Impact of Private Tutoring on Learning Levels

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Despite widespread and substantial household expenditure on private tutoring 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 endogenous. This paper utilises a large household survey conducted in rural India, and employs fixed effect estimation to control for the effect of unobserved variables. It finds a positive and significant effect of private tutoring on learning outcomes for students in Classes 1 to 8. The effect is stronger for disadvantaged students—those who are less wealthy, and those whose parents are relatively less educated.

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Realising the importance of education in the development of human capital and economic growth, policymakers 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, boys and girls, should be able to complete a full course of primary schooling.[1] Consequently, critical and rigorous analysis of policies surrounding provision of school-based education has received much deserved attention (Glewwe et al 2013; Muralidharan 2013; Hanushek 2003). But in the process, role of additional educational inputs provided by the households, such as private tutoring, has remained neglected.

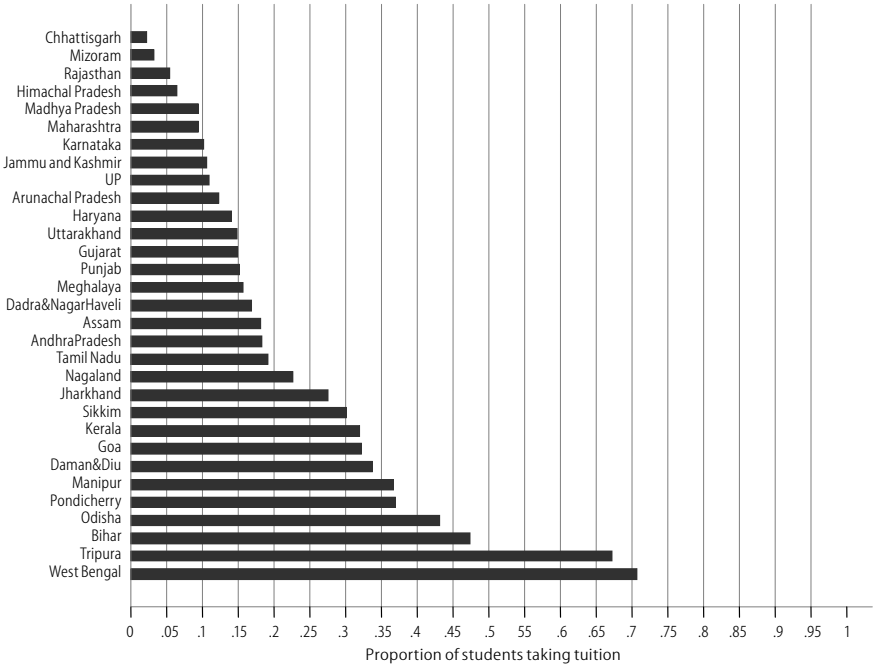
Private tutoring can be defined as fee-based tutoring that provides supplementary instruction to children in academic subjects that they study in the mainstream education system (Dang and Rogers 2008). It is widespread across many developing as well as developed countries.[2] A substantial fraction of household expenditure on education is devoted to spending on private tutoring. In Korea, for example, households spent 2.8% of the gross domestic product (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 and Bircan 2006).

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 do not take tuitions on various observable and unobservable dimensions. Differences along the observable dimensions can 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 the learning levels of students who attend private tuition and those who do not, it is not clear whether it is due to private tuitions alone or unobservable factors also play a role. Only a few papers have recognised this problem and their findings are mixed. Dang (2007) and Ono (2007) find substantial effects of private tutoring, while Briggs (2001), Gurun and Millimet (2008), and Kang and Ryu (2013) find negligible effects.[3, 4]

Our paper contributes to this nascent literature by providing the effect of private tutoring on learning outcomes of students in elementary school (Classes 1 to 8). We employ the 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 effects on the outcome of interest, which can be netted out using FE estimation.[5] We are well placed to employ this technique due to availability of a data set whose underlying sampling strategy is such that predetermined number of villages from each district and predetermined number of households from each selected village were to be surveyed (details below). But it must be noted that even the household FE cannot control for heterogeneity between children within the same household. Hence we use the procedure developed by Altonji et al (2005) and Oster (2015) to estimate the extent of bias in our estimates.

