University enrollment, spatial inequality and local labour markets: the role of public policies

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Motivation: intergenerational transmission of human capital

- Individual's success correlated with their family economic output and the place they were born

  Chetty, Hendren, Klin and Saez (2014)

- "Birth lottery": low intergenerational mobility and spatial inequalities.

  Chetty, Hendren, Kline, Saez, and Turner (2014)

- Evidence of a strong transmission of human capital between parents and offspring Black, Devereux, and Salvanes (2005), Black and Devereux (2011), Björklund and Salvanes (2011)

Motivation and Research questions

- Little: public policies able to affect university enrollment and interaction parental background.
- Investment in infrastructure can increase human capital Duflo (2001a)
- **Can local investment in infrastructure increase human capital in the region and reduce spatial inequalities?**
- **Can such a policy, by increasing local opportunities increase intergenerational mobility in education?**

This paper

- **University reform: increased the number of campuses across Uruguay**
  - Public University campuses were located at the country capital
  - Students outside the capital: extra costs (e.g. moving or traveling)
- **In 2008 a geographic expansion policy was implemented: decrease this cost heterogeneity**
  - **The policy:** variation in space and time given budget constraints
- **We exploit this variation: staggered difference-in-difference model with fixed effects.**

  $\Rightarrow$ Outcomes: enrollment, FG, completion and labour market.

  $\Rightarrow$ Novel administrative data of students in Uruguay's main public university (Period 2002 to 2019 and 86 % of total tertiary students).

Related literature and Contributions

- Role of public policies in educational attainments

  Angrist and Krueger (1991), Oreopoulos (2006),Meghir and Palme (2005), Duflo (2001b),

- Intergenerational mobility in developing countries: focus on education

  Celhay and Gallegos (2015) Neidhofer, Serrano and Gasparini (2018), Torche (2019) Mazumder and Triyana (2019),

  $\Rightarrow$ **Contribution:** (i) document intergenerational mobility at the top using educational outcomes in a developing country; (ii) provide evidence of causal effect of public policies (spatial University expansion).

Institutional Context

- Uruguay small, high income developing country
  - High income: top 3 in latin america
  - Lowest income inequality in the region: Cedlas Statistics (2020)
- Divided in 19 major geographical divisions named “Departamentos”
- Free access to public education at all levels
  - University: no admission exams or tuition fees
- Historically located at the capital city
  - Higher costs for students from outside the capital (travel costs, accommodation)
  - Spatial inequality of educational opportunities

The policy

- In 2008 a geographic expansion policy was implemented in order to decrease cost heterogeneity
- Educational choice: (i) cost, (ii) return, and, (iii) family income (credit constrained)
  - **By decreasing cost**: increase enrollment and the number of first generations students
    - $\Rightarrow$ given their parental background, might have lower returns to education
- The policy was implemented gradually in space and time given budget constraints

Timeline

Before 2008	2008	2010	2012	2013	2014
Paysandu*	Paysandu*	Paysandu*	Paysandu*	Paysandu*	Paysandu
Rivera*	Rivera*	Rivera*	Rivera*	Rivera	Rivera
Salto*	Salto*	Salto*	Salto*	Salto*	Salto
	Maldonado	Maldonado	Maldonado	Maldonado	Maldonado
	Rocha	Rocha	Rocha	Rocha	Rocha
	Treinta y Tres*	Treinta y Tres*	Treinta y Tres*	Treinta y Tres*	Treinta y Tres*
			Tacuarembo	Tacuarembo	Tacuarembo

Figure: University expansion.

Notes: Own elaboration based on University official documents. Unless specified, campuses are located at the capital of the department. * Indicates that a university center is open but with highly limited educational offer. When removed, indicates that a bigger campus was open.

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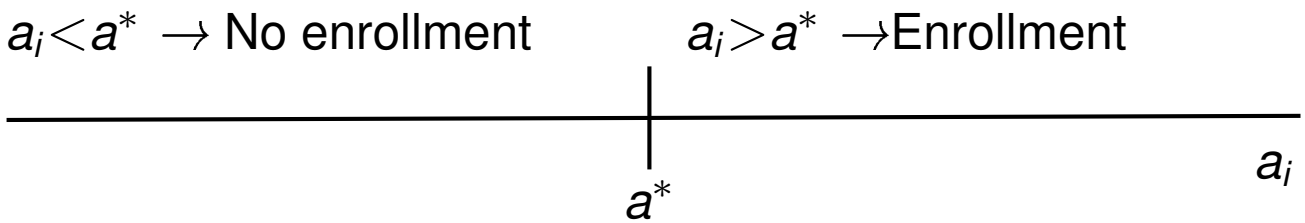
Empirical Framework for university enrollment

- **Distance to University might affect enrollment decision due to:**
  - transaction costs, neighborhood, peer and information effects
- **Larger distance to a university**
  - higher the costs of education.
  - emotional costs associated with leaving home
- **Geographical concentration of University campuses: within-country spatial inequality in educational opportunities**
- **A policy reducing distance to university campuses is expected to increase enrollment**
  - Which “type” of students will be the more benefit?

