The effects of a school management program on post-secondary education and labor market outcomes

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Motivation

- Quality of education varies subtantially across and within countries
- Implications for inequality and for growth

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- Quality of education varies subtantially across and within countries
- Implications for inequality and for growth
- Why?
  - School infrastructure
  - Teaching practices
  - Quality of teachers
  - **Quality of School Management**

    Bloom et al. (2015) 1σ better managment $\leftrightarrow$ $0.20–0.40\sigma$ better pupils outcome

Motivation

- Improving educational outcomes is particularly important for:
  - **Developing countries**: increased enrollment levels (primary education) but quality of education is still lagging behind
  - **Secondary education / High School**: challenging drop-out rates and performance even in developed countries

This Paper

- Leverage the randomized implementation of “Youth of the Future” (PJF)
  - 3-year program designed to improve Brazilian **public high schools** (management + resources)
  - Short-term evaluations show increases in student proficiency $\sim$0.10-0.15σ

This Paper

- Leverage the randomized implementation of "Youth of the Future" (PJF)
  - 3-year program designed to improve Brazilian **public high schools** (management + resources)
  - Short-term evaluations show increases in student proficiency $\sim$0.10-0.15σ
- Program has been active since 2008
- Use longitudinal administrative data to assess the effects on:
  1. High school graduation
  2. End of high school national exam
  3. College enrollment
  4. Labor market outcomes

Literature

A. School Management

B. Long-term effects of “better” schools

C. Transitions to Higher Education

Literature

A. School Management

Branch, Hanushek and Rivkin (2012), Coelli and Green (2012), Bloom, Lemos, Sadun and Van Reenen (2015), Di Liberto, Schivardi and Sulis (2015), Böhlmark, Grönqvist and Vlachos (2016), Fryer (2017), Grissom, Egalite and Lindsay (2021), Duchini, Lavy, Machin and Telhaj (2023), Borges, Leite, Madeira and Meloni (2024), Lemos, Muralidharan and Scur (2024)

- Exogenous variation of management
- Short, medium, and long-term outcomes

B. Long-term effects of “better” schools

C. Transitions to Higher Education

Literature

A. School Management

B. Long-term effects of “better” schools

Jackson (2010), Deming (2011), Pop-Eleches and Urquiola (2013), Deming, Hastings, Kane and Staiger (2014), Dobbie and Fryer Jr (2015), Angrist, Cohodes, Dynarski, Pathak and Walters (2016), Sass, Zimmer, Gill and Booker (2016), Dustmann, Puhani and Schönberg (2017), Beuermann, Jackson, Navarro-Sola and Pardo (2023), Jackson, Kiguel, Porter and Easton (2024)

- Treating schools (keeping staff and students fixed)
- Drawing from very diverse sample of schools

C. Transitions to Higher Education

Literature

A. School Management

B. Long-term effects of “better” schools

C. Transitions to Higher Education

Roksa and Velez (2012) (...)

- “Non-linear”/dynamic transition from high school to college
- Studying and working decisions

Preview of Results

1. Null–small effect of graduating from High School
2. Increase in take-up and scores in the national exam
3. Increase in college enrollment, particularly public universities and high-ranked majors
4. Higher effects for "better" schools and high-SES students

(coming soon) labor market + study and work

Institutional Setting and Data

Educational System in Brazil

	Primary School (9 years)					**Secondary School** (3 years)			**College** (3–6 years)			
Grade	1st	2nd	...	8th	9th	1st	2nd	3rd	1st	2nd	3rd	...
Age	6	7	...	13	14	15	16	17	18	19	20	...

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  - Tuition-free, ∼85% of students, lower quality

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- Higher Education — Public Universities
  - Tuition-free, high quality, highly selective, ∼25% students, admission exams: more

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  - Tuition-free, high quality, highly selective, ∼25% students, admission exams: more
  - Since 2009, national exam with increasing coverage
  - Expansion of quota system for students from public high schools / low income / Black

Data

1. **School Census (2007—2022)**: microdata of all students enrolled in primary/secondary education

2. **ENEM (2009—2022)**: microdata of end of high school national exam

3. **Higher Education Census (2009–2021)**: microdata of all students enrolled in any higher education course

