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Impact of Private Tutoring on Learning Levels: Evidence from India [1]

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Abstract

Despite widespread and substantial private expenditure on private tutoring outside the formal school system in many developing countries, not much is known about their effects on learning outcomes. The main challenge in estimating such an effect is that the decision to send the child for private tutoring is correlated with unobserved variables which are also correlated with learning outcomes.

This paper utilizes a large household survey conducted in rural India, and employs Fixed Effect (FE) estimation to control for the effect of unobserved variables. We find positive and significant effect of private tutoring on learning outcomes for students at elementary level (grades 1-8). This effect is equivalent to an additional year of schooling or being in a private school instead of a government school. The effect is stronger for the students enrolled in government schools compared to the students enrolled in private schools, for children from economically disadvantaged background, and for children whose parents are relatively less educated.

These are, to our knowledge, the first estimates of impact of private tutoring on learning outcomes in the Indian context.

JEL Classification: I20, I21
Keywords: Private tutoring, India

Introduction

Realizing the importance of education in development of human capital and economic growth, policy makers in developing countries have given substantial attention to education, especially school-based education in the last two decades. This commitment is reflected in the second Millennium Development Goal (MDG), which states that all children, whether boys and girls, should be able to complete a full course of primary schooling[2]. Consequently, critical and rigorous analysis of policies surrounding provision of school-based education has received much-deserved attention (Hanushek, 2003; Glewwe et. al., 2013). But in the process, role of additional educational inputs provided by the households, such as private tutoring, has remained neglected.

Private tutoring can be defined as fee-based tutoring that provides supplementary instruction to children in academic subjects that they study in the mainstream education system (Dang & Rogers, 2008). It is widespread across many developing as well as developed countries. To give a few examples, in Mauritius, almost all senior secondary school students receive private tutoring; In Japan, 70% of students receive such tutoring by the time they complete middle school; 83% students in Malaysia receive tutoring by the time they reach senior secondary school (Bray, 2007; Dang & Rogers, 2008; Bray 2011). 83.1% of primary school students, 92.8% of middle school students, and 87.8% of high school students in South Korea attend private tuitions (Kim & Lee, 2010)[3]. A substantial fraction of private expenditure on education is devoted to spending on private tutoring. In Korea, for example, households spent 2.8 percent of GDP on private tutoring in 2006, equivalent to 80% of government expenditure on public education for primary and secondary schooling (Kim and Lee, 2010). In Turkey, aggregate expenditure on private tutoring is 1.44% of GDP, and is comparable to total public sector educational spending (Tansel & Bircan, 2006).

[2] http://www.un.org/millenniumgoals/education.shtml

[3] Paviot et. al. (2008) analyze phenomenon of private tutoring in Kenya, Malawi, Mauritius, Namibia, Zambia and Zanzibar. They find proportion of students taking private tuitions ranged from 44.7% in Namibia to 87.7% in Kenya.

Why do such a large proportion of students and parents attend private tutoring? The literature suggests that demand for private tutoring (captured either through participation or expenditure on tutoring) is mainly driven by household income, parental education, and whether household resides in urban area. Higher incomes, higher parental education and residence in urban area increase the probability of a child from such a household attending private tutoring (Dang, 2007; Kim & Lee, 2010; Tansel & Bircan, 2006). It has been also found that students in higher grades, those preparing for school leaving examinations or university entrance examinations are more likely to attend tutoring (Briggs, 2001; Gurun & Millimet, 2008; Kim & Lee, 2010). It is believed that private tutoring might provide an extra edge in such highly competitive examinations, facilitating admission into reputed institutions for higher education. This, in turn, is likely to translate into higher economic reward, and social mobility in future.

An academically weak child might fall behind of what is being taught in the class, and hence might need more individual attention, which can be provided by private tutors[4]. In many developing countries, schools in general, and government schools in particular, do not deliver 'quality' education[5]. Parents might prefer private school but private schools may not be available or affordable. In these instances, parents might feel the need to supplement school-based education with private tutoring (Dang & Rogers, 2008; Banerjee & Wadhwa, 2013). In many instances, it has been observed that government school teachers shirk their responsibilities in school in order to increase demand for private tutoring (Biswal, 1999; Glewee & Jayachandran, 2006; Jayachandran, 2013).

Does private tutoring improve outcomes? The main challenge in estimating impact of private tutoring is non-random selection of students in it. Students who attend private tutoring are likely to differ systematically from those who don't take tuitions on various observable and unobservable dimensions. Differences along the observable dimensions can

[4] Baker (2001) shows that private tutoring is used significantly more often by low match achievers than by high achievers in three-fourth of the countries participating in the Third International Mathematics and Science Study (TIMSS).
[5] See Glewwe & Kremer (2006) and Chaudhury et al. (2006) for more on state of government schools in developing countries.

be controlled but differences along the unobservable dimensions such as ability, motivation, parental concern for education etc., by their nature, are difficult to account for. More importantly, these factors are correlated with both, learning outcomes and likelihood of attending tuitions. As a result, if we find any difference in learning levels of students who attend private tuition and those who don't, it's not clear whether this difference is due to private tuitions alone or the unobservable factors also play a role. Many of the earlier studies did not explicitly control for such non-random selection.

Briggs (2001) recognizes this self-selection problem, and employs Heckman model to control for it. Using National Education Longitudinal Survey (NELS) of 1988, he finds that tutoring does improve scores on SAT and ACT tests, the standardized admission tests for admission into four year degree program in the United States. The effect is higher for math as compared to verbal tests (in case of SAT, and reading in case of ACT). Interestingly, for his sample, results obtained after controlling for selection bias through Heckman model are virtually identical to those produced by linear regressions. Dang (2007) utilizes a simultaneous framework, consisting of joint Tobit, and Ordered Probit model to address these concerns. In his framework, there are two equations of interest - first, determinants of expenditure on private tutoring and second, impact of expenditure on private tutoring on student academic achievement, which are estimated jointly. The instrumental variable in the academic achievement equation for expenditure on private tutoring is the fees charged by the schools in the commune which are regulated by government rules. He finds that higher spending on private tutoring significantly decreases probability that the student falls into either poor or average performance category, and increases probability that the student obtains the good or the excellent academic ranking. Impact is larger for students at the lower secondary level, especially those who are already doing well at school. On the other hand, Kang (2007) relies on instrumental variable (IV) estimation, exploiting a student's birth order to identify effect of expenditure on private tutoring on national college-entrance examination in South Korea. He finds modest effects of private tutoring for students in grade 12 in South Korea. Ryu and Kang (2013) employ four different empirical methods – IV, propensity score matching (PSM), first-differencing (FD),

and a non-parametric bounding method, to find negligible effect of private tutoring expenditure on test scores of middle school students (grades five to seven) in South Korea. Our paper contributes to this nascent literature by employing Fixed Effects (FE) estimation technique to control for heterogeneity between clusters of data. In cross-sectional data, clusters mean households, schools or villages that have heterogeneous effect on the outcome of interest, which can be netted out using FE estimation (French & Kingdon, 2010). We are well-placed to employ this technique due to availability of a dataset whose underlying sampling strategy is such that pre-determined number of villages from each district and pre-determined number of households from each selected village were to be surveyed (details below). But it must be noted that even the household FE can't control for heterogeneity between children in the same household.

The results indicate consistently positive and statistically significant effect of private tuitions on learning levels of students at Elementary level (grades 1-8) in rural India. The FE estimation indicates 0.14 standard deviation effect of private tutoring on learning outcomes. This effect is equivalent to an additional year of schooling or being in a private school instead of a government school. We also find that the effect of private tuition is stronger for the students enrolled in government schools compared to the students enrolled in private schools. The effect is also stronger for the children who are from economically disadvantaged background (indicated by nature of housing), and the children whose parents are relatively less educated. Thus, private tuition benefits more to the disadvantaged students, i.e. those who have lower learning outcomes.

To our knowledge, this is the first research work which attempts to rigorously estimate impact of tuitions on learning outcomes in the rural Indian context, where almost one-fourth students of elementary level attend private tuitions.