Empirical Framework

– let's assume there is a distribution ability a of individuals that affect returns to education.

– Let a^* denote the ability of the marginal student



- **By reducing the distance:**
  – there will be a new a^*_{post} lower than a^*.
  – new mass of students with ability such that $a^*_{post} \geq a \geq a^*$ will be now enrolling into university ("the marginal effect").
- **Environment with financial frictions:**
  – students with $a_i \geq a^*$ from less advantaged families that will not enroll in University (families can't afford the cost).
  – Policy reducing distance: help less advantaged students to overcome such restrictions

Data sources

- Administrative records of students enrolled at the public University from 2002 to 2020
- Combined with self-reported census data conducted during the entry year (mandatory)

Information on:

(i) Individual characteristics: gender, age, and other demographics

(ii) Center in which they accomplished their last year of secondary education

⇒ Use it to recover students locality of origin

⇒ Localities defined as in census data (National Institute of Statistics)

(iii) Chosen degree

(iv) Maximum educational level attain by their parents

⇒ Categories: (i) primary, (ii) secundary, (iii) terciary (non-university), and (iv) university education (complete and incomplete)

- National Household Survey (NHS)(local labor market outcomes as well as externalities on other educational outcomes)

Empirical measures

- **Vertical mobility:**

$$\textit{Perc. First generation students}_t^{UNI} = \frac{\textit{N. of enrolled students with non university parents}_t}{\textit{Number of students enrolled in university}_t} \quad (1)$$

$$\textit{Perc. First generation students}_t^{TER} = \frac{\textit{N. of enrolled students with non tertiary parents}_t}{\textit{Number of students enrolled in university}_t} \quad (2)$$

  - where t stands for the year of university enrollment.
  - *Perc. First-generation students*^{UNI} considers as first-generation university students those whose parents never enrolled in university but might hold a vocational degree.
  - we also consider those students whose parents did not attained tertiary education (*Perc. First-generation students*^{TER}).

Estimation sample

- Pool of enrollment records (first)
- Focus on students under 30 at enrollment
- Recover locality information for almost 90% of students that did not report to be from the capital

