Can Greater Access to Education Be Inequitable? New Evidence from India’s Right to Education Act[[1]](#footnote-1)

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# Abstract

India moved to a constitutional guarantee of universal basic education with the Right to Education (RTE) Act in 2009 that called for full access of children aged 6-14 to free schooling. This paper considers the offsetting effects from induced expansion of private tutoring that limited gains in educational equity from RTE. The character of the supply-constrained Indian schooling system implies that educational decisions are best thought of as a very large, hierarchical tournament, where private tutoring can advantage participants in the tournament to gain entry into high quality schools at the next level. We develop a unique database of registrations of new private educational institutions offering tutorial services by local district between 2001-2015. We estimate the causal impact of RTE on private supplemental education by comparing the growth of tutorial institutions in highly competitive educational markets to that in less competitive educational markets. We find a strong impact of RTE on the private tutoring market and show that this holds across alternative definitions of highly competitive districts and a variety of robustness checks, sensitivity analyses, and controls.

Key words: India, education for all, private tutoring, shadow education

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# Introduction

Decision makers in virtually all countries of the world see developing human capital as key to future economic prosperity, but they face uncertainty about what policies will best meet the sometimes-conflicting goals of expanding access, improving quality, and lessening disparities in their schools. This conundrum is most severe in developing countries where resource constraints are binding. Governmental policy dilemmas are further complicated by the fact that individuals affected by government educational programs respond to the incentives they see and take actions that could either reinforce or neutralize the program. This paper investigates the private responses to India’s rapid expansion of educational access. In particular, we evaluate whether the equity enhancing impacts of increased access to elementary and middle schools are offset by any increased utilization of private tutoring induced by the new schooling guarantees.

All of the issues of access, quality, and private reactions came into play when India passed a 2009 constitutional amendment ensuring a “right to education” for all and set in motion both public and private adjustments to new educational policy requirements. India’s Right to Education Act (RTE) established a right for all children to pursue basic education (up to eighth grade). Government schools had to be entirely free, and students could neither be retained in grade nor expelled. It also set minimal input quality standards defined by physical facilities, teacher background, pupil-teacher ratio (PTR) and maximum class sizes, and it required private schools to accept poor students up to one-quarter of their student body at first grade.

Our primary interest is not the direct impact of RTE but the causal impact of RTE on the expansion of supplemental educational services, primarily through private tutoring. Large scale private tutoring is common in many countries of the world (Bray (1999), Kim and Jung (2019), Zhang and Bray (2020)). This supplemental education is often called “shadow education,” reflecting the close connection to and dependence on the government education system and its learning objectives. There are continuing debates across countries about the pros and cons of such quite-common systems of educational supplementation.

There is no disagreement, however, that private tutoring leaves out a portion of the population that cannot afford the tuition. Importantly, this excluded population is precisely the focus of the Right to Education Act, implying that private responses could directly offset at least a portion of the government actions designed to promote more educational equity.

Our empirical analysis employs a difference-in-differences approach to estimate the causal impact of the RTE on the expansion of private tutorials. Our identification strategy builds on prior analyses that point to individuals’ use of private tutoring to prep for high-stakes exams and thus to gain a competitive advantage over peers (Kim and Lee (2010), Azam (2016), Bray (2017), Ghosh and Bray (2018), Bhorkar and Bray (2018)). This competitive motivation is particularly relevant for the highly selective and hierarchical schooling system in India. Indeed, Muralidharan (2019) concludes simply that “the majority of the [Indian] education system is driven by ‘sorting’ rather than ‘human development’” – with attending one of the limited number of elite post-secondary institutions being the ultimate prize.

Each level of the Indian school system can be thought of as part of a set of sequential elimination tournaments where successful progress is determined by relative performance on high-stakes examinations. RTE increased the size of the educational tournament suddenly and significantly. This expanded rivalry, while explicitly only affecting the lower rungs of the educational ladder, introduced new competition for attendance at all levels of elite feeder schools.[[5]](#footnote-5) And, in this we expect to see the clearest impact of RTE in locations where the competition and demand for high quality education was high prior to RTE.

Our main analysis focuses on the expansion of private tutoring in districts where the Indian Parliament had previously established Institutes of National Importance (INI). These highly selective institutions of higher education are the premier institutions in the fields of medical sciences, engineering, technology, management, architecture and others.[[6]](#footnote-6) While open to national admissions, they have been shown to have a sizable impact on the local demand for primary and secondary schooling (Jagnani and Khanna (2020)) that goes far beyond any expectation of admission to the local elite university. Moreover, the elite universities provide a direct signal to local residents and secondary schools about the central role of competitive admissions. The costs of movement and cultural similarities plus informational asymmetries induce a regional stickiness of students in each region’s elite feeder institutions. The overall increased competition from expanded school access after RTE would be expected to reinforce the prior levels of peer competition and to induce a relatively larger household response in these particularly competitive districts.[[7]](#footnote-7) We label these INI districts as educationally-competitive districts and compare expanded consumer reliance on private tutorials in them to that in districts without such institutions, where the tournament pressures are less.

The analysis builds on a newly-constructed original database of educational start-ups. This database tracks the entry of private tutorial centers across 374 (U.S. county-like) districts in 30 states/union territories of India. It uses official monthly administrative statistics compiled by the Ministry of Corporate Affairs of the Government of India (GoI) on firm registrations in the education sector between 2001 and 2015. These data are merged with information on existing district demographic and economic characteristics.

Both the raw data and the results of more sophisticated difference-in-differences estimation of the expansion of private tutoring support a conclusion that RTE led to a strong competitive/selection response to expanding school access. This increase is again best thought of as a result of the sequential tournament nature of Indian education.

Before enactment of RTE, the pattern of opening of new private tutoring centers was the same for the educationally-competitive and the less-competitive districts, but the pattern diverged sharply afterwards. We find that the number of private tutoring centers, called tuition centers in India, expanded at a monthly rate of 11 per billion persons in our educationally competitive districts (compared to less competitive districts). For the post-RTE period through 2015 this conservatively implies an expansion of tuition students in the 39 districts with premier institutions of over 114,000. Underscoring the degree of educational competition, although India has a wide range of tertiary schools, the premier institutions themselves enroll in total less than ten percent of this induced growth of new tutoring students. Thus, the real focal point of the competition is not the premier institutions per se but on the lower levels that are still extremely competitive institutions. The dramatic expansion of private schooling (Kingdon (2020)), much in the low-fee category, has not lessened competition throughout the lower secondary level and above for the elite schools that open up better quality institutions of higher education.

We also examine the effects of RTE on the entry of other educational units, i.e. private schools and higher educational institutions (HEI). We find an increase in private school registrations associated with the introduction of RTE.[[8]](#footnote-8) We also find an increase in new registrations of higher educational institutions in our main specifications, but this is not consistent across the robustness checks. The overall weaker results in these alternative educational providers may simply reflect variation in entry costs, since entrepreneurs need to procure licensing and permissions from local or state government, something that is much less burdensome for tuition centers.

In robustness analysis, we use alternative definitions of educationally-competitive districts: those with pre-existing registrations of tuition centers, private school, or higher education institutions between 1991 – 2000, and those with a narrower set of elite education institutions. Additional robustness checks consider alternative allowance for the varying population size of districts and the staggered nature of implementation of RTE in India by state. For each, we find consistently strong causal evidence that RTE induced an expansion of private tutoring.

Finally, using descriptive evidence from the India Human Development Survey (IHDS) dataset, we establish how the competitive margin plays a role in increasing the demand for tuition centers from households in competitive districts. These household data thus help to explain the increase in tuition centers registrations evidenced from our primary regression estimates.

Unfortunately, data limitations hinder attempts to trace the effect of RTE and of private tuition centers on student outcomes. Shah and Steinberg (2019) describe declining achievement in India since RTE but are unable to establish a clear link to RTE. Both the IHDS and the Annual Status of Education Report (ASER), the most complete existing data on performance, have severe limitations for our purposes and provide ambiguous pictures of achievement as related to the private tuition expansions.

Significant related parts of the Indian education system, most importantly unregistered schools and tuition centers, remain unexplored due to lack of data. However, these most likely make the current estimates of equity impacts lower bounds.

In the next sections, we provide an overview of Indian education along with a discussion of the historical pattern of private tutoring. Section 3 describes the tournament structure of Indian education along with existing literature. Section 4 presents our empirical strategy, and section 5 describes the construction of our database. Sections 6 and 7 provide the main empirical results and the robustness analyses, respectively. These are followed by a consideration of achievement outcomes and a concluding discussion.

# Education in India

The educational challenges to India are well known. While India has not been a recent participant in international testing, the available evidence consistently leads to a conclusion of low overall performance. Das and Zajonc (2010) construct tests that are comparable to the TIMSS assessments and find that students in the states of Odisha and Rajasthan perform very poorly in international comparisons, particularly at the lower parts of the achievement distribution. Students in Himachal Pradesh and Tamil Nadu states participated in the 2009 PISA tests and ranked at the bottom of the world distribution (Hanushek and Woessmann (2015b)). Finally, Singh (2020) documents the low productivity of Indian schools (in Andhra Pradesh state) compared to schools in Vietnam and Peru.

In 2000, just 86 percent of Indian children were in primary schools, and the survival rate to grade 5 was 47 percent (UNESCO (2003)), underscoring India’s longstanding challenge in providing broad access to schooling. With the worldwide push for expanded access in the Educational for All Initiative (UNESCO (2000a)), India began a push for universal access.

## 2.1 The Right to Education Act of 2009

An important element of India’s national policy moves toward expanded educational access was the Right to Education Act. Passage of this followed a complicated path described in Appendix A, but the key features for our purposes are easily summarized. In 2002, there was discussion of adding the 86th amendment to the constitution to introduce Article 21(a) that held that “the State shall provide free and compulsory education to all children of the age of six to fourteen years in such manner as the State may, by law, determine.”[[9]](#footnote-9)The RTE Act was first presented to the Indian parliament in 2006, but it was rejected with lack of funds cited as the official reason.[[10]](#footnote-10)However, the RTE Act gained approval from the Union Cabinet in 2008 and then passed through the Lower and Upper Houses of parliament in July and August 2009, making it national law.

Subsequently, the state governments implemented the RTE Act by passing it in their own state legislatures, although not all states passed the Act in their legislatures at the same time. (See Appendix Table 1 for details about the time of each state’s legislative enactment). The last states passed it in 2012, three years after its enactment in the Indian Parliament.

RTE ensured that every child between 6 to 14 years has a right to admission in every neighborhood school but does not mandate that a child must access only neighborhood schools.[[11]](#footnote-11) Further, any private unaided schools in the neighborhood must allocate 25 percent of its seats at the entry level (class 1) for economically weaker sections and disadvantaged groups with the compensation to the private schools for the added costs coming from the government.[[12]](#footnote-12)

RTE mandated that all schools offering primary and upper primary education must have good infrastructure in terms of a weather-proof building, boys’ and girls’ toilets, drinking water, ramps for handicapped children, a library and so on. It specified quality indicators such as pupil-teacher ratio below 1:30 for primary and 1:35 for upper primary section. The qualification of teachers, their working hours, and duties were also specified in RTE.

