The Aggregate Effects of School Choice: Evidence from a Two-Stage Experiment in India

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Private Schooling in Developing Countries

- Striking increase in the enrollment share of fee-charging private schools in developing countries (especially Africa & South Asia)
  - Drivers include demand for English, and poor perceived public school performance
  - 24% of rural and 58% of urban children in India aged 6-14 attend private schools – for a total of ~30% (Desai et al. 2009); growing at ~1%/year
  - Similar trends in other LDC's (Kenya, Nigeria, Pakistan)

- The increase in private school shares is often taking place in a context of *increasing* public school spending and greater investments in access and input-based markers of school quality

- But, there are large inefficiencies in the public school education system.
  - High rates of teacher absence (Kremer et al, 2005)
  - Not changed much in recent panel study (Muralidharan et al 2013)
  - Also, potentially very inefficient in choice of inputs – contract versus regular teachers (Muralidharan and Sundararaman 2013)

The Growth of Private Schooling is Controversial

- Supporters argue that:
  - Private schools are more accountable, responsive, and cost-effective
  - Revealed preference suggests parents prefer it (paying out of pocket)
  - Policy should do more to leverage private production of schooling

- Opponents of the growth of private schooling are concerned about:
  - Economic stratification of schooling
  - Worsening of public schools because of elite secession
  - Low-quality private schools (with poorly paid, unqualified teachers)

- A particular concern is that private schools function on the basis of selection of high-ability (or high SEC) students and then try to attract parents/students on the basis of better *levels* of test scores even though they may not add more value:
  - Zhang (2012) in China; Lucas & Mbiti (2012) in Kenya
  - Cullen et al (2005) in Chicago; Abdulkadiroglu et al. (2012) in Boston/New York
  - Hsieh and Urquiola (2005) in Chile

Summary Statistics on Public & Private Schools (in our sample)

Table 1: Baseline Test Scores and Socio-Economic Characteristics

	Private Schools (1)	Government Schools (2)	Difference (1) - (2)
Normalized Baseline Telugu Score	0.6385	0.0035	0.635***
Normalized Baseline Math Score	0.6605	0.0145	0.646***
Parents have completed at least primary schools	0.5580	0.2850	0.273***
At least one parent has completed grade 10	0.5470	0.3520	0.195***
Scheduled Caste	0.1280	0.3290	-0.201***
Household Asset Index	3.8460	3.1930	0.653***
Annual Fees (Rupees)	1330.37	3.79	1326.57***

Policy Context

- The recent Right to Education (RtE) Act in India includes a provision mandating that private schools reserve up to 25% of their seats for students from disadvantaged backgrounds
  - Government will reimburse the lower of private school fees or per-child spending in the government schools
- May create the world's largest program of publicly-funded attendance of private schools
- It is also perhaps the largest attempt at school integration (across economic classes) ever seen in the world
- No evidence on what the impact of such a provision may be!
  - Not clear if poor, disadvantaged students will do better in private schools
  - Spillovers on students in private schools is the other key concern
  - Highly controversial (contested all the way to the Supreme Court)

The Andhra Pradesh (AP) School Choice Project

- Presents results from the first randomized experiment of school choice in a developing country (outside Latin America)

- Features a two-stage randomization that creates both an individual and a market-level experiment, which allows us to:
  - Have an uncontaminated control group
  - Study spillovers on non-applicants and private school students
  - Study heterogeneity as a function of school and market characteristics

- The presence of control *villages* allows us to simulate a counterfactual *school system* in the absence of the program

- Large, long-term (4 year) study with perhaps the most comprehensive data collected on intermediate factors in any study on school choice – which allows us to say a lot more about the mechanisms of impact (if any)

Best-Practice Experimental Design

Typical Experimental Design for School Choice Studies

Group 1	Group 2	Group 3	Group 4
Non-Applicants in Public Schools	Applicants in Public Schools NOT awarded a Voucher	Applicants in Public Schools AWARDED a Voucher	Non-voucher students in private schools