  $\Rightarrow$ students from 140 localities

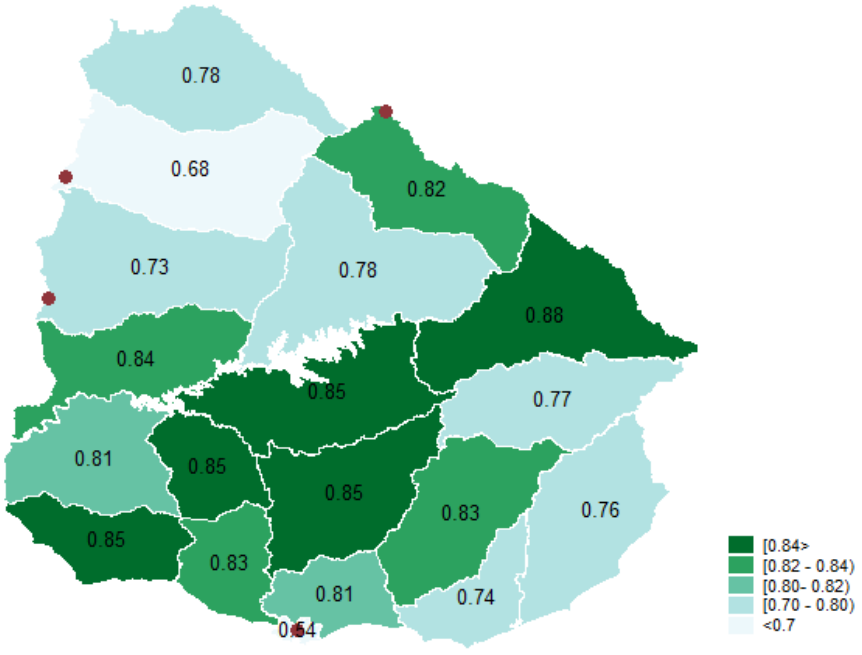
Sample

1. Vertical mobility:
   - Around 170,000 obs (2002–2020)

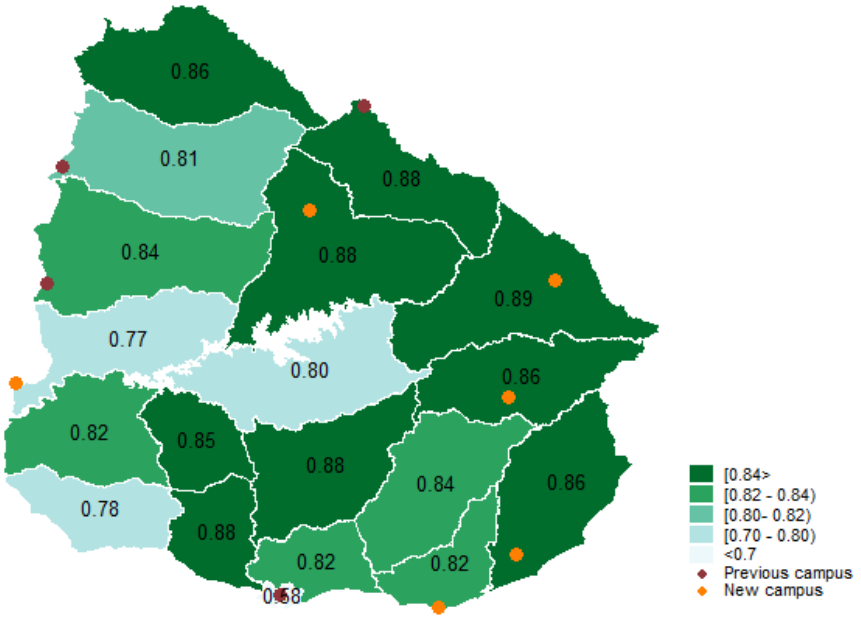
	Total			Non-capital		
	Mean	SD	Obs.	Mean	SD	Obs.
Female	0.61	0.49	168921	0.63	0.48	74696
Age	19.31	2.61	168921	19.05	2.34	74696
Has child	0.02	0.15	168705	0.02	0.15	74623
Parents' education						
Father primary	0.17	0.38	161108	0.25	0.43	70478
Father secondary	0.52	0.50	161108	0.55	0.50	70478
Father tertiary	0.31	0.46	161108	0.20	0.40	70478
Father University	0.23	0.42	162556	0.12	0.32	71382
Mother primary	0.14	0.34	167323	0.20	0.40	73933
Mother secondary	0.45	0.50	167323	0.50	0.50	73933
Mother tertiary	0.41	0.49	167323	0.30	0.46	73933
Mother University	0.26	0.44	168008	0.13	0.34	74309
Parent(s) University	0.34	0.47	168921	0.19	0.39	74696
Observations	168921			74696		

Graphic evidence

Share of first generation university students over total enrollment by geographical region



(a) 2002-2006



(b) 2016-2020

Empirical strategy

- Exploit variation in treatment time and across locations and estimate a staggered DiD with fixed effects (Borusyak and Jaravel, 2017)
- Each locality *l* at time *t* is part of one of the following 3 groups:

  (i) **Untreated:** if no new campuses ever opened in that locality
  (ii) **Treated before treatment:** localities that have not yet been treated but will
  (iii) **Treated after treatment:** localities where new campuses already opened

- We observe individual's decision but the policy varies at a locality level $\Rightarrow$ run analyses at those two different levels:

  – Locality level $\Rightarrow$ effect of the policy on the number of students and the share of first generation students and

  – Individual level $\Rightarrow$ effect on the conditional probabilities of being a first generation

Empirical model

- **Effect of the policy on Total enrollment, First generation Enrollment, Completion, First generation completion, and local labor market outcomes:**
  - two way fixed effect difference-in-difference models at a locality-year following

$$Outcome_{l,t} = \alpha_0 + \mu_l + \mu_t + \sum_{h=-a,}^{h=b-1} \gamma_h 1[K_{lt} = h] + \gamma_b^i [K_{lt} = b] + \epsilon_{l,t}^i \quad (3)$$

