Improving learning outcomes through information provision: Experimental evidence from Indian villages*

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Abstract

We study how information to parents and schools on the performance of primary school children can improve learning outcomes in an environment where public and private schools co-exist. Contiguous village councils in the Indian state of Rajasthan are randomly assigned to either a control or one of four treatment groups in which student report cards on curriculum-based tests are provided to schools, parents or both. We find no changes in academic performance in public schools. Student performance in private schools improves by one-third of a standard deviation when parents and schools can simultaneously place themselves in the distribution of scores in the community. There is no systematic change in performance for any treatment that involves only schools, or where households are not informed about the relative performance of all schools in the community. These results highlight the importance of common knowledge of relative school quality and provider incentives in improving learning.

JEL Classification: I20, I25, O15

Keywords: test scores, report cards, incentives, India

1 Introduction

Public services in poor countries are typically mediocre and often dysfunctional. For instance, public school teachers are frequently absent and, while at work, they spend much of their time on activities unrelated to their primary tasks (Muralidharan and Kremer, 2008; Bold et al., 2017). Private providers have mushroomed in response to the public malaise. In rural India, between 2006 and 2014, private enrolment in primary grades went up ten percentage points and about one-third of all enrolled children now attend private schools (Pratham, 2014; Desai et al., 2009). While average learning outcomes in private schools are usually better, the variation is enormous and private village schools hover just above the public alternatives that are available. It is therefore not surprising that the nationally representative household survey that formed the basis of the Annual Status of Education Report for rural India in 2012 found less than half of grade 5 students could read a grade 2-level text and less than a quarter of them could do simple division problems (Banerji et al., 2013). A variety of factors combine to produce this dismal scenario. Insufficient accountability and limited parental awareness of school quality are among these and are closely related. Schools cannot be held accountable for their services if parents cannot correctly assess the quality of education being provided to their children (World Bank, 2004).

We report results from an information experiment we conducted in village communities in the Indian state of Rajasthan. Our objective was to better understand how greater awareness among schools and households of extant learning levels can lead to changes in student performance in an education market with both public and private providers of primary schooling. Our research design allows us to test hypotheses about the nature of effective information by comparing results from treatments in which only one side of the market

(parents) receive information with those in which school quality is common knowledge in the community. Unlike most existing information interventions, we do not induce community dialogue or mobilization. Since collective action is more resource demanding and often difficult to catalyse, it is useful to know whether low-cost information provision can aid education policy.

Specifically, we randomly assigned village councils (a collection of 3-4 villages) to either a control group in which no attempt was made to bridge existing information gaps in the education market or one of four treatment groups in which we provided either households or schools or both with report cards on student performance in curriculum-based tests designed and administered by us. In the first treatment, parents received a report card with their child's absolute score and her rank in her grade. In the second treatment, in addition to the parent report card, we gave report cards to schools on the average performance of their own students. The third treatment had all the elements of the second plus the average scores of *all* schools in the village council in the school report card. The fourth treatment tried to create common knowledge of relative student and school performance. Schools continued to get the report card with information on within and between school performance in the village council while we added the schools' relative performance and the child's rank across all schools in the village council to the parental report card. Our intervention, unlike previous studies (e.g. Banerjee et al., 2010; Andrabi et al., 2017), did not include any facilitation of public discussions of the report cards by the researchers.

Our study falls within the rapidly expanding literature on school accountability programs that have a long history, originating primarily in the U.S., U.K. and Latin America (Figlio and Loeb, 2011). However, evidence on the effectiveness of school accountability

programs on students' learning outcomes is mixed.[1] Furthermore, the literature on addressing informational asymmetries in school quality has until recently focused mainly on countries with universal education and well developed state school systems. In poorer countries, with weaker governance structures, better information on schools to local stakeholders can plausibly improve student learning outcomes through three accountability channels: *choice, participation and voice* (World Bank, 2004). But experimental evidence on such initiatives from developing countries has been inconclusive.

Our research is most closely related to two recent studies in South Asia. Andrabi et al. (2017) conduct a randomized experiment, spanning two academic years, in which parents and teachers in the treated villages in Pakistan receive report cards on students' performance in three commonly taught subjects while no information was provided in the control group of villages.[2] Average test scores were higher in poorly performing schools with a larger increment in learning outcomes in private schools due to the treatment. In contrast, an experiment in

[1] Almost all states in the U.S. have instituted programs over the last couple of decades or more that reward or punish schools by linking teacher salaries, school autonomy and federal or state grants to students' performance in annual state-wide standardized exams (Figlio and Loeb, 2011). A review of the evidence on such programs in the U.S. by Figlio and Loeb (2011) concludes that '*although there is a positive association between school accountability and student achievement, it is far from universal*'. While some studies, primarily in the U.S. have found positive effects of these initiatives on students' learning outcomes (Wong et al. 2009; Jacob 2005; Ladd 1999) others suggest that perverse incentives can arise due to school accountability programs. For instance, Figlio and Getzler (2006) find that the No Child Left Behind program led to schools in one state of the U.S. to classify low-performing students and those from poor socio-economic background as 'disabled' and transferred to special education programs. Similarly, Jacob and Levitt (2003) show that teachers in Chicago public schools responded to accountability pressures by fraudulently completing student examinations in an attempt to improve student outcomes.

