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HUMAN CAPITAL IN LOWER AND MIDDLE INCOME COUNTRIES

The Right to Education Act: Trends in Enrollment, Test Scores, and School Quality[†]

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The Right of Children to Free and Compulsory Education Act or Right to Education Act (RTE) was enacted in August 2009 by the Indian Parliament, mandating free and compulsory education to all children ages 6 to 14. With RTE now operational, India joined some 20 other countries including Afghanistan, China and Switzerland, which have laws guaranteeing free and compulsory education for eight years of elementary education (The Hindu 2010).

The purpose of such laws is to operationalize the idea of education as a fundamental human right, though that can mean different things in different countries. In India, the four most important provisions of the law are (i) government schools must be completely free for all children ages 6–14, (ii) no student can be expelled or held back before the completion of primary school (grade 8), (iii) 25 percent of private school seats must be held for disadvantaged students in the local area, and (iv) infrastructure and quality minimum standards, such as the provision of libraries and girls' toilets, and minimum teacher qualifications and pupil-teacher ratios must be implemented.

This paper examines what changes, if any, occurred in the Indian educational system after the passage of this potentially transformative law. We use three separate nationally representative datasets to corroborate the findings. We examine changes in student enrollment, test scores, as well as various school characteristics, such as student-teacher ratios and school infrastructure. We document four important trends in the national data: (i) school-going increases after the passage of RTE, though this increase is more pronounced in "primary activity" NSS data than in official enrollment statistics; (ii) test scores decline dramatically after 2010 in both math and reading; (iii) school infrastructure, including pupil-teacher ratios, appear to be improving both before and after RTE; and (iv) the number of students who have to repeat a grade falls precipitously after RTE is enacted, in line with the official provisions of the law.

Though a number of countries have passed laws like RTE around the globe, very little microeconomic analysis exists on the impact of these types of laws. Some of this is likely due to the fact that these laws are implemented at the country level at one point in time, so causal analysis is challenging due to a lack of a counterfactual. We face similar constraints in this paper, and do our best to corroborate findings across various datasets. However, we note that the results in this paper are correlational associations with the passage of RTE and should not be interpreted as causal.

I. Data Sources

We use three datasets to investigate changes in educational outcomes in the pre– and post–RTE world: two household surveys (ASER and NSS) and one administrative dataset collected by the Indian Ministry of Education (DISE).

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The Annual Status of Education Report (ASER) is a household survey implemented in almost every rural district in India and is representative at the district level. We use annual ASER data from 2005–2014. The survey consists of several questions about the education of each child, including current enrollment status. We denote a child as enrolled if he or she reports being "currently enrolled" in school, and zero if he or she reports having dropped out or has never enrolled in school. ASER also tests each child in the household ages 5–16 on a total of four basic math and reading skills. Math score ranges from 0–4, where 1 is "can recognize numbers 1–9," 2 is "can recognize numbers 10–99," 3 is "can subtract two-digit numbers," and 4 is "can divide two-digit numbers." Reading scores range from 0 to 4, where 1 is "can recognize letters," 2 is "can read words," 3 is "can read a paragraph," and 4 is "can read a story." The test scores are constructed as in Shah and Steinberg (2017). Reading score is measured in the local language. The test is administered to each child in the household regardless of current school enrollment status, and the same test is given to each child regardless of her age.

The National Sample Survey (NSS) is a nationally representative household survey that is conducted on a regular basis by the National Sample Survey Organisation (NSSO), which is under the Ministry of Statistics and Program Implementation of the Government of India. The NSS gathers nationally representative information on household structure, consumption, and production. We use data from schedule 10, rounds 62, 64, 66, and 68 giving us annual household data from 2005 to 2012. The survey asks each member of the household for their primary activity, including children, and we use this to measure school enrollment. We define a child as attending school if they report their primary activity as "attends school," and zero if they report another activity (such as market work, home chores, or being idle).[1] In the main analysis, we use both urban and rural households but in the online Appendix we show that the results are robust to the rural sample only to be consistent with ASER data.