Figure 1: Proportion of Students Taking Tuition—State-wise (Age 6–14)



Source: Author calculations from ASER (2011).

The results indicate consistently positive and statistically significant effect of private tuitions on learning levels of students at the elementary level (Classes 1 to 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 who have lower learning outcomes, that is, the students enrolled in government schools compared to the students enrolled in private schools, children who are from economically disadvantaged background, and children whose parents are relatively less educated. The results if we consider mathematics and language scores separately, and for various sub-samples (children in the age group of 6 to 10 years, and restricting sample to a few states) are also in a similar direction.

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

Background

Elementary Education in India: The landscape of elementary education in India has transformed dramatically in the last decade. Governments, at the central and state levels have increased allocation on elementary education more than twofold from Rs 68,853 crore in 2007–08 to Rs 1,47,059 crore in 2012–13 (Accountability Initiative 2012). This 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. Enrolments have shot up, and proportion of out of school children has come down to less than 4% 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, that is, it is now the obligation of the government to ensure that every child between six and 14 years of age is in school and in an "age-appropriate" class. Despite these input improvements, it has been repeatedly shown that the learning levels of Indian students are alarmingly low. For example, only 47% students in Class 5 could read a Class 2 level text, and only 52.3% students in Class 5 could solve two-digit subtraction problem, in rural India (ASER 2013). Partly as a response to this, the share of private schools in total enrolment has been increasing in both rural and urban areas. A substantial body of literature has analysed the impact of private schools on learning outcomes.[6]

Most of the literature has focused on issues surrounding public and private provision of school-based education. Role of other private educational inputs provided by the household towards children's education, including private tuitions and their impact, has remained unexplored.

Private Tuitions in India: It is widely known that a large proportion of students attend private tuitions in India. This phenomenon is not restricted to higher grades and urban areas. Approximately one-fifth of rural Indian children in Classes 1 to 8 also attend private tuitions (ASER 2009–13).[7] There is substantial variation among states in terms of the proportion of children attending tuition (Figure 1). Almost three-fourths of the children at the elementary level in rural West Bengal and Tripura, and close to half of the children in rural Bihar and Odisha attend private tuitions.[8] 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 2,000 per annum to attend these tuitions (ASER 2013).[10]

Why might these children attend private tuitions?[11] For one, parents might feel that they are not in a position to guide their child in studies, and hence prefer to send the child to a tutor. An academically weak child might fall behind what is being taught in the class, and hence might need more individual attention, which can be provided by private tutors. This might be especially true in the Indian context where an "ambitious" curriculum leaves many students behind.[12] In many developing countries, schools, in general, and government schools, in particular, may not deliver "quality" education.[13] Parents might prefer a private school but private schools may not be available or affordable. In these instances, parents might feel the need to supplement the school-based education with private tutoring (Banerjee and Wadhwa 2013; Dang and Rogers 2008). The private tutors are said to provide notes on specific chapters and topics to the students, as well as conduct mock tests regularly. This helps reduce "exam phobia" among students (Majumdar 2014). In many instances, it has been observed that government school-teachers shirk their responsibilities in school in order to increase the demand for private tutoring (Biswal 1999; Jayachandran 2014).[14] As a consequence, private tutoring is now considered "essential," and unless it is beyond the parents' capability, tutoring has become as necessary as going to school (Majumdar 2014).

Empirical Strategy

Consider a "full" model of determining learning level of a child as shown below in equation 1,

$$Y_i = \beta_0 + \beta_1 * P_i + \pi * \mathbf{X_i} + \varepsilon_i, \quad \ldots(1)$$

where the dependent variable Y_i is a measure of learning level for child i (in this context, standardised aggregate score for child i, details below). P_i is an indicator for whether child i attends private tuition, while $\boldsymbol{X_i}$ is a vector of all other 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,

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

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

$$Y_i = \beta_0 + \beta_1 * P_i + \pi_1 * \mathbf{X_{1,i}} + \xi_i, \quad \ldots(3)$$

where ξ consists of X_2 and ε.