Background

Elementary Education in India

The landscape of elementary education in India has transformed dramatically in the last decade. The governments, at the Federal and at the level of states, have increased allocation on elementary education more than two fold from Rs. 68,853 crores in 2007-08 to Rs. 147,059 crores in 2012-13 (PAISA Report, 2012). Increased allocation has translated into higher expenditure which in turn, has led to increased access to schools, and improved physical and human infrastructure in schools. Various innovative programs and schemes have made it easier for parents to send children to school, and for children to attend the schools. Consequently, enrollments have shot up, and proportion of out of school children has come down to less than four per cent even in rural areas in 2013 (ASER, 2013). In 2010, the Indian parliament passed the Right to Education (RTE) Act, which declared elementary education as a fundamental right, i.e. it is now obligation of the government to ensure that every child between six and fourteen years of age is in school and in 'age-appropriate' class. Despite these input improvements, it has been repeatedly shown that learning levels of Indian students are alarmingly low. For example, only 47 per cent students in grade five could read class two level text, and only 52.3 per cent students in grade five could solve two-digit subtraction problem, in rural India (ASER, 2013). The Programme for International Student Assessment (PISA) surveyed 74 countries, including the two Indian states of Himachal Pradesh and Tamil Nadu. According to their results, the two Indian states stood at 72nd and 73rd position in both reading and mathematics (PISA, 2009). Further, spending an additional year in school doesn't seem to be effective in improving these low learning levels (Pritchett & Beatty, 2012; Muralidharan & Zieleniak, 2013)[6]. One plausible reason for such dismal situation is that on any given day, a significant fraction of teachers are absent, and when present, not necessarily engaged in teaching activity (Kremer et. al., 2005; Muralidharan et al, 2013; Muralidharan and Sundararaman, 2013). Partly as a response to this, share of private schools in total enrollment has been

[6] This phenomenon is not restricted to Indian public education system. See Hanushek (2003) for a review of the US and international evidence on the effectiveness of input-based policies.

increasing in both rural and urban areas. A substantial body of literature has analyzed impact of private schools on learning outcomes[7].

This discussion reveals that most of the literature has focused on issues surrounding public and private provision of school-based education. Role of other private educational inputs going into children's education, including private tuitions, and their impacts, has remained unexplored.

Private Tuitions in India

Though exact numbers are not available, it is widely known that a large proportion of students at secondary and post-secondary level attend private tuitions in India. But this phenomenon is not restricted to higher grades, and urban areas. Approximately one-fifth of rural Indian children in grades 1-8 also attend private tuitions (ASER 2009-2013)[8]. There is substantial variation among states in terms of proportion of children attending tuition (figure 1). Almost three-fourth of children at elementary level in rural West Bengal and Tripura, and close to half of children in rural Bihar and Odisha attend private tuitions (ASER 2012). Children attending tuition spend on an average nine hours in tuitions per week (IHDS, 2004-05), which is equivalent to one and a half school day[9]. They pay on average, Rs. 170 per month, amounting to slightly above Rs. 2000 per annum to attend these tuitions (ASER 2013). Why do these children attend private tuitions? Parents might feel that they are not in a position to guide their child in studies, especially at higher levels. Further, children may not be able to keep pace with an 'ambitious' curriculum, they may get left behind, and may feel the need for supplementary instruction[10]. Both these factors might explain why a significant fraction of students attend private tuitions even at

[7] The key problem in estimating effect of private schools is that of selection bias. Kingdon (1996), Desai et al (2008), Goyal (2009), French & Kingdon (2010), and Chudgar & Quin (2012), Singh (2013) attempt to correct for it, but can't fully address the concern. To our knowledge, Muralidharan and Sundararaman (2013) is the only paper which provides causal estimates of effect of private school on learning outcomes.

[8] Numbers are likely to be much higher for children in urban areas. ASER doesn't survey children in urban area. As per India Human Development Survey (IHDS), carried out in 2003-04, 26% per cent children in grades 1-8 attend tuition.

[9] IHDS stands for India Human Development Survey. Details can be found here: http://ihds.umd.edu/

[10] It is acknowledged that curriculum in developing countries is quite ambitious in terms of coverage and pace (Pritchett & Beatty (2012), Muralidharan & Zieleniak (2013), and references therein).

elementary level[11]. If this indeed is the main reason why parents send their children to tuitions, one would expect that attending private tuition would have positive effect on learning levels of the children who attend it, and this is the hypothesis we attempt to test in this paper.

Data

Sampling Methodology

We use 2011 round of ASER survey conducted by ASER Centre, Delhi, India[12]. Initiated in 2005, the main objective of ASER survey is to generate reliable estimates of the status of children's schooling and basic learning (reading and arithmetic level) at the district level. The sample size is 600 households per district – 30 villages per district and 20 households in each village. Given that ASER survey covers entire rural India, this sampling strategy yields large sample size, running into slightly more than half a million observations at an all India level, which is the main strength of the data. We have restricted our analysis to children in the age-group of six to fourteen years, which yields a sample size of slightly less than half a million[13].

For 2011 round, villages were randomly selected using the village directory of 2001 census. The sampling technique employed was probability proportional to size (PPS). For sampling households within each village, the surveyors divided the village into sections (based on number of hamlets within the village), and picked four sections randomly. Within each section, the surveyors chose the household in the centre of the habitation as

[11] Another reason, as discussed before, could be high-stakes end of the year exams, the performance in which determines whether the child can pursue faculty of education of his/ her choice, and quality of educational institution he/ she can attend. But this is unlikely to explain prevalence of private tuitions at elementary level.
[12] We have carried out exactly the same analysis using data from 2012 round of ASER as well. The results are broadly along the same lines, and available from the authors on request.
[13] Right to Education (RTE) Act guarantees 'age-appropriate' school-based education for children in the age-group of six to fourteen years. Hence we focus on this age group. Previous research using ASER data have also focused on this age-group (see French & Kingdon (2010), for example)

the first household to be surveyed in that section, and then surveyed every fifth household in a circular fashion.

The survey process in each village consisted of village survey, survey of a government school in the village, and household survey. Village survey involved collecting information on existence of basic infrastructure such as roads, electricity, health centres and health providers (both, public and private), and schools (both, public and private), through observation. School survey involved collecting information about student enrollment and attendance, teacher appointment and attendance, and basic school infrastructure for government school in the village with grades from one to seven/eight[14]. If there was no government school with grades one to seven/eight, the government school with the highest enrolment in grades one to four/five was surveyed. If the village did not have any government school with grades one to four/five, no school survey was done in that village. Household survey involved gathering information about the schooling status of all children between three to sixteen years of age, whether the child attended private tuition, both parents' background (age, schooling status) and certain household indicators.

The key feature of the data set is the assessment of reading and math level of all children between five to sixteen years of age in the sampled household. To measure the reading level, the child had to start with a paragraph (of grade one level). If the child could read the paragraph, then he/ she was asked to read a short story (of grade two level). If the child could not read the paragraph, then he/ she was asked to read any five words. If the child could not read words, he/she was asked to read any five letters. The child then was categorized into five categories: those who couldn't read the letters, those who could read letters but not the words, those who could read words but not the paragraph, those who could read paragraph but not the short story, and finally those who could read the short story (equivalent to grade two level). We have coded these categories as zero, one, two, three and four respectively. Similarly, for arithmetic, the children could belong to any of the categories – those who can't recognize numbers one to nine, those who can recognize

[14] In some states, elementary level education is from grades one to seven.

numbers one to nine but not 11 to 99, those who can recognize numbers between 11 to 99 but couldn't solve a simple subtraction problem (two digit numerical problem with borrowing), those who could solve subtraction problem but not the division problem (three digit number divided by one digit number), and finally those who could solve the division problem. We have coded these categories as zero, one, two, three and four respectively.

We have summed up the reading and math scores for each child, and then standardized it by subtracting a child's aggregate score from the mean aggregate score of all students, and then dividing by the standard deviation of aggregate score for that year. This standardized aggregate score has been used as dependent variable in our empirical analysis.

Descriptive Statistics

Table 1 presents basic statistics based on data collected through ASER 2011. Children are, on average, 10 years old which means they would be in grades four or five. 47 per cent of these are girl children. Proportion of children attending government school was 73 per cent in ASER 2011[15]. Learning levels of children are dismal – on an average, children are able to read words but not the paragraphs, and can recognize numbers 11 to 99 but can't solve the subtraction problem[16]. 20 per cent children attend private tuitions in this sample. On average, mothers are 34 years of age, and have completed education till grade four, while fathers are 39 years of age and have completed education till grade six. Only 36 per cent of the households stay in *pucca* houses. Interestingly, proportion of households with television is higher than proportion of households with toilets in the house. Hardly 10 per cent households get newspaper daily. Most of the villages have electricity connection, and close to three-fourth villages have *pucca* road leading to the village, and a PDS shop. 43 per cent of the villages have private schools.

********** (Table 1 here) **********

[15] This proportion has come down to 70 per cent in ASER 2012.
[16] Comparison of ASER 2011 and ASER 2012 indicates decline in learning levels.

