Corruption and Talent Allocation

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The *Civil Servant Fever*

public sector exams (*concursos públicos*) in Brazil

The *Civil Servant Fever*

- Civil servant fever around the world
  - **Brazil**: extremely competitive public *concursos* → avg. prob. of being hired around 4%
  - **China**: 2.1 million sit *Guokao* exam in 2021 → 1-in-68 chance
  - **India**: 1 in 4 recent college graduates appear in civil service exams in the state of Tamil Nadu

- "*...when young people say they want to become civil servants, I cannot help but wonder why...It's because they see in it a way to get rich quickly - the opportunity for* **corruption**. *In other words, it offers the prospect of rapid success without having to put in the hard work.*"

  Dmitry Medvedevv (July 2011)

  Russian politician who later faced with major corruption allegations

Corruption and Talent Supply for the Public Sector

- Talent is key for gov. performance (Fenezia, 2022; Best et al., 2023)

- Yet less is known about how factors such as corruption can "distort" the allocation of talent

- A priori unclear whether corruption in the public sector attracts or repels talent

  - corruption may attracts capable *rent-seekers* by increasing pecuniary returns to public sector careers (Baumol, 1990; Murphy et al., 1991; Acemoglu, 1995)

  - corruption may crowd out *pro-social* or *reputation-driven* agents (Hanna and Wang, 2017; Barfort et al., 2019)

  → ambiguous theoretical prediction calls for empirical investigation

This Paper
Context & Research Design

- Brazil: randomized anti-corruption audits at municipal gov. (2003-2015)
  - exogenous policy shock: evidence that it diminished local corruption (Avis et al., 2018)
  - rich administrative data on the universe of college students and the labor market

- Event-study estimation exploiting randomized and staggered nature of audits
  - staggered difference-in-difference framework
  - stack-by-event design to account for potential treatment effect heterogeneity (Goodman-Bacon, 2020)

This Paper
Overview of Results

- Audits lead to negative sorting into public sector careers by ability (proxied by standardized test scores)
  - ↓ share of high-ability students enrolling in majors tailored towards the public sector
  - ↓ share of high-ability students working as civil servants

  → *brain drain* out of public sector

- Mechanisms: effects driven by student behavioral response
  - evidence consistent with *diminished rent-seeking* and a *reputation deterrence effect*
  - not driven by *education supply* or *labor demand*

Literature & Contribution

- **Selection into the public sector** (Finan et al., 2013; Besley et al., 2022)
  - financial incentives and selection in experimental settings (Dal Bó et al., 2013; Deserranno, 2019; Ashraf et al., 2020)
  - corruption and honesty selection in experimental settings (Hanna and Wang, 2017; Barfort et al., 2019; Brassiolo et al., 2021)
  - natural resource rents and talent allocation (Ebeke et al., 2015; Balza et al., 2025)
  - $\rightarrow$ first empirical evidence from a policy experiment

- **Corruption & anti-corruption policies**
  - Baumol (1990); Murphy et al. (1993); Acemoglu (1995); Fisman and Miguel (2007); Olken and Pande (2012); Ajzenman (2021); Gulino and Masera (2022)
  - political and economic impacts of the same audit program (Ferraz and Finan, 2008, 2018; Colonnelli and Prem, 2022; Gonzales, 2021)
  - $\rightarrow$ implications of corruption on talent (mis)allocation

- **College major choice & labor market outcomes**
  - career & family (Wiswall and Zafar, 2021); stereotypes (Colon and Patel, 2022)
  - divergence in realized careers (Kirkeboen et al., 2016; Sloane et al., 2021)
  - $\rightarrow$ anti-corruption policy can impact human capital specialization

Institutional Background: Brazil
Corruption in the Public Sector

"251 civil servants dismissed for corruption in the first half of 2016"
(Source: *Agência Brasil*)

Institutional Background: Brazil
Anti-Corruption Drive by Lula Gov. 2003

- Publicly-aired lottery draws targeting municipal gov.
  - eligibility: non-capital muni. below certain population thresholds
  - replacement: can be audited again after some draws
  - over 40% municipalities audited during 2003-2015 `audits` `maps`

- Timeline of key events
  - audit *announcement*: covered by media and followed by audit activities within weeks
  - audit *report*: made public within 6-8 months after announcement, followed by anti-corruption enforcement activities

Institutional Background: Brazil
Tertiary Education and Public Sector Careers

- Higher education system in Brazil
  - public-private divide
    - public institutions: prestigious, free, and over-subscribed
    - private institutions: under-subscribed with 80% market shares
  - centralization reform 2010: students applying to the same program in public uni. are ranked by uniform exam performance

- Public sector careers in Brazil
  - selection is professionalized and meritocratic (Grindle, 2012)
  - civil servants enjoy tenure and a public sector wage premium
    -> highly competitive: avg. prob. of being hired 4% (Mocanu, 2023)

Data & Sample

- **National High School Exam (ENEM)** (2009-2018)
  - municipality of residence $\rightarrow$ *geo-locator*
  - exam performance as a proxy for (cognitive) ability

- **Census of Higher Education** (2010-2019)
  - universe of freshman major enrollment

- **Matched Employer-Employee Dataset (RAIS)** (2010-2019)
  - trace students to first jobs in the formal labor market
  - define public or private sectors by contract details

$\rightarrow$ all micro-data linked with individual ID and aggregated to a muni.-level panel

- **Municipal Datasets**
  - CGU audits (focus on **2011-2014** waves)
  - population census and municipal surveys

Stacked Diff-in-Diff

Traditional TWFE model could induce bias in the presence of treatment effect heterogeneity (Goodman-Bacon, 2021), instead

- consider the "sub-experiment" for treatment cohort $c \in \{2011, 2012, 2013, 2014\}$
    - $Treated_{mc} = 1$: units audited for the first time at time c
    - $Treated_{mc} = 0$: units not-audited in the time window of interest

  $\rightarrow$ reduced to *first-audited* (2011-2014) and *never-audited* (balance check)

- estimate TWFE for the "stacked" dataset

$$Y_{mct} = \beta Treated_{mc} \times Post_{ct} + \delta_{mc} + \lambda_{sct} + \epsilon_{mct},$$

    - Y_{mct}: outcome for municipality m in cohort c at time t
    - $Post_{ct}$ equals one for observations in year c and after
    - δ_{mc} and λ_{sct}: municipality-cohort and state-cohort-time FE
    - standard errors clustered at muni. level

Stacked Event-Study

- To investigate dynamic evolution of treatment effects & test for pre-trends, my main specification follows the event-study design

$$Y_{mct} = \Sigma_{\tau=-4}^{7} \beta_\tau D_{ct}^\tau \times Treated_{mc} + \delta_{mc} + \lambda_{sct} + \epsilon_{mct},$$

  - Y_{mct}: outcome for municipality m in cohort c at time t
  - D_{ct}^τ: cohort-specific indicator variables for "relative time to audit announcment", where $\tau = -1$ is the reference period
  - baseline time window [-4,7], where unit of time is the year

- Students are directly exposed to audits if their residence muni. is *announced* to be audited the year or before they enroll in college