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

Fixed Effects Estimation: We use FE estimation to control for observable and unobservable factors at various levels affecting learning outcomes. We start with 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

$$Y_{ij} = \beta_0 + \beta_1 * P_{ij} + \mu_j + \pi_1 * \mathbf{X_{1,ij}} + \xi_{ij}, \quad \ldots(4)$$

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

As noted, even the household FE cannot control for factors such as differences in intrinsic abilities and motivation of children, and differential parental support to children within the same household. And to the extent that these factors are correlated with the child attending tuition, even the household FE estimates will remain biased. Can we quantitatively assess size of this bias? Can the bias alone explain the positive correlation we find between private tutoring and learning outcomes? To answer these questions, we use the procedure suggested by Altonji et al (2005) based on the idea that the amount of selection on the observed explanatory

Table 1: Descriptive Statistics—ASER 2011

Variables	ASER 2011
Sample size (children between ages 6 and 14)	4,39,168
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 (grades completed)	3.82
Mother's age (years)	34.26
Father's education (grades 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

variables provide a guide to the amount of selection on the unobservables.

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

$$Y_{ij} = \beta_0 + \beta_1 * P_{ij} + \beta_2 * \text{CHARACTERISTIC1}_{ij} + \beta_3 * (P_{ij} * \text{CHARACTERISTIC}_{ij}) + \mu_j + \pi_1 * \mathbf{X_{1,ij}} + \xi_{ij}, \quad \ldots(5)$$

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

$$Y_{ijk} = \beta_0 + \beta_1 * P_{ijk} + \beta_2 * \text{NON-PUCCA}_{ijk} + \beta_3 * (P_{ijk} * \text{NON-PUCCA}_{ijk}) + \mu_k + \pi_1 * \mathbf{X_{1,ijk}} + \xi_{ijk}, \quad \ldots(6)$$

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.

Data

Sampling Methodology: We have used the 2011 and 2012 waves of the ASER survey conducted by ASER Centre, Delhi, India.[15] 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. 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 6 to 14 years, which yields a sample size of slightly less than half a million.[16]

For the 2011 round, villages were randomly selected using the village directory of 2001 Census through probability proportional to size (PPS) technique.

The survey process in each village consisted of a household survey, village survey, and survey of a government school situated there. The household survey involved gathering information about the schooling status of all children between 3 and 16 years of age, whether the child attended private tuition, both parents' background (age, schooling status) and certain household indicators such as availability of a power connection, toilet, whether the house is pucca (ceiling, walls and flooring of cement or stone), possession of television sets, mobile phone, vehicle, availability of newspaper or other reading material, etc. The 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.

The key feature of the data set is the assessment of reading and the math level of all children between 5 and 16 years of age in the sampled household. To measure the reading level, the child had to start with a paragraph (of Class 1 level). If the child could read the paragraph, then he/she was asked to read a short story (of Class 2 level). If the child could not read the

Table 2: Characteristics of Children Attending Private Tuition

	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)***

** significant at 5%; *** significant at 1%
Source: ASER (2011).

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 children then were categorised into five categories: those who could not read the letters, those who could read the letters but not the words, those who could read the words but not the paragraph, those who could read the paragraph but not the short story, and finally those who could read the short story (equivalent to Class 2 level). These categories have been coded as zero, one, two, three and four, respectively. Similarly, for arithmetic, the children could belong to any of the categories—those who cannot recognise numbers one to nine, those who can recognise numbers one to nine but not 11 to 99, those who can recognise numbers between 11 and 99 but could not 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. These categories have been coded as zero, one, two, three and four, respectively. Same tests were used for all the children tested.

We have summed up the reading and math scores for each child, and then standardised 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 standardised aggregate score has been used as dependent variable in our empirical analysis.

Descriptive Statistics: Table 1 (p 74) presents basic statistics based on data collected through ASER 2011. Children are, on average, 10 years old which means they would be in Classes 4 or 5, 47% of these are girl children and 73% of students attended government schools in the ASER 2011.[17] The learning levels of children are dismal—on an average, children are able to read words but not the paragraph, and can recognise numbers 11 to 99 but cannot solve the subtraction problem[18] and 20% children attend private tuitions in this sample. On average, the mothers are 34 years of age, and have completed education till Class 4, while the fathers are 39 years of age and have completed education till Class 6. Only 36% of the households stay in pucca houses. Interestingly, the proportion of households with television sets is higher than the proportion of households with toilets in the house. Hardly 10% of the households get a newspaper daily. Most of the villages have electricity connections, and close to three-fourths of the villages have pucca roads leading to the village, a public distribution system (PDS) shop and 43% of the villages have private schools.