Although passed nationally in August 2009, only ten states enacted state RTE rules by 2011 (Taneja et al. (2011)). It was not until early 2012 that all states and union territories had drafted RTE rules, and compliance remained poor across all the states through 2015 (Sachdeva et al. (2015)). This variation in initial implementation also appears in subsequent adherence to the various quality mandates of the Act (see Appendix A). Nonetheless, perhaps unsurprisingly, there does appear to be stronger enforcement of the quality provisions in the private school sector as opposed to the government school sector.[[13]](#footnote-13)

While the data are imperfect, Shah and Steinberg (2019) document a series of trends associated with the RTE.[[14]](#footnote-14) They conclude that RTE was associated with significant increases in student enrollments along with a continuation of movement out of government schools and into private schools. Although not directly attributable to RTE, both Kingdon (2020) and Shah and Steinberg (2019) find significant declines in government school students after RTE that were matched by significant increases in private school enrollment over the same period. Shah and Steinberg (2019) also show that the increase in overall attendance was driven by increases from older students (age 13-16). ASER achievement data for rural populations show significant declines in achievement following RTE with larger declines found in government compared to private schools (Kingdon (2020),Shah and Steinberg (2019)).[[15]](#footnote-15)

## 2.2 Shadow Education in India

Our primary interest is investigating the extent to which the expansion of access to schooling – an equity-enhancing move by the government – induced better off families to seek private education supplementation in order to secure a competitive advantage – an offsetting equity-reducing action by the families. The Indian schooling system is very hierarchical and relies on a series of examinations at multiple points in the schooling process to determine continuation and placement of students. Private tutoring is one way in which better off families can maintain a competitive advantage in school placement in the face of increased competition.

Prior judgments about the desirability of shadow education reflect the considerable heterogeneity within and between countries in both form and outcomes (Bray (1999), Kim and Jung (2019)).[[16]](#footnote-16) Critics suggest that these private tutoring schools reinforce and perpetuate social inequities and at times may even distort instruction in the traditional schools. Supporters point to the increase in learning and human capital produced by them along with the possibility of even reducing the load on the traditional teachers.[[17]](#footnote-17) This range of opinion suggests that overall judgements about the impact of shadow education rest on the balance between impacts on learning outcomes and impacts on the distribution of outcomes. As a result, government responses to private tutoring range from outright bans on private tutoring to active government encouragement (Dang and Rogers (2008)).[[18]](#footnote-18)

In India, there has been a long tradition of private tutoring – called “private tuitions”– since the 1980s (Azam (2016)). A gradual increase in accessing private tuition by students across the different education levels led to 13, 20, 30 and 31 percent of students attending primary, middle, secondary and senior secondary levels,[[19]](#footnote-19)respectively, by 2007-08. There also exists large variation across the 29 states and 7 union territories in India. West Bengal leads with 75 percent of students accessing private tuition, and Mizoram is at the other end of the spectrum with 3 percent in 2014 (Government of India (2016)).

Analyses in both India and other countries point to varying motivations for participation in private tutoring, but they invariably bring up competition for further education. A recent report indicated that parents in India lack trust in government schools and spend as much as 35 percent of household income on private schooling and supplemental education.[[20]](#footnote-20) The Indian data show relatively higher numbers of students employ private tuitions when they attend tenth and twelfth grades. These grades have high-stakes examinations that are an important determinant to each student’s pursuit of desired academic streams at the tertiary level and of chances to gain entry in more prestigious higher education institutions. For example, Ghosh and Bray (2018) find in a sample of students from Bengaluru, India, that the top reason for participating in private tutoring was to score high marks on examinations, a response of 80 percent of Grade 10 students. But, competition for higher quality feeder schools is clearly evident from the participation in private tutoring at lower levels where high stakes exams for admission to the next level broadly exist.

Similarly, in assessing the rise in private tutoring in West Bengal (the largest state of usage of private tutoring), Amartya Sen (2009) notes:

*Underlying this rise is not only some increase in incomes and the affordability of having private tuition, but also an intensification of the general conviction among the parents that private tuition is “unavoidable” if it can be at all afforded (78 per cent of the parents now believe it is indeed “unavoidable” - up from 62 per cent). For those who do not have arrangements for private tuition, 54 per cent indicate that they do not go for it mainly — or only — because they cannot afford the costs.* (p. 13)

From surveying parents in 2008/09, the Pratichi (India) Trust reports: “The felt need of private tuition was so high that even in schools where parents thought that the performance of the teachers were extraordinarily good also thought that private tuition was still needed for ‘even better performance of the children’.” (Pratichi Research Team (2009))

Azam (2016) also describes the role of elite universities in stimulating private tutoring, a factor motivating our analytical approach:

*The post-secondary institutions and programs remain highly stratified, with some offering much greater rewards (such as Indian Institute of Technology or All India Institute of Medical Sciences), hence demand for private supplementary tutoring during the years of senior secondary schooling remains intense. With the massive expansion of elementary education over time, the growth in number of seats in these premier institutions has not kept pace with the growth in number of students seeking admission in these institutes, resulting in much fiercer competition for the limited seats.”* (p 749)

The hierarchical structuring of education system leads to linkages between primary, middle and secondary education. The students’ performance at the transition points, grade 5 at primary level and grade 8 at middle level, becomes critical, and assessments of performance at these points act as gatekeepers to access to secondary education (Jha et al. (2019)). Given this, the desire to score higher marks in the high-stakes examinations at the secondary level dovetails with parents’ beliefs of the necessity of private tutoring at primary and middle levels. Thus, the perceived necessity of private tutoring permeates Indian primary and middle levels as well.

The private, for-fee nature of this tutoring has obvious implications for the distribution of access. Azam (2016) reports that for 2007/08, private tuition expenditure averaged 16.5 percent of per capita consumption, and this rose to 28.5 percent at senior secondary level. Thus, it is not surprising to find that at the secondary level, only 21.6 percent of students in the poorest quintile purchased private tutoring while 38.8 percent of students in the top quintile did. This compositional aspect of private tutoring in India underscores its potential for nullifying portions of the impact on educational equity from the provision of greater access to schooling.

# India’s Educational Tournament

Schooling decisions are commonly viewed through the lens of individual human capital investment models. In these, individuals choose a level of investment in schooling to maximize lifetime income or schooling (e.g., Heckman (1976), Rosen (1976)). The underlying theoretical models are entirely demand-driven with little explicit attention to either school supply or school quality.

These demand-driven models do not adequately capture schooling decisions in highly supply-constrained systems such as India. The Indian education system is a mixture of public and private schools where promotion to higher levels depends importantly on common test results and where admission to the highest quality schools throughout the hierarchy is very competitive. As such, it is best characterized as a large, multistage tournament. The question here is whether expansion in the size of the tournaments (through RTE) leads to more use of private tutoring. Existing theoretical and empirical results for tournament models provide some insights into schooling phenomena in India, but much also remains as open empirical questions.

A variety of aspects of tournaments have been investigated theoretically, experimentally, and observationally. The seminal work in the economics of tournaments is Lazear and Rosen (1981) who described pay under labor contracts based on rankings of workers rather than their productivity. The subsequent extensive study of tournament outcomes has ranged from analyses of promotions in firms to the outcomes of automobile races, and a variety of reviews assess this work (Connelly, Tihanyi, Crook, and Gangloff (2014), Dechenaux, Kovenock, and Sheremeta (2015)).

The standard formulation is that agents can win a prize based on their performance relative to other competitors. Each agent can change the probability of winning through costly effort, and effort plus some randomness (luck) determine the winner. In our context, families invest in private tutoring in order to improve test performance and thus to increase the probability of admission to high quality schools at the next level.

The most salient literature for our analysis of the demand for tutoring considers the size of tournaments, the role of heterogeneity of contestants, and the impact of hierarchical, multistage tournaments.[[21]](#footnote-21) The experimental evidence indicates that multistage tournaments will produce more effort than single stage tournaments (Sheremeta (2010), Dechenaux, Kovenock, and Sheremeta (2015)). Moreover, from empirical study, while ability differences may be more important in earlier stages, effort is more important in later stages (O'Neill and O'Reilly (2010)), thus corresponding to greater use of tutoring in the higher grades.[[22]](#footnote-22) But the predicted impacts of tournament size on effort are less clear and consistent for our application. In particular, the size-related experiments involve very small tournaments (invariably less than 10 contestants), and the experimental results are significantly affected by the structure of the experiments. For example, Orrison, Schotter, and Weigelt (2004) suggest that effort will fall as the probability of winning increases, but Dechenaux, Kovenock, and Sheremeta (2015) and List, Soest, Stoop, and Zhou (2020) conclude that the effort level may go up or down, depending crucially on the amount of risk aversion, the pattern of luck, and the structure of prizes.

The most common empirical application of tournament models focuses on labor market outcomes and various observed patterns of promotions and pay. One particularly relevant and innovative experimental application of tournaments by Lavy (2009, (2013) provides bonuses to Israeli teachers based explicitly on a ranked-outcome tournament. This large scale, real-world investigation of tournaments in schools (albeit for teachers rather than students) provides suggestive evidence that increased competition leads to more effort.

Nevertheless, because of the special features of the schooling competition in India, the existing literature on tournaments does not yield clear predictions of the impact of expanding the size of the Indian school tournaments. The educational tournaments are much larger in scale, incorporate participants of widely varying skills, and run in areas with varying competitiveness for the high-quality schools. Incorporating these features into simple theoretical models or laboratory experiments is not feasible. As a result, we turn to the direct estimation of how dramatic increases in tournament size (RTE) affect student effort (private tutoring).

# Analytical Approach and Identification

The significant expansion of access to schooling with RTE offers an opportunity to investigate the strength of competitive forces in driving up private tutoring, which in the Indian context acts to counteract attempts to develop a more equitable schooling system. The main identification challenge arises from the concurrent introduction of RTE across all states in India, but the heterogeneity of existing competitiveness for quality schools provides a natural way to disentangle the impacts of the constitutionally-mandated expansion in school access.

Just seeing an increase in private tutoring after introduction of RTE does not establish that RTE caused the expansion. Changes in private tutoring could simply be a reflection of broader trends and forces arising from other causes and not necessarily from RTE. For example, Pratham, a nongovernment organization, began publicizing the results of a broad voluntary testing program of rural youth in 2005.[[23]](#footnote-23) This assessment program, the Annual Status of Education Report (ASER), was subsequently conducted annually and indicated some severe learning deficiencies that called for remediation. Increased private tutoring could simply reflect attempts to make up for problems of inadequate school quality as indicated by the ASER data and other information on the state of Indian schools.

As previously noted, the force of credentialism and competition is strong across broad income groups in India (Ghosh and Bray (2018), Muralidharan (2019)). But, in a tournament environment, increased school populations from the mandates of RTE would be expected to have a larger impact in areas where competition within cohorts for grades and for school entry is already high.[[24]](#footnote-24)

Our key to the identification of the causal effect of RTE on private tutoring is comparing changes in private tutoring in areas already having intense education competition to changes in areas with less competitive pressures. The anecdotal evidence for India cited previously and extensive U.S. analyses show that the geographical patterns of school attainment are highly influenced by the proximity of higher education institutions.[[25]](#footnote-25) Our main analysis leverages this intuition. We define highly-competitive districts as those containing one of India’s premier institutions, i.e., an Institute of National Importance such as Indian Institute of Technology (IIT), All India Institute of Medical Sciences (AIIMS), Indian Institute of Management (IIMs) and more.[[26]](#footnote-26) For our analysis, we consider the subset of districts where a premier institution was established before 2001 as educationally-competitive districts to ensure exogeneity to the introduction of RTE. The less-competitive districts that form the comparison group are those districts lacking one of these institutions.[[27]](#footnote-27)

The available evidence for India suggests that the impact of premier institutions on local demand for education is particularly significant. Jagnani and Khanna (2020) investigate how the introduction of an elite college into a district increases the demand for primary and secondary schooling in the year of entry. While the exact mechanism behind this is somewhat unclear, there is strong support of a causal impact of elite colleges on local educational demands. The admissions competition for these institutes is especially intense as they have been traditionally viewed as a clear gateway to economic success in India. But they are national institutions, and local district residents do not appear to have unrealistic expectations about securing admissions in them. Instead admission to the next quality tier is more salient.

The educationally-competitive districts are spread across India and are almost evenly split between rural (20) and urban (19).[[28]](#footnote-28) The less-competitive districts are, however, found more in rural areas (305) than urban (30). The INI districts almost certainly differ in other dimensions, and the modeling incorporates both fixed effects and time varying measures of key differences to incorporate these differences.