[2] Parents received two report cards. The first card included the child's individual score in each subject, her quintile rank in the village, and the average scores and rank for the child's school and for her village. The second card included the average scores for each school in the village, its quintile rank, and the number of students tested. Teachers received an additional card that included a disaggregation of the scores across subtopics—for example, word recognition and sentence building in English. The cards were delivered through discussion groups where it was explained how to interpret the cards. Schools and households were also explicitly informed that report cards will be distributed and discussed again a year later.

Jaunpur district of the state of Uttar Pradesh in India in which the community was informed of the average village-level test scores in math and reading of students enrolled in public primary schools showed no evidence of improvement in learning outcomes (Banerjee et al., 2010). In a related experiment in Liberia no improvements in reading levels was reported from a randomized study where some communities were informed about average reading achievement using school report cards (Piper and Korda, 2011).

Furthermore, the channels through which information provision can impact student outcomes remain unclear. While Andrabi et al. (2017) find an increase in test scores of students, there was no impact of the intervention on parental time allocated to children's education. Schools raised investments, but only in the more competitive markets through hiring more qualified teachers and increased instruction time. They do not find any evidence of households switching schools although private schools reduce tuition by 17 percent and increase primary enrolment by 4.5 percent in response to the intervention. In contrast, Banerjee et al. (2010) show that providing information on the performance of local public schools did not have any impact on parental participation in community management of schools.[3] The findings of this limited research suggest that sanctions imposed by local communities on poorly performing schools, in the absence of explicit and credible punishments for low learning outcomes, do not always have a significant impact on school inputs.

Our results provide evidence of a positive impact on learning outcomes when information on *both* intra and inter-school performance is provided to both stakeholders – households and schools. But this holds only for students enrolled in private schools at baseline – test scores improved by more than one-third of a standard deviation when information on

[3] In contrast, Bjorkman and Svensson (2010) argue that health provider report cards led to a sharp decline in infant mortality due to an increase in provider effort in Uganda.

relative quality of schooling was provided to both households and schools. There is no impact on test scores when information only on the intra-school quality is provided to either or both households and schools. Further, we do not find any improvement in learning outcomes of public school students in any of the treatments.

The improvement in learning outcomes was driven by the increase in the private schools' resources and effort. We find that an index of school response to the intervention, measured by parental perception of schools' effort, schools' interactions with parents and resources, improved by 26% to 43% of a standard deviation, relative to the baseline, but only when information on *relative* quality of schooling was provided to both households and schools in the private school sample. We do not find any change in households' education expenditures or parental effort in either the private or public school sample in any treatment arm. These findings suggest that when information on the relative quality of schooling is common knowledge, the service providers respond significantly when their incentives are linked to their performance in the market. Social pressures through information provision, alone, on poorly performing schools may not be sufficient to have a significant impact on school quality. Our findings, thus, indicate that both the nature of information and the incentives of service providers can impact learning outcomes.

Our results contribute to the existing literature on information as a tool for improving educational outcomes by providing a more nuanced understanding of its nature and role. First, we establish that providing information on *relative* school quality and to both sides of the market could be integral for improving student learning outcomes. Second, our experiment suggests that even in the absence of community pressures created through explicit dialogues between the service providers and households, information itself can be a powerful instrument

for raising service quality. However, this claim is conditional on the incentives of the service provider. While our results support the findings of Andrabi et al. (2017), they also suggest that public schools' incentives should be redesigned to align them with those of the households (Banerjee et al. 2010). In our study learning outcomes in public school did not improve, suggesting that such complementary measures, besides relative school quality information, may be required.

The remainder of the paper is organised as follows. Section 2 provides the background, including the context and design of the intervention. Section 3 discusses the data and methodology. The results are analysed in Section 4. Section 5 concludes with policy recommendations.

2 Background

2.1 The context

Our study was conducted in the rural areas of Ajmer district, in the north-western state of Rajasthan. The average literacy rate in this district was 59% in 2011, lower than the national (74%) and state (67%) averages (GoI, Census, 2011). Although the district is well connected with urban centers (62% of villages in the district have access to paved roads (GoI, Census 2011), it is also quite poor.[4] Inspite of the low levels of literacy and extant poverty, the population is aspirational - the growth of private school enrolment in this state has accompanied rapid urbanisation in Ajmer district. To elaborate, between 2006 and 2014, the percentage of children aged 6 to 14 enrolled in rural private schools increased from 25% to 42% (Pratham, 2014). But

[4] World Food Program's (2009) report on food security in rural Rajasthan finds that in 2009 daily rural wages in Ajmer were only Rs. 54 compared to the state average of approximately Rs. 70. (Note: $1= Rs. 48 in 2009).

issues of school quality abound – while 65% of children enrolled in grade 5 in private schools could read a text meant for grade 2, the figure for public schools was 35% (Pratham, 2014).