Table 2 compares children attending private tuition and those who don't with respect to various characteristics. Column 5 shows that children attending private tuition have different characteristics than children who don't attend private tuitions (after controlling for State effects). Being in a government school, being a girl child and being in a lower grade, each reduce the probability of attending tuition. In terms of numbers, prevalence of tuition is 15.5 percentage points lower among the students attending government school. Parents of children attending tuition are more educated, i.e. they have completed two more grades of education. Children attending tuition belong to relatively affluent households, as indicated by nature of house, availability of toilet, ownership of television set, mobile phone, and computers, and availability of newspapers and other reading material in the house. Children who belong to economically active or larger villages have higher probability of attending private tuition–children from villages which have banks, primary health centre, private health centre, private school, and internet café have higher probability of attending private tuitions.

********** (Table 2 here) **********

We also estimate a linear probability model where dependent variable equals unity if the student attends tuition and zero otherwise. The complete results are in appendix (table A1.1) where column 1 has results for district Fixed Effect (FE), and column 2 shows results for village FE. The results are broadly similar to that of table 2.

The next section discusses empirical strategy to estimate effect of private tuition on learning level.

Empirical Strategy

Consider a 'full' model of determining learning level of a child as shown below in equation I,

$$Y_i = \beta_0 + \beta_1 * P_i + \pi * \mathbf{X_i} + \varepsilon_i, \quad \text{(I)}$$

where dependent variable Y_i is a measure of learning level for child i (in this context, standardized aggregate score for child i). P_i is an indicator for whether child i attends private tuition, while $\mathbf{X_i}$ is a vector of all factors that affect learning levels of child i, including child, household and village level factors. ε is the error term. In this 'full' model, β_1 is the true causal effect of private tuition on learning levels. But in reality, not all factors affecting private tuition are observed. Hence,

$$Y_i = \beta_0 + \beta_1 * P_i + \pi_1 * \mathbf{X_{1,i}} + \pi_2 * \mathbf{X_{2,i}} + \varepsilon_i, \quad \text{(II)}$$

where $\mathbf{X_1}$ indicates vector of observable characteristics affecting learning levels, and $\mathbf{X_2}$ indicates vector of unobservable characteristics. Since only $\mathbf{X_1}$ are observable, what is estimated is

$$Y_i = \beta_0 + \beta_1 * P_i + \pi_1 * \mathbf{X_{1,i}} + \xi_i, \quad \text{(III)}$$

where ξ consists of X_2 and ε.

Factors such as a child's inherent ability or motivation, emphasis a family places on education, school environment are some of the examples of variables in $\mathbf{X_2}$. A key feature of these variables is that they are cor-related not only with the learning levels but also with whether a child attends private tuition. As a result, OLS estimation yields biased estimate of effect of private tuitions on learning levels.

(i) Fixed Effects (FE) Estimation

We use fixed effects estimation to control for observable and unobservable factors at various levels affecting learning outcomes. We start with the OLS estimation, and then introduce state FE, district FE, village FE and household FE successively. State FE controls for factors varying across states, district FE controls for factors varying across districts within the same state, village FE controls for factors varying across villages, while household FE controls for factors which vary across households (but not within households) that affect learning levels. Each successive level of FE estimation yields an

estimate of effect of private tuition on learning level, which is closer to the 'true' causal effect. The equation with household FE is

$$Y_{ij} = \beta_0 + \beta_1 * P_{ij} + \mu_j + \pi_1 * \mathbf{X_{1,ij}} + \xi_{ij}, \quad \text{(IV)}$$

where μ_j captures household level factors affecting learning levels. $\mathbf{X_{1,ij}}$ indicates *child level* factors affecting learning levels.

As noted, even the household FE can't control for factors such as differences in intrinsic abilities and motivation of children in the same household, and differential parental support to children within the same household. And to the extent that these factors are correlated with child attending tuition, even the household FE estimates will remain biased.

(ii) Differential Effect of Private Tuition

Next, we allow the effect of tuition to vary as per the type of school child attends (government or private), economic status of the household (captured through condition of the building of the house), parental schooling (mother's schooling and father's schooling separately), and finally gender of the child. Note that when the variable of interest is at child-level (type of school attended, parental schooling, and gender), we use household FE, and when the variable of interest is at the household level (condition of the building of the house), we use village FE. The general equations of both type are indicated below.

$$Y_{ij} = \beta_0 + \beta_1 * P_{ij} + \beta_2 * \text{CHARACTERISTIC1}_{ij} + \beta_3 * (P_{ij} * \text{CHARACTERISTIC}_{ij}) + \mu_j + \pi_1 * \mathbf{X_{1,ij}} + \xi_{ij}, \quad \text{(V)}$$

where the variable 'CHARACTERISTIC1' is the child-level variable of interest – type of school attended, parental schooling, and gender of the child.

$$Y_{ijk} = \beta_0 + \beta_1 * P_{ijk} + \beta_2 * \text{NON-PUCCA}_{ijk} + \beta_3 * (P_{ijk} * \text{HOUSE}_{ijk}) + \mu_k + \pi_1 * \mathbf{X_{1,ijk}} + \xi_{ijk}, \quad \text{(VI)}$$

where Y_{ijk} indicates learning level of child *i* in household *j* and village *k*. The variable 'NON-PUCCA' takes value of one if the building is poorly constructed.
In both these equations, sign and magnitude on the interaction term indicates whether attending tuition has a differential impact on learning levels.

Results

Private Tuition and Learning Level

Table 3 shows the results from FE estimations. Keeping space constraint in mind, we have shown the coefficients for tuition variable and other child level controls only[17]. In both the tables, column (1) shows the results with no controls other than variable of interest– whether the child attends private tuition. In column (2), we add child, household and village level controls. In columns 3 to 6 we successively add state FE, district FE, village FE and finally, household FE.

********** (Table 3 here) **********

Column (1) shows that attending private tuition is associated with 0.36σ increase in standardized aggregate score. Once other control variables are added, the magnitude drops to 0.15σ (column 2). As we add State FE, district FE and Village FE, and finally Household FE, the coefficient on private tuition doesn't change much, remaining around 0.14σ-0.15σ. How large is this effect? Comparing coefficient on private tuition with that of grade in which child is studying or that of type of school reveals that the effect of attending tuition is as large as moving one grade up or attending a private school (Household FE in column 6)[18].

As far as other variables are concerned, the direction of effect is on anticipated lines (see table A.2 in appendix for the full result). Higher the age of the child, higher the standard in

[17] Complete results are shown in table A1.2 in appendix.
[18] Baseline is a child in government school not attending private tuition.

which the child is studying, and higher the affluence of the household, higher is the learning levels. Being in a government school is associated with lower learning levels. Village characteristics don't play an important role.

Robustness Checks[19]

In table 4, we provide results separately, for standardized math score (column 1) and standardized language score (column 2). Columns (1a) and (2a) show the village FE results, while columns (1b) and (2b) show household FE results. In each case, the effect of private tuition is positive and statistically significant. Effect is higher for math compared to language score.

In table 5, we restrict the sample to include only those students who are in the age-group of 6-10 years. Coefficient on private tuition is positive and significant. In fact, effects are much higher for the younger age-group[20].

As mentioned before, prevalence of private tuition is quite high in states like Bihar, West Bengal and Orissa. Columns 1 to 4 in table 6 show the results when we restrict the sample to students in these States. Effect of private tuition on learning outcomes is higher in these states compared to the rest of the country.

Thus, the main result, that of positive and significant effect of private tuition on learning outcome holds even within various sub-samples.

Heterogeneous Effects

Tables 7A and 7B display the result where we allow the effect of tuition to vary as per the school type, condition of the building of the house, and gender of the child (in table 7A), and

[19] Complete tables are in the appendix – A1.3, A1.4 and A1.5

[20] This can partly be explained by the fact that the highest level of language and math skills tested in ASER surveys correspond to standard 2 level. The older students have greater probability of doing better whether they attend tuition or not.

mother's and father's schooling (in table 7B). In table 7A, those who attend private school but not private tuition are at the baseline in column 1, those who stay in non-pucca houses and not attend private tuition are at the baseline in column 2, and finally, male students not attending private tuition are at the baseline in column 3. Results in columns 1 and 3 are based on household FE, while results in column 2 are based on Village FE. In table 7B, children whose mothers and fathers have zero years of schooling, and not attend private tuition are at the baseline. Results in table 7B are based on Household FE.