The District Information System for Education (DISE) data are a census of schools conducted yearly by the Ministry of Education. This census, aggregated to the state level, is publicly available for download at udise.in. We use annual data from years 2005–2014. The census includes variables such as total enrollment numbers by standard (grade) and type of institution (public or government versus private) and information about the school, including infrastructure (i.e., latrines), number of teachers (and their education levels), number of students who repeat a grade, etc. The DISE collects enrollment numbers (not rates), and while it is purportedly a census of schools, there are some well-known issues with both completeness and quality of the data.[2]

We use NSS and DISE data starting in 2005 to remain consistent with the ASER data (which starts in 2005). There is no NSS schedule 10 data between 2013–2014, so the last year of NSS data is 2012. We restrict all analysis to children ages 6 to 16 since RTE is binding from ages 6 to 14. We include children aged 14–16 as RTE stipulates that children must be entitled to free education until the completion of elementary education even after the age of 14. Table 1 displays the means of all variables of interest by three time periods: pre-RTE (2004–2008), during RTE transition (2009–2010), and post-RTE (2011–2014).

II. RTE and Changes in Enrollment

To investigate the changes in educational outcomes before and after RTE, we show a series of figures that graph β_t from the following regression:

$$(1) \quad S_{ijt} = \alpha + \beta_t \cdot year + \gamma \mathbf{X}_i + \delta_j + \epsilon_{ijt},$$

where β_t is a vector of the coefficients for each year, $\mathbf{X}_i$ is a vector of child age and sex fixed effects, and δ_j is a vector of district fixed effects. Regressions are clustered at the district level, and 95 percent confidence intervals are shown as bars in the figures. The omitted year is 2008. In the DISE data (which we have at the state level), we include state fixed effects and cluster at the

[1] This is the same definition as in Shah and Steinberg (2015).

[2] For example, see https://blog.socialcops.com/intelligence/data-stories/dise-education-data-failing-us/.

TABLE 1—SUMMARY STATISTICS FROM THREE DATA SOURCES

	Pre-RTE 2004–2008			Transition 2009–2010			Post-RTE 2011–2014		
	Mean	SD	Observations	Mean	SD	Observations	Mean	SD	Observations
ASER									
Enrolled	0.927	0.260	2,139,648	0.936	0.245	1,075,007	0.936	0.245	1,902,958
Math score	2.70	1.26	2,021,299	2.71	1.27	1,010,941	2.42	1.29	1,637,007
Read score	2.79	1.38	2,031,465	2.87	1.32	1,017,423	2.70	1.43	1,641,179
Teacher absence	0.120	0.196	11,642	0.130	0.208	25,886	0.147	0.227	55,628
NSS									
Attends school	0.847	0.360	225,966	0.907	0.291	107,403	0.927	0.260	104,485
DISE									
Enrollment (10,000)	524.8	690.8	136	554.6	720.2	68	579.3	773.2	136
Student-teacher ratio	28.4	11.1	136	26.0	10.1	68	22.1	9.4	136
Girls' toilet (10,000)	1.63	2.72	136	2.73	3.63	68	3.64	4.79	136
Teacher lower (10,000)	6.71	7.50	136	7.16	8.05	68	7.23	8.24	136
Teacher higher (10,000)	8.31	10.7	136	10.4	12.9	68	14.1	17.0	136
Repeaters (10,000)	32.2	50.0	136	23.8	39.3	68	9.6	22.7	136

Notes: This table shows summary statistics of the main outcome variables used in this paper from three data sources. "Teacher lower" is the number of teachers with less than a high school diploma. "Teacher higher" is the number of teachers with at least a high school diploma. Enrollment, girls' toilets, teacher lower, teacher higher, and repeaters are the total number in each category, in a given state, in 10,000s. The Right to Education Act was passed in 2009, though not fully implemented until 2010.

Source: ASER 2005–2014; NSS Rounds 62, 64, 66, and 68 (2005–2012); DISE 2005–2014

state level and do not include individual characteristics (X_i). For the DISE enrollment Figure 1 (panel C), we simply graph the total numbers of students enrolled in each year.

Figure 1, panel A shows the estimates of the rates of attending school in the NSS, while panel B shows enrollment rates as measured in the ASER data. It is worth noting that these two variables are not measuring the exact same thing: from 2004–2008, 85 percent of children ages 6–16 in the NSS report attending school as their primary activity, while 93 percent of children ages 6–16 report being currently enrolled in school in ASER. In addition, enrollment (in ASER) is likely to have a lagged effect, because children will report being enrolled in school even if they no longer attend, until the new school year begins.