Experimental Design of AP School Choice Project

Design of the AP School Choice Project

Treatment Villages

Group 1T	Group 2T	Group 3T	Group 4T
Non-Applicants in Public Schools	Applicants in Public Schools NOT awarded a Voucher	Applicants in Public Schools AWARDED a Voucher	Non-voucher students in private schools

Control Villages

Group 1C	Group 2C	Group 3C	Group 4C
Non-Applicants in Public Schools	Applicants in Public Schools NOT awarded a Voucher	Does not exist	Non-voucher students in private schools

Research Questions

- What changes do voucher-winning students experience when they switch to attending a private school?
  - Schools, teachers, households
- What is the impact of providing economically disadvantaged students with a voucher to attend a private school in rural India?
  - Are private schools more effective (productive) than government-run schools in rural India?
- How does the impact of the program vary by:
  - Individual, school, and market characteristics
- Are there spillover effects on:
  - Students left behind in the public schools?
  - Students who start out in the private schools to begin with?
- How cost effective are private schools in India at delivering primary education?

Summary of Results (1 of 2)

- Private schools are poorer on measures of input-quality, but much better on measures of school processes
  - Teachers have lower levels of education, training, experience, salaries
  - But have much better measures of effort (absence, active teaching, etc)
  - Private schools also have a longer school day and year, lower pupil-teacher ratio, and better school hygiene
  - No significant change in household inputs – school time goes up, but time spent on homework does not (so changes likely to be due to school)

- No test-score impact on two main subjects (Math/Telugu)
  - Natural inference is that private schools are not more effective
  - But private schools spend much less instructional time on Math/Telugu
  - Use extra time to teach more English, Hindi, Science, Social Studies
  - Positive point estimates on all of these (large and significant for Hindi)
  - Positive and significant "combined" effects (ITT: 0.13 SD; ToT: 0.23 SD)
  - Can clearly infer that the private schools are more productive (but arguably not more 'effective' in improving basic competencies)

Summary of Results (2 of 2)

- No heterogeneity by student characteristics (except for Muslims);
- Some evidence of positive effects of greater choice/competition
- Important heterogeneity by medium of instruction
  - IV estimate of attending a Telugu-medium (native language) private school is positive in ALL subjects (mean ToT: 0.5 SD)
  - But, IV estimates suggest that causal impact of attending an English-medium private school are negative on Telugu, Math, EVS; and positive on English/Hindi (mean ToT: not significantly different from zero)
  - Private schools even more effective if no shift in medium of instruction
- No evidence of spillovers on either non-applicants or students who start out in private schools
- Private schools are substantially more productive
  - Cost ~30% of public schools on average; voucher value is ~40%
  - Teacher salaries and accountability; Bloom & Van Reenen (2010)

- **Experimental Design & Validity**
- Results – School and Household Inputs
- Results – Test Scores
- Policy Implications and Next Steps

Location of Study

- Indian State of Andhra Pradesh (AP)
  - 5th most populous state of India
    - Population of 80 Million
  - 23 Districts (2-4 Million each)
- Close to All-India averages on many measures of human development
- Importance of language policy
  - States are linguistic/cultural units as well as administrative ones
  - 15 official languages in India
  - Hindi spoken by ~40% of population and considered the 'national' language
  - But all states conduct their education systems in the native language of the state (Telugu in AP)
  - Official federal government business carried out in English/Hindi

Key Features of Voucher/Scholarship Program

- Household level
  - Completely voluntary, can always go back to public school
  - No conditions (and told clearly that they may not be awarded a voucher/scholarship)
  - Scholarship covered all school fees, books, and uniforms
  - Did not cover transport and mid-day meals
  - Household did not see any cash or physical voucher (payments made directly to schools)

- School level
  - Completely voluntary as well
  - Fees set by Foundation at the 90th percentile of the distribution of private school fees in the sample villages (expected to be above marginal cost for all schools)
  - Schools were asked if they:
    - A) Wanted to participate in the program
    - B) And if so, how many seats they could offer to scholarship students
  - Schools not allowed to cherry pick students (just like charter-school protocols)
  - Fees would be directly paid by the Foundation (including books, and uniforms)
  - No top up fees could be charged (except for the school bus if used)