Both, 7A and 7B indicate that, female students, as well as those students who attend government schools, those who stay in non-pucca households, and those whose parents have zero years of schooling have lower learning outcomes. Interestingly, coefficients on interaction terms indicate that these are the students who benefit more from private tuitions, with exception of female students. For example, effect of tuition is almost twice as high for children enrolled in government schools compared to those who are enrolled in private schools (table 7A). Thus, interaction effects clearly suggest that private tuitions benefit more to those who have lower learning levels, and thus they are actually leveling the playing field.

********** (Table 7A, 7B here) **********

Discussion

Why do private tuitions have a positive effect on learning outcomes? One explanation is that those who attend tuition spend more time at studying. Though ASER doesn't capture time spent at tuitions, analysis of IHDS data indicates that those who attend tuition spend, on average, 9 hours in tuitions. That would mean 1.5 extra school days per week. Another explanation could be remedial teaching in the sense that tutors might be making some efforts to identify the child's weakness, and teach accordingly, which may not be happening in schools, which also might explain why effects of private tuition are higher for relatively disadvantaged students who are likely to benefit more from such assistance.

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Figure 1: Proportion of Students taking tuition- State-wise (Age 6-14)

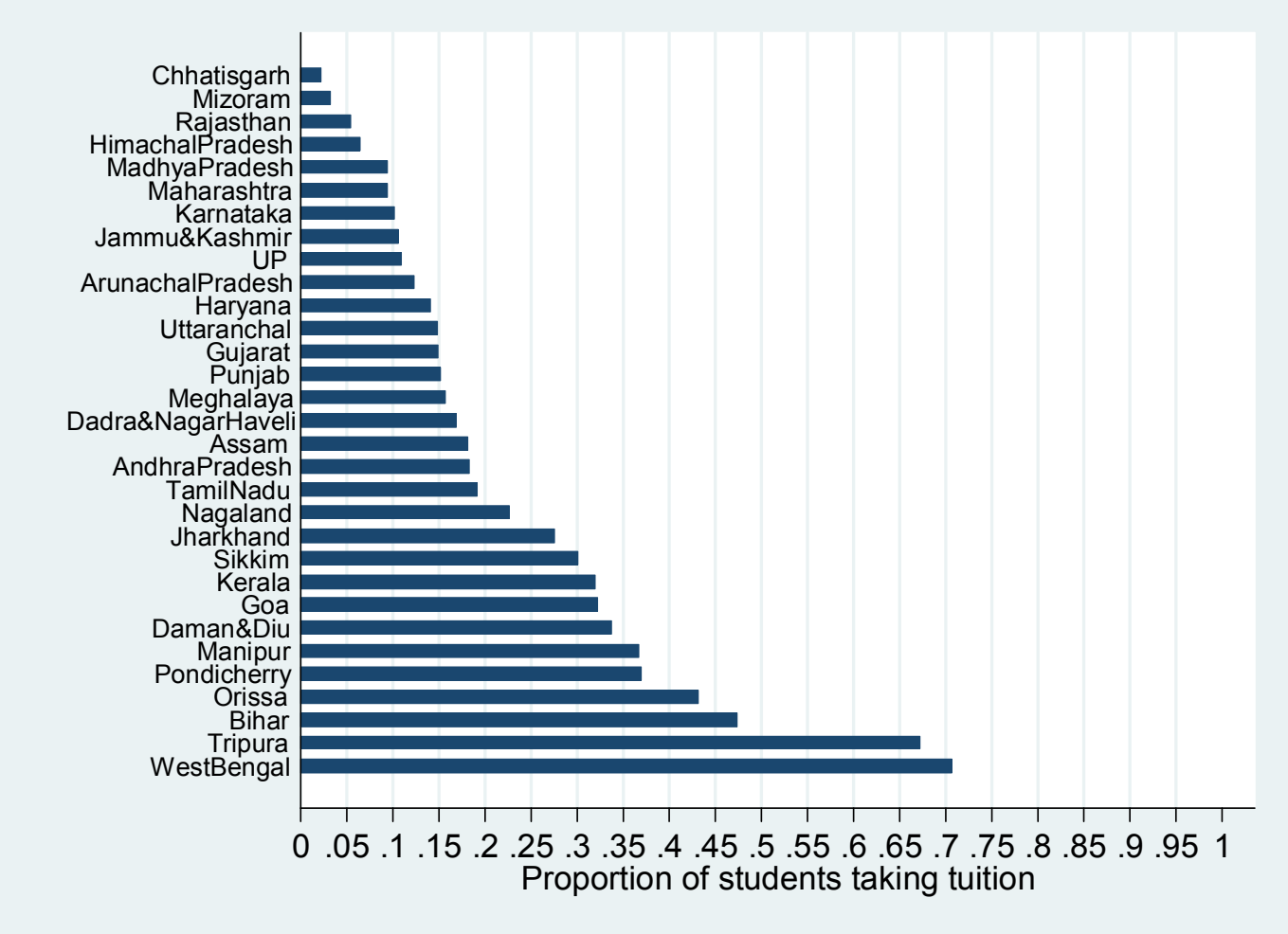

Table 1: Descriptive statistics – ASER 2011

Variables	ASER 2011
Sample Size (children between ages six to fourteen)	439168
Children	
Mean Age (years)	9.98
Proportion of female students (%)	46.81
Proportion of students attending government schools (%)	72.73
Mean Language Score (range zero to four)	2.63
Mean Math Score (range zero to four)	2.39
Proportion of children attending tuition (%)	19.61
Household	
Mother's Education (standard completed)	3.82
Mother's Age (years)	34.26
Father's Education (standard completed)	6.25
Father's Age (years)	39.32
Proportion of households (%) which	
stay in *Pucca* houses	36
have toilet facility	40.92
have TV	48.01
get newspaper daily	10.64
Proportion of Villages (%) with	
Pucca road	74.98
Electricity	93.02
Post Office	44
STD booth	36.7
Bank	23.21
PDS	71.28
PHC	43.47
Private Health Clinic	33.61
Internet Café	13.39
Private school	43.99

Table 2: Characteristics of children attending private tuition (ASER 2011)

	Without State fixed effects				with State fixed effects	
	Tuition=1 (1)	Tuition=0 (2)	Difference (3)	Standard Errors (4)	Difference (5)	Standard Errors (6)
Child Characteristics						
Grade	5.076	4.57	0.506	(0.010)***	0.653	(0.011)***
Total Score	5.886	4.925	0.961	(0.011)***	1.106	(0.011)***
Age	10.339	9.945	0.394	(0.010)***	0.476	(0.011)***
Whether attend government school	0.668	0.729	-0.061	(0.002)***	-0.155	(0.002)***
Female	0.434	0.474	-0.04	(0.002)***	-0.051	(0.002)***
Standard till which mother has been educated	5.266	3.6	1.666	(0.019)***	1.816	(0.019)***
Standard till which father has been educated	7.547	6.111	1.436	(0.021)***	1.905	(0.022)***
Mother's Age	34.141	34.301	-0.16	(0.030)***	-0.371	(0.031)***
Father's Age	39.548	39.254	0.294	(0.033)***	-0.355	(0.035)***
Household Characteristics						
Proportion staying in *pucca* households	0.397	0.307	0.09	(0.002)***	0.137	(0.002)***
Proportion staying in semi-*pucca* households	0.303	0.33	-0.027	(0.002)***	-0.004	(0.002)**

Proportion who has electricity connection in the house	0.748	0.729	0.019	(0.002)***	0.098	(0.002)***
Proportion who has toilet in the house	0.517	0.395	0.122	(0.002)***	0.157	(0.002)***
Proportion who has TV in the house	0.551	0.473	0.078	(0.002)***	0.17	(0.002)***
Proportion who has mobile in the house	0.805	0.726	0.079	(0.002)***	0.144	(0.002)***
Proportion who get newspaper daily	0.17	0.095	0.075	(0.001)***	0.091	(0.001)***
Proportion who has any reading material	0.274	0.222	0.052	(0.002)***	0.08	(0.002)***
Proportion who has computer at home	0.169	0.1	0.069	(0.001)***	0.087	(0.001)***
Village Characteristics						
Is the Village connected by a *pucca* road	0.756	0.756	0	-0.002	0.065	(0.002)***
Does the Village have electricity	0.921	0.937	-0.016	(0.001)***	0.026	(0.001)***
Does the Village have a post office	0.494	0.432	0.062	(0.002)***	0.083	(0.002)***
Does the Village have a bank	0.283	0.225	0.058	(0.002)***	0.078	(0.002)***
Does the Village have a PDS system	0.722	0.722	0	-0.002	0.058	(0.002)***
Does the Village have a Primary Health Centre	0.46	0.432	0.028	(0.002)***	0.071	(0.002)***
Does the Village have a Private Health Centre	0.379	0.335	0.044	(0.002)***	0.082	(0.002)***

