 20.35 |
| **4** | 103 | 51.45 | 17.38 |

2) The actual tuition fees paid (by YS)

| YS | N | mean | sd |
|---|---|---|---|
| *Cohort 2007* | | | |
| **1** | 145 | 519.2281 | 264.0623 |
| **2** | 145 | 825.253 | 245.1583 |
| **3** | 99 | 745.9799 | 287.6802 |
| **4** | 85 | 802.2388 | 356.4188 |
| *Cohort 2009* | | | |
| **1** | 142 | 677.8356 | 334.267 |
| **2** | 142 | 1019.295 | 351.3216 |
| **3** | 103 | 1079.213 | 433.9986 |
| **4** | 91 | 1573.071 | 677.5424 |

# (preliminary) counts of attempts

- Cohort 2007 has more number of retakes than the other two cohorts from the second year of study.

- Very few students took the 3rd attempt (4.5% student-pairs for 2007 to 2009 cohorts), or even 4th or more attempts (1.4% student-pairs for 2007 to 2009 cohorts).
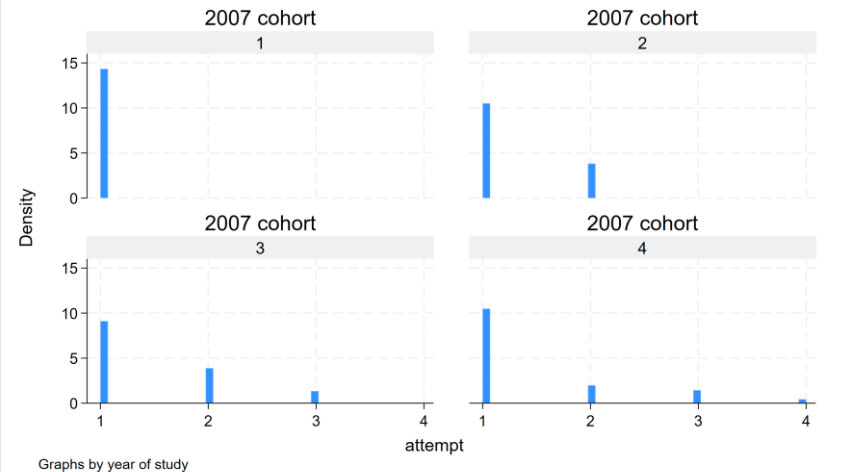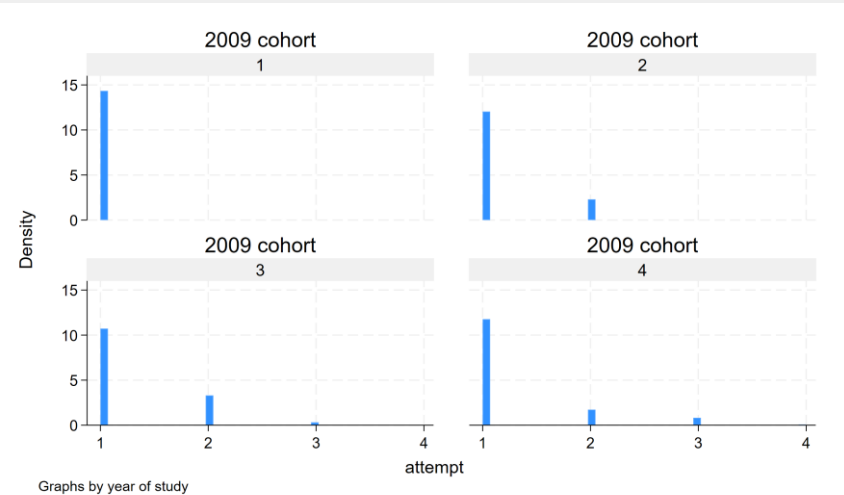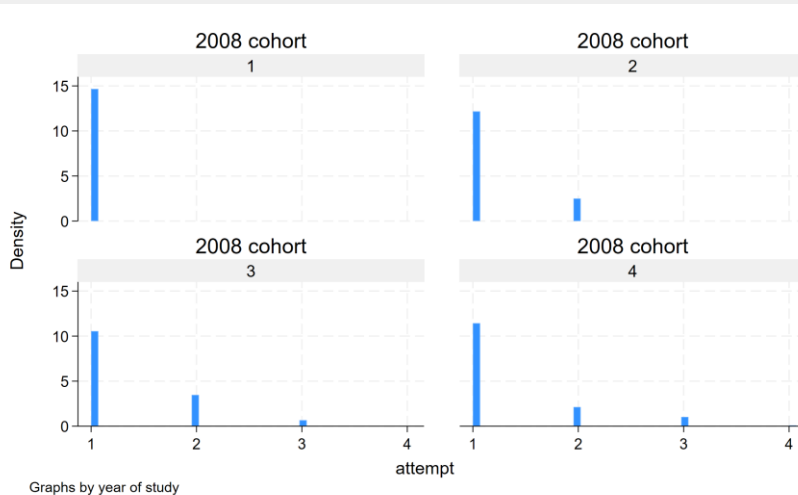