4. **RAIS (2007–2020)**: matched employer-employee data

The PJF Program

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- Diagnostics:
  - Brazil: below the cross-country prediction of proficiency as a function of spending
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  a. Training and Technical support
  b. Transfer of resources (USD 48/student-year)

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- **Phase 1: 2008–2010, 2010–2012 (4 states and 208 schools)**

  Phase 2: 2012–2014, 2013–2015 (4 states and 698 schools)

  Phase 3: 2015–2017, 2017–2019 (3 states and 689 schools)

The program — PJF

- Random assignment to treated/control group
  - Treatment group: start immediately
  - Control group: start after 3 years

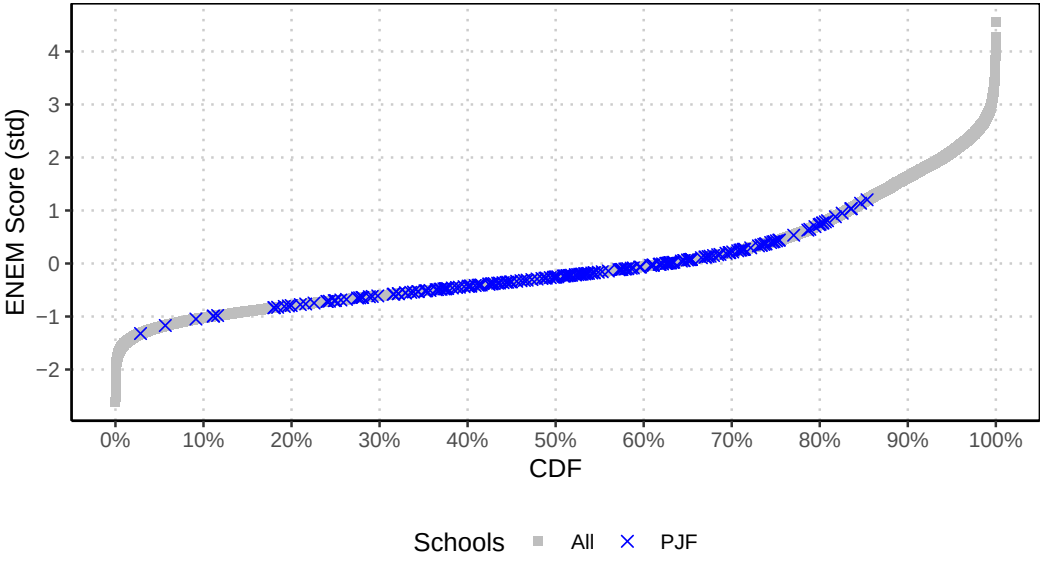
	Primary School (9 years)					**Secondary School** (3 years)			**College** (3–6 years)			
Grade	1st	2nd	...	8th	9th	1st	2nd	3rd	1st	2nd	3rd	...
Age	6	7	...	13	14	15	16	17	18	19	20	...

Numbers for Phase I

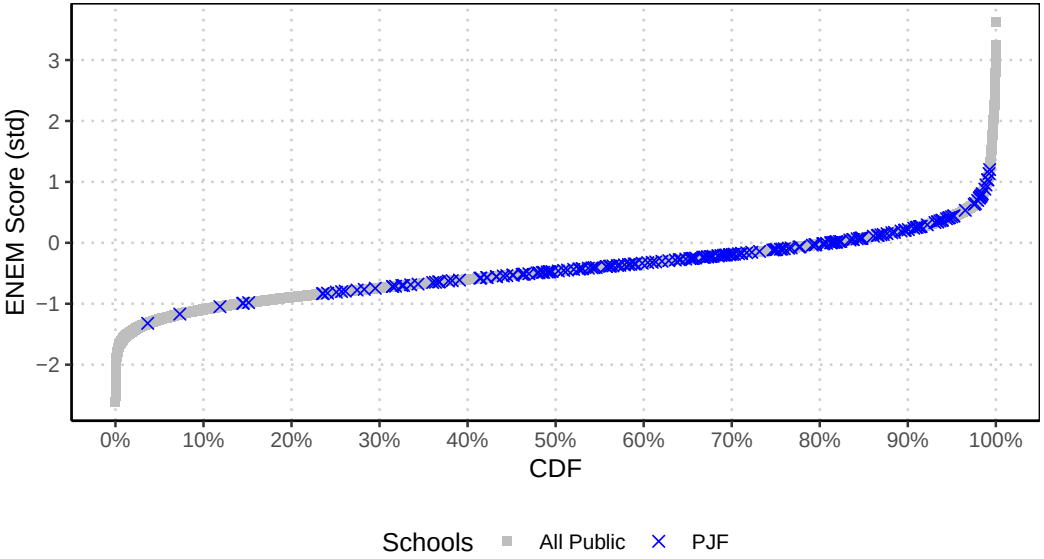
Randomization and Non-compliance (Number of Schools)