Does the village have an internet Café	0.186	0.125	0.061	(0.001)***	0.064	(0.001)***
Does the Village have a Private school	0.467	0.447	0.02	(0.002)***	0.089	(0.002)***

Table 3: Private Tuitions and Standardized Aggregate Score (Math+Reading)

	No controls	Adding Child, household and village controls	Col.(2) + State FE	Col. (2)+District FE	Child & Household Controls + Village FE	Child Controls +HH FE
	1	2	3	4	5	6
Whether child attends tuition	0.359	0.147	0.133	0.146	0.15	0.138
	(0.004)***	(0.003)***	(0.004)***	(0.004)***	(0.005)***	(0.010)***
Grade in which the child is studying		0.168	0.174	0.172	0.168	0.138
		(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.002)***
Age of the child		0.077	0.072	0.075	0.079	0.118
		(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.002)***
School type (1 = government school)		-0.128	-0.177	-0.187	-0.199	-0.134
		(0.003)***	(0.003)***	(0.003)***	(0.005)***	(0.007)***
Gender of the child (1 = female)		-0.039	-0.036	-0.033	-0.028	-0.034
		(0.003)***	(0.003)***	(0.003)***	(0.002)***	(0.003)***
Grade up to which mother studied		0.018	0.014	0.014	0.012	0.005
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.002)**
Grade up to which father studied		0.011	0.013	0.013	0.012	0.004
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.002)**
Mother's age		0.002	0.002	0.001	0	-0.001
		(0.000)***	(0.000)***	(0.000)**	(0)	(0.002)
Father's age		-0.002	-0.002	-0.001	0	0.001
		(0.000)***	(0.000)***	(0.000)***	(0)	(0.001)
Constant	-0.046	-1.757	-1.686	-1.664	-1.647	-1.751
	(0.002)***	(0.012)***	(0.012)***	(0.012)***	(0.013)***	(0.056)***
N	342477	245138	245138	245138	266056	281970
R-squared	0.02	0.49	0.48	0.49	0.51	0.57
Child Controls	N	**Y**	**Y**	**Y**	**Y**	**Y**
Household Controls	N	**Y**	**Y**	**Y**	**Y**	N
Village Controls	N	**Y**	**Y**	**Y**	N	N
State FE	N	N	**Y**	N	N	N
District FE	N	N	N	**Y**	N	N
Village FE	N	N	N	N	**Y**	N
Household FE	N	N	N	N	N	**Y**

Note: All columns are estimated using OLS; robust standard errors in parentheses (clustered at village level);
Dependent variable: Standardized score (Math + Reading);
Independent variables: **Child control variables** include whether the child attends private tuition; class in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; **Household control variables** include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers; **Village control variables** include whether village has paved road; electricity connection; post office; telephone connection; bank branch; public or private health facility; government or private school;
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Private Tuitions and Standardized Score in Math & Reading

	Standardized Math Score		**Standardized Language Score**	
	Child & Household Controls + Village FE	Child Controls +HH FE	Child & Household Controls + Village FE	Child Controls +HH FE
	(1a)	(1b)	(2a)	(2b)
Whether child attends tuition	0.164	0.16	0.127	0.11
	(0.005)***	(0.010)***	(0.005)***	(0.010)***
N	266,421	282,363	267,749	283,827
R-squared	0.47	0.52	0.46	0.5
Child Controls	**Y**	**Y**	**Y**	**Y**
Household Controls	**Y**	N	**Y**	N
Village Controls	N	N	N	N
State FE	N	N	N	N
District FE	N	N	N	N
Village FE	**Y**	N	**Y**	N
Household FE	N	**Y**	N	**Y**

Note: All columns are estimated using OLS; robust standard Errors in parentheses (clustered at village level);
Dependent variable: Standardized score in Math (col. 1a & 1b); Standardized score in Language (col. 2a & 2b);
Independent variables: **Child control variables** include whether the child attends private tuition; grade in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; **Household control variables** include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers;
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Private Tuitions and Standardized Aggregate Score (Math+Reading) for students aged 6-10 years

	Age group 6-10 years	
	Child & Household Controls + Village FE	Child Controls +HH FE
	(1)	(2)
Whether child attends tuition	0.186	0.236
	(0.007)***	(0.020)***
N	147,272	147,272
R-squared	0.44	0.6
Child Controls	**Y**	**Y**
Household Controls	**Y**	N
Village Controls	N	N
State FE	N	N
District FE	N	N
Village FE	**Y**	N
Household FE	N	**Y**

Note: All columns are estimated using OLS; robust standard Errors in parentheses (clustered at village level);
Dependent variable: Standardized score in Math (col. 1a & 1b); Standardized score in Language (col. 2a & 2b)
Independent variables: **Child control variables** include whether the child attends private tuition; grade in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; **Household control variables** include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers;
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Private Tuitions and Standardized Aggregate Score (Math+Reading) for State-specific Samples

	Bihar		**West Bengal**		**Orissa**		**Bihar+West Bengal+Orissa**	
	Child & Household Controls + Village FE	Child Controls +HH FE	Child & Household Controls + Village FE	Child Controls +HH FE	Child & Household Controls + Village FE	Child Controls +HH FE	Child & Household Controls + Village FE	Child Controls +HH FE
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
Whether child attends tuition	0.177	0.223	0.185	0.216	0.237	0.182	0.198	0.228
	(0.012)***	(0.022)***	(0.026)***	(0.055)***	(0.020)***	(0.053)***	(0.010)***	(0.019)***
N	25,158	27,311	6,038	6,411	9,888	10,286	41,084	44,008
R-squared	0.53	0.58	0.47	0.53	0.51	0.59	0.51	0.57
Child Controls	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
Household Controls	**Y**	N	**Y**	N	**Y**	N	**Y**	N
Village Controls	N	N	N	N	N	N	N	N
State FE	N	N	N	N	N	N	N	N
District FE	N	N	N	N	N	N	N	N
Village FE	**Y**	N	**Y**	N	**Y**	N	**Y**	N
Household FE	N	**Y**	N	**Y**	N	**Y**	N	**Y**

Note: All columns are estimated using OLS; Standard Errors in parentheses (clustered at village level); * significant at 10%; ** significant at 5%; *** significant at 1%

Dependent variable: Standardized score (Math + Reading);

Independent variables: **Child control variables** include whether the child attends private tuition; grade in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; **Household control variables** include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers;

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7 A: Private Tuition and Learning Outcomes: Interaction Effects

	School Type (1)		House Type (2)		Gender of Child (3)
Whether child attends tuition	0.063	**Whether child attends tuition**	0.119	**Whether child attends tuition**	0.137
	(0.013)***		(0.006)***		(0.010)***
School type (1 = government school)	-0.153	House Type (=1 if non-pucca)	-0.047	Gender of the child (1 = female)	-0.035
	(0.008)***		(0.004)***		(0.003)***
Private Tuition * School Type	0.117	**Private Tuition * House Type**	0.054	**Private Tuition * Gender**	0.002
	(0.015)***		(0.008)***		-0.008
Observations	281970	Observations	266056	Observations	281970
R-squared	0.57	R-squared	0.51	R-squared	0.57
Child Controls	**Y**	Child Controls	**Y**	Child Controls	**Y**
Household Controls	N	Household Controls	**Y**	Household Controls	N
Village Controls	N	Village Controls	N	Village Controls	N
State FE	N	State FE	N	State FE	N
District FE	N	District FE	N	District FE	N
Village FE	N	Village FE	**Y**	Village FE	N
Household FE	**Y**	Household FE	N	Household FE	**Y**

Table 7 B: Private Tuition and Learning Outcomes: Interaction Effects

	Mother's Schooling		**Father's Schooling**
Whether child attends tuition	0.222	**Whether child attends tuition**	0.245
	(0.015)***		(0.020)***
Mother's Schooling		Father's Schooling	
Category 1 (Grades 1-5)	-0.017	Category 1 (Grades 1-5)	0.007
	-0.027		-0.029
Category 2 (Grades 6-8)	0.023	Category 2 (Grades 6-8)	0.025
	-0.026		-0.027
Category 3 (Grades 9-12)	0.086	Category 3 (Grades 9-12)	0.061
	(0.029)***		(0.027)**
Category 4 (Above 12)	0.153	Category 4 (Above 12)	0.092
	(0.055)***		(0.035)***
Private Tuition * Category 1	-0.054	**Private Tuition * Category 1**	-0.056
	(0.026)**		(0.029)*
Private Tuition * Category 2	-0.147	**Private Tuition * Category 2**	-0.096
	(0.024)***		(0.027)***
Private Tuition * Category 3	-0.215	**Private Tuition * Category 3**	-0.169
	(0.022)***		(0.024)***
Private Tuition * Category 4	-0.242	**Private Tuition * Category 4**	-0.193
	(0.058)***		(0.034)***
Observations	281970	Observations	281970
R-squared	0.57	R-squared	0.57
Child Controls	**Y**	Child Controls	**Y**
Household Controls	N	Household Controls	N
Village Controls	N	Village Controls	N
State FE	N	State FE	N
District FE	N	District FE	N
Village FE	N	Village FE	N
Household FE	**Y**	Household FE	**Y**