  - $Outcome_{l,t}$ stands for Total enrollment, First generation Enrollment, Completion, First generation completion, and local labor market outcomes in locality l and enrolled in University at year t.
  - μ_l and μ_t are the unit and period (two-way) fixed effects,
  - $a \geq 0$ and $b \geq 0$ are the numbers of included "leads" and "lags" of the event indicator, respectively, and
  - $\epsilon_{l,t}^l$ is the error term.
  - $K_{l,t} = t - E_l$ is the number of periods since the event date E_l ("relative time").
  - The coefficients on the leads are interpreted as measures of "pre-trends"

Defining treatment

- Some locations already have small campuses prior to the policy implementation

  $\Rightarrow$ Still there was a substantial increase in infrastructure and resources
- While campuses open their headquarters in a given location, students from close locations can be also considered as affected by the policy
- Montevideo and Canelones not considered as controls in baseline specifications

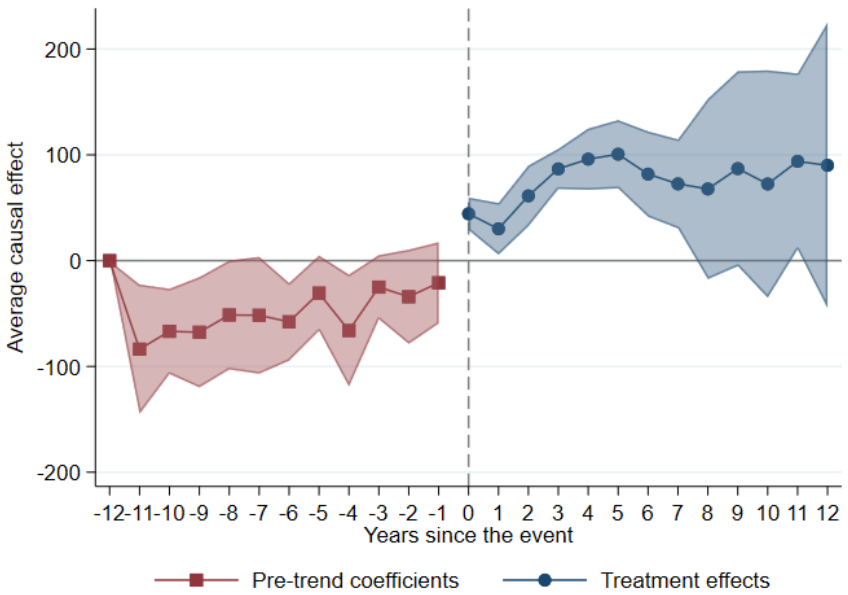
Different treatment definitions/scenarios:

1. As specified in the timeline
2. Use geodestic distance between the locality and the campus as a continues measure of treatment

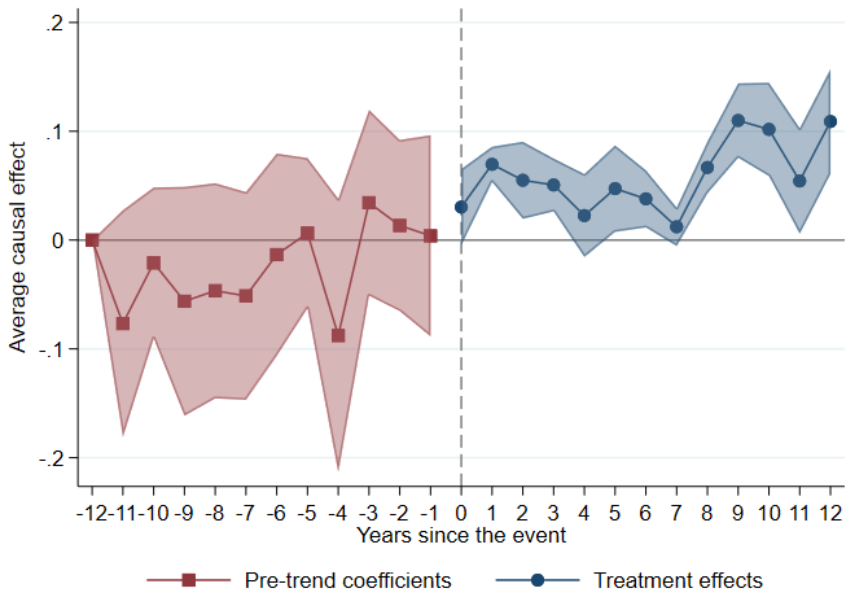
   $\Rightarrow$ We then define 3 buffers centered at the locality where the new campus opened:

- Radio of 20, 30 and 50 kilometers, respectively (treatment variable: value one if a new campus opened at 20, 30 of 50 kms, buffers).