Effect of Audits on Majors: Motivating Facts

Among **high-ability** (top 25% grade) students low-ability
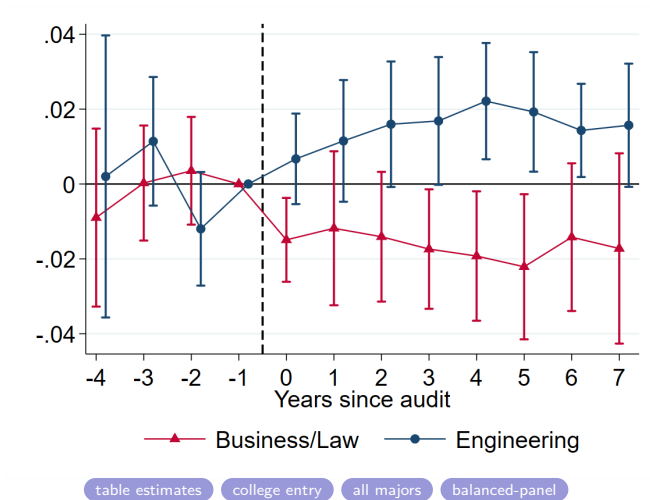
- $> 40\%$ choose either business/law or engineering
- business/law students more likely to become civil servants more

Figure: Majors & Careers for High-Ability Students in 2010

Share of major enrollment

Share in civil service by major
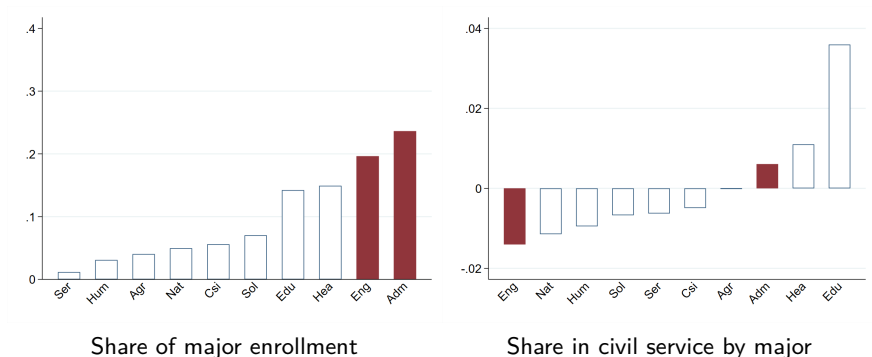
Effect of Audits on Majors: Aggregate Enrollment

Figure: Shares of Aggr. Major Enrollment (All Universities)

→ on average, 1 in 60 students switches majors after anti-corruption audits

Effect of Audits on Majors: *Public* vs. *Private*

The public-private divide

- public universities: over-subscribed
- private universities: under-subscribed

Figure: Shares of Aggr. Major Enrollment (Private vs. Public Uni.)

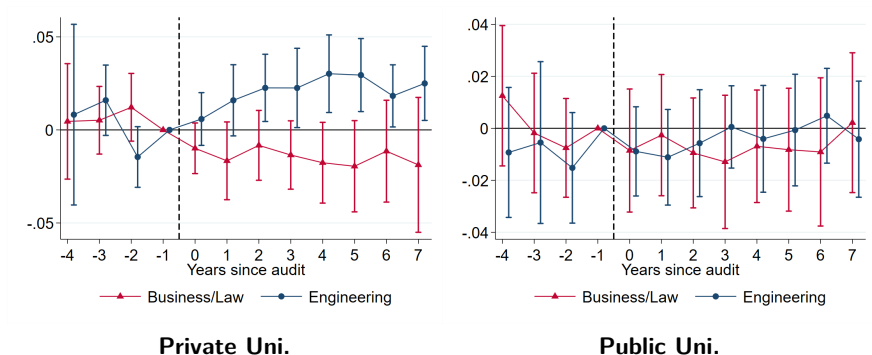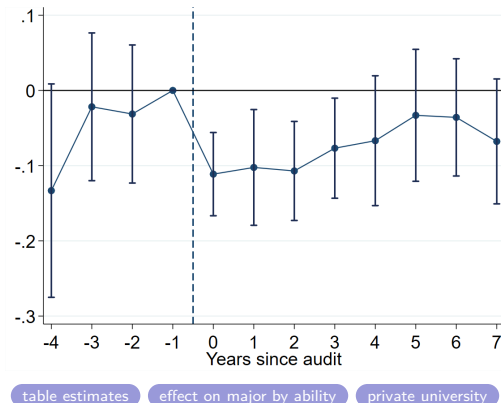**Private Uni.**   **Public Uni.**

table estimates

Effect of Audits on Majors: Ability Composition

However, null effects on aggregate enrollment shares in public institutions mask compositional changes

Figure: Share of High-Ability in Business/Law in Public Uni.

table estimates   effect on major by ability   private university

DiD coefficient: a 14.8%** relative decline in numbers

Effect of Audits on Careers: Sample Construction

- College Enrollment (2010-2019) $\rightarrow$ RAIS (2010-2019)

- Sample attrition: 11.7% freshmen matched to full-time contracts
  detail

  - short timespan and unemployment spells
  - do not observe emigration, the informal sector, or postgraduate education

Effect of Audits on Careers: Career Realizations

Figure: Number (asinh) of First Jobs by Sector

table estimates   detailed public
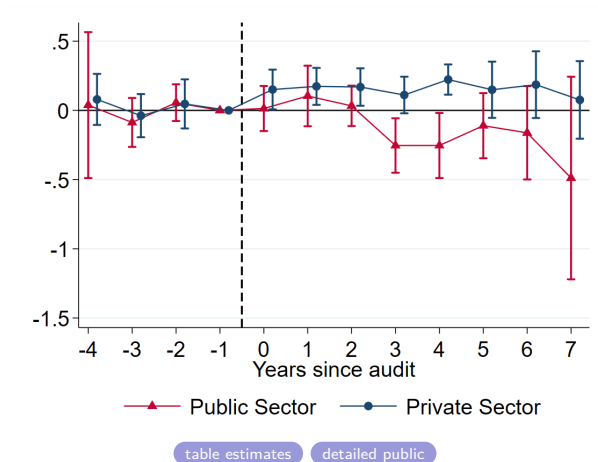
DiD coefficients: a 9.5% (14.9%**) relative decline (increase) in numbers in public (private) sector

Audits and Realized Careers: Ability Composition

Public sector posts in Brazil are over-subscribed...

Figure: Number (asinh) of High-Ability in Public vs. Private Sector

table estimates
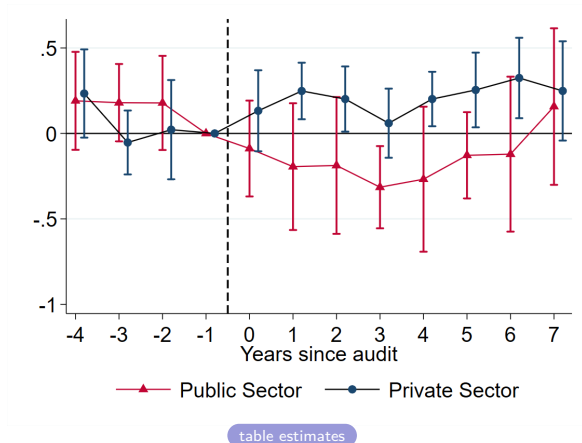
DiD coefficients: a 29.5%*** (17.3%**) relative decline (increase) in numbers in public (private) sector

Summary of Results

- Audits lead to an inferior candidate pool for the public sector

- Audits lead to an inferior civil service workforce

$\rightarrow$ public sector *brain drain*

Possible Mechanisms

Why do audits lead to public sector *brain drain*?