Appendix 1

Table A1.1: Determinants of Private Tuition - Linear Probability Model

	Dependent Variable: Does the child attend private tuition?			
	Adding Child, household and village controls	Col.(1) + State FE	Col. (2)+District FE	Child & Household Controls + Village FE
	(1)	(2)	(3)	(4)
grade in which the child is studying	0.013	0.018	0.016	0.015
	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Age of the child	0	-0.003	-0.002	-0.001
	(0.001)	(0.001)***	(0.001)***	(0.001)**
School type (1 = government school)	-0.003	-0.06	-0.066	-0.07
	(0.002)	(0.002)***	(0.002)***	(0.002)***
Gender of the child (1 = female)	-0.027	-0.026	-0.025	-0.024
	(0.002)***	(0.001)***	(0.001)***	(0.001)***
grade up to which mother studied	0.009	0.006	0.005	0.004
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
grade up to which father studied	0.003	0.003	0.003	0.002
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Mother's age	-0.004	-0.001	-0.001	-0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Father's age	0.003	0	0	-0.001
	(0.000)***	(0.000)*	(0.000)*	(0.000)***
Whether stays in *pucca* house	0.021	0.037	0.034	0.036
	(0.002)***	(0.002)***	(0.002)***	(0.002)***
Whether stays in semi-*pucca* house	-0.006	0.018	0.016	0.019
	(0.002)***	(0.002)***	(0.002)***	(0.002)***
Whether has electricity connection in house	-0.038	0.004	0.01	0.018
	(0.002)***	(0.002)*	(0.002)***	(0.002)***
Whether has toilet in house	0.041	0.028	0.035	0.025
	(0.002)***	(0.002)***	(0.002)***	(0.002)***
Whether has TV in house	-0.021	0.024	0.021	0.017
	(0.002)***	(0.002)***	(0.002)***	(0.002)***

Whether has mobile in house	0.03	0.036	0.03	0.024
	(0.002)***	(0.002)***	(0.002)***	(0.002)***
Whether gets newspaper daily	0.038	0.029	0.025	0.015
	(0.003)***	(0.003)***	(0.003)***	(0.002)***
Whether has any reading material	0.001	0.001	0.012	0.016
	(0.002)	(0.002)	(0.002)***	(0.002)***
Whether has computer at home	0.017	0.03	0.031	0.02
	(0.003)***	(0.003)***	(0.002)***	(0.002)***
Is the Village connected by a *pucca* road	-0.02	0.017	0.008	
	(0.002)***	(0.002)***	(0.002)***	
Does the Village have electricity	-0.068	0.005	0.01	
	(0.003)***	(0.003)	(0.003)***	
Does the Village have a post office	0.025	0.009	0.004	
	(0.002)***	(0.002)***	(0.002)**	
Does the Village have a bank	0.006	0.01	0.01	
	(0.002)***	(0.002)***	(0.002)***	
Does the Village have a PDS system	-0.014	0.011	0.007	
	(0.002)***	(0.002)***	(0.002)***	
Does the Village have a Primary Health Centre	-0.012	0.004	0.004	
	(0.002)***	(0.002)**	(0.002)**	
Does the Village have a Private Health Centre	0.009	0.016	0.012	
	(0.002)***	(0.002)***	(0.002)***	
Does the village have an internet Café	0.041	0.024	0.029	
	(0.003)***	(0.002)***	(0.002)***	
Does the Village have a Private school	-0.015	0.004	0.01	
	(0.002)***	(0.002)**	(0.002)***	
Constant	0.166	0.095	0.097	0.155
	(0.007)***	(0.006)***	(0.006)***	(0.006)***
R^2	0.04	0.07	0.06	0.04
N	261,884	261,884	261,884	282,995
Child Controls	**Y**	**Y**	**Y**	**Y**
Household Controls	**Y**	**Y**	**Y**	**Y**
Village Controls	**Y**	**Y**	**Y**	N
State FE	N	**Y**	N	N
District FE	N	N	**Y**	N
Village FE	N	N	N	**Y**

Household FE	N	N	N	N

Note: All columns are estimated using OLS; robust standard Errors in parentheses (clustered at village level);
Dependent variable: Standardized score (Math + Reading);
Independent variables: Child control variables include whether the child attends private tuition; grade in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; Household control variables include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers; Village control variables include whether village has paved road; electricity connection; post office; telephone connection; bank branch; public or private health facility; government or private school;

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A1.2: Private Tuition and Learning Outcomes (standardized aggregate score)

Dependent Variable: Standardized Aggreate Score (Math+Reading)						
	No controls	Adding Child, household and village controls	Col.(2) + State FE	Col. (2)+District FE	Child & Household Controls + Village FE	Child Controls +HH FE
	(1)	(2)	(3)	(4)	(5)	(6)
Whether child attends tuition	0.359	0.147	0.133	0.146	0.15	0.138
	(0.004)***	(0.003)***	(0.004)***	(0.004)***	(0.005)***	(0.010)***
grade in which the child is studying		0.168	0.174	0.172	0.168	0.138
		(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.002)***
Age of the child		0.077	0.072	0.075	0.079	0.118
		(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.002)***
School type (1 = government school)		-0.128	-0.177	-0.187	-0.199	-0.134
		(0.003)***	(0.003)***	(0.003)***	(0.005)***	(0.007)***
Gender of the child (1 = female)		-0.039	-0.036	-0.033	-0.028	-0.034
		(0.003)***	(0.003)***	(0.003)***	(0.002)***	(0.003)***
grade up to which mother studied		0.018	0.014	0.014	0.012	0.005
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.002)**
grade up to which father studied		0.011	0.013	0.013	0.012	0.004
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.002)**
Mother's age		0.002	0.002	0.001	0	-0.001
		(0.000)***	(0.000)***	(0.000)**	0.000	(0.002)
Father's age		-0.002	-0.002	-0.001	0	0.001
		(0.000)***	(0.000)***	(0.000)***	0.000	(0.001)
Whether stays in *pucca* house		0.026	0.055	0.056	0.06	
		(0.004)***	(0.004)***	(0.004)***	(0.005)***	
Whether stays in semi-*pucca* house		0.026	0.032	0.038	0.039	
		(0.003)***	(0.003)***	(0.004)***	(0.004)***	
Whether has electricity connection in house		0.12	0.055	0.04	0.039	
		(0.004)***	(0.004)***	(0.004)***	(0.005)***	
Whether has toilet in house		0.125	0.063	0.04	0.034	
		(0.003)***	(0.003)***	(0.004)***	(0.004)***	
Whether has TV in house		0.059	0.049	0.035	0.023	

		(0.004)***	(0.004)***	(0.004)***	(0.004)***	
Whether has mobile in house		0.019	0.042	0.044	0.032	
		(0.003)***	(0.003)***	(0.003)***	(0.004)***	
Whether gets newspaper daily		0.026	0.017	0.005	0	
		(0.005)***	(0.005)***	(0.005)	(0.005)	
Whether has any reading material		0.074	0.061	0.061	0.057	
		(0.003)***	(0.004)***	(0.004)***	(0.005)***	
Whether has computer at home		0.001	-0.015	-0.005	0.002	
		(0.005)	(0.005)***	(0.005)	(0.005)	
Is the Village connected by a *pucca* road		-0.02	0.001	-0.003		
		(0.003)***	(0.003)	(0.003)		
Does the Village have electricity		-0.029	-0.002	0		
		(0.006)***	(0.006)	(0.006)		
Does the Village have a post office		0.005	0	0.001		
		(0.003)	(0.003)	(0.003)		
Does the Village have an STD booth?		0.037	0.009	0.006		
		(0.003)***	(0.004)***	(0.004)		
Does the Village have a bank		-0.007	-0.002	-0.005		
		(0.004)*	(0.004)	(0.004)		
Does the Village have a PDS system		0.006	0.02	0.009		
		(0.003)*	(0.003)***	(0.003)***		
Does the Village have a Primary Health Centre		0.028	-0.002	0.001		
		(0.003)***	(0.003)	(0.003)		
Does the Village have a Private Health Centre		-0.011	-0.001	0.009		
		(0.003)***	(0.003)	(0.003)***		
Does the village have an internet Café		-0.012	-0.008	0.002		
		(0.005)**	(0.005)	(0.005)		
Does the Village have a Private school		-0.005	0.012	0.004		
		(0.003)	(0.003)***	(0.003)		
Constant	-0.046	-1.757	-1.686	-1.664	-1.647	-1.751
	(0.002)***	(0.012)***	(0.012)***	(0.012)***	(0.013)***	(0.056)***
N	342,477	245,138	245,138	245,138	266,056	281,970
R- Squared	0.02	0.49	0.48	0.49	0.51	0.57
Child Controls	N	**Y**	**Y**	**Y**	**Y**	**Y**
Household Controls	N	**Y**	**Y**	**Y**	**Y**	N
Village Controls	N	**Y**	**Y**	**Y**	N	N

