School choice in urban India:

Experimental Evidence on the impact of school choice and private schools

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Motivation

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- This paper
  - What is the impact of India's national school choice policy on childrens' outcome?
  - What is the value added at private schools?
- Implementation of India's national school choice policy in the southern state of Karnataka

Context- Private sector in elementary education

- Private sector enrollment
  - India: 200 million children, 38 percent enrolled at private schools
  - Karnataka: 8.3 million children, 49 percent enrolled at private schools

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- Private sector is very heterogeneous
- Fee distribution is log-normal (mean USD-210, p50- USD 149, p10-USD 52, p99- USD 1,279)
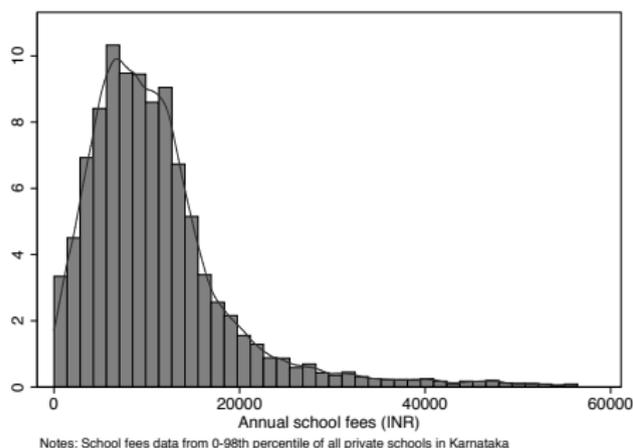

Notes: School fees data from 0-98th percentile of all private schools in Karnataka

Figure: Histogram of annual school fees in Karnataka

- Perception of private school and high-fee school achievement advantage

Context- The policy

- RTE Act of 2009- 25 percent mandate
  - 25 percent places in entry grades of all private schools are set aside for children from disadvantaged backgrounds
  - Government reimburses the tuition fees to private schools
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- Implementation
    - Contentious: Several large states not implementing despite legal requirement
    - Proponents: It will lead to improved outcomes for children
    - Opponents: Diverts resources from public schools and difficult to target the most disadvantaged

Methodology and data

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  - Identification- RTE free places are allocated through a centralized lottery in Karnataka
  - ITT estimates- Policy impact
  - IV estimates- Value added at private schools and at high-fee private schools

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- Data
  - Primary data on childrens' outcomes and HH characteristics- 1616 children
  - Secondary data- RTE admissions, school characteristics

Summary of findings

- On the 25 percent mandate
  - The mandate has not led to any improvement in outcomes of policy beneficiary children
  - The mandate is mistargeted- policy applicants are not income-constrained households as envisaged in the policy design
  - Mistargeting is a result of defects in policy design rather than implementation
    - Income based targeting
    - Partial nature of the RTE subsidy

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- On value added at schools
  - Private schools do not significantly improve learning outcomes of poor children relative to government schools
  - Private school enrollment leads to large improvements in the self-efficacy of poor children
  - Elite/ high-fee private schools perform better than low-fee ones only in English learning

Study setting- Karnataka

- Contextual details
  - Population- 60 million, 8.3 million children, 49 percent in private schools
  - Participating private schools-11,000
  - RTE free places- 100,000 annually '
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- Implementation details
  - Eligible households- socially and economically disadvantaged
  - Choice within neighborhoods
  - From 2015- online admission system '
    - Can only apply to upto five schools
    - Central lottery- necessitated due to oversubscription

- Random serial dictatorship mechanism (Abdulkadiroglu, Sonmez 1998)
  - Random ordering of agents
  - First agent assigned her top choice, next ranked agent assigned her top-choice among remaining options, and so on

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Table: **Randomization strata**

Child	1	2	3	4	5	6	7	8
Choice profile	AB	BA	ABC	AB	BCA	ABC	ABC	BCA
Randomization stratum	1	2	3	1	4	3	3	4