- Evidence consistent with a decrease in perceived attractiveness of public sector careers following audits

  - ↓ rent-seeking returns
  - ↑ reputation costs

- Unlikely to be driven by *crowding-out* of prosocial agents

- Evidence inconsistent with demand-side explanations

  - University course offerings
  - Hiring practices of firms or public sector organizations

Mechanisms: Immediate Effects at Announcement

Immediate responses of students at audit *announcement*, but before audit *report* (available 6-8 months later) → *priors* matter

Figure: Shares of Major Enrollment (Time is Semester)
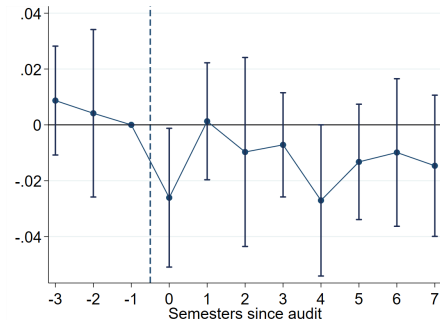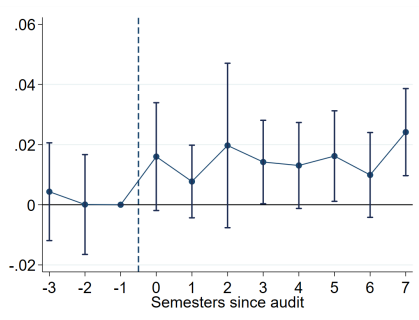
Business and Law   **Engineering**

Mechanisms: Heterogeneity by Revealed Corruption

Effects concentrated in high-corruption (above-median irregularities) muni. $\rightarrow$ *priors* on corruption level largely correct

Figure: Shares of Major Enrollment (Corruption Level)
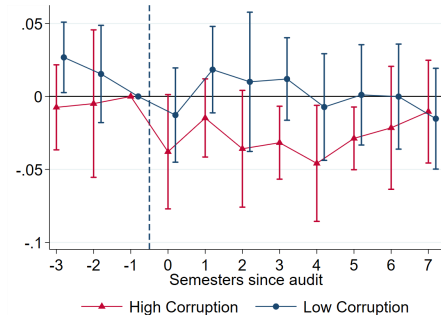
Business and Law
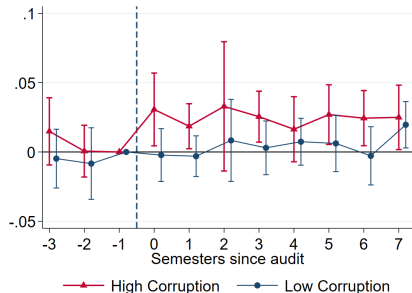
Engineering

Mechanisms: Motivation Crowding-Out?

Classify *ex-ante* all 4-digit CBO occupations in Brazil by their "prosociality"

Private Sector Job Realization of High-Ability Students		
	High Pro-Social (1)	Low Pro-Social (2)	Share High (3)
Audit $\times$ Post	0.203**	0.169*	0.004
	(0.092)	(0.096)	(0.023)
R^2	0.90	0.91	0.27
Mean Dep. Var.	2.44	2.66	0.44
SD Dep. Var.	1.46	1.58	0.22
Observations	57,059	60,732	32,941
Num. of Clusters	2,161	2,255	1,315
Muni. $\times$ Cohort FE	X	X	X
State $\times$ Year $\times$ Cohort FE	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

categorization detail

Mechanisms: Discussions

- Students hold largely correct priors on local corruption and foresee future ↓ in corruption rents and/or ↑ reputation costs
  - effects seem to be amplified by issue salience `more`

- Unlikely to be driven by motivation *crowding-out*
  - no surprise shock at audit announcement before corruption revelation
  - no evidence of talent disproportionately sorting into prosocial jobs

- Possible *crowding-in* of pro-social students
  - consistent with anti-corruption efforts leading to *honesty gain* in other middle-income contexts (Hong, 2023)
  - suggests the negative sorting by ability are net effects

Mechanisms: General Equilibrium Responses

- Audits impact a wide range of political and economic outcomes (Ferraz and Finan, 2008; Avis et al., 2018; Colonnelli and Prem, 2022)

- So far, treatment is defined based on students' "origin"

- Yet, both the higher education market and the labor market in Brazil are somewhat localized
  - 50% of students go to college in their hometown muni.
  - 58% of students end up working in the same muni. as their muni. of high school residence

- Next, evaluate the direct effects of audits on
  - university degree supply detail
  - labor demand in private firms & public organizations detail

Additional Results & Robustness Checks

- Heterogeneous effect by local media (see)
- Effect on other dimensions of workforce composition
  - degree background (see)
  - demographic and socioeconomic background (see)
- Geographic spillovers (see)
- Audits and selective migration (see)
- Audits and corruption perception (see)
- Robustness checks:
  - alternative estimators (Borusyak et al., 2023) (see)
  - Poisson QMLE (Chen and Roth, 2023) (see)
  - parallel-trend sensitivity (Rambachan and Roth, 2023) (see)

Taking Stock

- Anti-corruption efforts in Brazil lead to a public sector *brain drain*

- Effects are mainly driven by students self-selecting out of a less attractive public sector career

  - corruption could distort talent allocation toward rent-seeking in the public sector, other than its direct costs on the economy
  - top-down anti-corruption policy could potentially adjust this "allocative inefficiency"

- Economy-wide microdata is a promising first step to gauge the concrete effects of bureaucratic selection on economic growth and public service delivery
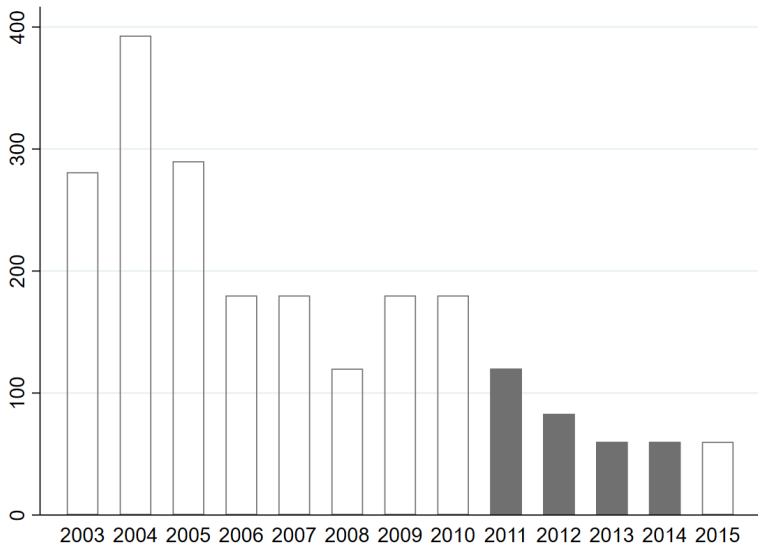
Thank you!