We make use of the heterogeneity in competitiveness at the district level to analyze a difference-in-differences model of expansion of private tutoring caused by the introduction of RTE. Consider $Y\_{dt}$, the number of new tuition centers per billion in district d and month t:

$Y\_{dt}= α\_{0}+ α\_{1}RTE\_{t}+ α\_{2}C\_{d}+β\left(RTE\_{t}×C\_{d}\right)+ γ Z\_{dt}+State\*Year FE+ ε\_{dt}$ *(1)*

where $RTE\_{t}$ =1 for all months from August 2009 (its date of enactment) through March 2015 and $RTE\_{t}$ =0 for all months before August 2009; $C\_{d}$ is an indicator for competitive districts that have a premier technical institute established before 2001; $Z\_{dt}$ is a vector of time-varying characteristics of district d; and $ε\_{dt}$ is a stochastic error term. Our interest is $β$, the coefficient of the marginal impact of being in a competitive district after the enactment of RTE.

The intuition behind this estimation is that, if the educationally-competitive and the less-competitive districts are following common trends in the development of tuition centers, those trends would continue in the absence of RTE. Deviations from trend after the introduction of RTE are interpreted as the causal effect of RTE on private tutoring.[[29]](#footnote-29) In the empirical analysis we can verify and validate the parallel trend assumption for periods prior to enactment of RTE.

As noted, states embraced RTE at varying speed. Their passage of enabling legislation stretched from 2009 for a number of years after. Thus, in a parallel set of event-study estimates, we define *RTEdt*  1 if t is at or beyond the state enactment date for the state of district d. This estimation adds cross-sectional variation to the estimation at the cost of potential error in when the idea of expanded access to schools entered into decision making in district d.

$Z\_{dt}$ is a vector of environmental factors in each district including presence of private schools and higher education institutions (lagged by three months), population and percentage of manufacturing and software share of total company registrations. The lagged private school and higher education institutions (HEIs) capture the effects of changes in registration of these education institutions on the private tuition center registrations. Finally, the percentage of manufacturing and software share of total company registrations controls for the overall development level and demand for skilled labor in the district.

It is also possible to analyze the impact of RTE on the development of new private schools and new institutions of higher education.[[30]](#footnote-30) These other institutions provide alternative outlets for the expanded educational demand. They do not, however, have the same flexibility as private tutoring centers, and they often involve large capital commitments. An important difference between tutoring firms and these alternative providers of additional education is that the latter (and especially new private schools) are heavily regulated. Thus, the contrast with tutoring involves both the nature of the services provided and the ease with which new firms can enter the market given government regulatory actions.

There are a number of challenges to identifying the impact of RTE on private tutoring. Perhaps most obviously, many private tutoring activities in India are not registered, and we are just looking at the registered portion of the market. At the same time, while we are just looking at a portion of the market, it is less clear that not observing these activities would bias our results. At the very least, it would be entirely plausible to interpret our estimates of the causal effects of RTE on registered private tuition centers as lower bounds on the total impact of RTE on private tutoring. Additionally, the competitive districts that we identify as the treated populations are not a random selection of districts in India. Instead the location of INI higher education institutions are found in more urban and developed areas and in politically active areas, making them different from the average control district. But, that is exactly what drives our formulation that includes a district fixed effect ($C\_{d}$) and time varying indicators of the local economies. Finally, the appropriate timing for the elements of Eq. 1 is not known since private firms – anticipating RTE passage on the basis of prior legislative discussions – might decide to invest prior to RTE passage, at the time of RTE passage, or after RTE was already in place. We structure our modeling as being contemporaneous, although we look at alternatives with anticipatory effects and delayed entry across the states.[[31]](#footnote-31)

In the empirical analysis, we also pursue a number of specification tests and extensions. In a robustness analysis, we also investigate a series of alternative ways of defining treatment and comparison groups including prior usage of private tutoring and the competitive pressures generated by a narrower set of premier tertiary institutions – in particular the IITs.

# Data on Educational Firms

There is no master listing of educational firms in India. We construct a data base of new firm entrants from the official Indian government company registry. In order to operate legally, all firms, including non-profit organizations, must register with the Registrar of Companies (ROC), a component of the Ministry of Corporate Affairs (MCA) of the Government of India (GoI). The overall universe of all the firms that registered during the period 1900-2015 for 35 states and union territories[[32]](#footnote-32) is available online from the Ministry of Corporate Affairs website.[[33]](#footnote-33) The universe of all firms electronically available is 1,459,084, with sufficient information including their principal business activity[[34]](#footnote-34) and year of registration available for 1,457,281 firms. Appendix Table 2 reports the distribution of firm registrations in India by principal business activity across five time periods: (i) 1900-1950, (ii) 1951-1990, (iii) 1991- 2000, (iv) 2001-2009 and (v) 2011-2015. Firms registered between 1900-1950 constitute only about 1.2 percent of the overall clean sample.[[35]](#footnote-35)A majority of firm registrations, about 84 percent, took place during the period 1991-2015.

We define *tuition centers* as companies providing supplementary tutorial services and operating outside of school hours. These are companies that offer fee-based classes to teach students concurrently attending elementary or secondary education (including technical/vocational courses offered at the secondary or senior secondary level). Additionally, they offer training for specialized entrance exams to pursue tertiary education.[[36]](#footnote-36)While three percent are registered as public companies, we refer to them collectively as private tutoring centers.

We define *private schools* as organizations that are fully substitutable for government schools and provide pre-school, elementary (grade 1 to 8), or secondary education (grade 9 to 12) education. Using the MCA dataset, we captured primarily private schools including international schools (although there was a small number that were not fully private).

*Higher* e*ducation institutions or HEIs* are defined as organizations providing tertiary education in science, commerce, and humanities. The broad definition captures institutions providing tertiary professional education such as the Indian Law Institute and the International College of Financial Planning. In addition, we were able to capture private entities that impart specialized education and skill such as taxation offered by Institute of Chartered Tax Advisers of India, music production by Audio Media Private Ltd, pilot training by Star Flight Training Educare Private Limited, and others.

We compile the number of new registrants in each category. This may differ from the overall presence of an entity in the country because of the ability of registered firms to add subsidiaries. For example, Delhi Public School Private Ltd has been franchising since 2007. Its main school is located in Delhi, but franchises are located across 108 districts in India and in 6 countries (UAE, Kuwait, Qatar, Saudi Arabia, Nepal and Singapore). Despite its widespread presence in the country, it appears as one unit in our dataset since the company has to register with Ministry of Corporate Affairs just once, irrespective of its corporate structure.

We use the unique corporate identification number (CIN) to identify the schools, tuition centers, and HEIs. The CIN is a 21-digit code containing information on the listing status, industry code, state code, incorporation year, ownership, and registration number of the firm. We use the industry code in conjunction with the NIC 2004 (National Industrial Classification of 2004) classification to identify the five-digit codes for education, although these codes do not fully identify all schools, tuition centers, or HEIs. We then searched the entire database with key words such as “schools”, “tuition”, “learning”, and “coaching” to identify other industry codes associated with schools or tuition centers. An algorithm that made use of the industry codes and key words jointly was adopted to identify the schools, tuition centers and HEIs from the master data. (Appendix Table 3 gives the details of the industry codes used to identify private tuition centers, schools and HEIs in our sample). Finally, all identified educational firms were manually checked to ensure accuracy.

Using this strategy, we identified 686 private tuition centers, 339 private schools, and 3,460 HEIs registered between 1991 and 2015 and spread across 374 districts. In our final analysis, we considered 171 months of data starting from January 2001 to March 2015, while the 1991-2000 registrations were used subsequently in the robustness analyses.[[37]](#footnote-37)From each firm’s office address, we aggregate the data by district and month of registration.

We obtained population data for each district from the decennial Census surveys conducted in 1991, 2001 and 2011 by the Office of the Registrar General & Census Commissioner, GoI. We make use of these data points to interpolate linearly district level population information for each month between 1991, 2001 and 2011, and extrapolated for the months between 2011 to March 2015. The district-month population information was then merged with the district-month firm registration database.

The firm registration data have been criticized recently for an incomplete representation of firm formation and their contribution to Indian GDP (Nagaraj (2015), Nagaraj and Srinivasan (2017)), but this remains to date the only source of official data of firm formation in India. Given the critique about the quality of the MCA dataset, we analyzed how many of the registered tuition centers, schools, and HEIs were still operating on June 2019. We made telephone calls and online searches for the 625 tuition centers, 299 schools, and 3,207 HEIs reporting positive investments at the time of registration.[[38]](#footnote-38)We located 42 percent of tuition centers, 37 percent of schools, and 25 percent of HEIs that were still operating (although it is likely that some additional institutions might have been operating but simply could not be located). This finding reemphasizes the fact that the MCA dataset contains firms registered in the past. It is suitable for measuring entry, but is not a good source for credibly identifying exits, thus precluding any analysis of the long-term implications of growth in this fee-based shadow education sector.

# Basic Results

We first show that the growth of tuition centers is strongly related to the expansion of schooling under RTE. We subsequently return to the other educational providers – private schools and higher education institutions – finding them also to be influenced by RTE.

## *The growth of tuition centers*

Table 1 provides a description of the flows of new tuition centers in the sample of 374 districts from 2001-2015. We divide flows between those in less educationally competitive districts (i.e., without a premier institution established before 2001[[39]](#footnote-39) ) and those in the 39 educationally competitive districts (with a premier institution established before 2001).[[40]](#footnote-40)

The top row of Table 1 equals the average number of new tuition center per million[[41]](#footnote-41) that opened in the decade prior to our analysis (1991-2000).[[42]](#footnote-42) The educationally-competitive districts clearly began introducing and using tuition centers before the typical other district. The reasons for this have not been fully analyzed, although the previous sampling of reflections on tutoring (e.g., Sen (2009), Azam (2016)) suggests that the on-going pressures to get into a reputable higher-education institute undoubtedly led to more competitive behavior and choices by parents.

The next rows provide the raw entries of new tuition centers by year over our sample period, 2001-2015. Two things stand out: first, the expansion of tuition centers is always much larger in the competitive districts; and, second, there is a significant jump in tuition center registrations beginning in 2009 and extending until near the end of the period. As we formally consider below, this pattern is consistent with differential educational competition across the two groups of districts and with substantial reactions to possible increased enrollment with RTE.

The bottom of this table shows the unadjusted averages in the number of new tuition centers (per million district residents) introduced annual from January 2001-August 2009 (pre- RTE) and from August 2009-March 2015 (post-RTE). While there is a small increase in private tutoring in the less competitive districts, it is only about one-fifth of that in the competitive districts.

## *The Causal Impact of RTE*

Our comparison of educationally-competitive districts to less competitive districts after the enactment of RTE assumes that the less competitive districts comprise a good comparison group. We begin with an analysis of the fundamental assumption of parallel trends in tuition center start-ups that is key to the impact evaluation. We then move to the impact of RTE on the expansion of private tutoring. Throughout this analysis, our sample includes monthly data on the introduction of tuition centers normalized by district population. All standard errors in the regressions are clustered at the state level.

* + 1. *Parallel Trends in Start-ups*

Figure 1 provides a visual display of the expansion of tuition centers between 2001 and 2015 in educationally-competitive districts relative to less-competitive districts. The monthly registrations are flat for the entire pre-RTE time period (January 2001 to July 2009), confirming similar behavior in these two sets of districts before RTE. These raw data with the divergent patterns after 2009 are also consistent with RTE’s having induced more tuition centers.

In Table 2, we consider more formally the monthly introduction of tuition centers across our sample of 374 districts in the period before any potential impact of RTE. The simplest model (Col. 1) includes just an indicator for competitive districts, a time trend, and the competitive indicator times the time trend. This last term provides a direct test of whether the pre-trends are different. The common trends assumption cannot be rejected.

The other three columns look at variations in this test by adding a state fixed effect, measures of other education providers (lagged school and higher education institutions), district population and the manufacturing and software share of total company registrations to capture the level of economic activity, and state-by-year fixed effects to capture for any other unobserved time-varying factors at the state level. Again, there is no significant difference in the trend of tutoring centers between the competitive and less competitive districts before RTE across these regressions.