Study design

- Pair-wise matching design (Bruhn, McKinzie 2009)
    - Random generating matched pairs (T and C) with randomization strata
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Table: Pairwise matching

R. Stratum	Child	Choice profile	Lottery	Pair number
1	1	AB	Winner	-
1	4	AB	Winner	-
2	2	BA	Loser	-
3	3	ABC	Loser	-
3	6	ABC	Loser	1
3	7	ABC	Winner	1
4	5	BCA	Winner	2
4	8	BCA	Loser	2

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Table: Population and sample

Item	State	Sample districts
Districts	34	4
Applicants	126,728	35,875
Lottery winners	62,046	18,443
Matched pairs	25,123	6,293

Karnataka state and sample districts

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  - 16-statement dichotomous response test- adapted from Young Lives instrument
  - Four indices- self-efficacy, peer support, school support, and teacher support
 - Inverse covariance weighting approach

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- Administrative data
    - RTE admissions data
    - School characteristics data

Learning outcomes
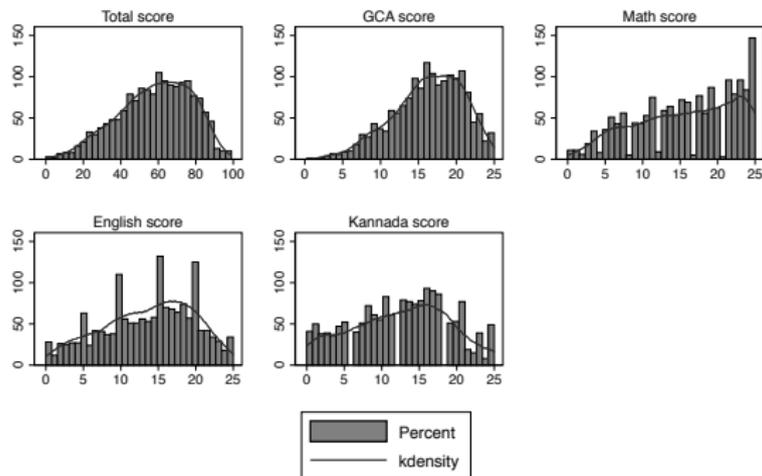
Notes:
1. Total score is the sum of the individual scores
2. GCA- General Cognitive Ability
3. N= 1616

Figure: Histogram of test score measures

Psychosocial outcomes

Table: Summary of psychosocial measures

Panel A:Simple aggregation (naive approach)				
Index	Mean	Std.Dev.	Min	Max
Self efficacy	3.0	0.8	0	4
Peer support	3.1	1.0	0	4
School support	3.5	0.8	0	4
Teacher support	3.2	0.9	0	4
Panel B: Inverse covariance weighting approach				
Self efficacy	0.0	1.0	-4.7	1.2
Peer support	0.0	1.0	-3.6	0.9
School support	0.0	1.0	-6.8	0.5
Teacher support	0.0	1.0	-5.2	0.7

Validity of the design

	Treatment	Control		
	Mean		Difference	p-value
	(1)	(2)	(3)	(4)
Age (in years)	7.33	7.32	0.01	0.62
Gender- male	0.56	0.59	-0.03	0.13
Caste- Scheduled Caste	0.18	0.19	-0.01	0.74
Caste- Other Backward Castes	0.61	0.6	0.01	0.42
Religion- Muslim	0.24	0.24	0	0.89
Mother's age	30.16	30.35	-0.19	0.32
Mother's education (in years)	8.26	8.28	-0.02	0.86
Working mother	0.22	0.24	-0.02	0.34
Father's age	36.69	37.01	-0.32	0.17
Father's education (in years)	8.67	8.62	0.05	0.77
Working father	0.94	0.95	-0.01	0.36
Birth order	1.59	1.63	-0.04	0.23
Number of siblings	1.07	1.09	-0.02	0.61
Attended pre-primary school	0.9	0.91	-0.01	0.65
Asset index	8.92	8.81	0.11	0.52
House ownership	0.5	0.53	-0.03	0.15
Number of rooms in the house	3.01	3	0.01	0.77
N	808	808	1616	

Notes: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.