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Number of Municipalities Audited by Year

Source: *Controladoria-Geral da União* (CGU)

Geographic Distribution of Audits Back

Source: Colonnelli and Prem (2022)
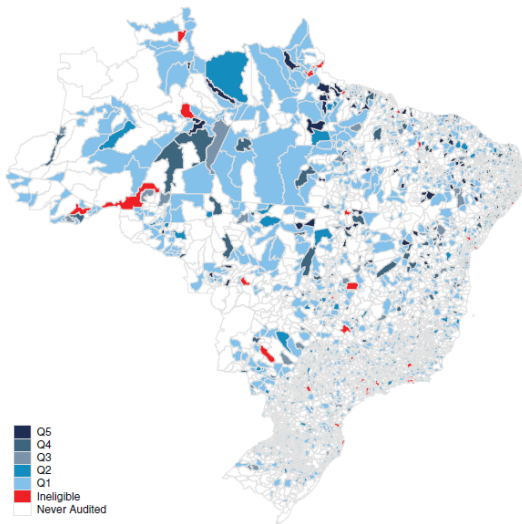
Figure 2
Corruption across Brazilian municipalities

Sample Balance Test back

	Control		Treatment		Difference
	Mean (1)	Std. Dev. (2)	Mean (3)	Std. Dev. (4)	(5)
Panel A: Pre-Trement Municipal Characterisitcs					
Population (logs)	10.02	0.60	10.09	0.62	0.03
					(0.04)
Share urban	0.63	0.22	0.64	0.20	0.02*
					(0.01)
Share literate	0.78	0.09	0.77	0.09	0.00
					(0.00)
Share of population with a college degree	0.04	0.02	0.03	0.02	0.00
					(0.00)
Has AM radio 2009	0.19	0.39	0.20	0.40	0.02
					(0.03)
Has internet provider 2009	0.54	0.50	0.59	0.49	0.03
					(0.03)
Panel B: Pre-Treatment Higher Education Market Charateristics					
Num. of freshmen (logs)	3.10	1.39	3.15	1.41	0.02
					(0.09)
Share female	0.49	0.02	0.49	0.02	-0.00
					(0.00)
Share in public universities	0.34	0.27	0.35	0.27	0.01
					(0.02)
Share enrolled in business/law	0.27	0.17	0.27	0.18	0.01
					(0.01)
Share enrolled in engineering	0.11	0.12	0.10	0.10	-0.00
					(0.01)
Share enrolled in education	0.28	0.21	0.30	0.21	0.00
					(0.01)
Share enrolled in health	0.17	0.15	0.18	0.15	0.00
					(0.01)
Panel C: Pre-Treatment Labor Market Charateristics					
Num. of public sector workers (logs)	5.75	1.22	5.96	1.11	0.05
					(0.07)
Share of workers in public sector	0.42	0.29	0.47	0.30	0.01
					(0.02)
Share of workers in civil service	0.34	0.26	0.37	0.27	0.01
					(0.02)
Observations	3,409		221		

Appx: Low-Ability Students (Lowest 50% Grade) back

Figure: Majors & Careers for Low-Ability Students in 2010
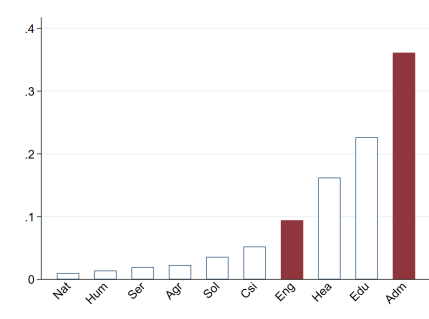
Share of major enrollment
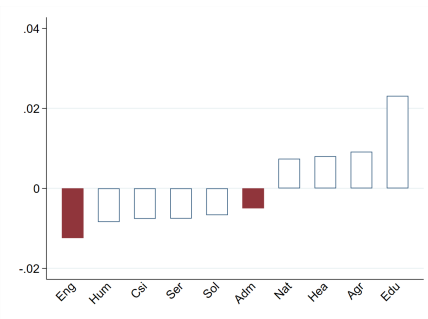
Share in civil service by major

Appx: Detailed Major-Career Mapping back

Figure: Shares in Public Careers by Major

Executive

Legislative/Judiciary
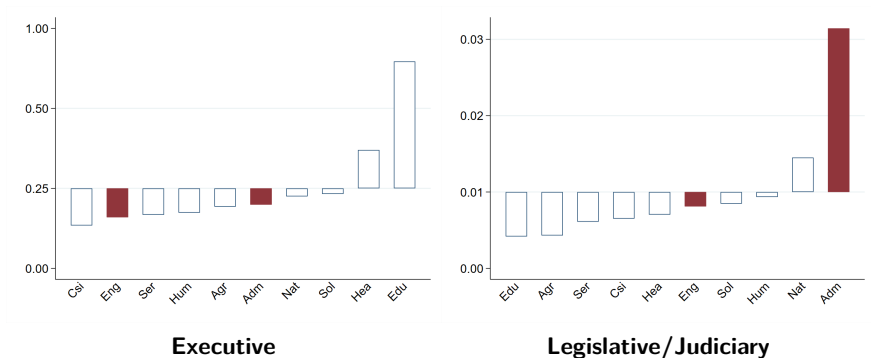
Effect on Major Enrollment `back`

	Freshmen Major Enrollment: All Universities					
	Business/Law			Engineering		
	Share (1)	Num. (asinh) (2)	Num. (log) (3)	Share (4)	Num. (asinh) (5)	Num. (log) (6)
Audit × Post	-0.017***	-0.040	-0.042	0.016**	0.091	0.099*
	(0.006)	(0.029)	(0.029)	(0.007)	(0.056)	(0.057)
R^2	0.58	0.98	0.98	0.73	0.96	0.97
Mean Dep. Var.	0.30	5.43	4.75	0.16	4.68	4.07
SD Dep. Var.	0.08	1.68	1.66	0.08	1.82	1.73
Observations	169,835	169,835	164,179	169,835	169,835	145,926
Num. of Clusters	3,693	3,693	3,692	3,693	3,693	3,659
Muni. × Cohort FE	X	X	X	X	X	X
State × Year × Cohort FE	X	X	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Effect on College Entry

	Num. of Freshmen (log) (1)	Num. in Public Uni. (log) (2)	Share in Public Uni. (3)
Audit × Post	0.019	0.010	0.004
	(0.025)	(0.040)	(0.008)
R^2	0.99	0.96	0.85
Mean Dep. Var.	5.90	4.37	0.27
SD Dep. Var.	1.59	1.73	0.17
Observations	155,920	143,667	143,667
Num. of Clusters	3,693	3,684	3,684
Muni. × Cohort FE	X	X	X
State × Year × Cohort FE	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

|	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A	Education		Humanities		Soc. Sci.		Nat. Sci.	
	Share	Num.	Share	Num.	Share	Num.	Share	Num.
Audit × Post	0.008	0.040	-0.002	-0.062	-0.002	-0.067	0.003	0.144*
	(0.006)	(0.036)	(0.001)	(0.065)	(0.002)	(0.054)	(0.002)	(0.083)
R^2	0.71	0.95	0.62	0.93	0.52	0.94	0.63	0.92
Mean Dep. Var.	0.19	4.84	0.02	2.37	0.05	3.40	0.02	2.34
SD Dep. Var.	0.11	1.52	0.02	1.85	0.03	1.86	0.02	1.75
Observations	155,920	155,920	155,920	155,920	155,920	155,920	155,920	155,920
Num. of Clusters	3,693	3,693	3,693	3,693	3,693	3,693	3,693	3,693
Panel B	Comp. Sci. and IT		Agriculture		Medicine		Services	
	Share	Num.	Share	Num.	Share	Num.	Share	Num.
Audit × Post	-0.001	-0.004	0.000	-0.016	-0.005	-0.026	0.000	-0.054
	(0.002)	(0.050)	(0.003)	(0.060)	(0.005)	(0.044)	(0.001)	(0.096)
R^2	0.45	0.94	0.64	0.91	0.59	0.96	0.44	0.90
Mean Dep. Var.	0.05	3.41	0.04	3.05	0.15	4.65	0.02	2.35
SD Dep. Var.	0.03	1.78	0.04	1.55	0.07	1.63	0.02	1.69
Observations	155,920	155,920	155,920	155,920	155,920	155,920	155,920	155,920
Num. of Clusters	3,693	3,693	3,693	3,693	3,693	3,693	3,693	3,693
Muni. × Cohort FE	X	X	X	X	X	X	X	X
State × Year × Cohort FE	X	X	X	X	X	X	X	X