Area	Treated	Control	Non-Compliance Treated	Non-Compliance Control
MG	20	28	0	0
RS	25	25	3	0
RJ	15	15	3	0
SP1	20	20	1	3
SP2	20	20	0	0
Total	100	108	7	3

PJF Schools


ENEM Score (std)
4
3
2
1
0
−1
−2
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
CDF
Schools
All
PJF

PJF Schools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Summary Statistcs

	Treated			Control			Difference		
	N	mean	sd	N	mean	sd	diff	se	t-stat
Computer lab	101	0.84	0.37	108	0.84	0.37	-0.02	0.05	0.30
Science Lab	101	0.60	0.49	108	0.64	0.48	-0.03	0.06	0.45
Library	101	0.59	0.49	108	0.62	0.49	0.01	0.02	0.32
N classrooms	101	18.24	9.01	108	18.69	8.17	-0.48	1.09	0.44
N classrooms in use	101	17.63	8.06	108	18.27	7.87	-0.60	1.01	0.59
N computers	101	20.97	14.81	108	22.35	16.85	-1.62	2.25	0.72
Internet	101	0.88	0.33	108	0.99	0.10	-0.12	0.04	3.31
N employees	101	105.14	104.32	108	96.79	31.68	10.75	12.18	0.88
N students	101	1,575.46	561.24	108	1,625.81	509.31	-40.94	62.41	0.66
N students in HS	101	858.92	446.11	108	914.56	458.84	-32.55	40.65	0.80
N senior students in HS	101	209.22	112.83	108	222.64	121.58	-5.88	11.76	0.50
N students enrolled in ENEM	101	112.98	79.49	107	117.12	71.71	2.30	8.00	0.29
% students enrolled in ENEM	101	0.53	0.19	106	0.52	0.18	0.02	0.02	0.92

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Empirical Strategy

Empirical Strategy

- Compare students enrolled in the 1st year of high school in treatment and control schools
- ITT strategy:

$$Y_{it} = \beta T_{j(i)} + \eta_{s(i)} + \delta X_i + \varepsilon_{it}$$

- $T_{j(i)}$ treatment indicator for the school $j(i)$ where i is enrolled
- $\eta_{s(i)}$ is a strata fixed-effect
- Standard errors are clustered at the *strata* level

Results

High School

	Enrolled 2nd	Approved 2nd	Enrolled 3rd	Approved 3rd	Ever Graduated
Estimate	0.003	0.005	0.006	0.010	0.012
Std Error	(0.018)	(0.018)	(0.016)	(0.014)	(0.011)
P-value	[0.885]	[0.797]	[0.721]	[0.466]	[0.278]
N Obs	53667	53667	53667	53667	53667
N Schools	126	126	126	126	126
N Strata	44	44	44	44	44
Control Mean	0.497	0.373	0.357	0.302	0.385
% Effect	0.005	0.013	0.016	0.033	0.032

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National Exam

	Taking Exam		Scores			
	Exp Year	Any Year	Math	Language	Humanities	Science
Estimate	0.026	0.046	0.147	0.091	0.162	0.117
Std Error	(0.017)	(0.023)	(0.070)	(0.056)	(0.057)	(0.053)
P-value	[0.117]	[0.052]	[0.042]	[0.110]	[0.007]	[0.034]
N Obs	40388	40388	11285	11606	11285	11606
N Schools	126	126	126	126	126	126
N Strata	44	44	44	44	44	44
Control Mean	0.282	0.501	-	-	-	-
% Effect	0.094	0.091	-	-	-	-