* + 1. *Induced Expansion of Private Tutoring*

The central question is whether introducing the Right to Education alters the demand for private tutoring (as suggested by the raw data in Figure 1). We present the estimates of the basic difference-in-differences model (Eq. 1) in Table 3, using the registration data from January 2001 through March 2015. In the first three columns, we set the introduction of RTE at August 2009 – the date of enactment by GoI – and compare the subsequent addition of new tuition centers in the educationally competitive districts with premier institutions established before 2001 to that in the other districts of India. The final two columns consider the staggered adoption of implementing legislation across the states and present estimates of the model with state-specific dates for effective introduction.

The differential effect of RTE in competitive districts (** (*RTEt*  *Cd* ) in Eq. 1)) gives a direct estimate of the causal impact of RTE on the expansion of private tutoring. The first column provides the simplest estimates that do not allow for any time-varying characteristics of districts or fixed effects. Col. 2 and 3 include the time-varying characteristics such as lagged (by three months) new school and higher education institution registrations per billion, population size of the district and the percentage of firm registrations in manufacturing and software.

The difference in the models estimated in Col 2 and 3 is the degree at which we control for unobserved heterogeneity. In Col 2, we introduce state-level fixed effect to control for state-specific unobserved heterogeneity. In Col 3, we introduce the much stronger state-by-year fixed effects to control for any state-specific time-varying unobserved heterogeneity. Our results are strongly consistent across these models providing confidence in the estimated differential effect of RTE in competitive districts (** (*RTEt*  *Cd* )).

The increase in tuition centers within competitive districts is uniformly significant both quantitatively and statistically, ranging between 10 to 11 new tuition centers registrations each month per billion persons relative to less-competitive districts. Tuition centers vary widely in size. A conservative enrollment estimate of 1,000 students per center implies an expansion of tuition students from 2009-2015 of over 114,000 across the 39 districts where premier institutions were established before 2001. Of course, because these INI institutions have been both national and highly selective, the increased demand for tutoring in these competitive districts is not just a reflection of exam preparation for the local INI institution but instead a reflections of increased effort to compete in lower level tournaments and an interest in getting to the highest feasible educational institutions.

The final two columns introduce the time-varying implementation and enforcement of the right to education across the individual states, using state-specific effective starting dates for RTE. These event-study estimates in Col. 4 and 5 again show a strong and similar impact of RTE on the expansion of private tutoring.

In sum, the constitutionally-expanded access through the Right to Education Act induced a strong development of more private tutoring centers in the districts with the most intensive competitive educational pressures. Importantly, the strong causal estimate of the impact of RTE on tuition centers in Table 3 is a lower bound. Because the estimates provide the marginal impact on start-ups relative to that in less-competitive districts, any causal increase in start-ups in the less-competitive districts should be added to these estimates to get the total impact of RTE.

These results provide empirical evidence pertaining to tournaments. Viewing the school structure of India as a very large, hierarchical tournament, the results indicate that student effort increased as a result of expanded competition in the educationally-competitive districts. Since the set of high-quality schools did not expand commensurate with the enrollment expansions, the probability of winning the ultimate tournament for admission to a high education institution decreased, leading to more effort on the part of the contestants. But more effort in this case is skewed toward better-off households that can afford the expense of tutoring, thus offsetting at least a portion of the potential equity gains from expansion of basic schooling and limiting the long run schooling options of the newly enfranchised.

* + 1. *Induced Expansion of Other Educational Institutions*

The private tuition centers are the most responsive to altered educational competition, but other avenues of schooling expansion exist. The other margins include private schools and higher education institutions, but the results are not as clear and consistent.

There has been a continued expansion in private schooling in India ( Kingdon (2020)), but there is not a clear explanation of the varying causes of this expansion. Undoubtedly, this trend is motivated in part by concerns about the overall quality of the government schools. Our data permit investigating whether RTE also contributed to the expansion of private schools. For this, however, we can only consider registered private school, a heavily regulated subset of all private schools in India. It does not include unregistered schools, but we have no reason to believe that this distorts our analysis.

Similarly, another point of impact could be the further development of higher education institutions (HEIs). These institutions are aimed at a group of students older than those directly affected by RTE. But, RTE potentially expands the number of students prepared for the wide variety of HEI programs, which often include specialized vocational courses that can be taken in conjunction with the regular schools.

A parallel analysis to that of tuition centers shows a generally positive response of these other educational institutions to RTE. Figure 2 shows systematic patterns in the raw data of these other institutions to the introduction of RTE when we compare the educationally-competitive districts and the other, less competitive districts.

The systematic impact of RTE on the expansion of these institutions holds when we reproduce the prior analysis for private schools and HEIs. To establish the basis for the difference-in-differences analysis, Table 4 provides evidence on the parallel trends assumption of these new investments, again comparing the educationally competitive districts to all others. In our most conservative model with state-by-year fixed effects, there is a statistically significant difference in registrations between the two sets of districts in the lead up to RTE (January 2001-July 2009) for private schools (Col. 3) and HEIs (Col. 6) at ten percent and five percent significance, respectively. This leads us to be more cautious in interpreting these correlations as causal estimates of the impact of RTE.

The newly induced investment in schools and HEIs in the highly-competitive districts are seen in Table 5 where we present the correlations associated with the introduction of RTE. We observe that the associated increase in new investments in private schools (Col. 1-2) is positive and statistically significant, ranging around 5 new school registrations per billion district population. The results for the staggered adoption of RTE by states is not statistically significant and the magnitude reduces to 2 new school registrations per billion district population.

We observe similar pattern for HEI (Col 4-6) where the introduction of RTE is associated with increase of about 30 new HEI registrations per billion district population. The statistical significance dissipates with the consideration of staged adoption of RTE by states.

The responsiveness of these other educational institutions is somewhat surprising, but it reinforces the threat of countervailing forces to achieving more equitable outcomes from RTE. The approval process and regulatory structure surrounding these institutions is much more elaborate than that for tuition centers, yet these new registrations have navigated through the hurdles. Particularly with respect to the increased private schools, individual behavior of better off families is again potentially offsetting any general improvement in access due to RTE. Moreover, these results quite likely underestimate the total induced demand because we lack data on unregistered private schools. While the RTE Act made unregistered schools illegal, there is little evidence that this was closely enforced.

#  Robustness of Results

The previous analysis focused on the 39 educationally-competitive districts defined by having a premier higher education institution established before 2001. We believe this provides the clearest comparison sets, but it is important to ensure that the prior findings were not driven by the definition of competitive districts. We can validate the overall finding of induced private tutoring by introducing five other credible methods of identifying educationally-competitive districts. These fall into two broad extensions – one based on refinements of the existence of higher education institutions in the district and one based on historical supplementary educational investments.

## *7.1 Alternative Definitions of Educationally-Competitive Districts*

In our first alternate definition, we define educationally-competitive districts as those districts just with IITs established prior to RTE. The IITs are India’s premier engineering institutions, and admission to one is extremely competitive. The location and governance of the original IITs were exogenously set in 1961 according to the IIT Act. The number of such institutions has expanded over time, reaching a total of 23 in 2016. In 2018, there were less than 12,000 students across the IITs.[[43]](#footnote-43) This narrower definition results in categorizing 13 districts (namely Kamrup, Patna, Gandhi Nagar, Mandi, Indore, Mumbai, Khorda, Jodhpur, Chennai, Hyderabad, Kanpur Nagar, Hardiwar, and Medinipur) as educationally-competitive districts, and the remaining 361 districts as less-competitive districts.

It is still possible, however, that districts with IITs established closer to the passage of RTE are found in districts that have other characteristics that relate to educational demand, to the nature of RTE implementation, or to other important characteristics. To circumvent this possibility, the most stringent approach is to look just at the six IITs that were in existence before 2001, the start of our analytic period and prior to any discussions leading to the RTE Act. This restriction is, however, potentially offset by the small sample of resultant competitive districts that limits the power in the analysis.

We create an additional grouping of educationally-competitive districts by merging information for the earliest observation period on districts with Institutes of National Importance (INIs) with districts with IITs. This alternative defines educationally-competitive districts as those which had a premier INI institution established before 2001 but also within the full set of 13 IIT districts. This condition, below referred to as “*IIT and premier institution established before 2001*” adds back three districts, leaving a sample of nine districts competitive districts.

A different approach to defining educationally competitive districts relies on early use of private supplementary education across India. Returning to the data base on private educational investments, we develop two additional ways of defining competitive districts. First, we define any district that had new registrations for tuition centers, private school or higher education institutions for the period 1991-2000 as showing prior competitiveness. We find 89 such districts.[[44]](#footnote-44) Second, we expand on this to identify any district in the prior period that had recorded investments at registration (measured by paid-up capital) in either tuition centers, schools, or higher education institutions. This definition of competitiveness yields 82 districts.[[45]](#footnote-45)

When we replicate our basic investment analysis for these expanded collections of treated competitive districts, we find consistent and often larger impacts of RTE. With each alternative set of competitive districts, we can confirm parallel trends in registrations of tuition centers over the period January 2001 – July 2009. The parallel trend in registrations of private schools, and HEIs holds except under the alternative definition of any prior registrations and investments (see Appendix Tables 5- 19).

Table 6 summarizes estimates of the causal impact of RTE on registrations of private education (both tutoring and private schools) across the different comparison groups. This table shows just the differential impact of RTE across the five alternative samples, while the full estimation results can be found in Appendix Tables 20-34. The rows reproduce the estimate from Table 3, col. 3 and 5 for tuition centers and the parallel specifications for private schools and HEIs in Table 5. The first three columns relate to the national enactment of RTE in 2009, and the latter three looks at state implementation dates. Each table entry comes from a separate underlying regression estimate.

Except for estimates from the highly-restricted six-district sample of having an IIT before 2001, the results across educational response categories in col. 1-3 are uniformly significant at the five percent level or better. And, with a few anomalies, the estimates in col. 4-6 based on state policy timing are also strongly positive and significant.

Interestingly, the associated increase in private school registrations per billion persons appears even stronger when the competitive districts are defined alternatively by presence of IITs, by early IITs and premier institutions, prior registrations, and investments. It appears that RTE, with its increased competition for educational advancement, is associated with increase in the demand for private schools. Still, the rate of new registrations for tuition centers remains much greater than that for private schools. While possibly related to the scale of operations of the two, there is prima facie evidence against that argument: The average size of the two institutions is not very different if viewed by the average paid up capital at registration. Again, however, these are just the registered private schools, which almost certainly understate the total increase in private schools because of any unmeasured increase in unregistered schools.

The overall increase in new HEIs also appears significant. The magnitude is somewhat surprising, since across the samples the new registrations of HEIs appears greater than those of tutoring centers. However, as discussed earlier, these effects could be a manifestation of the RTE effect spilling over to upstream areas of education and skill building in the ecosystem. Based on paid-up capital at registration, the scale of operation of HEIs is much different from that of tuition centers; the average size of HEI is almost four times the average size of tuition centers.

The consistency of results with these alternative definitions of educationally competitive districts makes it clear that the finding of a direct impact of RTE on private supplemental education is not an artifact of the specific comparison groups. There is strong support for a conclusion that RTE led to offsetting schooling choices that dampened any enhanced equity of access under RTE.

## *7.2 Incorporating District Size*

The prior models analyzed the per capita development of new institutions and also included a measure of district population. The measurement of population does, however, include some inaccuracies because it is necessary to interpolate population by district in our monthly registrations. One concern is that the inaccuracies in population size could distort the estimated responsiveness to RTE. Additionally, it might be that district size, by affecting the relevant market size, directly affects market entry.