2.2 Study Design

Test Instruments

Our learning assessment tests were designed with the assistance of Bodh Shikshan Samiti, an NGO based in Jaipur (the state's capital), which has worked extensively in the field of education in Rajasthan. The questions we use in our multiple-choice, written tests, are from the NGO's question bank of assessment tests which were based on the curriculum of public schools in Rajasthan and adapted for relevance to grades 4 and 5. [5]

We focused on grades 4 and 5 in our study for three reasons. First, these are the highest grades of primary education. Parents are at a point when they have to decide if a child should continue education to secondary levels or not.[6] Therefore, they may be more sensitive to the quality of education and respond to new information on it. Second, these students would soon transition to secondary education and are therefore on the cusp of choosing a school. Information interventions designed for these grades would allow us to analyse how households make school choices. Furthermore, we felt that these students were old enough to understand instructions and be able to take our tests in a classroom environment.

The instruments were designed to test proficiency in language (Hindi and English) and Math. Each test instrument consisted of 3 sections – Hindi, English and Math – in the order in

[5] Hindi is the native language in our study area. The curriculum in both private and public schools is similar and most private schools use textbooks designed by the state education board.
[6] A study by the Ministry of Human Resource Development (2010) using a sample of public primary schools from 21 states found that while dropout rates are around 1% from grades 1 to 3, this figure increases to 3% and 7% for grades 4 and 5, respectively.

which they appeared in the test booklet. The Hindi and Math questions were based on the curriculum of grades 1 to 3 while the English questions were based on grades 1 and 2 curricula. Since English is not the native language, we kept the threshold low for this language skill. Each question was designed to measure basic skills such as word construction, sentence construction and mathematical operations.[7] The test booklets for grades 4 and 5 differed, with questions appropriate for grade 3 forming a relatively higher proportion of the total score for grade 5.[8] Students were allowed 30 minutes to answer questions in each section of the test. [9]

Unannounced visits to schools were made to administer the tests and all schools in a village were covered on the same day. All students present in a grade were given a booklet which had separate Hindi, Math and English sections. The field assistants would explain how to answer each question in their native language, Hindi, in a given section from solved examples in the booklet. To control for any instructor biases, a script of the instructions for administering the tests was prepared and strictly followed by each instructor.

Report Cards

[7] For each skill, questions asked were of increasing difficulty level. For instance, to test addition skill, we first included 1-digit addition, then 2 and finally 3-digit addition, with carry over. Each section began with the easiest question, i.e. questions that a student who has completed grade 1 should be able to solve, and moved on to the more difficult ones.

[8] Each question carried a maximum score equal to the grade-level of difficulty, i.e. questions of level 1 (grade 1) carried 1 mark, 2 marks for a level 2 (grade 2) question and so on. This was done to enable us to evaluate the quality of learning. For example- in Hindi sentence construction the maximum score was 2 (since a child is expected to be able to write a simple sentence by grade 2). The child received the full score if she wrote a grammatically correct sentence using the word given. If the child wrote a sentence using the word correctly but it was grammatically incorrect overall, the child scored 1 point. The highest grade level was 3 in all tests and in all rounds. The test scores in each section were scaled over 100 to make it easier for parents to interpret the results.

[9] In the follow-up rounds the test booklets contained the same questions as at baseline but an additional question for each cognitive skill was added. The weightage given to level 3 questions for each subject was marginally higher in the follow-up rounds compared to the baseline. Since there were additional questions in the follow-up rounds, we gave students 45 minutes to complete each section.

We designed four different report cards to provide information on the performance of students in the assessment tests to parents and schools. Parental (P) report cards were of two types – (1) P1 reported the student's absolute performance in Hindi, English and Math as well as her relative performance in her grade on the basis of her combined score in all three subjects. (2) P2 showed the performance of the student as in P1 plus the relative performance of all students and schools in the village council (henceforth, panchayat – a collection of 3-4 villages which are administered by the same elected body) based on combined scores, for the relevant grade. Bar charts, in ascending order of scores of all students in the panchayat were shown and the child's position was highlighted in the graph. Students of the same school were marked in identical colors which allowed parents to understand the ranking of every school in the panchayat. Thus, while the first report card allowed parents to assess their ward's performance within her school, the second helped them evaluate her learning levels relative to other students within her own school and across schools.

School (S) report cards were designed similarly. S1 reported the average, subject specific score for each grade in the school and the proportion of students at different levels of competency in reading, writing and numeracy in each grade at the school level. S2 showed the grade-averaged score in each subject of all schools in the panchayat. All four report cards were in Hindi and in color. See Figures A1-A4 in the Appendix for sample report cards that have been translated into English and the colors slightly modified for visual ease in black and white print.

We chose panchayats as the unit of randomization to control for any spillover of information. Furthermore, we had established that students were more likely to attend schools

within their panchayats. Randomization at this level helped us to limit the possibility of contamination of treatments due to switching of students between treatment groups.

The objective of our experiment's design was to test the effectiveness of the salience and nature of information on school quality based on the evidence that information gaps exist (e.g. Table 4). We had 4 treatment arms in which we provided different combinations of parental and school report cards as shown in Table 1. In the control group no report cards were provided to either households or schools. In treatment T1, only parental report card P1 was given. In T2, parents received P1 while schools were provided S1 report cards. In T3, schools were informed of their absolute and relative performance in the panchayats through S1 and S2 while parents continued to receive information on their child's intra-school performance in P1. In T4, both parents and schools had information on intra and inter-school performance – P1 and P2 was given to parents while S1 and S2 were provided to the schools. Thus, while in T1 and T3 knowledge of school quality is not made common, in both T2 and T4 information is made salient although its nature (intra vs. inter school) varies. Note that even if the report cards did not contain new information for one or both sides of the market, T2 and T4 make common knowledge explicit.