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College Access

	1st year			1st–4th years	1st–9th years
Enrolmment	Total	Public	Private		
Estimate	0.010	0.004	0.006		
Std Error	(0.008)	(0.002)	(0.007)		
P-value	[0.224]	[0.011]	[0.415]		
N Obs	40388	40388	40388		
N Schools	126	126	126		
N Strata	44	44	44		
Control Mean	0.066	0.008	0.058		
% Effect	0.155	0.549	0.101		

College Access

	1st year			1st–4th years			1st–9th years
Enrolmment	Total	Public	Private	Total	Public	Private	
Estimate	0.010	0.004	0.006	0.027	0.010	0.018	
Std Error	(0.008)	(0.002)	(0.007)	(0.022)	(0.004)	(0.019)	
P-value	[0.224]	[0.011]	[0.415]	[0.219]	[0.016]	[0.357]	
N Obs	40388	40388	40388	40388	40388	40388	
N Schools	126	126	126	126	126	126	
N Strata	44	44	44	44	44	44	
Control Mean	0.066	0.008	0.058	0.225	0.025	0.204	
% Effect	0.155	0.549	0.101	0.122	0.400	0.088	

College Access

	1st year			1st–4th years			1st–9th years		
Enrolmment	Total	Public	Private	Total	Public	Private	Total	Public	Private
Estimate	0.010	0.004	0.006	0.027	0.010	0.018	0.032	0.010	0.025
Std Error	(0.008)	(0.002)	(0.007)	(0.022)	(0.004)	(0.019)	(0.023)	(0.005)	(0.021)
P-value	[0.224]	[0.011]	[0.415]	[0.219]	[0.016]	[0.357]	[0.174]	[0.049]	[0.248]
N Obs	40388	40388	40388	40388	40388	40388	40388	40388	40388
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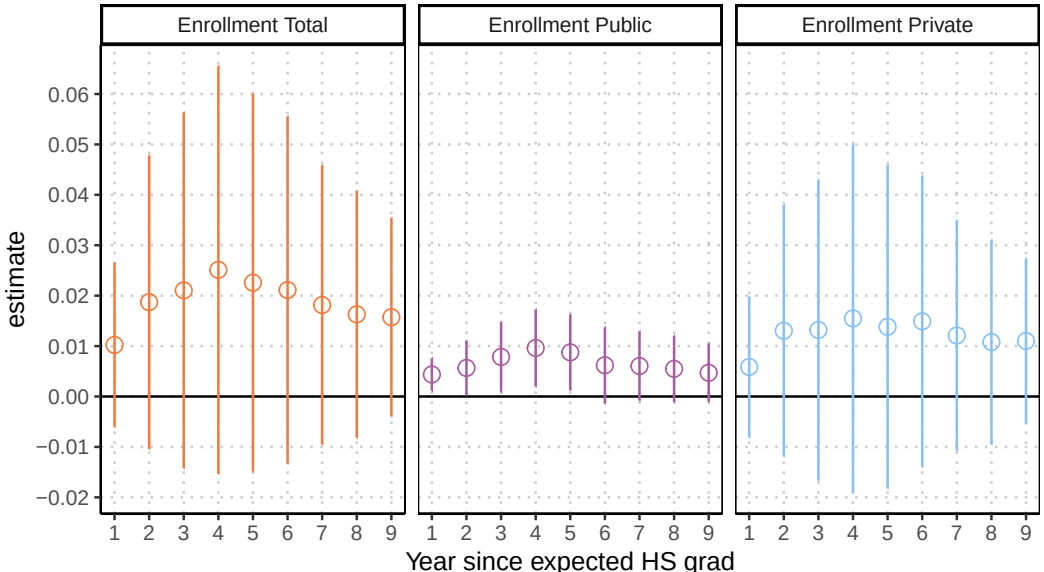
N Strata	44	44	44	44	44	44	44	44	44
Control Mean	0.066	0.008	0.058	0.225	0.025	0.204	0.373	0.039	0.351
% Effect	0.155	0.549	0.101	0.122	0.400	0.088	0.087	0.257	0.071