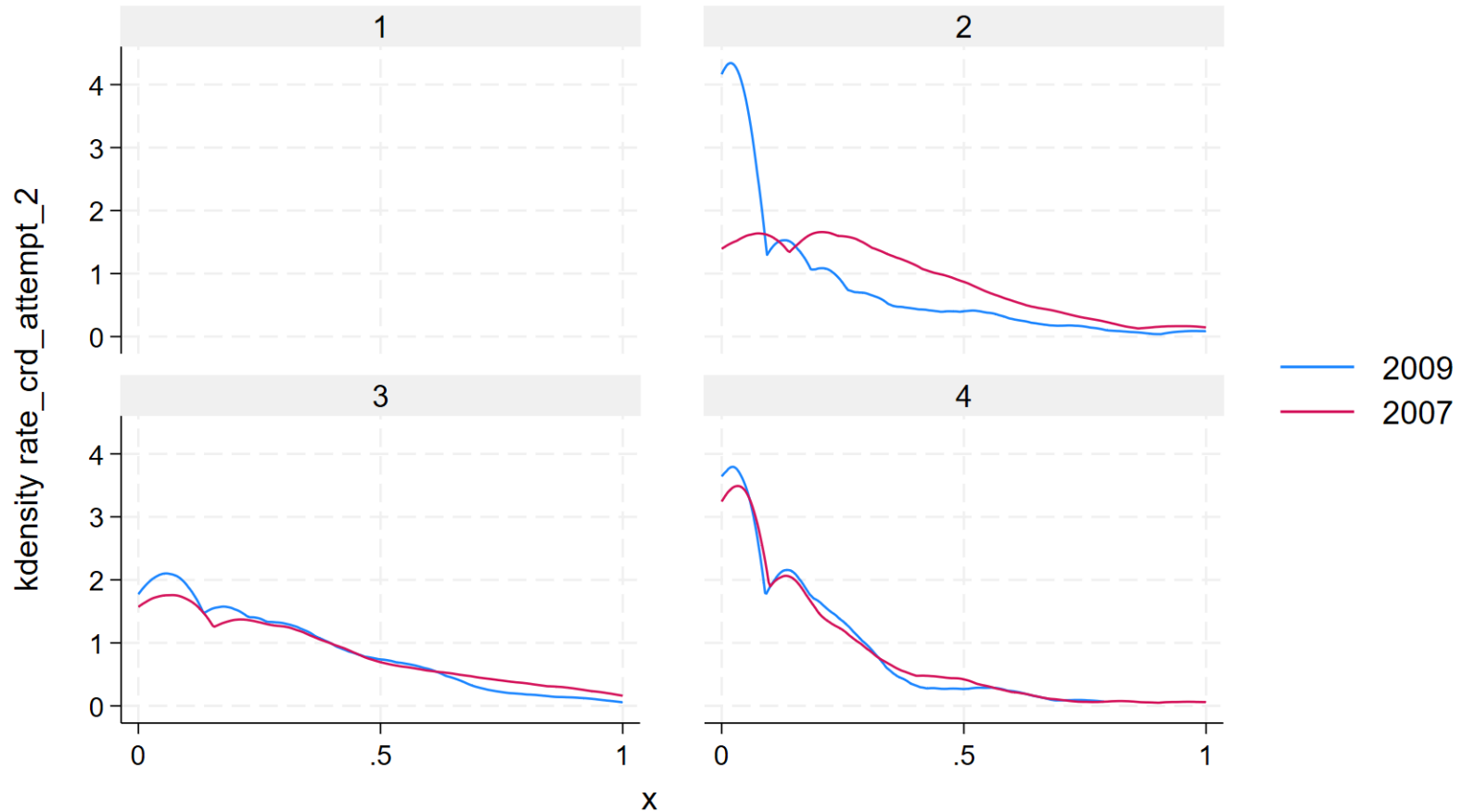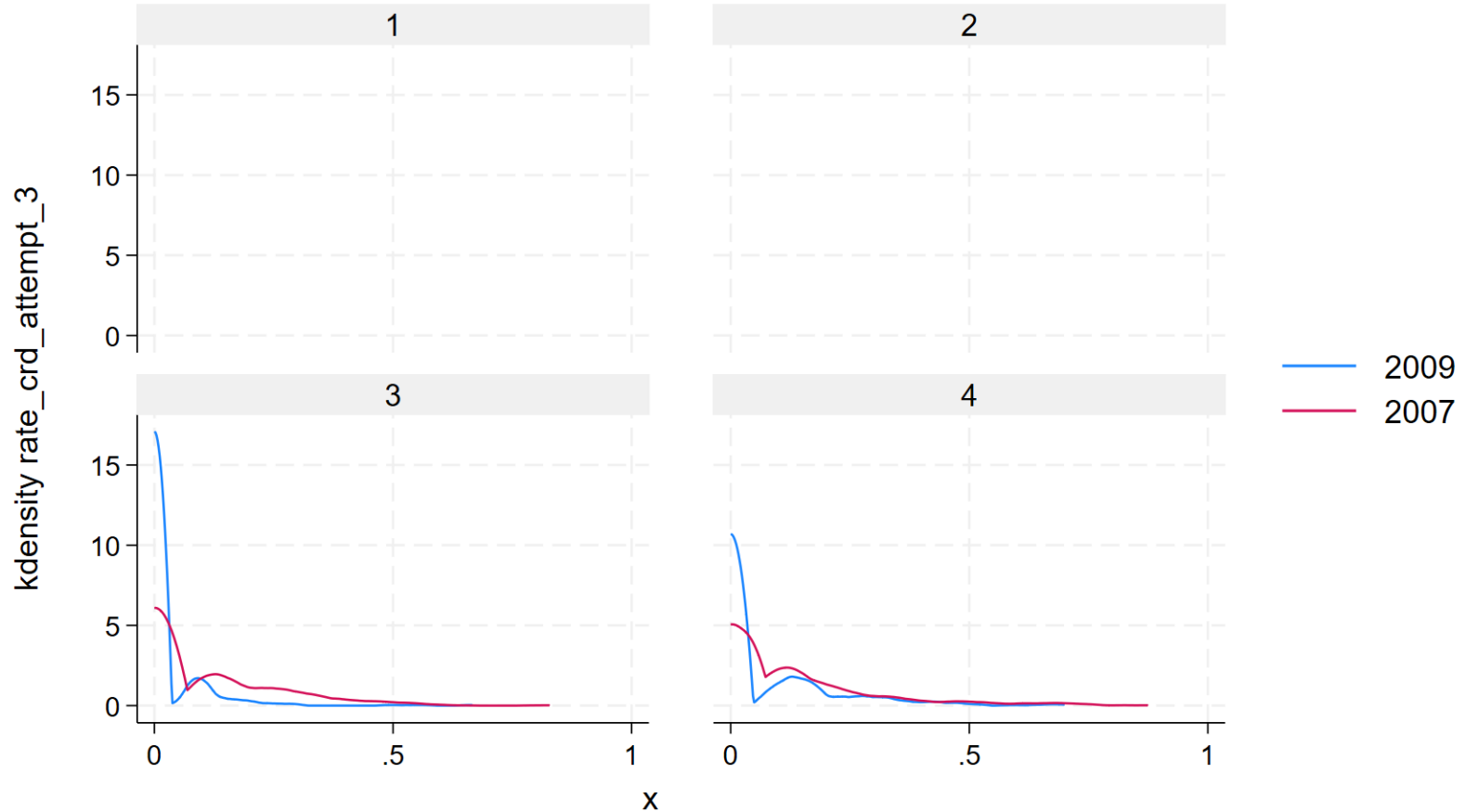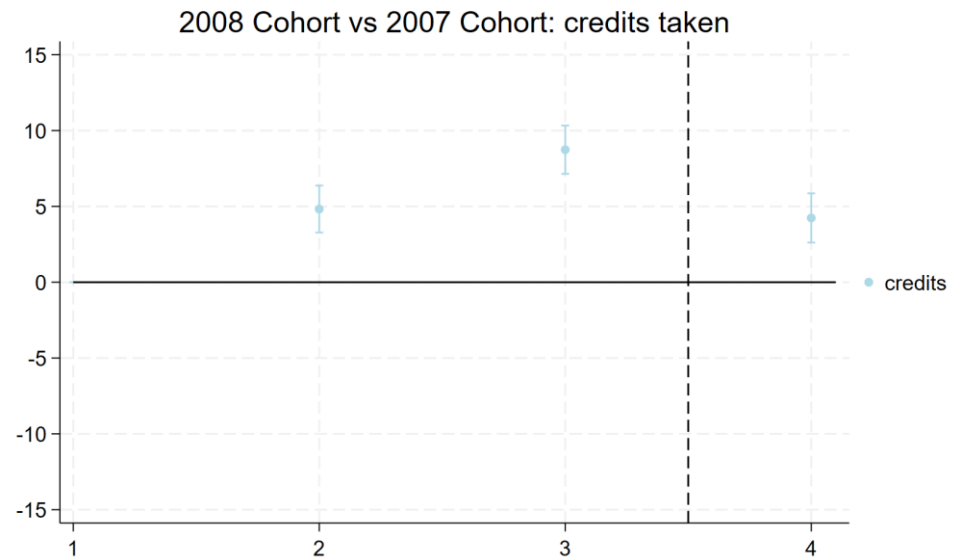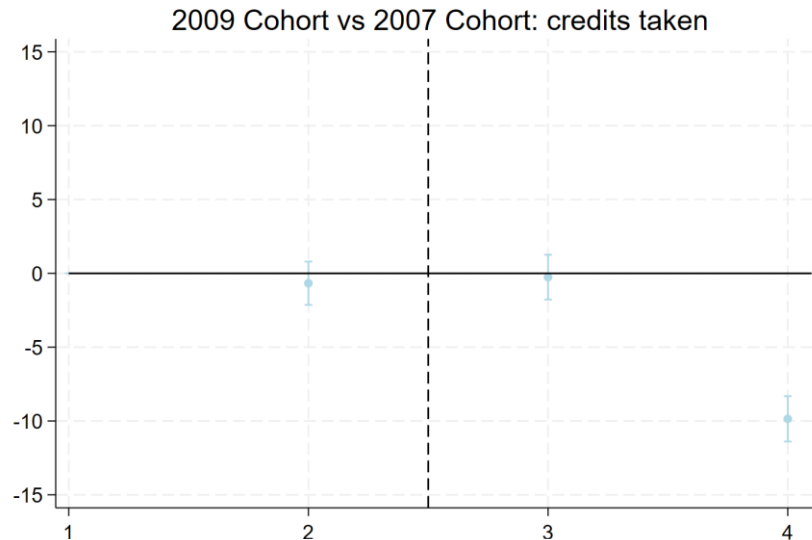
Graphs by YS

Graphs by YS

# Empirical results (2): credits taken

- It is strange because 2008 people are taking more credits but paying less.

- **Maybe** there were **more failures**? Or maybe there is a mistake in the processing.

Still need to check…

# Next steps

- More outcome? – figure out whether there is a way for students to choose "easier"/ "lower-level" options.

- Prepare a semester version of dataset #1 once we have the data with more sem info

- Start to explore dataset #2—filtering records of certain times of retaking and explore the effects.

- Heterogeneity:
  - Compulsory courses vs. all courses
  - Good students vs. bad students
  - Disciplines: Science, Engineering, Social Sciences, Humanities; or different experimentalidades