- Entire framing and communication to both HH and Schools was that this was a pilot project to understand RtE implications

Correlates of Take Up (Application & Acceptance)

	Correlates of Application and Acceptance	
	Applied==1	Accepted==1 (conditional on winning)
	[1]	[2]
Normalized baseline Telugu score	-0.006	0.013
	(0.009)	(0.014)
Scheduled caste	0.005	-0.036
	(0.013)	(0.022)
Muslim	-0.014	-0.027
	(0.023)	(0.047)
Both parents literate	0.022	-0.004
	(0.014)	(0.020)
Household asset index	0.008	0.017
	(0.007)	(0.011)
Older sibling in government school	-0.026**	-0.056***
	(0.011)	(0.018)
Private school exists within 0.5 kilometers	0.054***	0.102**
	(0.021)	(0.039)
Observations	7,951	1,975

Design Validity and Attrition

- The randomization worked fine - no difference between any of the four groups across T & C villages on observables
- Main challenge is attrition (really hard, lots of migration)
  - We try to track every kid who applied for a voucher
  - Also try to track a representative sample of groups 1 and 4
- 2 main rounds of testing (after 2 and 4 years of program)
- In Y2, attrition is 10% (15%) in T(C); In Y4 it is 15% (19%) in T(C)
  - This difference IS significant
  - But, no difference on observables
  - Also, cannot reject that the SAME model predicts attrition in both T and C
  - Will do both inverse probability re-weighting and Lee bounds (results unchanged)
- No differential attrition between treatment and control villages among non-applicants and among students who started out in private schools

- Experimental Design & Validity
- **Results – School and Household Inputs**
- Results – Test Scores
- Policy Implications and Next Steps