College Enrollment

Means



College

	Ever Enrolled in a Major					Quotas	Graduated
	Below Median	Above Median	Above 70th	Above 80th	Above 90th		
Estimate	0.012	0.033	0.026	0.021	0.010	0.009	0.018
Std Error	(0.012)	(0.022)	(0.017)	(0.010)	(0.006)	(0.003)	(0.015)
P-value	[0.302]	[0.137]	[0.140]	[0.046]	[0.082]	[0.015]	[0.239]
N Obs	40388	40388	40388	40388	40388	40388	40388
N Schools	126	126	126	126	126	126	126
N Strata	44	44	44	44	44	44	44
Control Mean	0.268	0.217	0.123	0.068	0.029	0.024	0.138
% Effect	0.046	0.153	0.210	0.314	0.345	0.365	0.129

Heterogeneity

School Quality Tercile	T1 (bottom)		T2		T3 (top)	
	Coeff	Pvalue	Coeff	Pvalue	Coeff	Pvalue
HighSchool						
On-time Graduation	0.057	0.002	-0.011	0.498	0.012	0.765
Graduation	0.034	0.022	-0.016	0.354	0.028	0.343
ENEM						
Exp Year take-up	0.056	0.000	0.038	0.097	0.011	0.748
Take-up	0.070	0.013	0.067	0.109	0.050	0.028
Math Score	0.089	0.344	0.200	0.219	0.126	0.330
College						
Ever Enrolled	0.029	0.373	0.067	0.200	0.042	0.030
Ever Public	-0.001	0.674	0.012	0.166	0.021	0.002
Ever Private	0.026	0.428	0.061	0.205	0.025	0.186
Ever Quotas	0.001	0.727	0.010	0.070	0.011	0.001
Below Median	0.022	0.397	0.043	0.103	0.014	0.481
Above Median	0.016	0.460	0.045	0.358	0.059	0.002
Above 90th	0.004	0.365	0.017	0.243	0.015	0.079
Col Grad	0.014	0.311	0.035	0.368	0.039	0.004

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Ever Public	-0.001	0.674	0.012	0.166	0.021	0.002
Ever Private	0.026	0.428	0.061	0.205	0.025	0.186
Ever Quotas	0.001	0.727	0.010	0.070	0.011	0.001
Below Median	0.022	0.397	0.043	0.103	0.014	0.481
Above Median	0.016	0.460	0.045	0.358	0.059	0.002
Above 90th	0.004	0.365	0.017	0.243	0.015	0.079
Col Grad	0.014	0.311	0.035	0.368	0.039	0.004

Gender	Men		Women	
	Coeff	Pvalue	Coeff	Pvalue
HighSchool				
On-time Graduation	0.006	0.675	0.012	0.396
Graduation	0.008	0.533	0.015	0.202
ENEM				
Exp Year take-up	0.023	0.129	0.028	0.159
Take-up	0.049	0.038	0.042	0.083
Math Score	0.130	0.043	0.162	0.047
College				
Ever Enrolled	0.032	0.140	0.033	0.228
Ever Public	0.008	0.128	0.012	0.037
Ever Private	0.025	0.190	0.025	0.331
Ever Quotas	0.007	0.053	0.010	0.014
Below Median	0.014	0.225	0.011	0.457
Above Median	0.032	0.117	0.034	0.169
Above 90th	0.009	0.085	0.011	0.100
Col Grad	0.014	0.175	0.021	0.299

Race	White/Asian		Black/Native	
	Coeff	Pvalue	Coeff	Pvalue
HighSchool				
On-time Graduation	-0.018	0.398	-0.014	0.524
Graduation	-0.001	0.967	-0.007	0.683
ENEM				
Exp Year take-up	0.009	0.714	0.003	0.908
Take-up	0.043	0.157	0.032	0.210
Math Score	0.187	0.032	0.174	0.085
College				
Ever Enrolled	0.026	0.346	0.032	0.276
Ever Public	0.018	0.064	0.004	0.540
Ever Private	0.013	0.608	0.030	0.281
Ever Quotas	0.018	0.012	0.009	0.108
Below Median	-0.001	0.945	0.024	0.200
Above Median	0.036	0.240	0.034	0.149
Above 90th	0.014	0.121	0.005	0.432
Col Grad	0.016	0.385	0.009	0.589

Race	White/Asian		Black/Native	
	Coeff	Pvalue	Coeff	Pvalue
HighSchool				
On-time Graduation	-0.018	0.398	-0.014	0.524
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Conclusion