We hypothesize that the difference between the post-intervention learning outcomes of the control group and T1 would inform us about the response of parents to receiving report cards on within school performance in terms of their own effort and/or exerting greater pressure on their child's school to improve learning. The impact of T2, relative to the control group, would indicate whether parents respond in terms of increasing own effort, demanding schools to provide better service to their child and/or whether schools respond by raising effort if the report card contains new information.

The difference in learning outcomes between T3 and the control group would indicate not only the response of parents in terms of own effort and pressure on schools to improve their child's learning but also schools' response by raising effort in response to the reported performance of other schools in the market. The expectation is that both parental and school response to inter school performance should be high in T4 since relative school quality information provided to the demand side will allow households to better evaluate the quality of their child's school. In particular, even if S2 did not contain new information for schools, the strength of T4 would lie in making schools aware that knowledge of relative school quality is common and salient for the entire market.[10]

Note that the parental report cards were delivered to the households by our field staff who would discuss the report card in detail with parents or guardians, even though our report cards were designed for ease of self-comprehension. The report card was discussed in the presence of at least one parent and one educated adult family member, often the elder brother or uncle, if the parents were illiterate. The school report cards were delivered and explained to the school principals by our field staff .[11] Unlike previous work where community discussions were

[10] Alternatively, we could have had an additional treatment arm - P1+P2 to households and S1 to schools (besides T3). However, in our pilots we found that a treatment with P1+P2 and S1 would be equivalent to current T4 due to spillover of information on *relative* school quality from households to schools (but not vice versa). We dropped this arm in favour of T4 to make common knowledge explicit, and in favour of T3 to allow us to understand information to which side of the market is more critical for generating common knowledge – households or schools (relative effects of T3 and T4) by exploring the possibility that S2 may not contain new information for schools. Furthermore, an additional treatment arm would reduce power of each treatment to detect impacts given that our sample consisted of the census of all panchayats and schools in the block.

[11] We did not hand the report cards to the relevant school teacher to pre-empt any strategic sharing of information within the school administration. Parents were informed if schools had received a report card or not but the details of this report card was not revealed to them. Similarly, although we informed schools that some parents received report cards, we did not identify them. However, parents could have shared their report cards with schools and other parents. Similarly, teachers could ask students to show their report cards. Schools may even choose to disclose their report cards to parents. Field reports suggested that most schools knew what type of report cards were provided to parents but not vice-versa.

organized by the researchers around the report cards, our intervention was private and minimal and differs from more resource demanding information campaigns that also mobilize communities. Any significant effects we find could, therefore, suggest that even in the absence of explicit community participation, information provision can be a cheap and effective means of making households, schools or both more responsive to low educational attainment.[12]

3 Data and Methodology

3.1 Data

Our sample consists of all villages in Srinagar panchayat samiti, a collection of panchayats, approximately the size of a census block, in Ajmer district of Rajasthan (see Figure A5 in the Appendix).[13] In addition, 23 villages of the adjoining panchayat samiti, Kishangarh, which bordered Srinagar and were potentially a part of the education market of Srinagar, were also included, giving a total sample of 72 villages in 32 panchayats. [14] We conducted a census of all public and private primary schools in each of the 72 villages – a total of 159 schools (excluding schools which did not have primary grades). Our sample of villages and schools, therefore, represents the entire primary education market in the census block. [15]

[12] The average cost of one report card in our intervention was a little over 1 USD (or Rs. 57 in 2011), including the cost of labor in designing and delivery to the household and school. This compares very favorably with other randomized school interventions that aim to improve learning outcomes (Kremer and Holla, 2009).

[13] A cluster of village councils with close socio-economic ties form a panchayat samiti which forms a link between village councils and the state development authority. The panchayat samiti is responsible for implementation of development works including investments in primary education.

[14] Instead of randomly choosing villages, we covered all of them because of our expectation that information could expand the potential choice set to schools outside the village - at least some students (in about 30% of villages) attended primary schools outside the village but seldom outside the panchayat (e.g. Alderman et al. 2001).

[15] 5 villages from Srinagar panchayat samiti were excluded from our baseline because there were no students enrolled in grades of our interest (4 and 5) in these villages' public primary schools.

The average number of primary schools in a village was 2.2, and 5.5 within a panchayat, suggesting the presence of a market for education. A panchayat, on average, had 2.6 private and 3.6 public primary schools.[16] This is not accounting for the fact that children often enroll in schools outside their villages and there is rapid turnover in the market for private schooling (Muralidharan and Kremer, 2008).[17] Thus there were considerable schooling options for households in this area.

Our study was conducted in three rounds. Since the academic year begins in April followed by a long summer break of two months, the assessment tests and baseline survey was conducted in July-September, 2011 (academic year 2011-12). We administered the tests to students in grades 4 and 5 in the 159 schools on a school day during school hours. [18] Since we administered the tests on a random school day, our dataset includes the test scores of a representative sample of students who attended school on the day of our visit in each round. School authorities had received no prior intimation of our visit or its purpose.