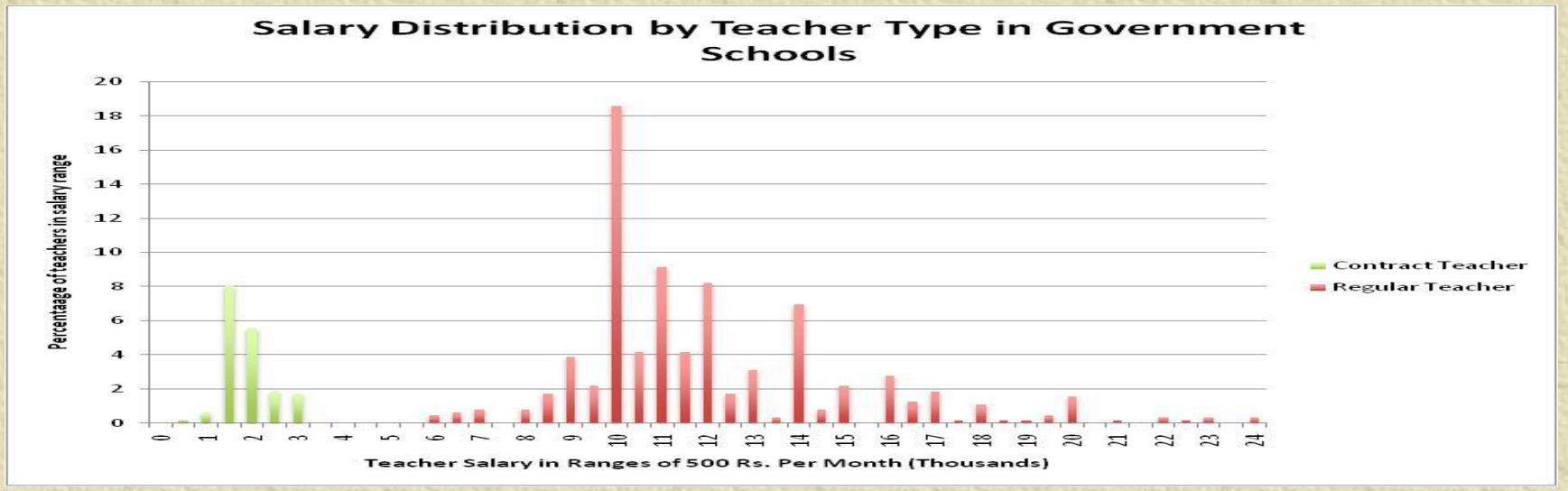
School Characteristics

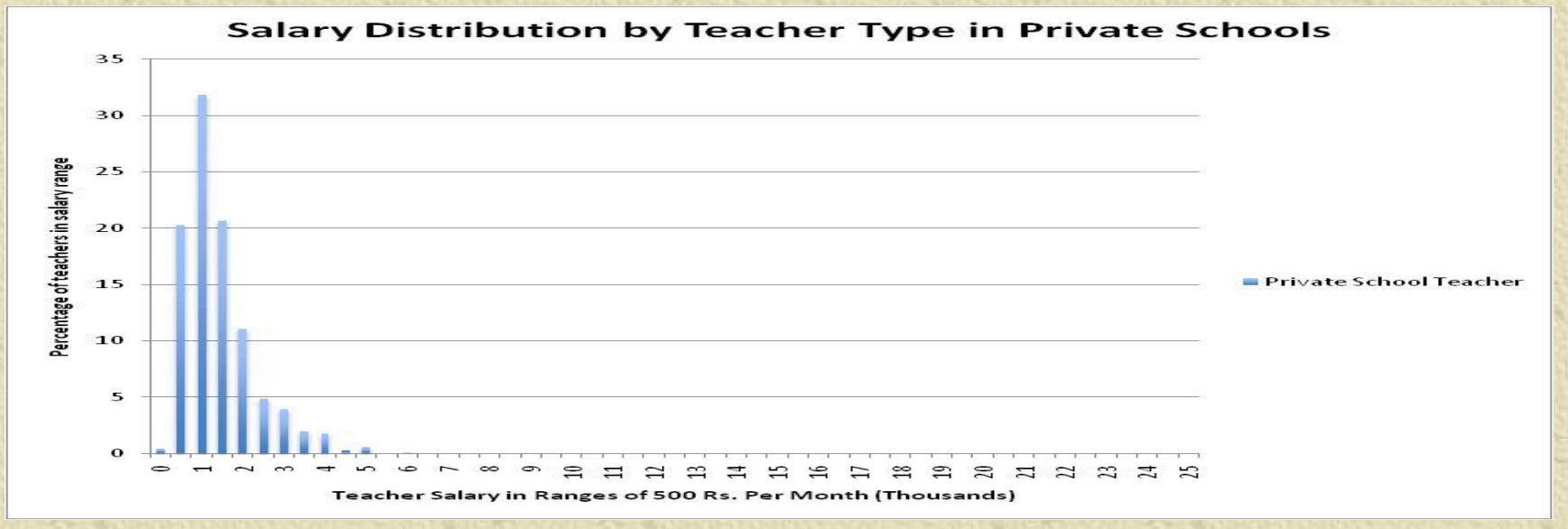
	Private schools	Government schools	Difference
	[1]	[2]	[3]
Total enrollment	301.71	83.31	218.4***
Total working days	229.42	218.40	11.02***
Pupil-teacher ratio	16.86	26.37	-9.514***
Drinking water available	0.99	0.92	0.0730***
Functional toilets	0.89	0.68	0.205***
Separate functional toilets for girls	0.79	0.43	0.364***
Functional electricity	0.90	0.59	0.305***
Functional computers	0.53	0.04	0.484***
Functional library	0.81	0.98	-0.169***
Functional radio	0.14	0.80	-0.660***

Teacher Characteristics

Characteristics:	Private School Teachers (1)	Government School Teachers (2)	(1) - (2)	P-value of (1) - (2)
Male	0.25	0.44	-0.19***	0.00
Age	35.47	47.04	-11.57***	0.00
Years of teaching	5.61	14.82	-9.21***	0.00
Number of Schools taught previously	0.84	2.50	-1.66***	0.00
Completed at least college or masters	0.70	0.86	-0.16***	0.00
Teacher training completed	0.34	0.98	-0.64***	0.00
In-service teacher training program attended in the last 6 months	0.21	0.56	-0.35***	0.00
Come from the same village	0.46	0.14	0.32***	0.00
Current gross salary per month	2310.03	13720.88	-11410.85***	0.00
Total number of observations	2,868	2,370		