State FE	N	N	**Y**	N	N	N
District FE	N	N	N	**Y**	N	N
Village FE	N	N	N	N	**Y**	N
Household FE	N	N	N	N	N	**Y**

Note: All columns are estimated using OLS; robust standard Errors in parentheses (clustered at village level);
Dependent variable: Standardized score (Math + Reading);
Independent variables: Child control variables include whether the child attends private tuition; grade in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; Household control variables include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers; Village control variables include whether village has paved road; electricity connection; post office; telephone connection; bank branch; public or private health facility; government or private school;

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A1.3: Private Tuitions and Learning Outcomes (Standardized Math & Standardized Language Scores)

	Standardized Math Score		**Standardized Language Score**	
	Child & Household Controls + Village FE	Child Controls +HH FE	Child & Household Controls + Village FE	Child Controls +HH FE
	(1a)	(1b)	(2a)	(2b)
Whether child attends tuition	0.164	0.16	0.127	0.11
	(0.005)***	(0.010)***	(0.005)***	(0.010)***
grade in which the child is studying	0.16	0.132	0.162	0.134
	(0.002)***	(0.002)***	(0.002)***	(0.002)***
Age of the child	0.075	0.112	0.078	0.116
	(0.001)***	(0.002)***	(0.001)***	(0.002)***
School type (1 = government school)	-0.198	-0.135	-0.185	-0.123
	(0.005)***	(0.008)***	(0.005)***	(0.008)***
Gender of the child (1 = female)	-0.048	-0.051	-0.007	-0.016
	(0.003)***	(0.003)***	(0.003)***	(0.003)***
grade up to which mother studied	0.012	0.006	0.011	0.004
	(0.000)***	(0.003)**	(0.000)***	(0.003)
grade up to which father studied	0.012	0.005	0.011	0.003
	(0.000)***	(0.002)**	(0.000)***	(0.002)
Mother's age	0	-0.001	0	-0.001
	0	(0.002)	0	(0.002)
Father's age	0	0.001	0	0.002
	0	(0.001)	0	(0.001)
Whether stays in *pucca* house	0.063		0.054	
	(0.005)***		(0.005)***	

Whether stays in semi-*pucca* house	0.037		0.038	
	(0.005)***		(0.005)***	
Whether has electricity connection in house	0.032		0.042	
	(0.005)***		(0.006)***	
Whether has toilet in house	0.038		0.027	
	(0.005)***		(0.005)***	
Whether has TV in house	0.023		0.022	
	(0.004)***		(0.004)***	
Whether has mobile in house	0.032		0.03	
	(0.004)***		(0.004)***	
Whether gets newspaper daily	0.01		-0.007	
	(0.005)*		(0.005)	
Whether has any reading material	0.056		0.054	
	(0.005)***		(0.005)***	
Whether has computer at home	0.012		-0.008	
	(0.005)**		(0.005)	
Constant	-1.578	-1.678	-1.591	-1.696
	(0.014)***	(0.058)***	(0.014)***	(0.058)***
N	266,421	282,363	267,749	283,827
R-squared	0.47	0.52	0.46	0.5
Child Controls	**Y**	**Y**	**Y**	**Y**
Household Controls	**Y**	N	**Y**	N
Village Controls	N	N	N	N
State FE	N	N	N	N
District FE	N	N	N	N
Village FE	**Y**	N	**Y**	N
Household FE	N	**Y**	N	**Y**

Note: All columns are estimated using OLS; robust standard Errors in parentheses (clustered at village level);

Dependent variable: Standardized score in Math (col. 1a & 1b); Standardized score in Language (col. 2a & 2b)

Independent variables: Child control variables include whether the child attends private tuition; grade in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; Household control variables include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers;
* significant at 10%; ** significant at 5%; *** significant at 1%

Table A1.4: Private Tuitions and Learning Outcomes - Restricted Sample

Dependent Variable: Standardized Aggregate Score (Math+Reading)		
	Child & Household Controls + Village FE	Child Controls +HH FE
	(1)	(2)
Whether child attends tuition	0.186	0.236
	(0.007)***	(0.020)***
grade in which the child is studying	0.258	0.225
	(0.003)***	(0.005)***
Age of the child	0.128	0.186
	(0.002)***	(0.004)***
School type (1 = government school)	-0.292	-0.208
	(0.007)***	(0.016)***
Gender of the child (1 = female)	-0.021	-0.025
	(0.004)***	(0.006)***
grade up to which mother studied	0.015	0.002
	(0.001)***	(0.004)
grade up to which father studied	0.014	0.006
	(0.001)***	(0.003)**
Mother's age	0	0.004
	(0.001)	(0.003)
Father's age	0.001	-0.001
	(0.000)*	(0.002)
Whether stays in *pucca* house	0.071	
	(0.008)***	
Whether stays in semi-*pucca* house	0.038	
	(0.006)***	
Whether has electricity connection in house	0.047	
	(0.007)***	
Whether has toilet in house	0.044	
	(0.006)***	
Whether has TV in house	0.03	
	(0.006)***	

Whether has mobile in house	0.028	
	(0.006)***	
Whether gets newspaper daily	0.015	
	(0.008)*	
Whether has any reading material	0.062	
	(0.007)***	
Whether has computer at home	0.048	
	(0.008)***	
Constant	-1.896	-2.154
	(0.021)***	(0.092)***
N	147,272	147,272
R-squared	0.44	0.6
Child Controls	**Y**	**Y**
Household Controls	**Y**	N
Village Controls	N	N
State FE	N	N
District FE	N	N
Village FE	**Y**	N
Household FE	N	**Y**

Note: All columns are estimated using OLS; robust standard Errors in parentheses (clustered at village level);
Dependent variable: Standardized score in Math (col. 1a & 1b); Standardized score in Language (col. 2a & 2b)

Independent variables: Child control variables include whether the child attends private tuition; grade in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; Household control variables include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers;

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A1.5: Private Tuitions and Learning Outcomes - State Samples

	Dependent Variable: Standardized Aggreate Score (Math+Reading)							
	Bihar		**West Bengal**		**Orissa**		**Bihar+West Bengal+Orissa**	
	Child & Household Controls + Village FE	Child Controls +HH FE	Child & Household Controls + Village FE	Child Controls +HH FE	Child & Household Controls + Village FE	Child Controls +HH FE	Child & Household Controls + Village FE	Child Controls +HH FE
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
Whether child attends tuition	0.177	0.223	0.185	0.216	0.237	0.182	0.198	0.228
	(0.012)***	(0.022)***	(0.026)***	(0.055)***	(0.020)***	(0.053)***	(0.010)***	(0.019)***
grade in which the child is studying	0.189	0.149	0.142	0.118	0.132	0.123	0.173	0.141
	(0.004)***	(0.006)***	(0.011)***	(0.014)***	(0.009)***	(0.015)***	(0.004)***	(0.005)***
Age of the child	0.075	0.116	0.078	0.107	0.104	0.13	0.077	0.12
	(0.004)***	(0.005)***	(0.009)***	(0.012)***	(0.009)***	(0.014)***	(0.003)***	(0.004)***
School type (1 = government school)	-0.356	-0.215	-0.199	-0.095	-0.095	0.092	-0.28	-0.161
	(0.027)***	(0.037)***	(0.040)***	(0.091)	(0.036)***	(0.062)	(0.020)***	(0.032)***
Gender of the child (1 = female)	-0.05	-0.045	0	-0.022	0.009	-0.009	-0.034	-0.042
	(0.008)***	(0.009)***	(0.018)	(0.024)	(0.012)	(0.018)	(0.006)***	(0.008)***
grade up to which mother studied	0.014	0.006	0.02	-0.011	0.017	-0.005	0.015	0.004
	(0.002)***	(0.007)	(0.003)***	(0.018)	(0.003)***	(0.021)	(0.001)***	(0.006)
grade up to which father studied	0.011	0.01	0.015	-0.007	0.014	0.014	0.013	0.01
	(0.001)***	(0.006)*	(0.003)***	(0.016)	(0.002)***	(0.012)	(0.001)***	(0.005)*
Mother's age	-0.003	-0.006	-0.003	-0.015	0.004	0.025	-0.002	-0.003
	(0.001)***	(0.004)	(0.003)	(0.011)	(0.002)**	(0.011)**	(0.001)**	(0.003)
Father's age	0.001	0.004	0.004	0.012	-0.001	-0.014	0.001	0.002
	(0.001)	(0.003)	(0.002)*	(0.009)	(0.002)	(0.009)	(0.001)	(0.003)
Whether stays in *pucca* house	0.06		0.087		0.096		0.073	
	(0.014)***		(0.031)***		(0.025)***		(0.012)***	
Whether stays in semi-*pucca* house	0.047		0.065		0.053		0.051	
	(0.013)***		(0.025)***		(0.018)***		(0.010)***	
Whether has electricity connection in house	-0.002		0.076		0.024		0.012	