Table 2 (p 75) compares children attending private tuitions and those who do not with respect to various characteristics. Column (3) shows results without state FE, while Column (5) shows results with state FE. Column (5) shows that children attending private tuition have more privileged background than children who do not attend private tuitions. Being in a government school, being a girl child and being in a lower grade, each reduce the probability of attending tuition. Parents of children attending tuition are more educated, that is, they have completed two more grades of education. Children attending tuition belong to relatively affluent households, as indicated by nature of house (pucca, semi-pucca or kutcha), availability of toilet, ownership of television set, mobile phone, and computers, and availability of newspapers and other reading material in the house.[19] Children who belong to economically active or larger villages

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

	No Controls	Adding Child, Household and Village Controls	Col (2) + State FE	Col (2)+ District FE	Child and 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)***
Class 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)***
Class 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)**
Class 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

All columns are estimated using OLS; robust standard errors in parentheses (clustered at village level); Dependent variable: Standardised 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%

have a 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.

We also estimate a linear probability model where dependent variable equals unity if the student attends tuition and zero otherwise. The results are broadly similar to that of Table 2.[20]

Results[21]

Private Tuition and Learning Level: Table 3 (p 76) shows the results from FE estimations. The baseline is a child that attends government school, and does not attend private tuition. Keeping the space constraint in mind, we have shown the coefficients for tuition variable and other child level controls only. 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.

Column (1) shows that attending private tuition is associated with 0.36σ increase in standardised 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 does not change much, remaining around 0.14σ–0.15σ.[22] How large is this effect? Comparing the coefficient on private tuition with that of the class in which the child is studying or that of the 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).

Table 4: Private Tuitions and Standardised Score in Math and Reading

	Standardised Math Score		Standardised Language Score	
	Child and Household Controls + Village FE (1a)	Child Controls + HH FE (1b)	Child and Household Controls + Village FE (2a)	Child Controls + HH FE (2b)
Whether child attends tuition	0.164 (0.005)***	0.16 (0.010)***	0.127 (0.005)***	0.11 (0.010)***
N	2,66,421	2,82,363	2,67,749	2,83,827
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

All columns are estimated using OLS; robust standard errors in parentheses (clustered at village level);
Dependent variable: Standardised score in Math (col 1a and 1b); Standardised score in Language (col 2a and 2b);
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;
*** significant at 1%.

Table 5: Private Tuitions and Standardised Aggregate Score (Math+Reading) for Students Aged 6–10 Years

	Age Group 6-10 Years	
	Child and Household Controls + Village FE (1)	Child Controls +HH FE (2)
Whether child attends tuition	0.186 (0.007)***	0.236 (0.020)***
N	1,47,272	1,47,272
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

All columns are estimated using OLS; robust standard errors in parentheses (clustered at village level);
Dependent variable: Standardised score in Math (col 1a and 1b); Standardised score in Language (col 2a and 2b)
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;
*** significant at 1%.

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

	Bihar		West Bengal		Orissa		Bihar+West Bengal+Orissa	
	Child and Household Controls + Village FE (1a)	Child Controls +HH FE (1b)	Child and Household Controls + Village FE (2a)	Child Controls +HH FE (2b)	Child and Household Controls + Village FE (3a)	Child Controls +HH FE (3b)	Child and Household Controls + Village FE (4a)	Child Controls +HH FE (4b)
Whether child attends tuition	0.177 (0.012)***	0.223 (0.022)***	0.185 (0.026)***	0.216 (0.055)***	0.237 (0.020)***	0.182 (0.053)***	0.198 (0.010)***	0.228 (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

All columns are estimated using OLS; Standard Errors in parentheses (clustered at village level); *** significant at 1%
Dependent variable: Standardised 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.