Notes: Num. in asinh transformation. Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Effect on Majors - Balanced Panel back

Figure: Shares of Major Enrollment (All Universities)

Business/Law
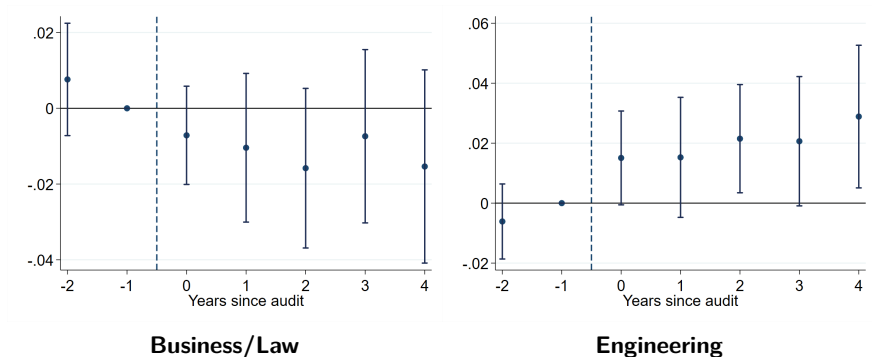
Engineering

Effect on Major Enrollment (Pub. vs. Pri.) [back]

	Freshmen Major Enrollment: Private vs. Public Universities					
	Business/Law			Engineering		
	Share (1)	Num. (asinh) (2)	Num. (log) (3)	Share (4)	Num. (asinh) (5)	Num. (log) (6)
Panel A: Private Universities						
Audit × Post	-0.018***	-0.039	-0.041	0.021**	0.140**	0.149**
	(0.007)	(0.031)	(0.031)	(0.008)	(0.056)	(0.058)
R^2	0.51	0.97	0.98	0.69	0.96	0.96
Mean Dep. Var.	0.36	5.36	4.68	0.15	4.38	3.81
SD Dep. Var.	0.09	1.68	1.66	0.08	1.83	1.71
Observations	168,476	168,476	161,969	168,746	168,476	135,963
Num. of Clusters	3,693	3,693	3,692	3,693	3,693	3,629
Panel B: Public Universities						
Audit × Post	-0.006	-0.045	-0.006	0.001	-0.008	0.028
	(0.009)	(0.088)	(0.090)	(0.006)	(0.078)	(0.078)
R^2	0.52	0.91	0.91	0.64	0.94	0.94
Mean Dep. Var.	0.13	3.16	2.81	0.17	3.42	3.05
SD Dep. Var.	0.11	1.88	1.67	0.13	1.94	1.72
Observations	157,506	157,506	90,227	157,506	157,506	96,615
Num. of Clusters	3,691	3,691	3,132	3,691	3,691	3,152
Muni. × Cohort FE	X	X	X	X	X	X
State × Year × Cohort FE	X	X	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Effect on Student Compo. in Pub. Uni back

| | Total Num. (log) | Num. (asinh) by Quartile of ENEM Grades | | |
| | | Lowest 50% | Second Highest 25% | Highest 25% |
	(1)	(2)	(3)	(4)
Panel A: Business/Law				
Audit × Post	-0.042	0.141	-0.044	-0.148**
	(0.076)	(0.149)	(0.120)	(0.070)
R^2	0.90	0.79	0.85	0.92
Mean Dep. Var.	3.04	2.17	2.43	2.95
SD Dep. Var.	1.63	1.52	1.55	1.69
Observations	56,317	56,317	56,317	56,317
Num. of Clusters	1,526	1,526	1,526	1,526
Panel B: Engineering				
Audit × Post	0.080	0.054	0.300	0.044
	(0.073)	(0.139)	(0.189)	(0.068)
R^2	0.95	0.84	0.88	0.95
Mean Dep. Var.	3.51	2.10	2.54	3.72
SD Dep. Var.	1.65	1.57	1.62	1.70
Observations	64,070	64,070	64,070	64,070
Num. of Clusters	1,661	1,661	1,661	1,661
Muni. × Cohort FE	X	X	X	X
State × Year × Cohort FE	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Effect on Major Enrollment by Ability back

|	Num. of Enrollment (asinh) in Broad Major Fields				
	Business/Law (1)	STEM (2)	Education (3)	Medicine (4)	Hum. & Soc. Sci. (5)
Panel A: High-Ability Students (ENEM Highest 25%)					
Audit × Post	-0.093***	0.049	-0.042	-0.005	-0.020
	(0.029)	(0.040)	(0.039)	(0.041)	(0.052)
R^2	0.96	0.97	0.94	0.95	0.95
Mean Dep. Var.	3.90	4.27	3.26	3.50	3.01
SD Dep. Var.	1.73	1.83	1.70	1.71	1.87
Observations	136,686	136,686	136,686	136,686	136,686
Num. of Clusters	3,619	3,619	3,619	3,619	3,619
Panel B: Low-Ability Students (ENEM Lowest 50%)					
Audit × Post	-0.026	0.084	0.070*	-0.055	-0.022
	(0.035)	(0.054)	(0.042)	(0.052)	(0.064)
R^2	0.96	0.94	0.92	0.94	0.91
Mean Dep. Var.	4.57	3.83	4.13	3.85	2.58
SD Dep. Var.	1.71	1.77	1.50	1.62	1.76
Observations	154,800	154,800	154,800	154,800	154,800
Num. of Clusters	3,693	3,693	3,693	3,693	3,693
Muni. × Cohort FE	X	X	X	X	X
State × Year × Cohort FE	X	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Effect on Student Compo. in Pri. Uni. back

	Total Num. (log)	Num. (asinh) by Quartile of ENEM Grades		
		Lowest 50%	Second Highest 25%	Highest 25%
	(1)	(2)	(3)	(4)
Panel A: Business/Law				
Audit $\times$ Post	-0.026	-0.013	-0.038	-0.051*
	(0.031)	(0.040)	(0.035)	(0.027)
R^2	0.98	0.97	0.96	0.95
Mean Dep. Var.	4.80	4.89	4.07	3.82
SD Dep. Var.	1.62	1.61	1.67	1.70
Observations	143,393	143,393	143,393	143,393
Num. of Clusters	3,167	3,167	3,167	3,167
Panel B: Engineering				
Audit $\times$ Post	0.186**	0.249***	0.187**	0.111
	(0.073)	(0.088)	(0.085)	(0.069)
R^2	0.96	0.94	0.94	0.95
Mean Dep. Var.	4.17	4.00	3.61	3.56
SD Dep. Var.	1.63	1.60	1.65	1.70
Observations	90,705	90,705	90,705	90,705
Num. of Clusters	2,090	2,090	2,090	2,090
Muni. $\times$ Cohort FE	X	X	X	X
State $\times$ Year $\times$ Cohort FE	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Sample Attrition back