Results: Baseline

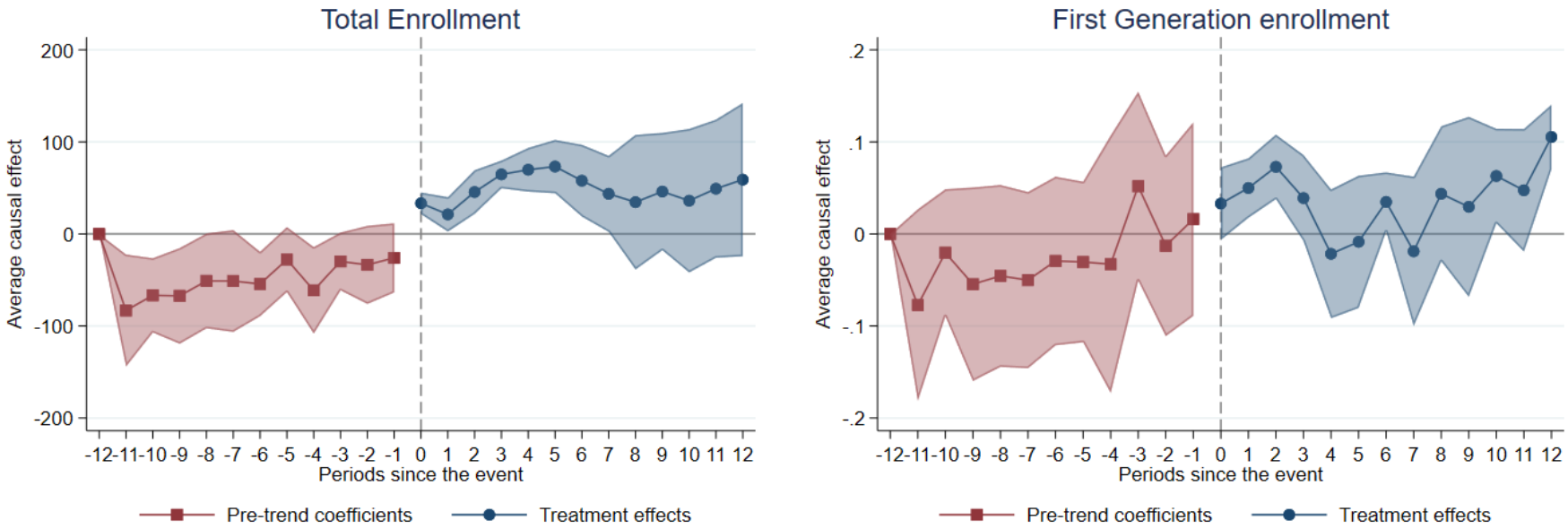


(a) Total enrollment



(b) Share of first generation enrollment

Results: 20 km

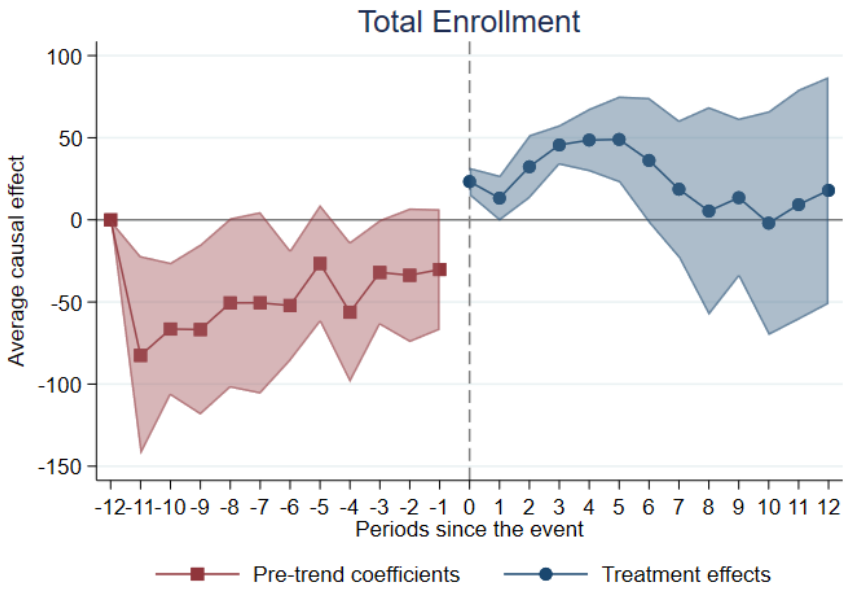


(a) Total Enrollment

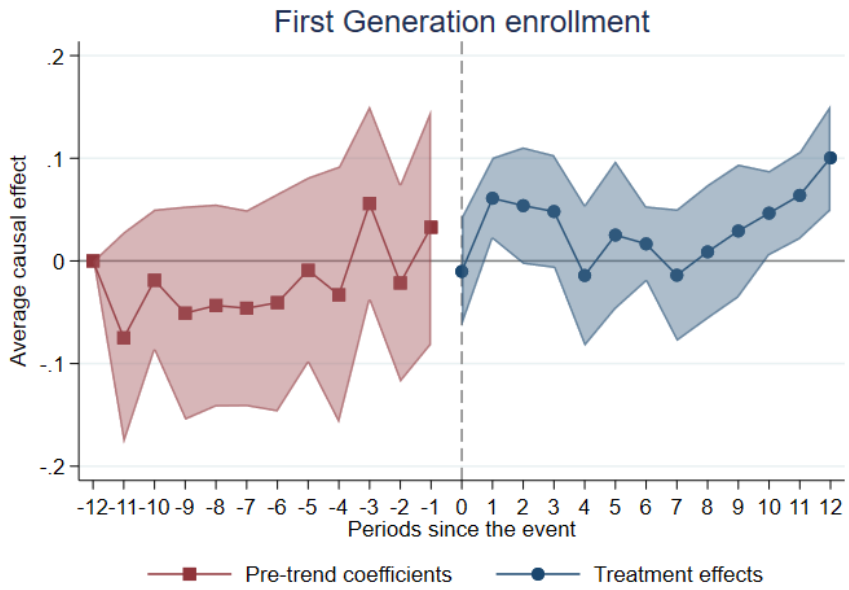
(b) First Generation Enrollment

Figure: Treatment: any locality 20 kms far away from the new campus

Results: 30 km



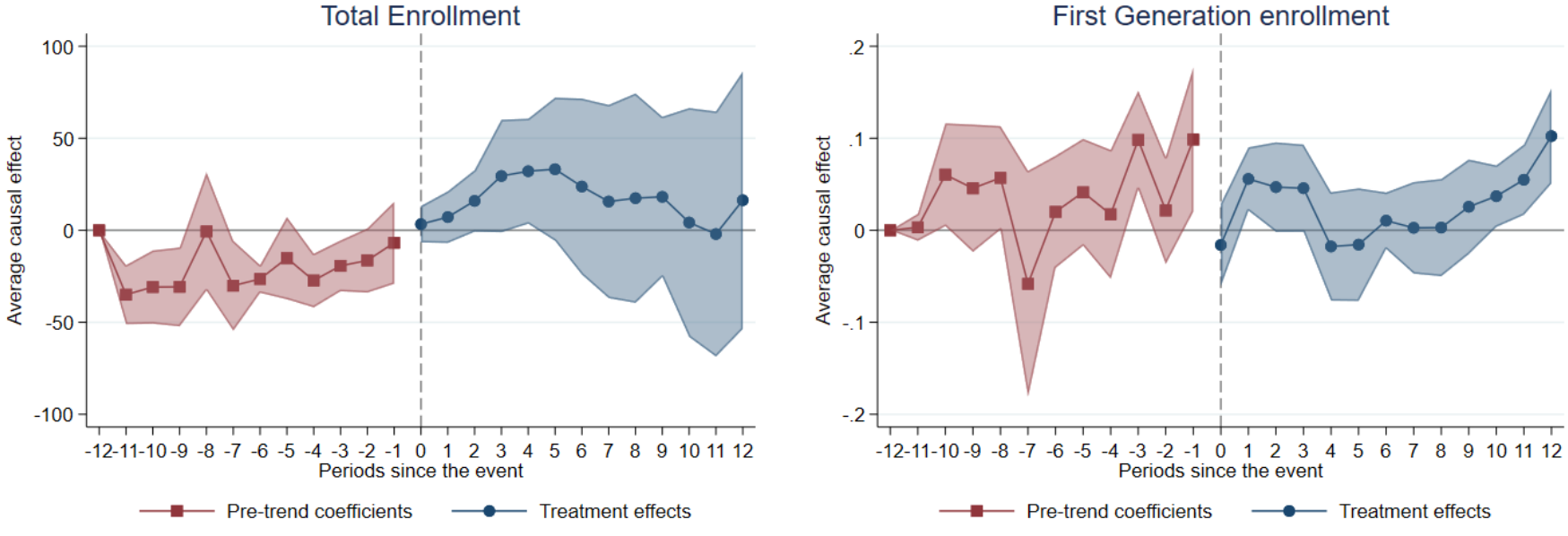
(a) Total Enrollment



(b) First Generation Enrollment

Figure: Treatment: any locality 30 kms far away from the new campus

Results: 50 km

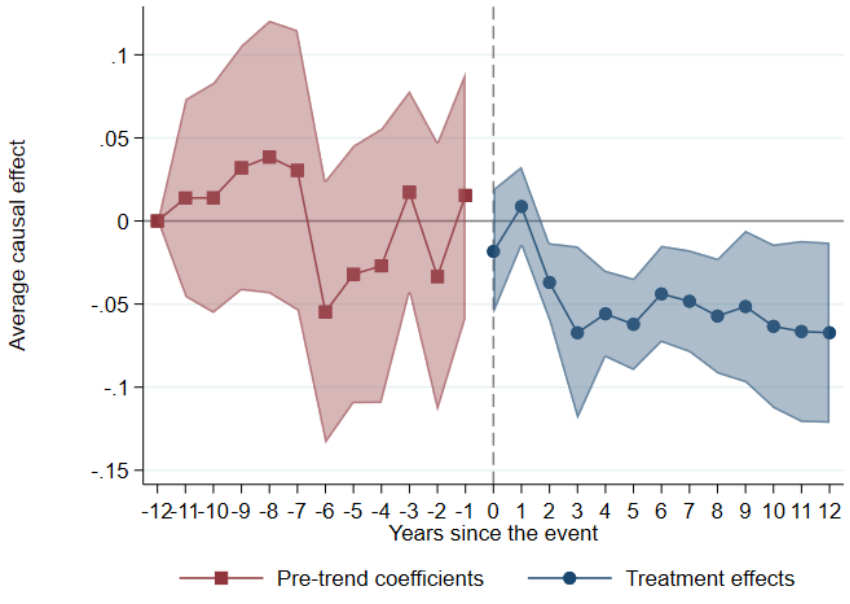


(a) Total Enrollment

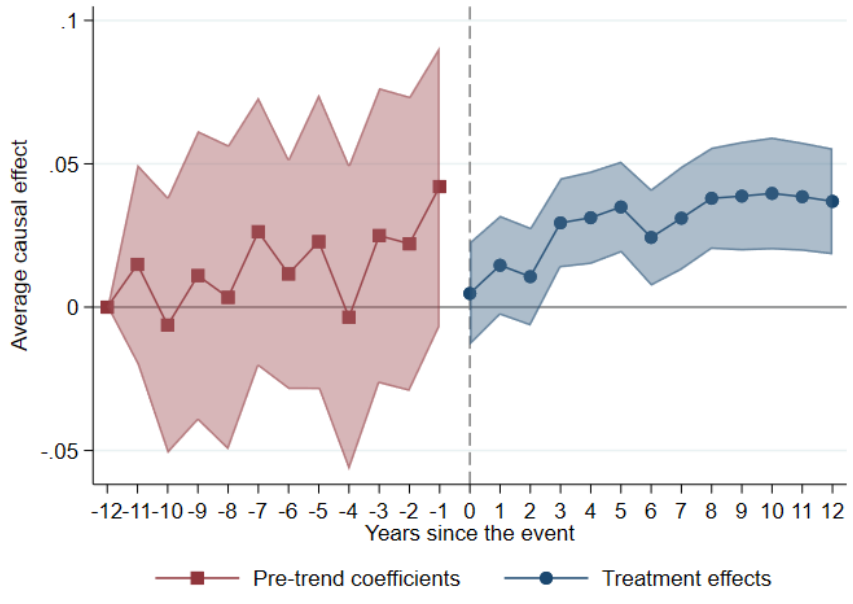