The NSS data show a clear increase in the rate of attending school after 2008 (5 percentage points in 2010), which is sustained until 2012 without much of a pre-trend before 2008. ASER data show a much smaller increase (1 percentage point in 2010), though there is a similar increase between 2006 and 2007, prior to the enactment of RTE. Using the raw DISE data, panel C shows total enrollment numbers per million students by year in India. As in ASER, there appears to be an increase in enrollment numbers in 2010, though enrollment is increasing sharply before RTE is implemented, so the effect of RTE (separate from underlying trends) is less clear. In Figure A1 in the online Appendix, we restrict the NSS and DISE sample to rural areas only (to be consistent with the ASER data), and the results for the NSS look fairly similar while the DISE enrollment increase is smaller in the rural sample.

Figure A2 (online Appendix) shows the same plots, broken up roughly by primary and secondary age children. Panels A and B separate by age, while panel C separates by grade, due to data constraints in the DISE. In all three panels, it is clear that the increases in schooling in Figure 1 appear to be driven by the older children (ages 13–16 or upper primary). In Figure A3 in the online Appendix, we show that the increase in enrollment seems to be driven by private schools but the underlying trends (increase in private and decrease in government enrollment) make it difficult to attribute this change to the RTE. In Figure A4 in the online Appendix, we plot the enrollment changes by quartile of enrollment in 2008. The largest increases are coming from areas that had lower enrollment in 2008.

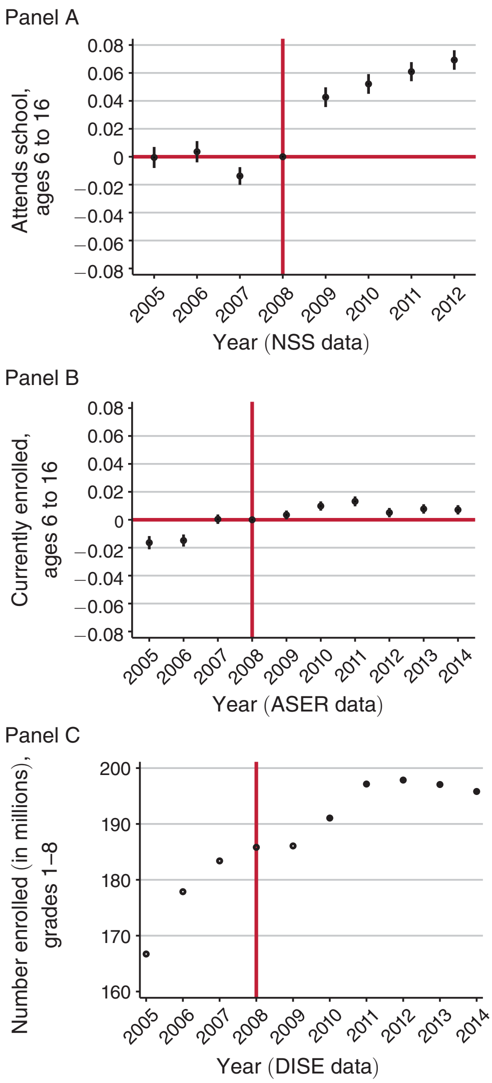

Figure 1. RTE and Enrollment: A Snapshot from Three Datasets

Notes: This figure shows β_t from an OLS regression of equation (1) on two measures of enrollment (NSS and ASER) and raw enrollment numbers (DISE). "Attends school" is equal to one if the child lists attending school as his or her primary activity, and zero if he or she lists another primary activity. "Currently enrolled" is equal to one if the child reports being enrolled in school, and zero if he reports having dropped out or never enrolled. "Number enrolled" is the average of the total number of students enrolled. NSS and ASER regressions contain district, age, and sex fixed effects and are clustered at the district level. Additionally, 2008 is the omitted base year. Ninety-five percent confidence intervals are shown for ASER and NSS regressions.