Figure: Shares of Students Traced to RAIS

By Year of Enrollment

By Major (2010)
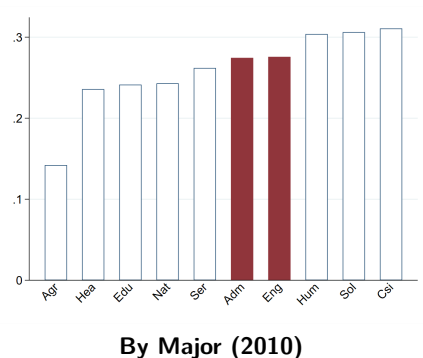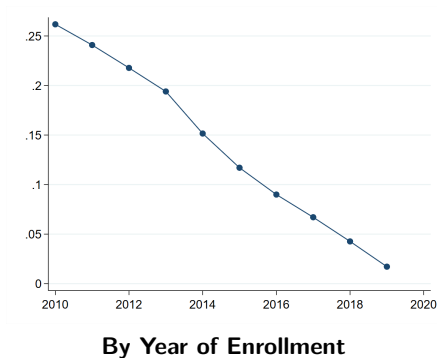
Appx: Sum. Stat. of Tracked Students [back]

| | Private Sector | | Public Sector | | | |
| | | | Tenure-Track | | Temporary | |
	Mean (1)	Mean ($t \geq 4$) (2)	Mean (3)	Mean ($t \geq 4$) (4)	Mean (5)	Mean ($t \geq 4$) (6)
Num. of students (log)	5.03	4.28	2.71	2.31	2.40	2.18
Lapse CES-RAIS (Years)	3.65	5.88	4.71	6.26	4.80	6.20
Share female	0.56	0.56	0.62	0.63	0.67	0.69
Age	25.55	27.18	29.38	30.06	29.47	30.19
Share with postgraduate degree	0.01	0.01	0.02	0.03	0.01	0.02
Share with college-educated parent	0.26	0.32	0.22	0.24	0.21	0.23
Share among top family income quartile	0.15	0.18	0.14	0.14	0.11	0.11
Share among top ENEM grade quartile	0.29	0.37	0.37	0.40	0.24	0.26
Avg. ENEM grade	553.03	566.19	563.47	568.96	530.67	535.24
Share enrolled in Business/Law	0.36	0.27	0.20	0.20	0.19	0.19
Share enrolled in Engineering	0.18	0.21	0.08	0.08	0.08	0.08
Share enrolled in Education	0.13	0.14	0.45	0.41	0.45	0.41
Share enrolled in Health	0.11	0.15	0.14	0.16	0.15	0.18
Observations	2,444		1,701		1,645	

Effect on Career Realizations back

	Realizations of First Jobs by Sector					
	Public Sector			Private Sector		
	Share (1)	Num. (asinh) (2)	Num. (log) (3)	Share (4)	Num. (asinh) (5)	Num. (log) (6)
Audit × Post	0.001	-0.095	-0.094	-0.001	0.149**	0.155***
	(0.017)	(0.115)	(0.118)	(0.017)	(0.060)	(0.059)
R^2	0.67	0.84	0.83	0.67	0.96	0.96
Mean Dep. Var.	0.18	2.33	1.88	0.82	4.15	3.54
SD Dep. Var.	0.21	1.30	1.12	0.21	1.66	1.57
Observations	96,153	96,153	62,363	96,153	96,153	77,430
Num. of Clusters	3,036	3,036	2,460	3,036	3,036	2,615
Muni. × Cohort FE	X	X	X	X	X	X
State × Year × Cohort FE	X	X	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Effect on Careers in Public Sector back

	Realizations of First Jobs in Public Sector by Contract Type					
	Tenure-Track			Temporary		
	Share (1)	Num. (asinh) (2)	Num. (log) (3)	Share (4)	Num. (asinh) (5)	Num. (log) (6)
Audit × Post	-0.016*	-0.231*	-0.246*	0.018	0.119	-0.004
	(0.009)	(0.139)	(0.135)	(0.012)	(0.158)	(0.127)
R^2	0.51	0.82	0.80	0.65	0.79	0.80
Mean Dep. Var.	0.09	1.82	1.59	0.09	1.28	1.18
SD Dep. Var.	0.13	1.30	1.05	0.17	1.23	1.07
Observations	96,153	96,153	35,760	96,153	96,153	41,312
Num. of Clusters	3,036	3,036	1,711	3,036	3,036	1,838
Muni. × Cohort FE	X	X	X	X	X	X
State × Year × Cohort FE	X	X	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Effect on Workforce Composition back

	Total Num. (log)	Num. (asinh) by Quartile of ENEM Grades		
		Lowest 50%	Second Highest 25%	Highest 25%
	(1)	(2)	(3)	(4)
Panel A: Public Sector				
Audit × Post	-0.094	-0.046	-0.013	-0.295***
	(0.118)	(0.186)	(0.214)	(0.083)
R^2	0.83	0.68	0.66	0.77
Mean Dep. Var.	1.88	1.47	1.39	1.66
SD Dep. Var.	1.12	1.01	1.02	1.19
Observations	62,363	62,363	62,363	62,363
Num. of Clusters	2,460	2,460	2,460	2,460
Panel B: Private Sector				
Audit × Post	0.155***	0.064	0.173**	0.173**
	(0.059)	(0.054)	(0.083)	(0.078)
R^2	0.96	0.92	0.92	0.94
Mean Dep. Var.	3.54	3.29	2.92	3.10
SD Dep. Var.	1.57	1.47	1.52	1.67
Observations	77,430	77,430	77,430	77,430
Num. of Clusters	2,615	2,615	2,615	2,615
Muni. × Cohort FE	X	X	X	X
State × Year × Cohort FE	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
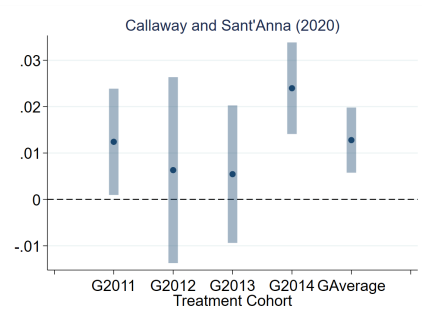
Appx: Group-Specific Treatment Effects [back]

- 2011: Major high-profile corruption scandals
- 2014: Landmark anti-corruption probe (Operation Car Wash)

Figure: Shares of Enrollment by Audit Year

Business/Law   **Engineering**

Appx: Categorization of Prosocial Occupations
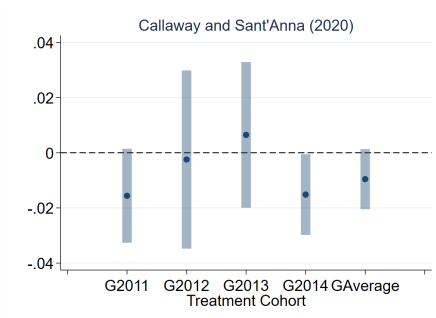
- I conduct a keyword search through the job description texts of the classification of all 4-digit Brazilian occupations (*Classificação Brasileira de Ocupações*, or CBO)

- Top-five "prosocial" occupations: nursing technicians and assistants (3222), community health agents and related occupations (5151), caregivers of children, youth, adults and the elderly (5162), psychologists and psychoanalysts (2515), occupational therapists and related occupations (2239)

	Total Num. (log)	Num. (asinh) by Quartile of ENEM Grades		
		Lowest 50%	Second Highest 25%	Highest 25%
	(1)	(2)	(3)	(4)
Panel A: Tenure-Track				
Audit × Post	-0.246*	-0.095	-0.127	-0.250**
	(0.135)	(0.190)	(0.272)	(0.103)
R^2	0.80	0.58	0.59	0.73
Mean Dep. Var.	1.59	1.05	1.17	1.53
SD Dep. Var.	1.05	0.90	0.91	1.10
Observations	35,760	35,760	35,760	35,760
Num. of Clusters	1,711	1,711	1,711	1,711
Panel B: Temporary				
Audit × Post	-0.004	0.102	-0.039	-0.259*
	(0.127)	(0.163)	(0.139)	(0.138)
R^2	0.80	0.70	0.67	0.73
Mean Dep. Var.	1.18	1.11	0.86	0.99
SD Dep. Var.	1.07	0.95	0.92	1.02
Observations	41,312	41,312	41,312	41,312
Num. of Clusters	1,838	1,838	1,838	1,838
Muni. × Cohort FE	X	X	X	X
State × Year × Cohort FE	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Mechanisms: University Degree Supply

- Education sector in Brazil vulnerable to corruption & political turnover (Ferraz et al., 2012; Akhtari et al., 2021)

  - audits may affect degree supply, esp. in public uni.