Along with surveys of village and school characteristics, for a sub-sample of 5 randomly selected students from each tested grade of all schools we conducted a survey of households' economic status and parental perception of students' learning achievements at baseline. These 1499 students and their households were purposively tracked.[19] Report cards on

[16] Education policy in India mandates the provision of at least one primary school within 1 kilometer radius of a habitation. Hence there can be multiple public primary schools even within a village, which often consist of several habitations.

[17] The average age of a private school in our sample was 9.8 years as opposed to 39.4 years for public schools.

[18] Some of the students were tested at their homes during the post-intervention visits. We tried to follow the same protocol as in schools - an instructor would visit the student's home and request for permission to test the student. Students were tested alone and parents and family members were requested to not assist them in any way. Our results are unchanged when we include a dummy for 'tested at home' in our analyses.

[19] Some schools had less than 5 students in a grade. In such cases all the students in that grade were sampled.

student performance were delivered only to the households of the randomly selected 1499 students from the sampled schools and each of the 159 schools following the baseline tests in October-November, 2011.

Subsequent to the report card intervention two more rounds of post-intervention assessment tests were conducted. The midline tests were administered in February-March, 2012, in the same academic year as the baseline survey.[20] The endline tests were conducted in the new academic year (2012-13) in August-October, 2012. Endline information on observable school characteristics, such as infrastructure, fees and pupil teacher ratio and household level data of the purposively tracked students were also gathered. Neither schools nor households were informed beforehand about potential revisits at any point during the study. The timeline of the study and the sample sizes are described in Table 2.

Table 3 reports the summary statistics on the student and household level characteristics of our sample at baseline. In column 1 we show the average characteristics of the control group, while columns 2-5 show the difference between the control and each of the four treatment groups. The top panel reports characteristics from the school based sample of 5157 students. The panel below reports data from the random sub-sample of 1499 students for whom we collected household level data.

The first four rows in panel 1 show that there are no significant differences in the raw baseline scores on standardized tests between the control and treatment groups (T1 test scores are marginally significantly lower than the control group). About half of our sample was male, in grade 4 and enrolled in a private school. However, T1 has significantly more male students than in the control group. In the bottom panel we find some significant differences in gender

[20] The academic year begins in April and ends in March of the subsequent calendar year.

and age of children between T2 and T3 and the control group. Eyeballing the figures, however, suggests that students' individual and household characteristics are largely comparable across the groups. We reach similar conclusions when we compare the village and school characteristics in Table A1 in the Appendix, suggesting that randomization (at the panchayat level) was largely successful. Any significant differences suggest that the treatment group(s) had worse learning outcomes than the control group which would potentially bias the treatment effects downwards. In our empirical analysis, however, we control for observable differences at the individual, school and village level.

At baseline, we elicited parental perceptions of the children's learning levels in the student linked household survey. Parents were asked if they thought that their child could perform a specific scholastic task or not. We then compared their perceptions of the child's learning levels with the actual performance of the child on standardized tests administered by us at baseline. Table 4 shows that parental perceptions, in both public and private schools, were significantly different from actual learning levels of their child but the gap between perceptions and actual performance was larger for parents whose ward was in a public school. Although private and public schools did not differ markedly on inputs in our study, they diverged in terms of effectiveness, as shown by the higher attainment of private school children in Table 4 (column 2 vs. column 4).[21] Parents whose children were enrolled in public schools also had lower expectations across all tasks than those in private schools. This suggests significant gaps

[21] Table A2 in the Appendix shows that private and public schools were comparable in terms of size (school enrolment), infrastructure, qualification of teachers and pupil-teacher ratios. Although public schools were officially more likely to have a school management committee (SMC) that consist of parents and teachers, they had a lower proportion of locally appointed teachers and almost 10 times higher salary of teachers which are typically not linked to students' performance. Households with children enrolled in public schools were significantly less educated, financially more constrained, less aspirational and more likely to be non-participants in school affairs as suggested by Table A3.

in households' information about their child's current educational attainment and a potential role for information provision in education in our sample.[22]

3.2 Methodology

Since our study design randomizes the allocation of treatments, we can infer treatment effects by comparing the post-treatment average test score between control and treatment groups. The outcome variable of interest for us is a student's total test score (sum of scores in Hindi, English and Math) post-treatment. To enable us to compare scores across grades and rounds, we use normalized test scores. We normalize baseline scores to the population mean and standard deviation for each subject and grade. For instance, baseline grade 4 scores in Hindi are normalized with respect to grade 4 mean and standard deviation for Hindi. To normalize the combined score, we use the population mean and standard deviation of the raw combined score. In the post-intervention rounds, we normalize with respect to the mean and standard deviation of the control group since we do not expect the distribution of this group to alter due to our treatments.

Our main estimating equation is given by,

$$Y_{isp} = \alpha + \sum \beta_k T(k)_p + \varphi Y^0_{isp} + \mathbf{Z}_{isp} + \varepsilon_{isp} \quad (1)$$

[22] While both types of schools claim to provide some information on their child's academic performance. Public schools do not provide 'report cards'. Instead they are expected to hold annual/bi-annual meetings where the student's performance is discussed with parents. However, household participation in these meetings is often dismal. Private schools, on the other hand, provide some form of report cards but there is no standardization. Further a typical report card contains information on the score of the child in various subjects, with almost no information on child's relative performance within her grade. Some are in English, making it hard for parents whose children are first generation school goers difficult to comprehend.