- Explore randomization of the PJF program to assess effects on education/labor market trajectories of high schoolers
- Main findings
  - Increase in HS graduation for students in low-performance school
  - Increase in take-up and scores in the national exam
  - Increase in college access, particularly in public universities and high-selective majors
  - Larger effects for better schools and White/Asian students

Next Steps

1. Additional controls (school level national exam at the baseline) + larger sample

2. Labor market outcomes

3. More dynamic results on college entrance/graduation

Thank you

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Appendix

Presentation

- Introduction
- Data
- PJF program
- Empirical Stretegy
- Main Results
- Heterogeneity
- Appendix

- School Level Results
- Age at Entry
- Literature Management

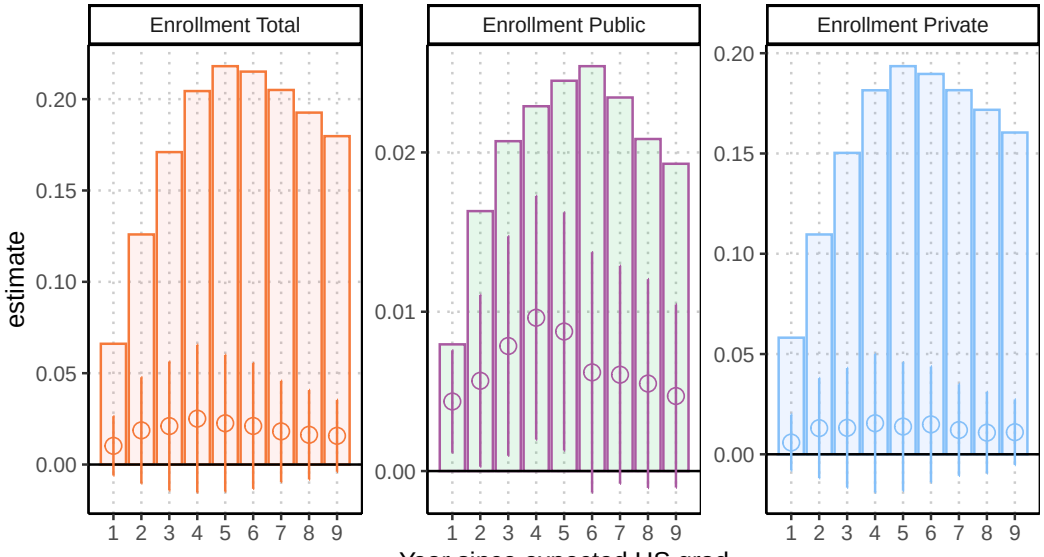
Brazil: Higher Education

Back

	Public Universities	**Private Institutions**
Tuition	Tuition Free	Charge Tuition
Quality	High	Low-medium
Selectivity	Highly Selective	Non-selective
Avg Candidates/Seat	12.1	1.6
% Enrollment	$\sim$ 25%	$\sim$ 75%
% students working FT	22.7%	42.6%