Salary Distribution by School and Teacher Type





Percentage

Measures of Classroom, Teacher, and School Activity

	Private schools	Government schools	Difference
	[1]	[2]	[3]
Panel A: Measures of Classroom Activity			
Class is engaged in active teaching	0.51	0.34	0.17***
A teacher is present in class	0.97	0.92	0.048***
Effective in teaching and maintaining discipline	0.50	0.36	0.14***
Teacher has complete control over class	0.69	0.41	0.28***
Teachers teaching mutliple classes at the same time	0.24	0.79	-0.55***
Panel B: Measures of Teacher Activity			
	[1]	[2]	[3]
Cannot find the teacher (absent) before the class starts	0.09	0.24	-0.15***
Teacher is actively teaching	0.50	0.35	0.15***
Teacher is in school and not teaching	0.01	0.03	-0.02***
Panel C: Measures of School Hygiene			
	[1]	[2]	[3]
Flies heavily present on premises of the school	0.14	0.19	-0.05**
Stagnant water present on premises of the school	0.18	0.28	-0.10***
Garbage dumped on premises of the school	0.33	0.44	-0.11***

Home Inputs (Time Use and Spending)

Table 6: Changes in Household Inputs

	Private schools	Government schools	Difference	Applicants offered scholarship	Applicants in control villages	Intention to treat estimate	Treatment on the treated estimate
	Panel A: Student Time Diaries (Minutes per Day)						
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Activity							
Time spent in school	423.53	380.25	43.28***	409.34	383.38	25.96***	46.93***
Studying and doing homework at home	75.99	52.72	23.27***	59.83	56.86	2.97	5.38
Private Tuition	25.15	16.62	8.53**	21.95	17.43	4.52	8.17
Bathing/Toilet/Getting ready	55.11	61.7	-6.59***	57.82	61.24	-3.42	-6.19
Time traveling to school	23.5	20.92	2.58*	23.51	21.43	2.08	3.75
Working (outside/inside the house)	1.51	11.05	-9.54**	5.46	9.36	-3.90	-7.14
Chores	16.82	31.18	-14.36***	21.62	34.45	-12.83**	-23.51**
Watching TV	75.88	83.38	-7.50**	80.57	84.04	-3.47	-6.28
Playing with friends	82.34	101.99	-19.65***	100.88	99.73	1.15	2.08
Eating	43.57	44.69	-1.12	43.78	44.12	-0.34	-0.61
Free time	53.38	64.38	-11.00**	56.69	62.13	-5.44	-9.96
	Panel B: Household Student Expenditure (Rupees per year)						
Household student expenditure	2910.36	566.73	2343.64***	774.94	892.69	-117.75***	-215.95***

- Experimental Design & Validity
- Results – School and Household Inputs
- **Results – Test Scores**
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Y2 Test Score Impact: ITT and ToT

Table 7: Test Score Impacts (Two Years)

	Telugu score	Math score	English score	Combined across tests
	[1]	[2]	[3]	[4]
Panel A: Impact of Winning a Voucher ("Intention to Treat" Effect)				
Offered scholarship	-0.079	-0.053	0.179**	0.014
	(0.055)	(0.065)	(0.079)	(0.061)
Total observations	4,620	4,620	4,525	13,765
Treatment observations	1,778	1,778	1,738	5,294
Control observations	2,842	2,842	2,787	8,471
Panel B: Impact of Attending a Private School ("Treatment on the Treated" Effect)				
Scholarship recipient in private school	-0.140	-0.094	0.317**	0.025
	(0.098)	(0.115)	(0.139)	(0.108)
Total observations	4,620	4,620	4,525	13,765