Here Y_{isp} is the z-score of student *i* in school *s* in panchayat *p* at the endline. $T(k)_p$ takes value 1 if school *s* in panchayat *p* is in treatment group *k*=1,2,3,4. The control group is the reference population. Following Todd and Wolpin (2003) and Andrabi et al. (2011), we include Y^0_{isp} or the baseline z-score of student *i* as a control variable. Gains in test scores are determined by not only educational inputs in that period but also the entire history of inputs that provided the basic knowledge. Having the baseline score as an independent variable accounts for the achievement that the student already has.[23] Since we observe some marginal differences in baseline characteristics between the control and treatment groups, we analyse equation (1) accounting for student, school and village characteristics in vector $\mathbf{Z}_{isp}$. We include the gender and grade of the student, school characteristics - baseline pupil-teacher ratio, school's total enrollment in primary grades, school's highest grade level- and village characteristics - female literacy rate, distance to town and proportion of SC (scheduled caste) population and a dummy for village development block. ε_{isp} is the idiosyncratic error term. Throughout, we conduct our analysis separately for private and public schools. Standard errors are clustered at the panchayat level.

The causal effect of the treatment, relative to the control group, is given by the coefficients of $T(k)_p$. While the coefficients of each treatment variable would suggest the impact of the treatment compared to the control group, we can estimate the value-added by the additional information in each treatment as well by comparing the coefficients between treatments. For instance, a significant difference between coefficients of T2 and T4 would suggest that the provision of relative information can impact learning outcomes more significantly than information on within school performance alone to both sides of the market.

[23] We control for the past inputs linearly (Y^0), but history may affect current learning outcomes non-linearly.

Recall that we administered the tests to students on a randomly selected school day during each visit. 1406 of 1499 students who were purposively tracked were retested and their households re-interviewed at endline. However, due to high student absenteeism we are able to re-administer the test to 58% of all baseline students at endline.[24]The probability of a student being absent from school during subsequent visits was systematically correlated with her observable characteristics. In particular, students with lower baseline scores were more likely to be absent during revisits, raising concerns about upward biased estimates (see Table A4 in the Appendix). In addition, our intervention may itself have had an impact on schooling decisions of students leading to changes in the composition, relative to baseline, of students in a school-grade. We conduct several robustness checks to address this concern, outlined in the next section.

4 Results

4.1 Learning

In Table 5, we show the results from estimating equation (1). We conduct the analysis separately for private (columns 1-2) and public school students (columns 3-4) (categorized at baseline) between baseline and endline. In columns 1 (and 3) the sample includes all students who were tested at endline, controlling for the baseline school-grade z-score. Since this sample accounts for any students who may have been absent at baseline but were tested at endline, it addresses potential concerns with changes in student composition between rounds. Column 2 (and 4) restricts the sample to a balanced panel of students who were tested both at baseline and endline. We are thus able to control for baseline individual z-scores in this

[24] According to a government report (2007) the average attendance rate in primary grades is approximately 60% in rural India.

sample. Both samples include the purposively tracked students by design.

The results for private schools in columns 1 and 2 are comparable and suggest that student test scores improved significantly and by more than one-third of a standard deviation in T4. We do not find any impact of the other treatments. The comparability of estimates between the two samples (columns 1-2) also suggests that compositional changes at the school level are not driving our results. None of the treatments, however, had a significant impact in public schools, as shown in columns 3-4.[25] Under the assumption that in each round the draw of students who were tested was random and representative of the school-grade, we also conduct the analyses of test scores at the school-grade level. Our results are consistent with the individual level analysis (results not shown for conciseness, but available on request). Going forward, our analysis and discussion is, thus, restricted to the balanced student panel (columns 2 and 4).

We report the *p*-values of tests of overall significance of the treatments and the difference in the estimates between treatments in Table 5. Our treatment variables are jointly significantly different from zero for the private school sample (*p*-value 0.001) but not for public schools (*p*-value 0.938). The *p*-values of the difference between the treatment arms suggest statistically insignificant difference between T1, T2 and T2, T3 for both the private and public school samples. This indicates that providing information to one or both sides of the market on the absolute quality of schooling (T1 and T2) did not impact learning outcomes, neither did providing relative school quality information to schools alone (T3). However, the point estimate on T4 is significantly different from both T2 and T3 for the private school

[25] These results are broadly in line with the mean, difference-in-difference estimate of treatment impacts in Table A5 in the appendix, which suggest significant treatment impacts only for the private school sample.

sample. This implies that when information is provided on relative school performance to both households and schools (i.e. T4) learning outcomes improve significantly more than when information on only intra school performance is made available to both sides of the market (i.e. T2) and when relative school quality information is provided to schools alone (T3).[26] Further, our point estimates for T4 are significantly different between public and private schools (*p*-value 0.008), but not for the other three treatments.[27]

4.2 Robustness

Our estimates from equation (1) for the balanced panel of students are likely to be biased if there were systematic changes in the composition of students between baseline and endline. We addressed some of that concern in Table 5 but we did not account for students who took the test at baseline and selectively dropped out of the sample at endline. Of the 5157 students tested at baseline, 2996 we re-tested at endline (see Table 2).[28] If students with low z-scores (low achievers) at baseline were more likely to drop out of the sample at endline, as suggested by Table A4 in Appendix, then our estimates in Table 5 could be biased upwards.[29]

We adopt two non-parametric methods to check the robustness of our results in Table 5

[26] None of the treatment coefficients are significant for public and private schools at midline. This is expected since only 2 to 4 months had lapsed between the distribution of report cards and the midline test, with a month of school winter vacations in between. The analysis of balanced panel across baseline, midline and endline in Table A6 in the Appendix, shows results similar to Table 5.