College Enrollment

Back

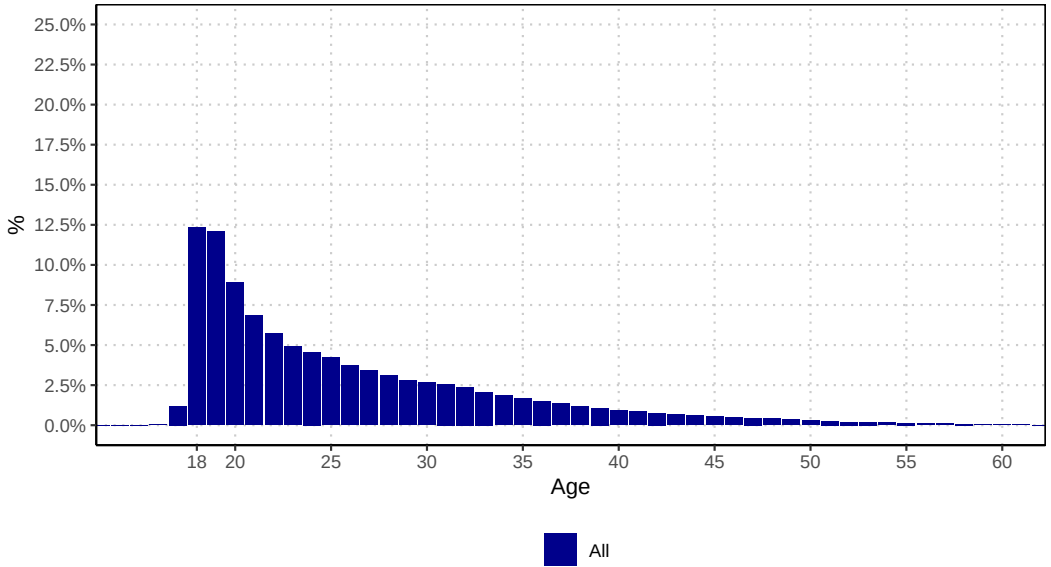


School-level results

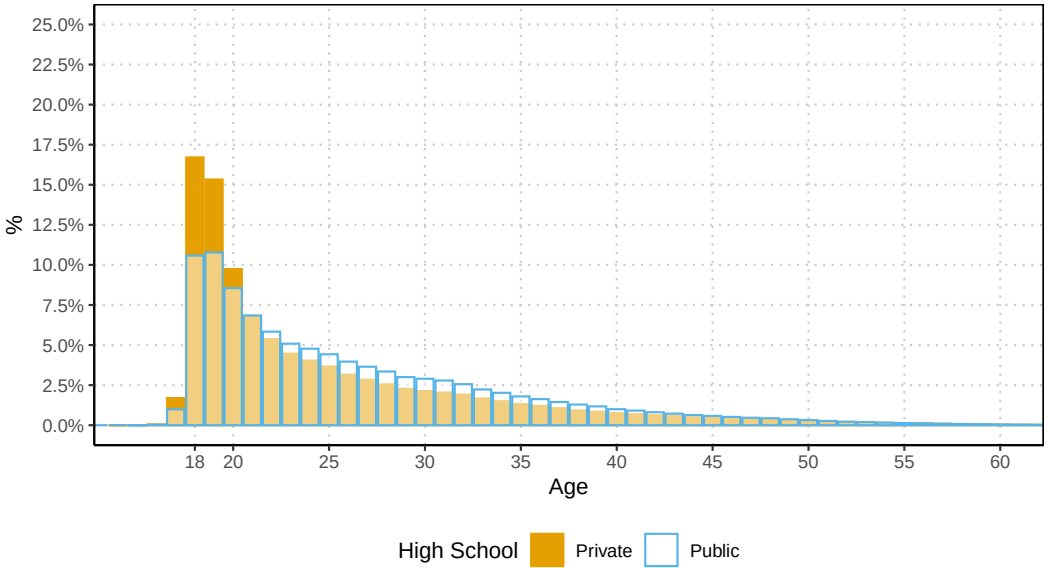
- Using yearly data from the Schooling Census
- DID specification with school fixed-effects

Variable	Estimate	Std.Error	P-value	Nobs	Level
# Computers	0.436	1.577	0.783	1044	School
# Computer/Students	0.530	1.082	0.626	937	School
Internet	0.082	0.035	0.023	1044	School
# Employees	-6.427	7.882	0.417	1051	School
# Classrooms	0.443	0.565	0.435	1051	School
# Classrooms in use	0.549	0.685	0.425	1051	School
# Teachers	-0.089	1.735	0.959	1000	School
# Students	4.207	30.918	0.892	1051	School
# Groups	-0.432	0.813	0.597	1051	School
Teacher age	-0.002	0.307	0.994	42517	Teacher
Teacher with College Degree	0.005	0.003	0.126	42517	Teacher
New teacher	-0.009	0.030	0.752	34404	Teacher
Teaching “right” subject	0.030	0.016	0.075	175218	Teacher x Group x Subject