Table 7a: 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 7b: 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 (Classes 1-5)	-0.017	Category 1 (Classes 1-5)	0.007
	-0.027		-0.029
Category 2 (Classes 6-8)	0.023	Category 2 (Classes 6-8)	0.025
	-0.026		-0.027
Category 3 (Classes 9-12)	0.086	Category 3 (Classes 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

As far as other variables are concerned, the direction of the effect is on anticipated lines. The higher the age of the child, higher the standard in which the child is studying, and the higher the affluence of the household, higher is the learning levels. Being in a government school is associated with lower learning levels. Village characteristics do not play an important role.

We also run similar regressions with dependent variable being a binary variable which takes the value of one if a student has a particular level of reading or math competency (say, being able to read grade one level text; being able to perform two digit subtraction). The results are on the similar lines.

Robustness Checks: As mentioned, even the household FE estimates are likely to be biased. Hence, we use the procedure suggested by Altonji et al (2005).[23] Our results indicate that the estimated size of the bias is less than 30% of the estimated coefficient. What this means is even after taking into bias into account, the learning outcomes of the children attending private tuitions are 0.1 SD higher.

In Table 4 (p 77), we provide results separately, for standardised math score (Column 1) and standardised 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 and it is higher for math as compared to the language score.

In Table 5 (p 77), we restrict the sample to include only those students who are in the age group of 6 to 10 years. The coefficient on private tuition is positive and significant. In fact, the effects are much higher for the younger age group.[24]

As mentioned before, the prevalence of private tuition is quite high in states like Bihar, West Bengal and Odisha. Columns 1 to 4 in Table 6 (p 77) show the results when we restrict the sample to students in these states. The effect of private tuition on learning outcomes is higher in these states as 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 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 pucca houses and do 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). The results in Columns (1) and (3) are based on household FE, while results in Column (2) are based on the 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, Tables 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 relatively less 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 the exception of female students. For example, the effect of tuition is almost twice as high for children enrolled in government schools as compared to those who are enrolled in private schools (Table 7a). Thus, the interaction effects clearly suggest that private tuitions benefit those more who have lower learning levels, and are actually leveling the playing field.

Conclusions

Private tutoring is fee based tutoring that provides supplementary instruction to students in academic subjects that they study in the mainstream education system. Private tutoring is widely prevalent in many countries, including India.

Results in this paper indicate the positive and statistically significant effect of private tuitions on standardised aggregate score (consisting of math and language scores) for students in Classes 1 to 8 in rural India. Bias cannot account for all the effects. We also find that private tuitions benefit those students more who have lower learning levels. These results also hold when we analyse subsequent rounds of the same data set.

Why do private tuitions have a positive effect on learning outcomes? Those who attend tuition spend more time studying. An analysis of the IHDS data indicates that those who attend tuition spend, on average, nine hours per week in tuitions, that is, one and half extra school days per week. Another explanation could be that tutors might be making some efforts to identify the child's weakness, and teach accordingly which might explain why the effects of private tuition are higher for relatively disadvantaged students. And finally, the link between incentives and accountability—if someone is paying for a service, the onus is on the service provider to deliver.

What policy implication does this have? Clearly there is demand for private tutoring. Curbing or banning tutoring is not the solution, which is in any case near impossible to enforce. Tutoring improves learning outcomes. But tutoring is available only to those who can afford it. Thus, tutoring can lead to widening existing inequalities in learning outcomes. But private tutoring benefits more those students who have lower learning levels. Hence, one possible public policy response could be provision of remedial education in schools itself. Majumdar (2014) also stresses the need for reforming the mainstream education system—reducing the weight of curricula, stopping the practice of "home tasks" at least for very young children and recruiting an adequate number of teachers.

NOTES

1 http://www.un.org/millenniumgoals/education.shtml

2 Paviot et al (2008) analyse 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. Countries such as Japan, Malaysia and Korea also have large proportion of students in the middle school and above attending private tuitions (Bray 2007; Bray 2011; Dang and Rogers 2008; Kim and Lee 2010).

3 We do not mention here the studies that do not attempt to control for endogeneity. See Dang and Rogers (2008) for details on these studies.