As an alternative, we look at the absolute number of new tuition centers (and schools and HEIs) and then control for district population size. The parallel trend assumption again is not rejected for new tuition, private school and HEI registrations across different definitions of competitive districts, with the exception of private school and HEI registrations under the definition of any prior registrations and investments (see Appendix Table 35 and Appendix Figure 1). The estimates based on total number of new tuition center registrations, however, are qualitatively similar to our prior estimates (see Appendix Table 36). The impact of RTE in competitive districts remains strong and significant. Further, we find that the absolute number of school and HEI registrations have also increased in competitive districts, statistically significant at 5 percent except for the stringent definition as having IIT established before 2001.

## 7.3 Resampling Control Districts

It is possible that the identification based on the establishment of premier institutions before 2001 is insufficient to balance systematic differences between the treatment and control districts (over and above the district fixed effects and time varying district factors). If true, the estimated effects could be attributed to these systematic differences and not to the RTE reform.

We address this concern through examining the sensitivity of our estimated effects of RTE to change in the control sample. Our results were based on identifying 39 and 335 districts as treatment and control districts, respectively, on the basis of premier institutions established before 2001. Using the large pool of control districts, we pursue a Monte Carlo simulation where we randomly select 39 out of the 335 districts and re-estimate the effect of RTE with this new control group. We repeat this process one hundred times to understand how sensitive is the estimated effect of RTE to a change in the pool of control units. We then examine how estimates with these new control samples compare to our main effects.

When we implemented the Monte-Carlo simulation (see Appendix Figure 2), It is clear that our main results are robust to change in the pool of control districts, supporting our assumption that the observed effect is driven by RTE reform and not by the systematic differences between treatment and control units. For a similar exercise using definitions of treatment and control units on the basis of prior registrations / investments between 1991-2000, we again observe that our main results are robust to change in the pool of control districts.

# Evidence on Educationally Competitive Motivations

If the increase in private tutoring is predominantly remedial in nature, concerns about private tutoring’s inequitable aspects may be lessened because it is acting to remove deficiencies that would otherwise detract from successful human capital development. The competitive side of private tutoring that we emphasize here tends, however, to be examination-focused with the objective of ensuring positions in the most rewarding schools and programs – and with the more advantaged students insulating themselves from the tournament competition of the predominantly less advantaged students covered by RTE.

We provide three types of evidence that the surges in private tutoring and private school registrations previously observed are weighted toward competitive tournament motives and not simply remedial action. First, the largest increases in private tutoring registrations were not found in districts requiring the quickest adjustment to new demands and thus potentially facing the largest quality problems. Second, the largest increase in private tutoring registrations were not found in districts where the teacher supply was inadequate to meet the input-quality criteria of RTE, thus again implying larger quality adjustment issues. Third, the pattern of increases follows existing concentrations of more educated families who have the means and the competitive inclinations to expand both private tutoring and private schooling.

## *Adjustments to the Implementation of RTE*

 The implementation of RTE was associated with an influx of new students, although this was centered on private schools with government schools, following a pre-existing trend, actually losing students after RTE.[[46]](#footnote-46) Interestingly, Shah and Steinberg (2019) document that the largest increases came from older students (age 13-16), an age where tournament competition for higher education positions becomes more intense. This student increase conceptually puts heavier demands on facilities, on class sizes, and on the quality of teaching provided by government and private schools, but this did not appear to have materialized – perhaps because of the quality provisions of RTE.[[47]](#footnote-47) We investigate whether increased demands for resources and speed of implementation lead to greater remedial demands relative to the competitive demands.

 We do not have an ideal way of testing the magnitude of remedial adjustment pressures, but we can look at the uneven adoption of RTE across states to make preliminary inferences. Specifically, the private demands of households seeking remediation would plausibly be stronger in states that were first formally to adopt RTE relative to late adopters. Early-adopting states had less time to support quality standards relative to schools in the late-adopting states.

 If state adoption is random, assessing adoption of private tutoring across early and late state-adopters of RTE is informative about the underlying motivations for expansion of private tutoring and private schooling. While we cannot conclusively show that the timing of adoption of RTE by states is random, anecdotal evidence indicates that a state’s decision to adopt RTE early or late was not influenced by their ability and capacity to implement its provisions better. To illustrate, both Tamil Nadu (late-adopter) and Maharashtra (early-adopter) were found to have better roadmaps for RTE implementation (Sarin et al. (2015)). In addition, an examination of the timing of adoption by each state reveals no obvious pattern supporting systematic adoption (see Appendix Table 1).

 We replicate our primary model with a focus on comparison of new tutorials in the early-adopting states (state adoption on or before 2010) and those in late-adopting states (state adoption later than 2010). We categorized nine early-adopting states (with 123 districts) as treated states, and we categorize 20 late-adopting states (with 251 districts) as comparison states. The hypothesis of parallel trends in registrations of tuition centers per billion persons is not rejected for the comparison of early- and late-adopting states over the pre-RTE period.

 The differential implementation pressures across states do not appear to lead to significant remedial demands for private schooling. Defining states that were early adopters of RTE as Ed , the difference-in-difference estimate ($β•RTE\_{t}×E\_{d}$) indicates that the registration of tuition centers per billion persons is actually smaller among districts in early-adopting states relative to late-adopting states (Appendix Table 37) and is statistically insignificant (Col 4). This pattern holds true when we estimate the model with absolute number of tuition center registrations as the dependent variable (not reported here). These results are thus consistent with a conclusion that the change in the registration of tuition centers in response to introduction of RTE is not being driven primarily by remedial motives.

## *8.2 Adequacy of teacher supply*

 Another approach to test whether the impact of RTE on private tutoring is driven by the remedial or the competition margin is to estimate the differential impact for districts defined on the basis of adequacy of supply of teachers. This directly ties in to the RTE mandate that of pupil-teacher ratios less than 30:1 for primary sections and 35:1 for upper-primary sections.

 Student expansion from RTE would add pressure on teachers in districts already constrained by less adequate supply of teachers relative to those with more adequate supply of teachers. Consequently, we consider private reactions of households potentially seeking remedial support in districts with less adequate supply of teachers.

 We develop two measures of adequacy of teachers using DISE data for both government and private schools. We consider the number of teachers reported in 2002 to circumvent the problem of endogenous increase in teacher supply owing to RTE. We create two definitions of districts with adequate supply of teachers: (i) on the basis of average number of teachers across all the districts in 2002, and (ii) on the basis of PTR of 35:1 for primary and upper primary sections in 2002. We first divide districts by whether the number of teachers is less than or greater than the average number of teachers in India in 2002. This results in classifying 157 districts having an adequate supply of teachers and 143 districts as a less-adequate supply of teachers. Secondly, we divide districts by whether the pupil-teacher ratio is less than 35:1 (28 districts) or greater than 35:1 (272 districts) for primary and upper primary sections in 2002.

 Under both definitions of districts with adequate teacher supply, the difference-in-difference estimate of new tuition center registrations is actually negative and smaller among districts with less-adequate supply of teachers relative to those with adequate supply of teachers and is not statistically significant at the five percent level (see Appendix Table 38). Thus, we conclude that the differential impact of RTE on private tuition center registrations does not appear to be driven by remedial demands emanating from adequacy of teacher supply.

## *8.3 More Direct Demand Information*

The India Human Development Survey (IHDS) provides details about the differential educational patterns of households in the competitive and less-competitive districts.[[48]](#footnote-48) The IHDS is comprised of two nationally representative and multi-topic household surveys conducted in 2004-2005 and 2011-2012 and permits a deeper look into pre- and post-RTE comparisons. We are able to match 97 percent of districts in our primary district dataset with data in the IHDS surveys. We focus our descriptive analysis on the educationally competitive districts defined on the basis of premier institutions established before 2001.[[49]](#footnote-49)

Our educationally competitive districts are interpreted as identifying the presence of higher numbers of high-demand households relative to the composition in less-competitive districts. The extant literature shows the role of parents and other adult members’ education in creating aspirations for the children’s educational pursuits.[[50]](#footnote-50) Thus, when we measure the education-demand of a household in the IHDS by the highest education level completed by any adult in the household, we expect to find more educationally accomplished households in competitive districts when compared to those in less-competitive districts. This is the case both before and after RTE enactment. Appendix Table 40 shows that there is higher probability of an adult who has completed secondary schooling and above in educationally competitive districts relative to less-competitive districts. The differential is particularly large for adult females in the household.

 The IHDS data also provide general confirmation of our interpretation of the prior analyses of the growth in private tutorials. Student enrolment increases with RTE are found in both government and private schools, especially at the elementary level, but this increase was accompanied by substantial shifts from government to private schools. Table 7 shows how the shares of students in government and private schools changed after the RTE enactment in both competitive and less-competitive districts. While the share of students attending private schools increased in both educationally-competitive and less-competitive districts, the movement was significantly larger in competitive districts at both the primary and the upper primary levels. This reaction is entirely consistent with the general perception that private schools provide better education and instill aspirations to pursue more educational outcomes among students in comparison to government schools.

 The IHDS data also allow us to trace changes in patterns of private tutoring in both government and private schools and to compare the movement to private supplementation between educationally competitive and less competitive districts. Over the period of RTE enactment, enrollment in private tutoring increased in educationally competitive districts relative to less-competitive districts for both primary and upper-primary students (Table 8). With the exception of private school students in less competitive districts, there is a uniform increase in private tutoring at primary and at upper primary levels between 2005 and 2012. At both schooling levels and across government and private schools, the increases in private tutoring are skewed toward students in the educationally competitive districts.

While the results with the more detailed survey data are descriptive and cannot be given a causal interpretation, they are all consistent with the hypothesis that the observed surges in private tutoring identified previously reflect competitive motivations.

# Student Achievement

The overall impact of RTE depends on how good the tuition centers are at improving the skills of students. Previous analyses of private tutoring provide a general *prima facie* case that there can be clear educational advantages to tuition centers (e.g., Banerjee, Cole, Duflo, and Linden (2007), Muralidharan, Singh, and Ganimian (2019)), but those centers induced to start by RTE may still be different and may be unable to get these experimental gains.

Unfortunately, as discussed previously, there are not good general achievement data, let alone data that can be used to evaluate the impact of RTE. Two sources provide some information, but it is both incomplete and conflicting.

The IHDS data on student learning provide a partial, but imperfect picture of the quality impact of tuition centers. The IHDS data on performance is confined to just the first and second child in the 8 to 11-year-old age-group. For this group we can get a description of how learning has changed in educationally-competitive and less-competitive districts and of how this relates to private tutoring.

The IHDS performance data provide a mixed picture with some improvements in reading and writing but not in math. The gains are most consistent for students enrolled in private tutoring, but there is considerable variation over time for the different definitions of treatment districts. (See Appendix Table 44).

While the ASER data can be compared over time, these performance data are relevant just for rural areas. In these data, performance declines across both competitive (rural) districts and for those in private tutoring. (See Appendix Table 45).

From the available test data, it is difficult to make any firm conclusions about student performance as related to RTE or to private tutoring. The main conclusion is that, because performance on such tests is so important to overall policy decisions, more effort should be made to assess Indian students over time and across different circumstances.

# Conclusions

There is a long history of policy initiatives designed to expand access to schools in developing countries. Perhaps the best known is the “Education for All” initiative. This international initiative became central to policy discussions of UNESCO and the World Bank and was an essential element of the parallel education plank of the Millennium Development Goals of the United Nations.[[51]](#footnote-51) These initiatives, catalyzed at international meetings beginning in 1990, were built on the overwhelming evidence of inequities around the world in access to schools and thus in limitations on future opportunities for wide swaths of the population to participate effectively in modern society. While there have been critiques of these movements based on quality aspects of expanded schools, there is no doubt that the sentiments behind them are well founded.[[52]](#footnote-52)

This analysis of the 2009 constitutional mandate of a Right to Education in India suggests that providing access by itself may not effectively deal with the educational inequities. The Right to Education Act provided that all Indian children should be provided a free education meeting certain input-quality standards through age 14. On the surface this appears to open up the education system to disadvantaged students who were previously underserved and to further equity consistent with Education for All.