Results- Policy impact (ITT) estimates

- On learning outcomes

	(1)	(2)	(3)	(4)	(5)
	Total	GCA#	Math	English	Kannada
Treatment	0.04	0.01	0.04	0.03	0.03
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Observations	1,616	1,616	1,616	1,616	1,616
R-squared	0.10	0.11	0.10	0.08	0.15
#-GCA is General Cognitive Ability					

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- On psychosocial outcomes

	(1) Self-efficacy	(2) Peer support	(3) School experience	(4) Teacher support
Treatment	0.12**	0.03	0.03	-0.03
	(0.05)	(0.04)	(0.05)	(0.04)
	[0.07]*	[0.67]	[0.67]	[0.67]
Observations	1,553	1,577	1,585	1,557
R-squared	0.05	0.12	0.15	0.17

Notes: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.

What explains the non-impact?

- Did policy move children to improved learning environments?
  - From government to private
  - From low-fee private to high-fee private
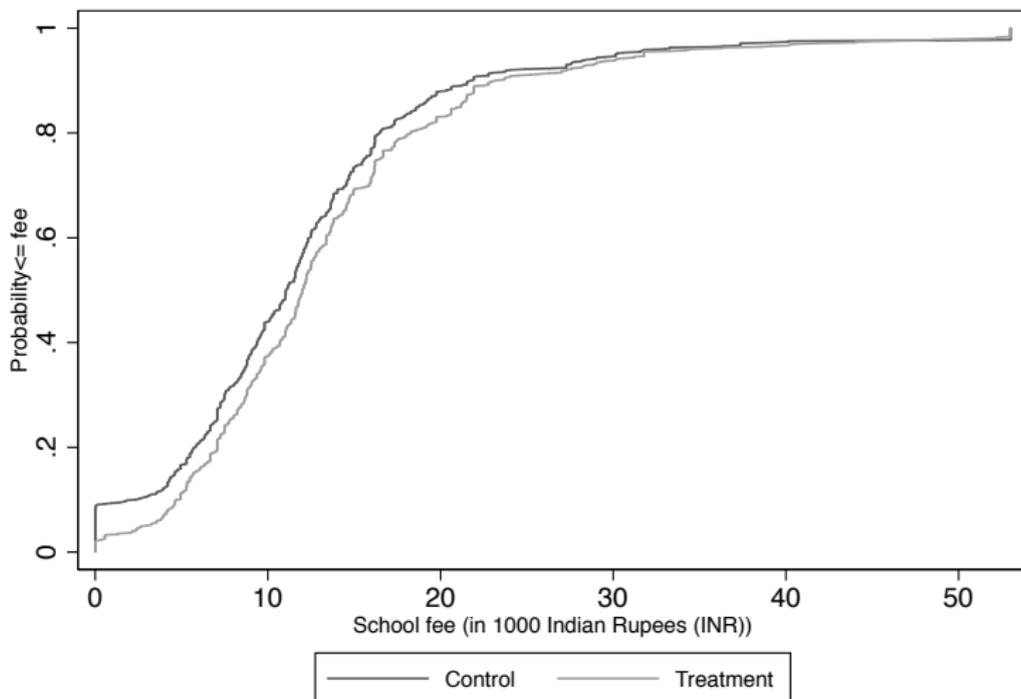
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	(1) Private School indicator	(2) School fee (in INR)
Treatment effect	0.06***	1,342***
	(0.01)	(372.75)
Constant/ Control mean	0.93***	12,472***
	(0.01)	(361.20)
Observations	1,616	1,459
R-squared	0.07	0.22

Notes: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.