School Time Tables

	Instructional Time by Subject (Minutes per week)		
	Private schools	Government schools	Difference
Telugu	307.46	511.49	-204.03***
Math	339.59	500.62	-161.02***
English	322.60	235.41	87.19***
Social studies	239.18	173.57	65.61***
General science	205.53	104.39	101.14***
Hindi	215.97	0.02	215.96***
Moral science	16.75	20.30	-3.55
Computer use	46.57	0.38	46.19***
Other (Mainly Study Hall)	311.95***	250.11***	61.84***
Break	461.51	473.10	-11.60
Total	2467.10***	2269.38***	197.72***

Y4 Test Score Impact: ITT and ToT

Table 8: Test Score Impacts (Four Years)

	Telugu score	Math score	English score	Science and social studies score	Hindi score	Combined across tests
	[5]	[6]	[7]	[8]	[9]	[10]
Offered scholarship	-0.017	-0.031	0.114	0.084	0.526***	0.129***
	(0.052)	(0.053)	(0.072)	(0.061)	(0.068)	(0.046)
Total observations	4,385	4,385	4,217	4,243	1,691	18,926
Treatment observations	1,674	1,675	1,607	1,628	867	7,451
Control observations	2,711	2,710	2,610	2,615	824	11,475
Scholarship recipient in private school	-0.030	-0.055	0.201	0.149	0.891***	0.227***
	(0.092)	(0.093)	(0.127)	(0.108)	(0.103)	(0.081)
Total observations	4,385	4,385	4,217	4,243	1,691	18,926

Hindi Impact by Question Type (% correct)

Appendix Table 2: Hindi Test Score Impacts by Question Type

Panel A: Intention to Treat Effects

	Student score (fraction correct) by question type				
	Letters	Words	Sentences	Paragraph	Advanced
	[1]	[2]	[3]	[4]	[5]
Offered scholarship	0.232***	0.172***	0.122***	0.121***	0.026***
	(0.029)	(0.026)	(0.023)	(0.023)	(0.009)
Mean in control	0.23	0.14	0.08	0.08	0.02

Panel B: Treatment on the Treated Effects

	Student score (fraction correct) by question type				
	Letters	Words	Sentences	Paragraph	Advanced
	[1]	[2]	[3]	[4]	[5]
Attended a private school (using scholarship as an instrument)	0.393***	0.291***	0.206***	0.204***	0.044***
	(0.046)	(0.041)	(0.036)	(0.036)	(0.015)
Total observations	1,691	1,691	1,691	1,691	1,691
Scholarship recipients	510	510	510	510	510
Non-recipients	1,181	1,181	1,181	1,181	1,181

Heterogeneous Treatment Effects (Y4)

Table 10: Heterogeneous Test Score Impacts (By Initial Student Characteristics)

	Telugu score	Math score	English score	Science and social studies score	Hindi score	**Combined across tests**
	[1]	[2]	[3]	[4]	[5]	**[6]**
Offered scholarship * covariate						
Baseline test score	0.004	0.000	-0.022	-0.022	-0.105*	**-0.030**
	(0.037)	(0.037)	(0.047)	(0.043)	(0.060)	**(0.033)**
Female indicator	0.010	-0.037	0.013	0.017	0.169*	**0.034**
	(0.064)	(0.064)	(0.071)	(0.071)	(0.098)	**(0.053)**
Scheduled caste indicator	0.029	0.099	0.006	0.056	-0.108	**0.014**
	(0.070)	(0.070)	(0.090)	(0.083)	(0.121)	**(0.064)**
Parents literate indicator	-0.031	-0.006	0.132	-0.138*	-0.234**	**-0.058**
	(0.068)	(0.070)	(0.120)	(0.077)	(0.117)	**(0.064)**
Household asset index	-0.028	-0.001	0.009	-0.019	0.017	**-0.002**
	(0.033)	(0.031)	(0.038)	(0.035)	(0.062)	**(0.030)**
Muslim indicator	0.364***	0.290**	0.151	0.288**	0.111	**0.263*** **
	(0.112)	(0.128)	(0.147)	(0.140)	(0.168)	**(0.097)**
Christian indicator	-0.154	-0.232**	-0.113	-0.109	-0.193	**-0.172**
	(0.130)	(0.111)	(0.121)	(0.159)	(0.248)	**(0.112)**
Indicator for older cohort at baseline	-0.045	-0.055	0.101	-0.051	0.116	**0.013**
	(0.082)	(0.087)	(0.116)	(0.097)	(0.104)	**(0.069)**
Observations	4,385	4,385	4,217	4,243	1,691	**18,926**