At the same time, the Indian education system is very competitive for those who wish to go further in schooling. It is especially competitive to gain admission into one of the elite higher education institutions such as the Indian Institutes of Technology (IIT) or the other Institutes of National Importance, but this also holds for a much wider swath of higher education institutions. Adding more students to this competition through RTE in fact lowers the admission opportunities for students interested in enrolling in high quality schools. This intense competition has fueled a private tutoring sector that can help provide individuals with a competitive advantage for college admission.

The overall system of education in India with significant supply constraints is best thought of as a large, hierarchical tournament. As such, the question is whether expanding competition leads to more effort through increased private tutoring. If so, the biases of enrollment in private tutoring centers (tuition centers in India) would work against any equity improvements through increased access to schooling.

Tracking registrations of new tuition centers across India, we find that they increase sharply after introduction of RTE. Importantly, registrations are heavily skewed toward districts already having significant educational competition. Specifically, the introduction of RTE leads to substantial increases in tuition centers in districts that contain elite post-secondary schools and which have been shown more generally to have higher educational demands.

Because the tuition centers charge fees that exclude the most disadvantaged, their clientele comes from higher up the income distribution. As a result, the tuition centers tend to reinforce existing inequities in access to education beyond the compulsory portion. In other words, opening up of access to primary and lower secondary schooling can induce private market responses that may inhibit further schooling opportunities for the newly enfranchised, and thus may thwart the government attempts to expand overall educational opportunities.

This of course is not an argument against broadening access to education. Instead it is a caution that RTE and other focused access policies may be insufficient on their own to ensure more equitable provision of education.

Interestingly, in the debates in the legislature leading up to the Right to Education Act, there is no mention of tuition centers (the Indian term for private tutoring centers). The thought that RTE might also induce growth in private centers and thus reinforce some existing inequities does not appear to have been considered.

It is not possible to ascertain the net effect of RTE, where expansion of access to schooling is balanced by the disequalizing effect of induced private supplementation. But clearly, the design of such government programs that have at their heart strong distributional objectives must also consider private reactions that might limit program effectiveness. Interestingly, writing before RTE, Amartya Sen (2009) concluded that private tutoring “effectively negates the basic right of all children to receive elementary education and replaces it by seeing effective education as a privilege, reserved for the better placed in society.” He did not consider the possibility that governmental policies to open access to schooling could actually exacerbate the inequities of private tutoring.

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**Table 1: Average flow of new tuition centers registrations per million persons**

|  |  |  |
| --- | --- | --- |
| Year | Less-competitive districts | Educationally-competitive districts |
| Mean | SE | Mean | SE |
| 1991-2000 (average) | 0.000 | [0.000] | 0.003 | [0.001] |
| 2001 | 0.001 | [0.001] | 0.009 | [0.003] |
| 2002 | 0.000 | [0.000] | 0.002 | [0.001] |
| 2003 | 0.001 | [0.000] | 0.006 | [0.002] |
| 2004 | 0.001 | [0.000] | 0.004 | [0.001] |
| 2005 | 0.002 | [0.001] | 0.008 | [0.002] |
| 2006 | 0.002 | [0.001] | 0.003 | [0.001] |
| 2007 | 0.002 | [0.001] | 0.006 | [0.002] |
| 2008 | 0.002 | [0.001] | 0.004 | [0.002] |
| 2009 | 0.004 | [0.001] | 0.012 | [0.003] |
| 2010 | 0.002 | [0.001] | 0.016 | [0.003] |
| 2011 | 0.005 | [0.001] | 0.019 | [0.004] |
| 2012 | 0.006 | [0.001] | 0.030 | [0.006] |
| 2013 | 0.005 | [0.001] | 0.024 | [0.005] |
| 2014 | 0.004 | [0.001] | 0.008 | [0.003] |
| 2015 | 0.006 | [0.002] | 0.022 | [0.010] |
| Number of districts | 335 | - | 39 | - |
| **Average pre-RTE** | **0.002** | **[0.000]** | **0.005** | **[0.001]** |
| **Average post-RTE** | **0.005** | **[0.000]** | **0.019** | **[0.002]** |
| **Differences between post-RTE and pre-RTE** | **0.003\*\*\*** | **[0.000]** | **0.014\*\*\*** | **[0.002]** |

Note: Competitive districts have a premier institution located in them which were established before 2001. Standard errors are reported in parentheses. We undertook t-test to arrive at the differences of average registrations of tuition centers between pre and post RTE. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

**Table 2: Testing the parallel trends for new tuition center registrations per billion persons**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Independent Variables | *[1]* | *[2]* | *[3]* | *[4]* |
| Educationally competitive district indicator ($C\_{d}$) | 9.411 | 10.781 | 6.172 | 0.348 |
| [12.761] | [13.032] | [11.228] | [10.160] |
| Time trend *(t)* | 0.021 | 0.021 | 0.019 | -0.076 |
| [0.017] | [0.017] | [0.018] | [0.078] |
| **Differential trend *(t \**** $C\_{d})$ | **-0.018** | **-0.018** | **-0.007** | **0.013** |
| **[0.046]** | **[0.046]** | **[0.039]** | **[0.036]** |
| Population |   |   | 0.000 | 0.000 |
|   |   | [0.000] | [0.000] |
| Share of manufacturing [%] |   |   | -0.026 | -0.031 |
|   |   | [0.021] | [0.023] |
| New HEI registrations per billion persons [Lagged 3 months] |   |   | 0.021\*\* | 0.021\*\* |
|   |   | [0.009] | [0.009] |
| New school registrations per billion persons [Lagged 3 months] |   |   | 0.007 | -0.001 |
|   |   | [0.007] | [0.009] |
| Constant | -4.915 | -5.058 | -4.354 | 24.824 |
| [4.297] | [5.249] | [4.961] | [24.292] |
| Observations | 38,522 | 38,522 | 37,400 | 37,400 |
| R-square | 0.001 | 0.028 | 0.033 | 0.046 |
| Fixed effects | None | State | State | StateXyear |

Note: Dependent variable: number of new tuition centers per billion population monthly in each district. Sample time period constitutes the pre-RTE period - January 2001 to July 2009. Standard errors clustered at the state level. Competitive districts are those with a premier institution established before 2001. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

**Table 3:** **Effect of RTE on new tuition centers registrations per billion persons**

|  |  |  |
| --- | --- | --- |
| Independent Variables | RTE = 1 after August 2009 | RTE = 1 after state enactment of RTE |
| *[1]* | *[2]* | *[3]* | *[4]* | *[5]* |
| Educationally competitive district indicator ($C\_{d}$) | 5.865\*\*\* | 4.240\*\* | 4.069\*\* | 5.325\*\* | 5.475\*\* |
| [1.818] | [1.916] | [1.544] | [2.249] | [2.024] |
| Post RTE indicator ($RTE\_{t}$) | 3.138\*\* | 2.640\*\* | 1.019 | 2.253\*\* | -4.766 |
| [1.279] | [1.211] | [1.491] | [1.088] | [3.049] |
| **Differential impact (**$RTE\_{t}$ **\*** $C\_{d}$**)** | **10.569\*\*** | **9.853\*\*** | **10.585\*\*** | **10.044\*\*** | **10.222\*\*** |
| **[4.730]** | **[4.401]** | **[4.457]** | **[4.748]** | **[4.704]** |
| Population |   | 0.000 | 0.000 | 0.000 | 0.000 |
|   | [0.000] | [0.000] | [0.000] | [0.000] |
| Share of manufacturing [%] |   | -0.062\* | -0.069\* | -0.068\* | -0.071\* |
|   | [0.034] | [0.036] | [0.035] | [0.036] |
| New HEI registrations per billion persons [Lagged 3 months] |   | 0.030\*\*\* | 0.029\*\*\* | 0.031\*\*\* | 0.029\*\*\* |
|   | [0.006] | [0.007] | [0.006] | [0.007] |
| New school registrations per billion persons [Lagged 3 months] |   | -0.004 | -0.007 | -0.002 | -0.006 |
|   | [0.012] | [0.014] | [0.012] | [0.014] |
| Constant | 1.275\*\* | 2.277\*\* | 3.227\*\* | 2.748\*\* | 5.001\*\* |
| [0.602] | [0.997] | [1.285] | [1.150] | [2.127] |
| Observations | 63,954 | 62,832 | 62,832 | 62,832 | 62,832 |
| R-square | 0.037 | 0.044 | 0.061 | 0.044 | 0.061 |
| Fixed effects | No | State | StateXyear | State | StateXyear |

Note: Dependent variable: number of new tuition centers per billion population monthly in each district. Sample is January 2001 to March 2015. Standard errors clustered at the state level. Competitive districts are those with a premier institution established before 2001. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

**Table 4: Testing parallel trends for new private school and HEI registrations per billion persons**

|  |  |  |
| --- | --- | --- |
| Independent Variables | New school registrations per billion persons | New HEI registrations per billion persons |
| *[1]* | *[2]* | *[3]* | *[4]* | *[5]* | *[6]* |
| Educationally competitive district indicator ($C\_{d}$) | -6.624 | -4.956 | -15.429\* | -76.595 | -95.832 | -170.352\*\* |
| [10.149] | [10.091] | [8.880] | [83.234] | [83.729] | [74.790] |
| Time trend *(t)* | 0.018 | 0.017 | -0.028 | 0.093\* | 0.083\* | -0.007 |
| [0.015] | [0.015] | [0.037] | [0.050] | [0.046] | [0.216] |
| **Differential trend *(t \**** $C\_{d})$ | **0.034** | **0.028** | **0.063\*** | **0.370** | **0.424** | **0.668\*\*** |
| **[0.037]** | **[0.037]** | **[0.033]** | **[0.291]** | **[0.292]** | **[0.268]** |
| Population |   | 0.000 | 0.000 |   | 0.000 | 0.000 |
|   | [0.000] | [0.000] |   | [0.000] | [0.000] |
| Share of manufacturing [%] |   | -0.006 | -0.010 |   | -0.127 | -0.140 |
|   | [0.012] | [0.012] |   | [0.109] | [0.113] |
| New HEI registrations per billion persons [Lagged 3 months] |   | 0.007 | 0.006 |    |
|   | [0.004] | [0.004] |
| New school registrations per billion persons [Lagged 3 months] |  |  | 0.046 | 0.011 |
|  | [0.068] | [0.069] |
| New tuition registrations per billion persons [Lagged 3 months] |   | -0.014\*\* | -0.019\*\* |   | 0.095 | 0.127\* |
|   | [0.007] | [0.009] |   | [0.072] | [0.066] |
| Constant | -4.516 | -4.353 | 9.448 | -17.936 | -14.064 | 13.922 |
| [4.576] | [5.053] | [11.427] | [15.456] | [13.202] | [64.612] |
| Observations | 38,522 | 37,400 | 37,400 | 38,522 | 37,400 | 37,400 |
| R-square | 0.016 | 0.017 | 0.038 | 0.102 | 0.104 | 0.158 |
| Fixed effects | State | State | StateXyear | State | State | StateXyear |

Note: Dependent variable: (col. 1-3) number of new schools per billion population monthly in each district; (col. 4-6) number of new HEI per billion population monthly in each district. Sample time period constitutes pre-RTE period – January 2001 to July 2009. Standard errors clustered at the state level. Competitive districts are those with a premier institution established before 2001. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