[27] We find significant effects of T4 on the learning outcomes of children in treatment schools (private school sample) who *did not* receive report cards. This suggests that there was sharing of information among households.

[28] Some of this drop-out (16%) can be attributed to non-response from schools at endline. Of the 159 schools at baseline, 20 schools (8 private and 12 public) did not respond at endline across all treatments (and control).

[29] When we regress a dummy for student attriting at endline on observables and interact the coefficient on the individual baseline score with treatment, we find that the coefficient on the interaction with T4 in the private sample is significantly negative. Thus drop-out was lower for high scorers when relative information on school quality was provided, suggesting that information may have helped in keeping a high ability student in school.

to selection bias. First, we use inverse probability weights suggested by Moffit et al. (1999) and Baulch and Quisumbing (2010) to address selection on observables. Intuitively, this method gives more weightage to students who are similar on baseline observables to students who did not stay in the sample at endline. The results are reported in the top panel in Table 6. Our overall finding of significant effect for private schools and no impact on the learning outcomes of public school students is not only upheld, the results are much stronger. The coefficients on all treatments is significant, but largest for T4. This suggests that our estimates from equation (1) in Table 5 were downward biased if the low achievers who dropped out of the sample were more likely to benefit from the information intervention.

As a second robustness check, we estimate a method proposed by Lee (2009) to address non-random selection in randomized control trials. The method estimates lower and upper bounds on treatment effects by trimming the sample (either by excluding the smallest or the largest values of the observed outcome) such that the share of observations with observed outcome is equal across all treatments (and the control). This ensures that all treatment groups are comparable on observables (and by assumption, therefore, on unobservables). The results are reported in the bottom panel of Table 6. The estimates for T4 show that the both the lower and upper bound estimates are significantly positive for the private school sample. Moreover, our estimate from Table 5 of 0.308 standard deviation increase in test score in T4 for the private school sample falls within the bounds.

A concern that remains with our estimates is that high intra-cluster correlation coupled with the small number of clusters (panchayats) in our study would lead to low power. Although we have addressed the possibility of high intra-cluster correlation by clustering our standard errors at the panchayat level, the presumption that these standard errors are correct is based on

having a large number of clusters. We may be falsely rejecting treatment impacts as insignificant. Note, however, that all the treatment arms are jointly significant as reported in Table 5. We, nevertheless, use the cluster-bootstrap procedure proposed by Cameron, Gelbach and Miller (CGM, 2008) for correcting standard errors with small clusters between 5 to 30 for each treatment arm. The estimates from the CGM bootstrap method is reported in Table A7 in Appendix. Our standard errors are marginally higher but the coefficient on T4 remains significant at 5% level, consistent with results reported in Table 5.

Overall, our findings suggest that learning outcomes improved significantly when information on relative school quality and to both sides of the market was provided. The absence of any significant effects of other treatments suggests that information on how a child is performing relative to other students *within* the same school may not be sufficient for improving learning outcomes. [30] This may be because the full information set – performance of children in the entire market for education – is missing. It also points, potentially, to the necessity of providing this information to the demand side of the market. Given that this result holds only for private schools, it indicates that incentives to respond to information may differ between public and private service consumers as well as providers. We explore this next.

4.3 Mechanisms

Using the baseline and endline household and school survey data we investigate whether and

[30] We do not find significant heterogeneity in outcomes by language or math when we break up the aggregate effect into performance in each of the three subjects in Table A8. Although the point estimates are not significantly different from each other, the coefficient on T4 for Hindi is larger than for English and Math. We also do not find any significant variation in the response to the intervention when we classify either students or schools into below and above median performers at baseline. Table A9 in the Appendix shows no significant difference in the impact of T4 on student performance between low and better performing students or schools, although we do find a marginally significant effect of T2 on above median performers in public schools.

how schools and households responded to the information intervention. We measure myriad ways in which the schools may have changed their behaviour - annual fees charged by the school (including tuition and any other annual charges), pupil-teacher ratio in the primary grades, whether parents reported receiving information on the child's performance from school authorities and parental perception of school effort. Since data on school fees was missing for several schools we used the household surveys for this measure.[31] The pupil teacher ratios were obtained by dividing the total enrolment with the number of teachers for all primary grades of the school using the school records. To further elicit school behaviour, we asked parents whether they regularly receive information from the school on the child's academic performance. One possible concern with this measure is that our report card intervention itself may have been construed as information from schools by less educated parents. However, any differential impact across treatments cannot be attributed to this misperception since households received information on their child's performance in all treatment arms. Finally, we measure school effort from two responses of parents in the household survey – first, parental perception of whether the teachers' attendance in school was regular and, second, whether the teachers were putting in sufficient effort in classroom teaching. We sum up these two variables to get a composite measure of 'school effort', whose value varies from 0 ('no' on both questions) to a maximum value of 2 ('yes' on both questions). The last two measures may be biased since they are not based on objective measures of school inputs. However, the bias is more likely to go against our finding any improvement in school inputs – the intervention is more likely to have raised households' awareness and expectations of school performance and biased downwards their perception of school effort at endline.