CDF of school fee: Treatment versus control

Notes: School fees is winsorized (0.02 level) on the rightside of the distribution

Discussion

- Inferences
  - Program applicants would have attended similar schools irrespective of the mandate
  - John Henry effects- improbable
  - Program is mistargeted
  - Design (rather than implementation) flaws are responsible
    - Identification of income-disadvantaged is challenging (inclusion errors)
    - Partial voucher (exclusion errors)

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    - Program is mistargeted
    - Design (rather than implementation) flaws are responsible
        - Identification of income-disadvantaged is challenging (inclusion errors)
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- Policy implications
    - Truly income constrained households are not applying to the mandate
    - Wastage of resources: Government using INR 6,800 to procure INR 1,342 worth of services
    - Program is a direct subsidy to undeserving households
    - No within HH spillover effects in education

Estimation: Private school effect

- Estimation model

$$Y_i = \beta_0 + \beta_1.Private_i + \beta_{Di}.\mathbf{D}_i + \epsilon_i$$

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- First stage of 2SLS

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- Strength of the lottery instrument

	(1)	(2)	(3)	(4)
Panel A- Public versus private enrollment				
	Public	Private	Total	Percent Private
Treatment	13	795	808	98.4
Control	59	749	808	92.7
Total	72	1544	1616	95.5
Panel B- First stage results				
	Private school enrollment indicator			
Treatment	0.06***	0.06***	0.06***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.93***	0.89***	0.93***	0.96***
	(0.01)	(0.05)	(0.07)	(0.09)
Subdistrict dummies	No	Yes	Yes	No
Controls	No	No	Yes	Yes
Pair fixed effects	No	No	No	Yes
F-statistic	32.30	31.82	31.69	32.54

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the pair level. N=1,616

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- IV estimates (LATE)- effects for the compliers, the population of interest

Results: Private school effect

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			Total score				Psychosocial outcomes		
	Total	GCA	Math	English	Kannada	Self efficacy	Peer support	School experience	Teacher support
Panel A- OLS results									
Private enrolled	0.25**	0.17	0.01	0.80***	-0.11	0.25***	0.08	0.41***	0.01
	(0.11)	(0.11)	(0.11)	(0.10)	(0.11)	(0.09)	(0.10)	(0.15)	(0.10)
	[0.04]**	[0.16]	[0.60]	[0.00]***	[0.29]	[0.02]**	[0.42]	[0.02]**	[0.81]
Observations	1,616	1,614	1,614	1,614	1,614	1,553	1,577	1,585	1,557
R-squared	0.20	0.19	0.16	0.20	0.25	0.07	0.12	0.16	0.18
Panel B- 2SLS/IV results									
Private enrolled	0.66	0.23	0.72	0.52	0.58	1.90**	0.50	0.56	-0.47
	(0.76)	(0.77)	(0.78)	(0.76)	(0.74)	(0.83)	(0.76)	(0.81)	(0.76)
	[1.00]	[1.00]	[1.00]	[1.00]	[1.00]	[0.09]*	[0.67]	[0.09]	[0.09]
Observations	1,616	1,614	1,614	1,614	1,614	1,553	1,577	1,585	1,557
Panel C- ITT/ reduced form results									
Treatment	0.04	0.01	0.04	0.03	0.03	0.12**	0.03	0.03	-0.03
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)
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	(1) Coefficient	(2) p-value
Self-efficacy		
Learning English is easy for me	0.10	0.70
Learning Mathematics (additions and subtractions) is difficult for me	0.55	0.11
I am proud of my achievement at school	0.19	0.23
I am good at learning Kannada	0.52	0.10
Peer support		
My classmates/friends tease me	0.27	0.41
Most of my classmates do not want to play with me in leisure hours	-0.07	0.82
I have a lot of friends in my class	-0.04	0.87
I can ask a friend to help me if I have difficulty with class work	0.25	0.38
School experience		
I am bored in class	-0.46	0.16
I feel alone in school	-0.46	0.16
I feel safe at school	0.15	0.22
I am proud to study in this school	0.28	0.13
Teacher support		
My class teacher does not treat me fairly	-0.03	0.89
I can talk to my class teacher freely	-0.09	0.71
I am afraid to ask my teacher to clarify my doubts	-0.78**	0.03
Most teachers at school are concerned about me	0.22	0.19