Other Dimensions of Heterogeneity

- In general, it's much harder to precisely estimate the impact of heterogeneity as a function of school characteristics
  - These reflect choices made by households based on unobservables
  - But, these may be quite important
- Language of instruction
  - ~50% of lottery winners who accept the voucher go to English medium schools, while the rest go to Telugu medium schools
  - Instrument for medium of school attended with the interaction of winning lottery and the medium of instruction of nearest private school
- Extent of competition in the market
  - Linear interaction
  - Non-parametric estimates

Impact of Attending a Private School by Medium of Instruction

Table 11: Test Score Impacts by Medium of Instruction of Private School Attended (Instrumental Variable Estimate)

	Telugu score	Math score	English score	Science and social studies score	Hindi score	Combined across tests	Combined - Math and Science and social studies
	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Students attending private English medium schools	-0.393*	-0.517**	0.607*	-0.377	1.464***	0.133	-0.448*
	(0.237)	(0.263)	(0.363)	(0.313)	(0.263)	(0.217)	(0.270)
Students attending private Telugu medium schools	0.247	0.281	0.014	0.733**	1.222***	0.499**	0.502*
	(0.209)	(0.248)	(0.221)	(0.297)	(0.243)	(0.196)	(0.265)
Total observations	4,161	4,161	4,008	4,025	1,605	17,960	8,186
Treatment observations	1,581	1,582	1,520	1,538	812	7,033	3,120
Control observations	2,580	2,579	2,488	2,487	793	10,927	5,066
First-stage F-stat on first regressor	9.4	9.5	9.6	9.3	9.1	9.7	9.4
First-stage F-stat on second regress	17.0	17.0	17.1	17.2	16.2	17.6	17.2
P-value of equality by medium	0.07	0.06	0.19	0.03	0.57	0.27	0.03

Heterogeneity by Extent of Competition

Table 12: Heterogeneous Impacts by Market Competition (Number of Private Schools within 1km)

	Year 4 assessments					
	Telugu score	Math score	English score	Science and social studies score	Hindi score	Combined across tests
	[1]	[2]	[3]	[4]	[5]	[6]
Number of Private Schools (Linear)	0.029	0.001	-0.017	0.001	-0.012	-0.001
	(0.024)	(0.026)	(0.032)	(0.030)	(0.030)	(0.021)
Number of Private Schools (Log)	-0.079	-0.030	0.023	-0.039	0.002	-0.043
	(0.049)	(0.052)	(0.067)	(0.055)	(0.059)	(0.060)
3 or more Schools (Top 25%)	0.046	-0.048	-0.063	-0.082	-0.127	-0.064
	(0.104)	(0.106)	(0.167)	(0.115)	(0.136)	(0.090)
5 or more Schools (Top 10%)	0.228*	0.127	-0.142	0.175	-0.030	0.061
	(0.126)	(0.146)	(0.174)	(0.157)	(0.163)	(0.118)
6 or more Schools (Top 5%)	0.457***	0.410***	0.170	0.449***	-0.156	0.264**
	(0.116)	(0.130)	(0.113)	(0.136)	(0.228)	(0.106)
Observations	4,378	4,378	4,215	4,237	1,689	18,897