**Table 5: Effect of RTE on new private school registrations and new HEI registrations per billion persons**

|  |  |  |
| --- | --- | --- |
| Independent Variables | New school registrations per billion persons | New HEI registrations per billion persons |
| RTE = 1 after August 2009 | RTE = 1 after state enactment of RTE | RTE = 1 after August 2009 | RTE = 1 after state enactment of RTE |
| *[1]* | *[2]* | *[3]* | *[4]* | *[5]* | *[6]* |
| Educationally competitive district indicator ($C\_{d}$) | 3.599\*\* | 3.656\*\* | 5.171\*\*\* | 34.196\*\*\* | 32.299\*\*\* | 39.913\*\*\* |
| [1.491] | [1.470] | [1.684] | [8.689] | [8.361] | [11.444] |
| Post RTE indicator ($RTE\_{t}$) | 0.234 | -0.763 | 0.567 | 9.483\*\* | -8.903\*\* | -5.578 |
| [0.235] | [1.076] | [0.631] | [3.540] | [3.784] | [4.005] |
| **Differential impact (**$RTE\_{t}$ **\*** $C\_{d}$**)** | **5.476\*\*\*** | **5.441\*\*\*** | **2.354** | **24.630\*\*** | **29.651\*\*** | **15.264** |
| **[1.497]** | **[1.563]** | **[1.718]** | **[11.090]** | **[11.734]** | **[13.765]** |
| Population | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Share of manufacturing [%] | -0.020 | -0.020 | -0.022 | -0.275\* | -0.304\* | -0.314\* |
| [0.019] | [0.020] | [0.020] | [0.156] | [0.172] | [0.173] |
| New HEI registrations per billion persons [Lagged 3 months] | 0.006\*\* | 0.006\*\* | 0.006\*\* |   |
| [0.003] | [0.003] | [0.003] |
| New school registrations per billion persons [Lagged 3 months] |   | 0.148\*\*\* | 0.119\*\*\* | 0.121\*\*\* |
| [0.041] | [0.041] | [0.042] |
| New tuition registrations per billion persons [Lagged 3 months] | -0.006 | -0.007 | -0.007 | 0.177\*\*\* | 0.185\*\*\* | 0.188\*\*\* |
| [0.008] | [0.009] | [0.009] | [0.060] | [0.066] | [0.067] |
| Constant | 1.254\* | 1.709\* | 1.259\* | 12.793\* | 21.015\*\* | 19.119\*\* |
| [0.715] | [0.915] | [0.739] | [7.101] | [8.518] | [8.594] |
| Observations | 62,832 | 62,832 | 62,832 | 62,832 | 62,832 | 62,832 |
| R-square | 0.016 | 0.032 | 0.031 | 0.114 | 0.164 | 0.163 |
| Fixed effects | State | StateXyear | StateXyear | State | StateXyear | StateXyear |

Note: Dependent variable: (col. 1-3) number of new school registrations per billion population monthly in each district; (col. 4-6) number of new HEI registrations per billion population monthly in each district. Sample is January 2001 to March 2015. Standard errors clustered at the state level. Competitive districts are those with a premier institution established before 2001. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

**Table 6: Summary of differential impact (**$RTE\_{t}$ **\*** $C\_{d}$**) on registrations per billion persons under alternative definitions of competitive districts**

|  |  |  |  |
| --- | --- | --- | --- |
| Differential Impact ($RTE\_{t}$ \* $C\_{d}$) by definitions of competitive districts | N. of competitive districts | RTE = 1 after August 2009 | RTE = 1 after state enactment of RTE |
| *New tuition registrations per billion persons* | *New school registrations per billion persons* | *New HEI registrations per billion persons* | *New tuition registrations per billion persons* | *New school registrations per billion persons* | *New HEI registrations per billion persons* |
| *[1]* | *[2]* | *[3]* | *[4]* | *[5]* | *[6]* |
| IIT established before RTE | 13 | **27.380\*\*** | 9.150\*\* | 46.515\*\*\* | **29.196\*\*** | 6.957 | 10.695 |
| **[12.157]** | [4.034] | [15.776] | **[11.101]** | [4.207] | [24.901] |
| IIT established before 2001 | 6 | **35.334** | 10.621\* | 38.963 | **32.025** | 4.398 | -44.329 |
| **[25.007]** | [5.754] | [27.584] | **[23.818]** | [4.292] | [34.888] |
| IIT and premier institutions established before 2001 | 9 | **34.956\*\*** | 11.578\*\* | 59.723\*\*\* | **33.494\*\*** | 8.599 | 4.244 |
| **[16.766]** | [5.216] | [21.639] | **[14.811]** | [5.673] | [34.795] |
| Prior registrations (1991-2000) | 89 | **8.959\*\*\*** | 3.663\*\*\* | 18.547\*\* | **7.970\*\*\*** | 2.236\*\* | 6.828 |
| **[2.459]** | [0.985] | [6.906] | **[2.427]** | [1.047] | [7.814] |
| Prior investments (1991-2000) | 82 | **9.390\*\*\*** | 4.082\*\*\* | 20.497\*\* | **8.938\*\*\*** | 2.605\*\* | 8.518 |
| **[2.566]** | [1.153] | [7.712] | **[2.680]** | [1.263] | [8.734] |

Note: Each cell provides estimates from a separate regression of the outcome identified in the column heading for the specific definition of competitive districts in each row. Sample is January 2001 to March 2015. All regressions include population, share of manufacturing and software firm registrations, other education center registrations (lagged by three months), and state-by-year fixed effects. Standard errors clustered at the state level. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

**Table 7: Percentage of enrolment by school type of current students - on the basis of premier institutions established before 2001 [IHDS]**

|  |  |  |  |
| --- | --- | --- | --- |
| Type of Districts | Type of School | Primary (%) | Upper Primary (%) |
| Pre RTE [2004-05] | Post RTE [2011-12] | Difference | Pre RTE [2004-05] | Post RTE [2011-12] | Difference |
| Less-competitive | Government | 71.95 | 62.63 | -9.32 | 67.98 | 68.10 | 0.12 |
| Private | 23.62 | 33.52 | 9.90 | 22.79 | 25.62 | 2.83 |
| Educationally-competitive  | Government | 64.60 | 49.36 | -15.24 | 61.19 | 52.13 | -9.06 |
| Private | 31.34 | 47.45 | 16.11 | 31.27 | 42.43 | 11.16 |
| **Difference-in-Difference** | **Government** |  | **-5.92** |  | **-9.18** |
| **Private** | **6.21** | **8.33** |

Note: 1. The difference-in-difference (in percentage points) is derived by undertaking the following steps: (a) subtract the percentage of students currently enrolled in a particular type of school during pre-RTE period from the post-RTE period for competitive and less-competitive districts, and (b) take the derived value from (a) and subtract the percentage points for less-competitive district from competitive districts. 2. A positive value of the difference-in-difference means that students attending a particular education level in a particular school type has increased in competitive districts relative to less-competitive districts during the post-RTE period in comparison to pre-RTE period. 3. A negative value of the difference-in-difference means that students attending a particular education level in a particular school type has increased in less-competitive districts relative competitive districts during the post-RTE period in comparison to pre-RTE period. 4. The category of school type include (a) Government, (b) Private, (c) Government-Aided, and (d) Others [Madrasa and Open schools]. We present the enrolment percentage in government and private schools since it constitutes 98 percent of enrolment in India. 5. For this calculation, we consider only the household and individuals which were surveyed in both time periods – 2004-05 and 2011-12. We make use of appropriate sample weights to arrive at the percentages of enrolment. 6. Similar statistic under alternative definition of competitive districts is provided in Appendix Table 41.

Source: Calculated by the authors on the basis of data made available from the India Human Development Survey [IHDS] 2004-05 and 2011-12

**Table 8: Status of private tuition take-up by education level - on the basis of premier institutions established before 2001 - [IHDS]**

|  |  |  |  |
| --- | --- | --- | --- |
| Type of District | Type of School | Primary | Upper Primary |
| Pre RTE [2004-05] | Post RTE [2011-12] | Difference | Pre RTE [2004-05] | Post RTE [2011-12] | Difference |
| Less-Competitive  | Government | 12.80 | 19.29 | 6.49 | 18.73 | 23.91 | 5.18 |
| Private | 21.98 | 25.96 | 3.98 | 25.92 | 25.79 | -0.13 |
| Total | 15.24 | 21.40 | 6.16 | 20.48 | 24.44 | 3.96 |
| Competitive | Government | 17.91 | 28.01 | 10.10 | 26.95 | 35.15 | 8.20 |
| Private | 29.97 | 32.78 | 2.81 | 35.60 | 36.56 | 0.96 |
| Total | 22.06 | 30.86 | 8.80 | 30.61 | 36.40 | 5.79 |
| **Difference-in Difference** | **Government** |  | **3.61** |  | **3.02** |
| **Private** | **-1.17** | **1.09** |
| **Total** | **2.64** | **1.83** |

Note: 1. The difference-in-difference (in percentage points) is derived by undertaking the following steps: (a) subtract the percentage of students accessing private tuition who are currently attending primary/upper-primary in a particular type of school during pre-RTE period from the post-RTE period for competitive and less-competitive districts, and (b) take the derived value from (a) and subtract the percentage points for less-competitive district from competitive districts. 2. A positive value of the difference-in-difference means that the students accessing private tuition has increased in competitive districts relative to less-competitive districts during the post-RTE period in comparison to pre-RTE period. 3. A negative value of the difference-in-difference means that the students accessing private tuition has increased in less-competitive districts relative competitive districts during the post-RTE period in comparison to pre-RTE period. 4. The category of school type include (a) Government, (b) Private, (c) Government-Aided, and (d) Others [Madrasa and Open schools]. 5. For this calculation, we consider only the household and individuals which were surveyed in both time periods – 2004-05 and 2011-12. 6. We make use of appropriate sample weights to arrive at the percentage of student accessing private tuition. 7. Similar statistic under alternative definitions of competitive districts is provided in Appendix Table 42.

Source: Calculated by the authors on the basis of data made available from the India Human Development Survey [IHDS] 2004-05 and 2011-12



**Figure 1: Graphical representation of parallel trends of new tuition centers registrations per billion persons**

Note: The estimates provide the differential trend *(t \** $C\_{d}) $which were derived from regressing the new tuition centers registrations per billion persons on dummy for competitive districts interacted with dummies for year. Standard errors clustered at the state level. Competitive districts have a premier institution established before 2001. The bandwidths represent the 95 percent confidence interval.



**Figure 2: Graphical representation of parallel trends of new school and HEIs registrations per billion persons**

Note: The estimates provide the differential trend *(t \** $C\_{d}) $which were derived from regressing the new school and HEIs registrations per billion persons on dummy for competitive districts interacted with dummies for year. Standard errors clustered at the state level. Competitive districts have a premier institution established before 2001. The bandwidths represent the 95 percent confidence interval.