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- Distribution of fee offered instrument
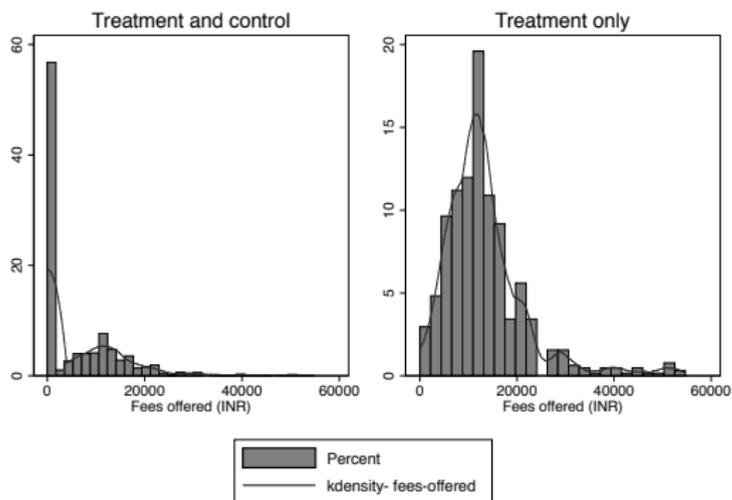
Notes: Observations from 0-98th percentile of the fees-offered variable shown here

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Validity of the instruments

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- Control for fee of the first choice school and the highest fee schools in the choice profile
- Estimation model

$$Y_i = \beta_0 + \beta_2.Elite_i + \beta_3.Fee\_first_i +$$
$$\beta_4.Fee\_highest_i + \boldsymbol{\beta_{Di}}.\mathbf{D}_i + \epsilon_i$$

- First stage

$$Elite_i = \alpha_0 + \alpha_2.Lottery_i + \alpha_3.Fee\_offered_i + \alpha_4.Fee\_first_i +$$
$$\alpha_5.Fee\_highest_i + \boldsymbol{\alpha_{Di}}.\mathbf{D}_i + \mu_i$$

Validity of the instruments

- Fee-offered instrument is not exogenous
- Control for fee of the first choice school and the highest fee schools in the choice profile
- Estimation model

$$Y_i = \beta_0 + \beta_2.Elite_i + \beta_3.Fee\_first_i +$$
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- First stage F-stat: 13.98

Results: Elite school effect

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			Total score				Psychosocial outcomes		
	Total	GCA	Math	English	Kannada	Self efficacy	Peer support	School experience	Teacher support
Panel A- OLS results									
High-fee enrolled	0.08	0.16**	0.08	0.20***	-0.11*	0.04	0.05	0.11**	0.08
	(0.07)	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.05)	(0.06)
	[0.12]	[0.04]**	[0.12]	[0.00]***	[0.01]***	[0.51]	[0.51]	[0.18]	[0.34]
Observations	1,458	1,456	1,456	1,456	1,456	1,401	1,425	1,429	1,404
R-squared	0.20	0.19	0.16	0.17	0.26	0.07	0.12	0.15	0.17
Panel B- 2SLS/IV results									
High-fee enrolled	0.16	0.29	0.27	0.58***	0.02	0.33	-0.07	0.20**	0.05
	(0.27)	(0.20)	(0.17)	(0.19)	(0.19)	(0.21)	(0.21)	(0.10)	(0.19)
	[0.38]	[0.25]	[0.25]	[0.01]**	[0.58]	[0.20]	[0.63]	[0.20]	[0.63]
Observations	1,232	1,230	1,230	1,230	1,230	1,189	1,201	1,208	1,188
Panel C- 2SLS/IV results (private school sample only)									
High-fee enrolled	0.16	0.29	0.25	0.60***	0.01	0.32	-0.08	0.20**	0.03
	(0.27)	(0.20)	(0.17)	(0.19)	(0.19)	(0.21)	(0.21)	(0.09)	(0.19)
	[0.39]	[0.25]	[0.25]	[0.01]**	[0.60]	[0.24]	[0.79]	[0.16]	[0.79]
Observations	1,172	1,170	1,170	1,170	1,170	1,131	1,141	1,148	1,129