4 Dang (2007) estimates effects of expenditure on tutoring in Vietnam using a nationally representative survey data. Since expenditure on tutoring is not reported for all the households, and dependent variable (that is, academic ranking) is discrete and ordered, he esimates joint Tobit and ordered Probit model, with tutoring prices as an instrument. He finds significant effects of tutoring on academic performance. Students in Japan invest substantial time and money in ronin (spending additional years to prepare for entrance examinations through specialised entrance preparatory schools) to get selected in top universities. Ono (2007) estimates an instrument variable regression which shows that ronin investments improve the probability of attending better quality university, which in turn, improves earnings. Thus, investment in ronin pays off from the individual student's point of view. Briggs (2001) investigates effect of tutoring on scores in standardised tests for college admissions in the US using a nationally representative sample of students from Class 8 through high school and beyond. But his estimates using Heckman approach suggest that tutoring helps but by a rather small amount. Findings from Turkey are also similar as shown by Gurun and Millimet (2008) through bivariate probit estimation. They show that expenditure on tutoring has no effect on probability of university placement when positive selection is taken into account. Kang and Ryu (2013) employ a variety of estimation methods to a panel data set from South Korea, and find that expenditure on tutoring has modest effect on test scores of middle school students (Classes 7 to 9).

5 French and Kingdon (2010) use a similar approach.

6 The key problem in estimating effect of private schools is that of selection bias. See Chudgar and Quin (2012); Desai et al (2008); French and Kingdon (2010); Goyal (2009); Kingdon (1996); Muralidharan and Sundararaman (2013); and Singh (2013) for more detailed discussion.

7 Numbers are likely to be much higher for children in urban areas. ASER does not survey children in urban area. As per India Human Development Survey (IHDS), carried out in 2003–04, 26% children in Classes 1to 8 attend tuition.

8 For more on private tutoring in West Bengal, see Majumdar (2014), Pratichi Education reports (2002, 2009) and SCERT, West Bengal (2009).

9 IHDS stands for India Human Development Survey. See Desai et al (2010) for more details.

10 NSS 64th round (2007–08), which is quite dated now, indicated that at an all-India level, on an average, expenditure on private tutoring constituted 8% and 14% of household expenditure on education, for primary and middle school classes. For rural areas, it was 7.6% and 13.1%, and for urban areas, it was 8.5% and 15.1%. For the age group 5–29 years, expenditure on private tutoring constituted 0.19% of GDP in 2007–08.

11 We mention here the reasons relevant in the context of private tutoring for children in elementary sections. Analysis by Kim and Lee (2010) indicates that among other things, high prevalence of private tuition in South Korea can be explained by increased demand for education with increased income, and real or perceived advantage of elite universities. In fact, they suggest that expenditure on private tutoring is driven by academically better students who have a good chance of being admitted to the prestigious universities. The same applies in case of Japan and Turkey as well (Ono 2007; Gurun and Millimet 2008).

12 It is acknowledged that curriculum in many developing countries is quite ambitious in terms of coverage and pace (Muralidharan and Zieleniak 2013; Pritchett and Beatty 2012).

13 See Glewwe and Kremer (2006) and Chaudhury et al (2006) for more on state of government schools in developing countries.

14 It is important to note that the Right to Education (RtE) Act explicitly prohibits private tutoring by schoolteachers.

15 This paper reports and discusses results from ASER 2011. The results from ASER 2012 are broadly along the same lines, and are available on request from the authors.

16 RTE Act guarantees "age-appropriate" school-based education for children in the age-group of 6 to 14 years. Previous research using ASER data have also focused on this age-group (French and Kingdon 2010). Results do not change if we relax this restriction.

17 This proportion has come down to 70% in ASER 2012.

18 Comparison of ASER (2011) and ASER (2012) indicates decline in learning levels.

19 These results are similar to what is found in Korea (Kim and Lee 2010).

20 Complete results are available on request from the authors.

21 The paper displays only the key results. Complete results are available on request from the authors.

22 We obtain similar results when we use propensity score matching (PSM) technique (nearest neighbour matching with replacement, with caliper values being 0.001, 0.0001 and 0.00001).

23 STATA code was specifically written to carry out this procedure. Special thanks to Soham Sahoo (Doctoral student at ISI (Delhi)) for his help on this aspect.

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

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