Estimating Spill-over Effects

Table 13: Estimating Spillover Effects

	Year 2 assessments				Year 4 assessments				
	Telugu score	Math score	English score	Combined across tests	Telugu score	Math score	English score	Science and social studies score	Combined across tests
Panel A: Comparing the Within-Village to Across-Village Controls									
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Lottery Loser in Treatment Village	0.009	0.010	0.033	0.017	0.014	0.001	-0.049	0.095*	0.015
	(0.041)	(0.044)	(0.056)	(0.069)	(0.044)	(0.045)	(0.059)	(0.051)	(0.056)
Total observations	3,784	3,784	3,705	11,273	3,606	3,605	3,472	3,488	14,171
Panel B: Impact on Non-applicants from Government Schools									
Treatment village	-0.025	0.046	0.119	0.046	0.049	-0.002	0.024	-0.023	0.011
	(0.072)	(0.068)	(0.089)	(0.068)	(0.063)	(0.069)	(0.071)	(0.073)	(0.057)
Total observations	1,030	1,030	1,008	3,068	1,173	1,174	1,145	1,149	4,642
Panel C: Impact on Non-scholarship Students from Private Schools									
Treatment village	0.065	0.025	-0.114	-0.003	0.040	0.037	-0.026	0.029	0.022
	(0.062)	(0.074)	(0.076)	(0.061)	(0.062)	(0.059)	(0.104)	(0.073)	(0.057)
Total observations	1,386	1,386	1,346	4,118	1,522	1,521	1,463	1,468	5,974

Cost Effectiveness

- In the absence of labor market outcomes, we have no good basis for weighting test scores by subject
  - We follow Kling, Katz, Liebman (2007) on multiple outcomes
- But, can clearly see that the private schools are more productive
  - Achieve same test scores on math/language with considerably less instructional time
  - Use the extra time to improve outcomes in other subjects (esp. Hindi)
  - Private schools even more productive without disruption of language
- Cost-effectiveness comparison is even more striking when we look at the relative costs
  - Mean private school costs are less than one third that in public schools
  - Voucher value was at the 90th percentile of fee distribution and hence equal to 40% of per-child spending
  - So private schools spend much less and deliver more value addition

Summary of Main Results

- Private schools are much more productive and cost-effective than public schools in India
  - Same scores with less time on the main subjects; use extra time to raise test scores on other subjects; cost ~1/3 per child as public schools
- No significant spillovers on non-applicants and students in private schools
  - Important for RtE Act as well as global literature
- Important heterogeneity by medium of instruction
  - Private schools are even more productive when no disruption in language of instruction
  - Important trade-offs to switching to English-medium schools
- Centrality of accounting for school time use patterns for studies of school choice, vouchers, charters in general
  - Inference on effectiveness would be mistaken without doing this
  - Implications for existing research (voucher studies could be under-stating gains, and charter studies could be over-stating them)

Implications for Policy

- The RtE clause 12 provision on private school places could be a rare example of a policy that improves equity, and efficiency, AND does so at lower cost than the status quo
  - Test score gains for voucher winners
  - No negative spillovers on losers and potential gains in terms of inclusiveness in outlook and attitudes (Rao 2013)
  - Reimbursement to private schools capped at per-child spending
- Three important caveats:
  - Learning may not be linear (or even concave) in more money and time
  - Trade off between libertarian and paternalistic approaches to education (example of *why* do private schools choose the curriculum they do)
  - Benefits might be eroded if lottery-based student assignment is replaced with a selection-based regime (Macleod and Urquiola 2012)
- Policy implications for India and implementation of clause 12
  - Designing of transparent (lottery-based) allocation of places
  - Principles of regulation of private schools should be based on requiring disclosure and transparency rather than input norms

Implications for Research

- Our results highlight the centrality of accounting for time use in schools in studies of school choice, vouchers, charters, etc.
  - May need to look for more 'content-neutral' measures of outcomes
  - Importance of long-term follow ups to look at outcomes such as educational attainment, employment, and wages
- Test scores are only one part of the picture; need to also consider welfare gains from better choice and matching
  - Estimate demand for school characteristics (can identify with market-level experiment) and estimate changes in consumer surplus
- Important future questions for research (in this context):
  - How would private schools do if the value of voucher was set equal to the per-child spending in the public schooling system?
  - Better understanding of trade-offs of switching medium of instruction
  - Study theoretical properties of hybrid system envisaged under RtE
  - States are implementing as we speak - fertile area for more research