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2. *IIM Ahmedabad, India and Hoover Institution, Stanford University;* chirantanc@iima.ac.in [↑](#footnote-ref-2)
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4. *HEC Lausanne, University of Lausanne;* Shreekanth.Mahendiran@unil.ch [↑](#footnote-ref-4)
5. See also Mukhopadhyay and Sahoo (2016) on the interactions between the different components of the Indian educational system during expansion of access. [↑](#footnote-ref-5)
6. In 2020, there were 159 Institutes of National Importance, but for identification reasons explained below we focus on the 39 districts that had such schools of higher education identified before 2001. See <https://en.wikipedia.org/wiki/Institutes_of_National_Importance> [accessed June 10, 2020]. [↑](#footnote-ref-6)
7. A parallel analysis is work on school attendance in U.S. studies where the influence of local colleges on school attendance is well-documented. Jagnani and Khanna (2020) show an immediate and large impact on educational demand for elementary and secondary schools when an elite university is introduced to an Indian district. Moreover, Bhorkar and Bray (2018) find evidence that Indian tuition centers also provide advice on school choice, reinforcing local competition. [↑](#footnote-ref-7)
8. Note, however, that we analyze registered private schools and do not consider unregistered schools, which may be substantial in some locations (e.g., see Rangaraju, Tooley, and Dixon (2012) and Kingdon (2020)). [↑](#footnote-ref-8)
9. [https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-eighty-sixth-](https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-eighty-sixth-amendment-act-2002)

[amendment-act-2002](https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-eighty-sixth-amendment-act-2002) - [Accessed as on March 14th 2019]. [↑](#footnote-ref-9)
10. See: <https://timesofindia.indiatimes.com/india/Centre-buries-Right-to-Education-Bill/articleshow/1748745.cms> [Accessed as on June 3rd 2020] [↑](#footnote-ref-10)
11. Details can be found in Jha, Ghatak, Mahendiran, and Bakshi (2013) and are summarized in Appendix A. [↑](#footnote-ref-11)
12. Private unaided schools are those which are managed by private management and does not take any assistance from the state or central government in any form. [↑](#footnote-ref-12)
13. Rangaraju, Tooley, and Dixon (2012) describe the private unaided schools that offer education services to 65 percent of children in Patna, Bihar. They neither have the infrastructure nor qualified teachers to meet the RTE mandates. The enforcement of RTE has led to closing down of such schools or leaving them to continue as illegal entities without the proper recognition from the local government. On the other hand, the public schools may not have faced such stringent requirements. [↑](#footnote-ref-13)
14. Data on schooling in India may be pieced together from alternative sources and are not necessarily consistent across sources (see Kingdon (2020) and Shah and Steinberg (2019)). The most reliable overall data come from the National Sample Survey (NSS), an annual household survey. The official school data come from the District Information System on Education (DISE), which is an administrative data set of the Indian Ministry of Education, although the accuracy and comprehensiveness of the DISE data have been questioned. These data can be supplemented with achievement data from the India Human Development Survey (IHDS). [↑](#footnote-ref-14)
15. The Annual Status of Education Report (ASER) is a household survey by the Pratham Education Foundation (<https://www.pratham.org/>) focusing on rural education and including student test data. [↑](#footnote-ref-15)
16. A number of international reviews summarize the range of experiences (e.g., Bray (1999

, 2017), Dang and Rogers (2008), Park, Buchmann, Choi, and Merry (2016), Kim and Jung (2019), Zhang and Bray (2020)). Existing international studies have been largely descriptive with few quantitative studies of the impact of supplementary education. [↑](#footnote-ref-16)
17. The interaction of private tutoring with regular schooling of course is not always positive. Jayachandran (2014) finds that learning can be less in the regular classrooms when teachers are also providing private tutoring. [↑](#footnote-ref-17)
18. There are limited consistent data on the extent and character of supplementary education consumed around the world, in part because of varying definitions (Bray, Kobakhidze, and Suter (2020)). Perhaps the most consistent data on supplemental education is found in the survey accompanying the OECD international testing of the Programme for International Student Assessment (PISA) in 2012. It asked 15-year-old students how many hours per week they spent in out-of-school classes that were offered by a commercial company and paid for by students’ parents. The percentage of students participating in such education ranged from four percent in Finland to over 50 percent in Thailand and Greece (Park, Buchmann, Choi, and Merry (2016)). [↑](#footnote-ref-18)
19. Primary levels include grades between 1-5, Middle levels include grades between 6-8, Secondary levels include 9th and 10th grade, and Senior Secondary levels include 11th and 12th grades. [↑](#footnote-ref-19)
20. See:<https://indianexpress.com/article/education/iim-a-study-parents-lack-trust-in-govt-schools-place-faith-in-> [tuition-teachers-5736589/](https://indianexpress.com/article/education/iim-a-study-parents-lack-trust-in-govt-schools-place-faith-in-tuition-teachers-5736589/)

 [↑](#footnote-ref-20)
21. Other important work has investigated the role of different prize structures (e.g., Freeman and Gelber (2010), Orrison, Schotter, and Weigelt (2004)), risk aversion and the nature of luck (e.g., List, Soest, Stoop, and Zhou (2020)), and general issues of optimal design of tournaments (e.g., Dechenaux, Kovenock, and Sheremeta (2015)). [↑](#footnote-ref-21)
22. Leuven, Oosterbeek, Sonnemans, and van der Klaauw (2011), however, suggest caution in interpreting observational studies of performance outcomes in tournaments with heterogeneous contestants and different rewards because of sorting into tournaments. [↑](#footnote-ref-22)
23. See <http://www.asercentre.org/p/158.html> [accessed November 9, 2020]. [↑](#footnote-ref-23)
24. The larger reaction in high demand areas is also consistent with standard models of human capital investment. A simple model of choice for private tutoring indicates that high-demand households will have greater use of private tutoring than low-demand households (Dang and Rogers (2008)) and that this demand will expand with increased school enrolment (Kim and Lee (2010)). The added demand by high-demand households represents extra effort in our tournament setting. [↑](#footnote-ref-24)
25. Beginning with Card (1993) and continuing through Carneiro, Heckman, and Vytlacil (2011), Doyle and Skinner (2016), and many other U.S. studies, distance to the nearest college or some related measure are used to instrument school attainment in analyses of the returns to schooling. [↑](#footnote-ref-25)
26. See <https://en.wikipedia.org/wiki/Institutes_of_National_Importance> for the entire list of premier institutions. [↑](#footnote-ref-26)
27. As we discuss below, while we believe this definition of competitiveness provides the clearest treatment group, our results hold when we expand the definition to include other arguably competitive districts. [↑](#footnote-ref-27)
28. The Census of India does not classify districts into rural and urban. We have classified a district as urban if the urban population is greater than the rural population, and rural if the urban population is lower than the rural population. [↑](#footnote-ref-28)
29. This is, as discussed below, a lower bound on the causal effect of RTE because it ignores any increase in private tutoring in the less-competitive districts that might be induced by the increased enrollment there. [↑](#footnote-ref-29)
30. In these extended analyses, we consider the relevant lagged introduction of other school opportunities. We introduce the lagged (by three months) new tuition center and higher education institutions registrations per billion persons to capture its effect on new school registrations per billion persons. Similarly, we introduce the lagged (by three months) new tuition center and school registrations per billion persons to capture its effect on new higher education institution registrations per billion persons. [↑](#footnote-ref-30)
31. The contemporaneous timing is consistent with the observed immediate response of increased primary and secondary demand at the introduction of an elite college into an Indian district (Jagnani and Khanna (2020)). [↑](#footnote-ref-31)
32. The 35 states and union territories are Andaman and Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Dadar and Nagar Haveli, Daman and Diu, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Lakshadweep, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Puducherry, Punjab, Rajasthan, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand, and West Bengal. [↑](#footnote-ref-32)
33. For a recent description of the data, see: https://www.ideasforindia.in/topics/macroeconomics/firm-formation-in- india-the-last-40-years.html and https://blog.theleapjournal.org/2019/03/the-geography-of-firms-and-firm.html [Accessed as on April 21, 2019]. The data provide information on a range of variables including: (a) unique corporate identification number (CIN hereon) – which is used for filing taxation and for other legal purposes in carrying out the business operations, (b) the name of the firm, (c) firm status (whether it is still active, dormant or closed its operations as on 2015 though this information is noisy and it was unclear to us if it was updated dynamically), (d) type of firm – whether it is private or public, (e ) firm category (whether it is limited by shares or limited by guarantees), (f) authorized capital, (g) paid up capital, (h) principal business activity (i) date of registration or incorporation (see footnote below) (j) state/union territory in which the firm was registered and (k) its office address with detailed city, district and pin code (similar to zip code in the USA). We retrieved the data from MCA website during December 2015. [↑](#footnote-ref-33)
34. Principal business activity is categorized into (i) Agriculture, (ii) Business, (iii) Community/Social Enterprises, (iv) Construction, (v) Electricity, (vi) Finance, (vii) Insurance, (viii) Manufacturing (food, leather, machinery, metals, papers, wood, textiles, and others), (ix) Mining, (x) Real Estate, (xi) Trading, (xii) Transportation and related services, and (xiii) Others (firms for which this particular information is not provided in the dataset). [↑](#footnote-ref-34)
35. The year of registration is the same as year of incorporation of the company. We make use of the term “registered” to refer to both the registration and incorporation of a company in this paper and use it as a measure of firm formation and entry in their respective industries. [↑](#footnote-ref-35)
36. India has a variety of admission exams for tertiary education: Indian Institute of Technology Joint Entrance Examinations (IIT JEE) for engineering students, National Eligibility Cum Entrance Test (NEET) for medicine students, and Common Law Admission Test (CLAT). [↑](#footnote-ref-36)
37. The registration data are sometimes incomplete. For the definition of educationally competitive districts in the robustness analysis, we consider reported investment of paid-up capital for registrations between 1990-2000, but these data are sometimes missing. We also considered the number of registrations of tuition centers between 1990-2000, but again these sometimes-lacked data on paid up capital. We are unable to distinguish no effective investment as indicated by no paid-capital from simply missing data. We also fail to identify any unregistered firms that may be illegally operating. [↑](#footnote-ref-37)
38. For online searches, we made use of google search engine and other search engines such as justdial, indiamart and sulekha to identify and validate whether an education firm is still operating its unit or not. [↑](#footnote-ref-38)
39. After 2001, 97 percent of the premier institutions were established only on or after 2007 which is much closer to the enactment of RTE at the national level. [↑](#footnote-ref-39)
40. In our preliminary analysis, we observed that the inclusion of New Delhi as part of our competitive districts sample altered the distribution of registration per billion persons such that it no longer represents the distribution as observed with the raw, and absolute, number of registrations. This is primarily due to the relatively small population of New Delhi which generates outliers when the absolute number of registrations are transformed into registrations per billion persons. Therefore, we exclude New Delhi from the analysis even though it has an IIT established in 1961. Nonetheless, from the preliminary analysis, the exclusion or inclusion of New Delhi from our regression analysis does not alter our main findings in any manner. [↑](#footnote-ref-40)
41. Because of the magnitudes involved, we make use of registrations per million persons for our discussion of the descriptive statistics for expositional purposes. For our main estimation results, we make use of registrations per billion persons as it facilitates putting our findings in the national context which has, in total, a population of about one billion. This was the motivating factor to make use of different measures, per million and per billion, for the descriptive and regression analysis respectively. [↑](#footnote-ref-41)
42. We accumulate the registration of new tuition centers over the decade to arrive at an indication of pre-existing differences in educational competition. [↑](#footnote-ref-42)
43. https://en.wikipedia.org/wiki/Indian\_Institutes\_of\_Technology [Accessed May 20, 2020] [↑](#footnote-ref-43)
44. Only three districts (Gandhi Nagar, Hardwar, and Medinipur) are categorized as competitive districts on the basis of an IIT but do not fall under competitive districts on the basis of prior number of centers and investments. [↑](#footnote-ref-44)
45. Not all registrants report the amount of paid-up capital at registration. Thus, this could simply reflect missing data, or it could reflect that some registrants are not really prepared to begin operation at the time of registration. [↑](#footnote-ref-45)
46. Shah and Steinberg (2019) and Kingdon (2020) both document the significant increase in private school attendance after the introduction of RTE but cannot reliably attribute this to RTE and not other forces. [↑](#footnote-ref-46)
47. In discussing the impacts of rapid expansion of schooling in a different context (higher education in Italy), Bianchi (2019) emphasizes general equilibrium effects including changes in peers and congestion for specific resources. [↑](#footnote-ref-47)
48. The description of the surveys and access to the data can be found at <https://ihds.umd.edu/data>. See also Desai and Vanneman (2018). [↑](#footnote-ref-48)
49. The overall findings discussed below hold true across alternative definitions of competitive districts with the exception of private tuition take-up under the competitive definitions based on prior registrations and prior investments. [↑](#footnote-ref-49)
50. There is a uniformly positive correlation between parental education and children’s education, but the causal structure is not well-understood (see, for example, Sewell and Shah (1968), Black, Devereux, and Salvanes (2005), Kajisa and Palanichamy (2010), Ermisch and Pronzato (2010), and the review in Holmlund, Lindahl, and Plug (2011)). For our purposes, the exact causal structure of family inputs is not crucial, as long as the correlates of parental education also point to high demand. [↑](#footnote-ref-50)
51. See, for example, UNESCO (2000b). [↑](#footnote-ref-51)
52. Hanushek and Woessmann (2008, 2015a) [↑](#footnote-ref-52)