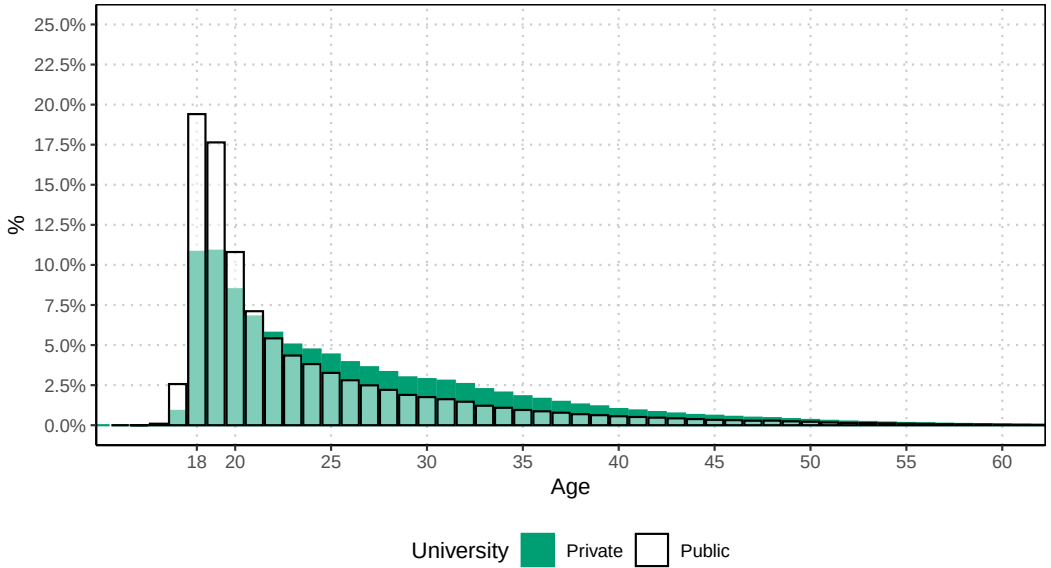
Histogram of age at starting Higher Education Course back



Histogram of age at starting Higher Education Course back

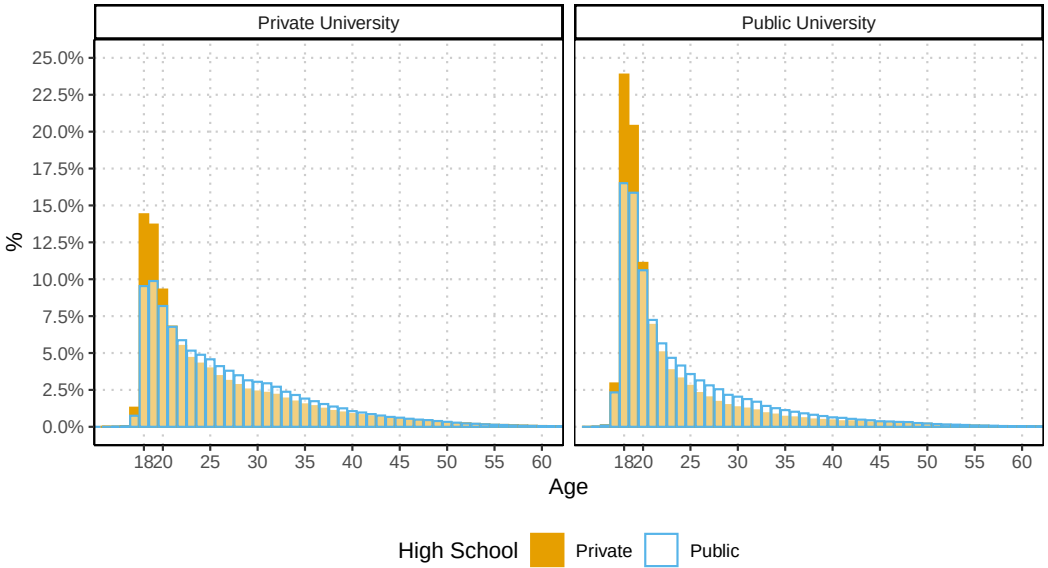


Histogram of age at starting Higher Education Course back



Histogram of age at starting Higher Education Course

back



Management and Student Performance

Study	Country	Methodology	Management Effect	Student Effect
Borges et al. (2024)	Brazil	RCT	0.50	0.26–0.29
Bloom et al. (2015)	Several	Cross and within-country	-	0.20—0.40
Bloom et al. (2015)	Brazil	Within-country	-	0.10
Grissom et al. (2021)	US	Meta-analysis	-	0.09–0.13
Böhlmark et al. (2016)	Scotland	SP FE	-	0.05–0.10
Lemos et al. (2024)	India	Within-country	-	0.31
Branch et al. (2012)	US	SP FE	-	0.05
Fryer (2017)	US	RCT	-	0.17–0.18