(b) First Generation Enrollment

Figure: Treatment: any locality 50 kms far away from the new campus

Results: Completion rates

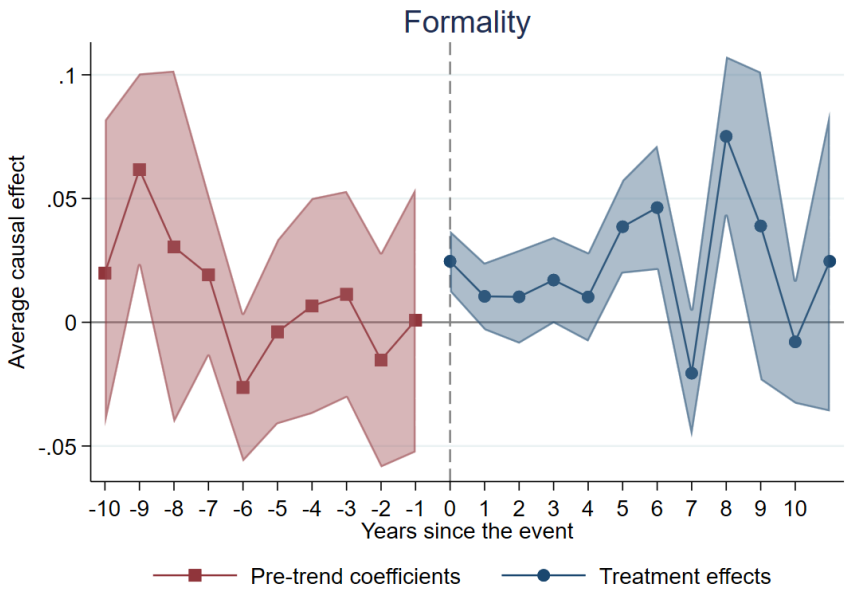


(a) Probability of completion

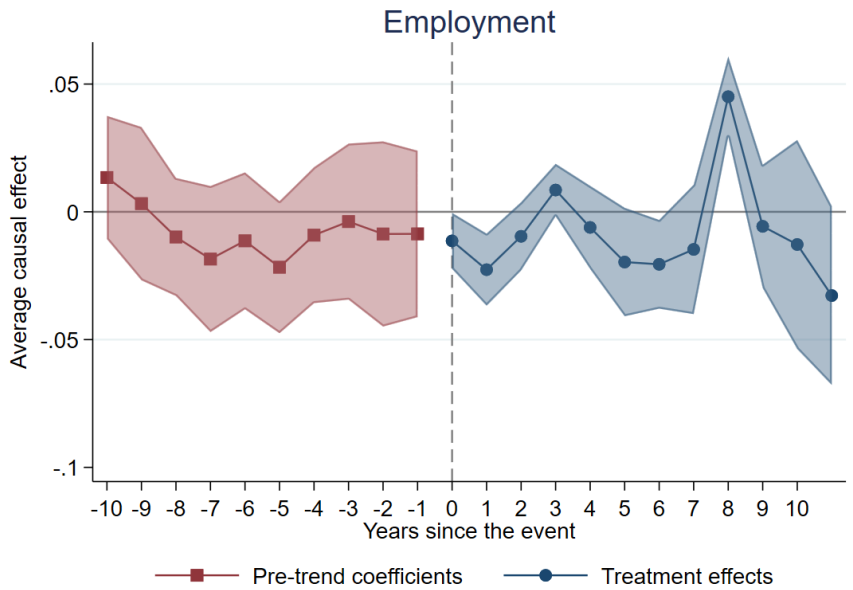


(b) Probability of completion for first generations students

Results: Labour market outcomes. Population: 21-40



(a) Formality



(b) Employment

Heterogeneities, Robustness checks, externalities

- **Heterogeneities**

  $\Rightarrow$ Greater and significant effect in those students with less educated parents among the first generation pool of students

  $\Rightarrow$ Greater and significant effect in those students from public high school.

- **Robustness checks**

  $\Rightarrow$ falsification exercise of the policy effect on intergenerational mobility in the capital, and on the capital plus Canelones.

  $\Rightarrow$ Policy intervention as if it has started in 2008 and 2010

  $\Rightarrow$ Results of this falsification exercise provide robustness to our empirical strategy.

- **Externalities on educational outcomes**

  item[] $\Rightarrow$ High school attendance: modest significant increase seven years after the implementation of the policy in localities where new campuses opened (composition effect).

  $\Rightarrow$ significant increase in the number of individuals finishing secondary education.

Conclusions and policy recommendations

- **The policy had a significant impact in educational and labour market outcomes:**

  $\Rightarrow$ increasing the number of students and the share of first generation in university students for localities where campuses opened and those 20 kms far away.

  $\Rightarrow$ Negative effect on completion rates at locality level, but positive for FG of university students.

  $\Rightarrow$ Positive effect on formality and employment rates.

- **Our results suggest the important role of public policies in the reduction of inequality of opportunities**

Thanks for your attention