Source: ASER 2005–2014; NSS Rounds 62, 64, 66, and 68 (2005–2012); DISE 2005–2014

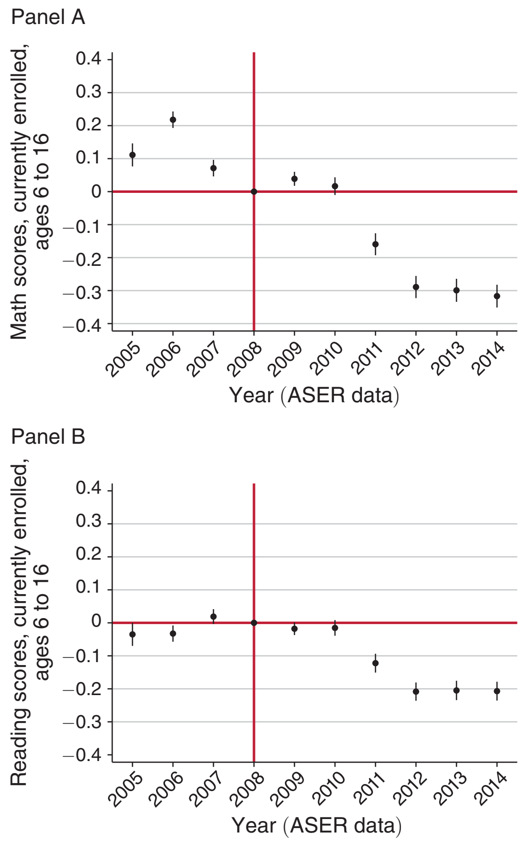

Figure 2. RTE and Test Scores of the Currently Enrolled

Notes: This figure shows β_t from an OLS regression of equation (1) with their respective 95 percent confidence intervals. Math score and read score range from 0–4. Additionally, 2008 is the omitted base year. All regressions contain district, age, and sex fixed effects and are clustered at the district level.

Source: ASER 2005–2014

Table A1 (online Appendix), panel A shows the enrollment results for each dataset from a regression identical to the one above, but with a single "post-2008" dummy replacing the vector of year fixed effects. In all three datasets, enrollment increases significantly after 2008. Enrollment increases from approximately 1–1.5 percent (ASER and DISE) to 7 percent (NSS) in the post-RTE period. Panel B shows results by gender using the NSS and ASER data. In both datasets, the magnitude of the change in enrollment is larger for girls (panel B).

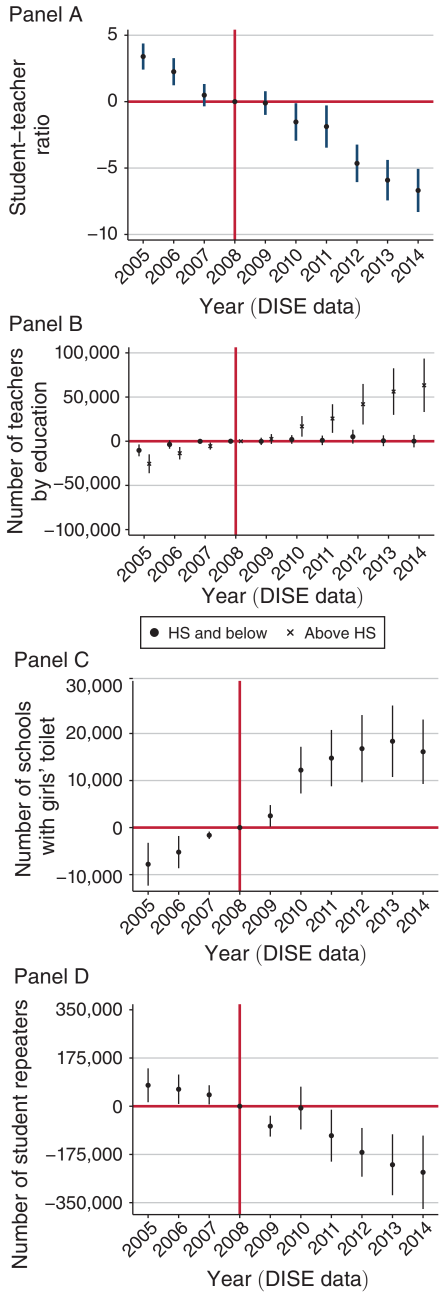

Figure 3. RTE and School Quality Measures

Notes: This figure shows β_t from an OLS regression of equation (1) with their respective 95 percent confidence intervals. Additionally, 2008 is the omitted base year. All regressions contain state fixed effects and are clustered at the state level.