	(0.014)		(0.029)***		(0.021)		(0.011)	
Whether has toilet in house	0.029		0.083		0.02		0.035	
	(0.015)*		(0.023)***		(0.023)		(0.011)***	
Whether has TV in house	0.012		-0.024		0		0.005	
	(0.016)		(0.027)		(0.022)		(0.012)	
Whether has mobile in house	0.021		0.047		0.022		0.025	
	(0.012)*		(0.024)**		(0.020)		(0.010)***	
Whether gets newspaper daily	-0.006		0.065		0.005		0.006	
	(0.022)		(0.040)		(0.033)		(0.017)	
Whether has any reading material	0.066		0.03		0.022		0.052	
	(0.016)***		(0.032)		(0.023)		(0.013)***	
Whether has computer at home	0.022		-0.046		0.009		-0.003	
	(0.026)		(0.040)		(0.031)		(0.018)	
Constant	-1.314	-1.616	-1.712	-1.518	-2.007	-2.388	-1.496	-1.781
	(0.045)***	(0.129)***	(0.086)***	(0.377)***	(0.074)***	(0.457)***	(0.035)***	(0.120)***
N	25,158	27,311	6,038	6,411	9,888	10,286	41,084	44,008
R-squared	0.53	0.58	0.47	0.53	0.51	0.59	0.51	0.57
Child Controls	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
Household Controls	**Y**	N	**Y**	N	**Y**	N	**Y**	N
Village Controls	N	N	N	N	N	N	N	N
State FE	N	N	N	N	N	N	N	N
District FE	N	N	N	N	N	N	N	N
Village FE	**Y**	N	**Y**	N	**Y**	N	**Y**	N
Household FE	N	**Y**	N	**Y**	N	**Y**	N	**Y**

Note: All columns are estimated using OLS; Standard Errors in parentheses (clustered at village level); * significant at 10%; ** significant at 5%; *** significant at 1%
Dependent variable: Standardized score (Math + Reading);
Independent variables: Child control variables include whether the child attends private tuition; grade in which the child is studying at present; age of the child; sex of the child; type of school attended by the child (government or private); age and education of the child's parents; Household control variables include type of housing; electricity connection; availability of toilets; ownership of TV and mobile phone; whether gets newspapers or other reading material; knowledge of using computers;
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix 2

Propensity Score Matching

We employ Propensity Score Matching (PSM) to conduct further robustness checks. PSM refers to the pairing of 'treatment' and 'control' units (in this case, 'treatment' implies attending private tutoring) with similar values on the propensity score, and possibly other covariates, and discarding of all unmatched units (Rubin, 1997).

This method attempts to replicate experimental setup with cross sectional data. In an experimental setup, control and treatment groups are identical on average on all the observable indicators except that one group has received the treatment (in our case, tuition) while the other has not. Thus, any differences in the outcomes between the two groups can be attributed to this treatment variable. PSM uses the fact that a large dataset has information on a number of observable variables to recreate an experimental setup.
The first step is to generate propensity score for every observation in the sample i.e. probability that the observation receives the treatment (i.e. the child opts for tutoring) using logit/ probit regression. We specify the logit model as follows-

$$\text{Log}(p(x)/(1-p(x))) = \beta_0 + x_1 * \beta_1$$

Where x_1 is a vector of all factors which impact the decision to send a child for private tuition. In our dataset we have parental factors, household factors and village factors which allow us to carry out this logistic regression.

The propensity score is the probability of assignment to one treatment conditional on a subject's measured baseline covariates. Once, this propensity score is generated, observations which received treatment are matched with those which did not receive the treatment but had the 'similar' propensity score. Thus, the method creates treatment and observation groups which are similar across other characteristics but differ in terms of

whether they received treatment or not. The results of the logit regression are given in table A2.1 below.

Table A2.1: Determinants of Private Tuition (Logistic Regression)- ASER 2011

Dependent Variable: Whether the child attends tuition or not	
grade in which the child is studying	0.084
	(0.004)***
Age of the child	0.006
	-0.004
School type (1 = government school)	-0.017
	-0.012
Gender of the child (1 = female)	-0.166
	(0.010)***
grade up to which mother studied	0.051
	(0.001)***
grade up to which father studied	0.022
	(0.001)***
Mother's age	-0.024
	(0.001)***
Father's age	0.019
	(0.001)***
Whether stays in *pucca* house	0.117
	(0.015)***
Whether stays in semi-*pucca* house	-0.044
	(0.014)***
Whether has electricity connection in house	-0.256
	(0.015)***
Whether has toilet in house	0.265
	(0.013)***
Whether has TV in house	-0.126
	(0.014)***
Whether has mobile in house	0.226
	(0.014)***
Whether gets newspaper daily	0.182
	(0.017)***
Whether has any reading material	0.012
	-0.013
Whether has computer at home	0.06

	(0.017)***
Is the Village connected by a *pucca* road	-0.129
	(0.013)***
Does the Village have electricity	-0.442
	(0.022)***
Does the Village have a post office	0.163
	(0.013)***
Does the Village have a bank	0.043
	(0.015)***
Does the Village have a PDS system	-0.091
	(0.013)***
Does the Village have a Primary Health Centre	-0.079
	(0.013)***
Does the Village have a Private Health Centre	0.057
	(0.012)***
Does the village have an internet Café	0.249
	(0.017)***
Does the Village have a Private school	-0.087
	(0.012)***
Constant	-1.663
	(0.047)***
N	246,154

* significant at 10%; ** significant at 5%; *** significant at 1%

We use *nearest neighbor matching with replacement* to identify observations in control group which are 'similar' to observations in the treatment group. This involves, matching a treated observation with its 'nearest neighbor' in the control group. We test different values of 'caliper' to determine who is the 'nearest neighbor' i.e. caliper of 0.01 implies that treated observation will be matched with an observation which has a propensity score within the radius of 0.01 of the treated observation's score. If no such observation exists, then this observation will be left unmatched, technically known as being *off common support*. Lower caliper value will lead to higher number of treated observations being *off common support* as indicated in column 4 of table A2.2.

We use 'with replacement' technique i.e. an observation in the control group can be matched with more than one observation in the 'treatment' group. This method allows us to find matches for a larger number of 'treated' observations.

The next step is to calculate the difference in variable of interest across treated observation and its nearest neighbors, and average it – average effect of treatment on the treated (ATT). The treated observation is weighted by the number of times it has been matched
We select a caliper of 0.001 as very few observations are off support[21]. For ASER 2011, the difference between the average standardized total score for the treatment group and control group is 0.14SD. This number is similar to the result we find from our fixed effects estimation.

Table A2.2 Difference between mean standardized total score of treatment and control group- ASER 2011[22]

1	2	3	4
Caliper	Difference between mean total score (standardised) of treatment and control group	S.E.	Percentage of observations in treatment group which are off-Support
0.00001	0.151443	0.006745	22.40888
0.0001	0.146193	0.006206	1.71604
0.001	0.145018	0.006187	0.170601

[21] Higher calipers have been used in (Ravallion and Jalan, 2003). In this paper, the authors experiment with different tolerance values and choose 0.001 as not many observations are off support.
[22] Similar results for ASER 2012 are available on request.