Notes: *** p<0.01, ** p<0.05, * p<0.1. Clustered standard errors (at pair level) are in parenthesis, and sharpened q-values in brackets

Robustness-I: Alternative definitions of elite school

Elite indicator	(1) First stage F-stat	(2) Total	(3) GCA	(4) Math	(5) English	(6) Kannada	(7) Self efficacy	(8) Peer support	(9) School experience	(10) Teacher support
				Test scores				Psychosocial outcomes		
>p50	11.24	0.22	0.34	0.37*	0.71***	0.05	0.45	-0.06	0.27**	0.05
		(0.33)	(0.26)	(0.22)	(0.26)	(0.24)	(0.28)	(0.26)	(0.13)	(0.23)
>p55	11.56	0.20	0.32	0.32*	0.65***	0.04	0.40	-0.06	0.24**	0.05
		(0.30)	(0.23)	(0.19)	(0.23)	(0.22)	(0.25)	(0.24)	(0.12)	(0.21)
>p60	11.34	0.19	0.31	0.31	0.64***	0.03	0.38	-0.06	0.23**	0.06
		(0.30)	(0.23)	(0.19)	(0.22)	(0.21)	(0.24)	(0.23)	(0.11)	(0.20)
>p65	11.21	0.17	0.31	0.29	0.61***	0.02	0.35	-0.07	0.21**	0.06
		(0.28)	(0.22)	(0.18)	(0.21)	(0.20)	(0.23)	(0.22)	(0.10)	(0.19)
>p70	13.07	0.16	0.30	0.26	0.58***	0.01	0.32	-0.07	0.20**	0.06
		(0.27)	(0.20)	(0.17)	(0.19)	(0.19)	(0.21)	(0.20)	(0.10)	(0.18)
>p75	13.98	0.16	0.29	0.27	0.58***	0.02	0.33	-0.07	0.20**	0.05
		(0.27)	(0.20)	(0.17)	(0.19)	(0.19)	(0.21)	(0.21)	(0.10)	(0.19)
>p80	16.02	0.16	0.30	0.27	0.59***	0.02	0.33	-0.07	0.20**	0.05
		(0.27)	(0.21)	(0.17)	(0.19)	(0.19)	(0.21)	(0.21)	(0.10)	(0.19)
>p85	18.19	0.18	0.32	0.31*	0.65***	0.03	0.38*	-0.07	0.23**	0.06
		(0.30)	(0.22)	(0.19)	(0.21)	(0.21)	(0.23)	(0.23)	(0.11)	(0.21)
>p90	27.57	0.18	0.40	0.32	0.76***	0.00	0.39	-0.12	0.24*	0.08
		(0.35)	(0.26)	(0.22)	(0.23)	(0.25)	(0.27)	(0.28)	(0.13)	(0.24)

Notes: *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$. Each cell reports the result from an IV regression of one of the outcome variables on an indicator for enrollment at an elite scool. Elite school is defined by cutting the school fees distribution at various points, from the 50th percentile (p50) to the 90th percentile (p90). Hence, the definition of elite school changes in each row: in the first row, the top 50 percent schools in the fees distribution are defined as elite. The F-stat of the first stage regressions is reported in column 1. The F-stat is higher than 10 for all definitions of elite school. The Hansen J- stat p-value (over identification test) is always above 0.1. Hence the instruments are valid. Standard errors are clustered at the pair level in all models.