Source: DISE 2005–2014

III. RTE and Changes in Test Scores and School Quality

Next, we examine trends in test scores around the time of RTE implementation in Figure 2. Interestingly, we see both math and reading scores drop sharply in 2011, two years post-RTE. The scores drop again in 2012 and then remain at that lower level through 2014, the last year in our data. The results in panel C of Table A1 in the online Appendix suggest that math test scores drop by about 25 percent of a standard deviation, and reading drops by about 10 percent of a standard deviation post-RTE. This is a large effect, comparable in magnitude to some of the most successful educational interventions in this context (Banerjee et al. 2007). The timing of the effect comes after the increase in enrollment, which is not surprising, since test scores might represent a stock of knowledge gained in the previous year(s). One might be worried that the test scores results are being driven by a changing composition of students taking the test. Figure 2 includes only children who are currently enrolled in school, but Figure A5 in the online Appendix includes all children (currently and never enrolled and dropped out). Both figures are surprisingly similar suggesting that compositional changes in children are not driving the decrease in test scores.

To understand these changes in enrollment and test scores, we turn to the aspects of schooling that might be associated with RTE. If enrollment is increasing and school capacity is not, this might crowd classrooms and increase student-teacher ratios. RTE at least nominally required schools to decrease pupil-teacher ratio in primary schools to less than 40 (less than 30 in most schools) and to provide infrastructure such as gender-specific toilets and libraries (KPMG 2016). In Figure 3, we show estimates from regressions using DISE data on four measures of school quality/infrastructure: student-teacher ratio, number of teachers by education (high school and below versus above high school), number of schools with girls' toilets, and number of student repeaters. Again, we graph the coefficients on the year dummies with their respective confidence intervals. All regressions include state fixed effects and are clustered at the state level. In panels A–C, broadly speaking, school quality seems to be improving over time by all three measures. It is not clear how much of this improvement is due to RTE, since all three measures are trending "better" both before and after RTE, but it at least appears that RTE does not reduce school quality to the extent that we can measure it. This is consistent with Muralidharan et al. (2017) who also show substantial improvements in input-based measures of school quality during this period in India.

IV. Discussion and Conclusion

The changes in enrollment, test scores, and school quality measures should be interpreted cautiously. Though some changes appear to coincide with the passage of RTE, this paper is not designed to provide causal estimates of the law on educational outputs.

However, if we assume at least some of the test score drop is due to RTE, our results present a bit of a puzzle. Enrollment seems to be increasing moderately over this time, while test scores are decreasing. The natural explanation for this would be overcrowding: more students increase classroom size and this decreases learning. However, Figure 3 (panels A and B), show that the student-teacher ratio is decreasing during this period so schools are hiring more teachers and teacher education is increasing. To the extent that we can measure infrastructure and resources per student, they seem to be getting better, not worse.

There are several alternative explanations that could help to explain this pattern. First, a large component of the RTE was designed to subsidize the entry of historically disadvantaged students into private schools. This might have changed the composition of students in both public and private schools (Hsieh and Urquiola 2006), and this change could have led to changing pedagogical strategies in some private schools with large influxes of lower ability students (Neilson 2017, Bau 2017). In addition, the influx of out-of-school students into schools could have caused negative peer effects in government schools. In Figure A6, we show the test score decline by public (government) and private schools using the ASER data. We observe that the decrease is happening in both types of schools, though it is larger in government public schools. Muralidharan et al. (2017) argues that teacher absenteeism actually worsens with decreased pupil-teacher ratios in India, and indeed, in Figure A7, we see a modest increase in teacher absenteeism over this time period.[3]

The other aspect of RTE that seems most likely to have lowered test scores is the lack of testing and universal promotion of students in primary school. We observe that the overall number of repeaters is decreasing quite significantly during this time period (panel D, Figure 3). It is possible that this "social passing" leads to decreased learning for students who are not prepared for upper level courses, worsening the problem of instructional mismatch in Indian classrooms (Muralidharan, Singh, and Ganimian forthcoming; Duflo, Dupas, and Kremer 2011; Bau 2017). It is also possible that the lack of high-stakes testing itself decreases the incentives for learning for both teachers and students (Banerjee and Duflo 2015).

These explanations are not exhaustive, nor are they mutually exclusive. Whatever the reason, it is clear that test scores have declined sharply in India since 2011, two years after the passage of RTE. We leave it to future research to conduct a more careful study of the mechanisms that may have caused this decline and how much is related to RTE.

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[3] The data from this figure comes from the ASER school survey, which is available in fewer pre-RTE years and, while a large sample, is not representative of Indian schools.

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