- Can examine direct effects of audits on vacancies offered (sample of muni. with universities located)

  - results consistent with private uni. catering to market demand

  - fewer vacancies in public uni. would increase competition & the ability of the "marginal" student
    $\rightarrow$ not what I observe in the student sample

Effect on Degree Vacancies `back`

	Num. of Degree Vacancies (asinh)	
	Business/Law (1)	Engineering (2)
Panel A: Private University		
Audit × Post	-0.156*	0.456**
	(0.090)	(0.200)
R^2	0.72	0.73
Mean Dep. Var.	5.44	5.38
SD Dep. Var.	0.68	0.59
Observations	14,488	6,161
Num. of Clusters	403	195
Panel B: Public University		
Audit × Post	-0.428	-0.049
	(0.327)	(0.251)
R^2	0.76	0.77
Mean Dep. Var.	4.60	4.55
SD Dep. Var.	1.21	0.83
Observations	6,346	5,689
Num. of Clusters	208	186
Muni. × Cohort FE	X	X
State × Year × Cohort FE	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Mechanisms: Labor Demand

- Audits boost private sector firm entry and growth (Colonnelli and Prem, 2022)
  - limited effects on first hires in the medium run
  - do not explain immediate effects on majors

- Audits increase patronage hiring in public sector (Gonzales, 2021)
  - do not explain negative sorting during higher education phase
  - negative selection by ability simiarly observed for civil servants and temporary workers, where patronage hiring is more prevalent among the latter

Effect on Total First Hires `back`

| | Num. of Total First Hires (asinh) | | |
| | Public Sector | | Private Sector |
	Civil Service (1)	Temporary (2)	(3)
Panel A: RAIS 2010-2018			
Audit × Post	0.021	0.187	0.009
	(0.274)	(0.235)	(0.048)
R^2	0.67	0.80	0.97
Mean Dep. Var.	2.82	3.07	6.89
SD Dep. Var.	2.28	2.43	1.68
Observations	156,266	156,266	156,266
Num. of Clusters	3,693	3,693	3,693
Panel B: RAIS 2002-2018			
Audit × Post	0.393***	0.178	0.007
	(0.116)	(0.118)	(0.027)
R^2	0.62	0.73	0.96
Mean Dep. Var.	2.69	2.84	7.03
SD Dep. Var.	2.27	2.33	1.66
Observations	524,351	524,351	524,351
Num. of Clusters	5,347	5,347	5,347
Muni. × Cohort FE	X	X	X
State × Year × Cohort FE	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
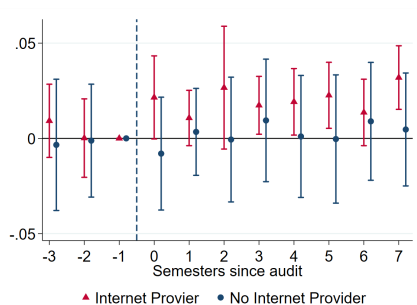
Appx: Effect Heterogeneity by Local Media

A similar pattern observed for muni. with better internet access
$\rightarrow$ media propagates audits & can be behind the formation of *priors*

Figure: Shares of Major Enrollment (Local Media)
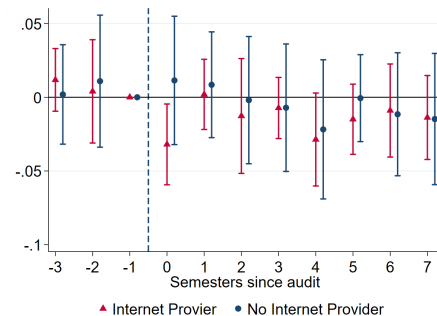
Business and Law   **Engineering**

	Share of Employee's Degree Background			
	Business/Law (1)	Engineering (2)	Education (3)	Health (4)
Panel A: Public Sector (Civil Servants)				
Audit × Post	-0.003	0.109	-0.047	-0.017
	(0.056)	(0.127)	(0.114)	(0.049)
R^2	0.36	0.31	0.38	0.34
Mean Dep. Var.	0.21	0.09	0.43	0.13
SD Dep. Var.	0.29	0.20	0.35	0.23
Observations	26,896	26,896	26,896	26,896
Num. of Clusters	1,403	1,403	1,403	1,403
Panel B: Private Sector				
Audit × Post	-0.099***	0.090***	-0.034**	0.014
	(0.026)	(0.022)	(0.017)	(0.025)
R^2	0.29	0.32	0.44	0.26
Mean Dep. Var.	0.31	0.18	0.16	0.13
SD Dep. Var.	0.19	0.15	0.18	0.14
Observations	66,686	66,686	66,686	66,686
Num. of Clusters	2,524	2,524	2,524	2,524
Muni. × Cohort FE	X	X	X	X
State × Year × Cohort FE	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Effect on Workforce Composition - Other `back`

	Demographic and Socioeconomic Characteristics			
	Share Female	Share College-Educated Parent(s)	Share Family Income (top 25%)	Avg. ENEM Grades (Std.)
	(1)	(2)	(3)	(4)
Panel A: Public Sector (Civil Servants)				
Audit × Post	0.046	0.090	-0.008	-0.039
	(0.138)	(0.111)	(0.124)	(0.215)
R^2	0.39	0.43	0.43	0.48
Mean Dep. Var.	0.56	0.28	0.23	0.47
SD Dep. Var.	0.35	0.32	0.30	1.01
Observations	26,896	26,896	26,896	26,896
Num. of Clusters	1,403	1,403	1,403	1,403
Panel B: Private Sector				
Audit × Post	0.004	0.074**	0.042*	0.048
	(0.029)	(0.031)	(0.022)	(0.080)
R^2	0.26	0.45	0.58	0.49
Mean Dep. Var.	0.59	0.35	0.31	0.31
SD Dep. Var.	0.20	0.21	0.22	0.67
Observations	66,686	66,686	66,686	66,686
Num. of Clusters	2,524	2,524	2,524	2,524
Muni. × Cohort FE	X	X	X	X
State × Year × Cohort FE	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Local Labor Market Spillovers [back]

	Share in Business/Law (1)	Share in Engineering (2)
Panel A: Spillover effects		
Audit $\times$ Post	-0.017*	0.010*
	(0.009)	(0.005)
R^2	0.65	0.76
Mean Dep. Var.	0.29	0.16
SD Dep. Var.	0.08	0.07
Observations	21,128	21,128
Num. of Clusters	690	690
Panel B: Excluding spillover effects		
Audit $\times$ Post	-0.015**	0.018***
	(0.008)	(0.005)
R^2	0.64	0.77
Mean Dep. Var.	0.29	0.16
SD Dep. Var.	0.08	0.07
Observations	20,732	20,732
Num. of Clusters	647	647
Muni. $\times$ Cohort FE	X	X
State $\times$ Year $\times$ Cohort FE	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Effect on Out-Migration `back`