Robustness- II: Fee as a continuous variable

$$Y_i = \delta_0 + \delta_1.\textit{Fee\_enrolled}_i + \delta_2.\textit{Fee\_first}_i +$$
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	Test scores					Psychosocial outcomes			
	Total	GCA	Math	English	Kannada	Self efficacy	Peer support	School experience	Teacher support
Fee	0.00	0.01	0.01	0.02***	0.00	0.01	-0.00	0.01*	0.00
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
	[0.40]	[0.19]	[0.19]	[0.02]**	[0.62]	[0.30]	[0.61]	[0.30]	[0.61]
Obs.	1,232	1,230	1,230	1,230	1,230	1,189	1,201	1,208	1,188

Notes: *** p<0.01, ** p<0.05, * p<0.1

Discussion

- Private school effects
  - Test score effects consistent with the MS study
  - Confirm the absence of value added at private schools in urban areas
  - Large self efficacy effect for the target population points to the need for efficacy instruction in government schools
  - Private schools cannot be relied upon for improving learning outcomes

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  - Test score effects consistent with the MS study
  - Confirm the absence of value added at private schools in urban areas
  - Large self efficacy effect for the target population points to the need for efficacy instruction in government schools
  - Private schools cannot be relied upon for improving learning outcomes
- Elite school effects
  - English effects are unsurprising
  - Lack of overall test score effects is puzzling
    - Information asymmetry
    - Parents choose high-fee schools for things other than academic performance

External validity

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- Find similar effects, confirming that targeting is not improving with time

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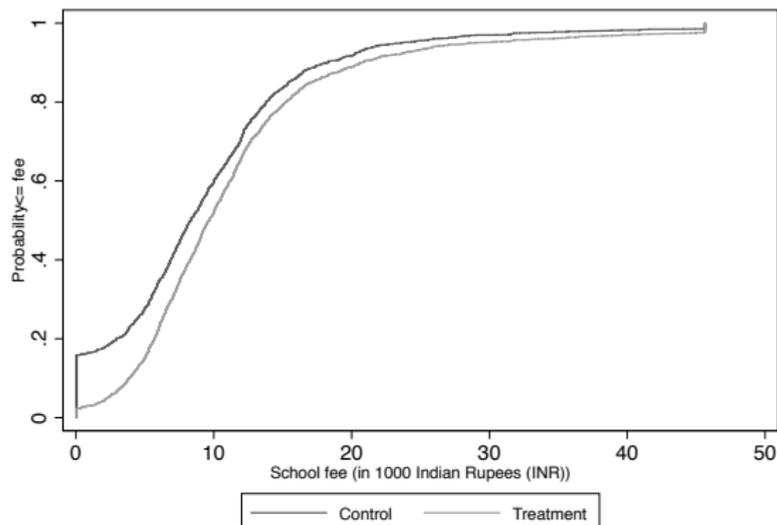
Notes: School fees is winsorized (0.02 level) on the rightside of the distribution

Figure: CDF of school fees for the larger sample

Conclusion

- On the RTE 25 percent mandate
  - Is a wastage of resources in its current form
  - Policy needs to be redesigned
    - Alternate targeting strategies- MP model
    - Subsidize non-tuition costs of education-Delhi
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Conclusion

- On the RTE 25 percent mandate
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  - Policy is not cost-effective as argued by government
  - Classic voucher model would be cost-effective
- On private schools and school choice
  - School choice would improve self-efficacy and English, but not overall test scores
  - Private schools and choice cannot be the default option to improve learning outcomes
  - Reforming government schools should be focused on simultaneously