	Workplace Muni. and Residence Muni.	
	In the Same Muni. (1)	In the Same State (2)
Panel A: Public Sector (Civil Servants)		
Audit × Post	-0.112**	-0.060
	(0.056)	(0.103)
R^2	0.74	0.65
Mean Dep. Var.	0.30	0.47
SD Dep. Var.	0.39	0.48
Observations	26,906	26,906
Num. of Clusters	1,404	1,404
Panel B: Private Sector		
Audit × Post	-0.058*	-0.015
	(0.033)	(0.022)
R^2	0.61	0.53
Mean Dep. Var.	0.49	0.86
SD Dep. Var.	0.27	0.27
Observations	66,706	66,706
Num. of Clusters	2,525	2,525
Muni. × Cohort FE	X	X
State × Year × Cohort FE	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Major Enrollment by Migration Status (back)

	Total Num. (log) (1)	Share in Business/Law (2)	Share in Engineering (3)
Panel A: Work Muni. Same as Residence (Stayers)			
Audit $\times$ Post	0.145	-0.136**	0.095**
	(0.144)	(0.054)	(0.045)
R^2	0.92	0.29	0.32
Mean Dep. Var.	2.53	0.31	0.16
SD Dep. Var.	1.43	0.22	0.17
Observations	56,917	56,917	56,917
Num. of Clusters	2,271	2,271	2,271
Panel B: Work Muni. Different Than Residence (Movers)			
Audit $\times$ Post	0.223	-0.061	0.073***
	(0.156)	(0.038)	(0.028)
R^2	0.93	0.27	0.29
Mean Dep. Var.	2.59	0.27	0.17
SD Dep. Var.	1.52	0.21	0.17
Observations	65,660	65,660	65,660
Num. of Clusters	2,529	2,529	2,529
Muni. $\times$ Cohort FE	X	X	X
State $\times$ Year $\times$ Cohort FE	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
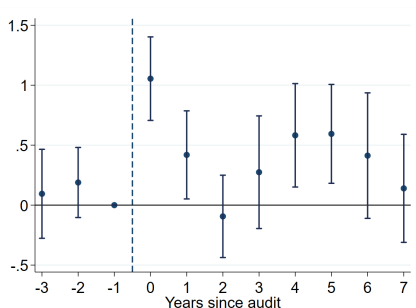
- *Latinobarómetro* Surveys (2004-2020)
- Suggestive: very few audited muni. are sampled

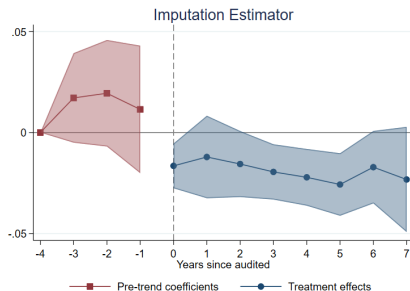Figure: "How much progress has been made combatting corruption?"
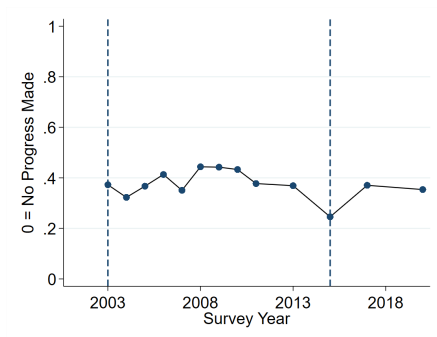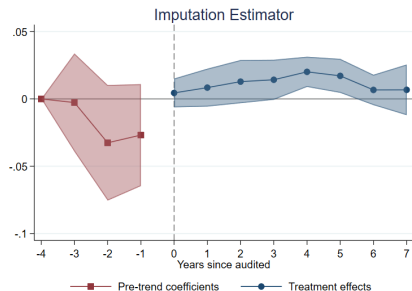

Yearly Trend

Stacked Event-Study

Appx: Alternative Estimators back

Figure: Imputation Estimator (Borusyak et al., 2023)

Business/Law

Engineering

Appx: Chen and Roth (2023) back

|	(1)	(2)	(3)
Panel A: Major Enrollment	All Students	Business/Law	Engineering
Audit × Post	0.085**	-0.021	0.345***
	(0.033)	(0.034)	(0.074)
Implied Prop. Effect	0.088**	-0.021	0.412***
	(0.036)	(0.033)	(0.104)
Mean Dep. Var.	1043.82	323.91	175.34
SD Dep. Var.	1408.42	439.80	246.22
Observations	169,835	169,835	169,477
Num. of Clusters	3,693	3,693	3,686
Panel B: Career Realization	All Workers	Public Sector	Private Sector
Audit × Post	0.154***	-0.024	0.161***
	(0.051)	(0.069)	(0.054)
Implied Prop. Effect	0.166***	-0.023	0.175***
	(0.059)	(0.068)	(0.064)
Mean Dep. Var.	306.41	22.63	283.98
SD Dep. Var.	426.11	31.03	402.45
Observations	115,148	110,584	114,062
Num. of Clusters	3,330	3,094	3,252
Muni. × Cohort FE	X	X	X
State × Year × Cohort FE	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appx: Parallel Trends Sensitivity Analysis back

Figure: HonestDiD (Rabamchan and Roth, 2023)

Business/Law   **Engineering**
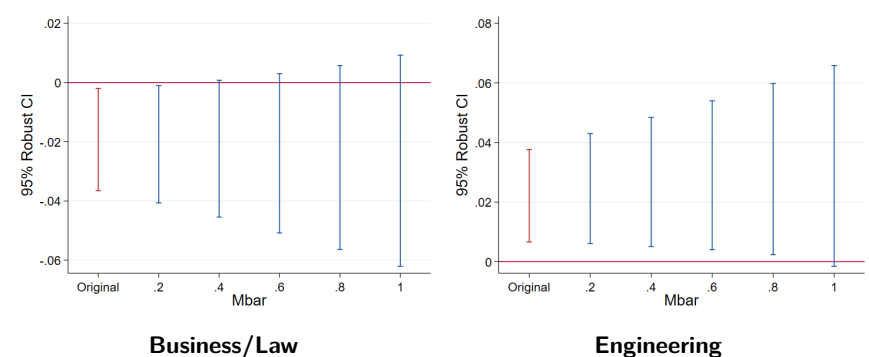
Effect on Civil Servants: Alternative Samples back

	full sample (1)	$n > 0$ (2)	$n > 1$ (3)	$n > 2$ (4)
Panel A: Num. of Public Sector Workers				
Audit × Post	-0.095	-0.096	-0.112	-0.139
	(0.115)	(0.117)	(0.125)	(0.134)
R^2	0.84	0.84	0.83	0.83
Mean Dep. Var.	2.33	2.60	2.84	3.03
SD Dep. Var.	1.30	1.08	0.93	0.83
Observations	96,153	62,363	34,225	21,416
Num. of Clusters	3,036	2,460	1,499	989
Panel B: Num. of High-Ability Students Among Public Sector Workers				
Audit × Post		-0.295***	-0.307***	-0.319***
		(0.083)	(0.083)	(0.081)
R^2		0.77	0.75	0.75
Mean Dep. Var.		1.66	1.85	2.03
SD Dep. Var.		1.19	1.14	1.08
Observations		62,363	34,225	21,416
Num. of Clusters		2,460	1,499	989
Muni. × Cohort FE	X	X	X	X
State × Year × Cohort FE	X	X	X	X

Notes: Standard errors in parenthesis are clustered at the municipality level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$