[31] Parent(s) was asked to report the annual school fees (including examination and other charges) paid for the sampled child.

We evaluate household response by utilizing data on three variables from the household survey – annual school expenditure on the sampled child (including, fees, textbooks and stationary, uniform and travel costs), parental effort in helping the sampled child with school work and expenditure on private tuitions for the sampled child (per month). Parental effort is measured using responses from time allocation questions – did either or both parent spend time (a) teaching the child at home; (b) checking the child's school or homework and (c) monitoring time spent by child on studying/home work at home? Parental effort is the sum of the dichotomous response to all three questions and hence varies from 0 ('no' on all questions) to 3 ('yes' to all three questions).

To account for correlated outcomes we construct an index of school and household behavior by adopting the now commonly used index method first suggested by Kling et al. (2007).[32] To check the robustness of our results we calculate the index using multiple combinations of the individual variables. Our specification is as outlined in equation (1), but we also control for the value of the relevant index at baseline. The analysis is conducted separately for the private and public school sample, as previously.

The results from the analysis of the school response, by school type, are reported in Table 7. We report results from four different indexes, as outlined in the bottom panel of Table 7. In columns 1 and 5, the index includes school fees and pupil teacher ratios as a measure of resources available to the school. [33] In columns 2 (3) and 6 (7), we include a third measure – information from school (school effort). These two variables would account for correlations

[32] For each round, we first standardize all relevant outcome variables (to be used in the index) using the mean and the standard deviation of the control group as the reference group (for the relevant round). The index is then calculated by taking an equally weighted average of all the standardized measures (z-scores).

[33] Although public schools do not charge tuition there are other annual school charges such as exam fees.

between schools' resources and their responsiveness to parental concerns. Columns 4 and 8 include all four measures in a composite index.

The results suggest that in the private school sample school resources rose significantly in T4, as shown in column 1. Including the measure of interaction between schools and parents in column 2, reduces the significance of the coefficient on T4 to 10% level. However, the results in columns 3 and 4 suggest that school effort improved and is perhaps correlated with the changes in school fees and pupil teacher ratios – school fees may have risen simultaneously with improvement in other school inputs. Overall, in the private school sample, school resources and inputs rose by 26%-43% of a standard deviation in T4. There was an insignificant effect of treatments T1-T3 in the private school sample and in the public school sample there was no change in the school inputs in any treatment. Note that none of the components of the indexes are significantly impacted by any treatment individually (results available on request).[34]

We analyse households' responsiveness to the intervention in Table 8. In columns 1 and 4, we include total school expenditures and parental effort in the household index. In columns 2 and 5, we substitute private tuition expenditures for parental effort in the index. Columns 3 and 6 include all three measures. Across both private and public school samples we find no responsiveness of households to the intervention in any of the treatments. It is, of course,

[34] If private schools in T4 increased tuition in response to the intervention then students who were socio-economically worse off and also more likely to be poorly performing at baseline, may have dropped out at endline. This would lead to a significant and positive coefficient on T4 in our estimating equation. We are, however, able to rule out this possibility using data from the random sub-sample of 1499 students for whom we have household level information. Irrespective of whether the wealth index of the household is above or below sample median, attrition does not vary by treatment. Further, when we interact treatment with baseline z-score of the student we do not find a significant coefficient for T4 in households with lower than median wealth. This suggests that the response of the private schools did not cause selective attrition in T4 (results available on request).

possible that households reduced own school expenditures if schools' inputs (e.g. fees and effort) improved. The point estimates on T4 in the private sample are negative throughout, indicative of this possibility, but imprecisely estimated. Suggestive evidence on another measure of household response, school choice, indicates that public school students may have switched schools at endline (new academic year) due to the report card intervention. [35] This implies that households in the public school sample may have responded to the information intervention, either in terms of their own behaviour or by ineffectually exerting pressure on the child's current school or both.

Our results in Tables 7 and 8, imply that relative information on school quality encouraged the private schools to respond when households were also provided inter-school quality information. This indicates that merely providing information on the absolute quality of schooling to both sides of the market was not sufficient to improve learning outcomes (T2 vs. T4). Providing relative school quality information to the households induced private schools to respond (T3 vs. T4) but not the public schools. Given that improvements in learning outcomes was observed in T4 in the private school sample, it suggests that private school management's incentives differed from that of public schools. For instance, private school teachers were less likely to be permanent employees and more likely to be from the local community (as shown in Table A2) and thereby more responsive to the households' demands unlike the public school teachers. Thus better stakeholder information may lead to improved service delivery when consumers can evaluate the relative quality of the service they receive and the incentives of service providers are aligned with the interests of households.

[35] Table A10 suggests exercise of school choice due to information provision by students in the public school sample. We do not find any systematic effect of any of the treatments on changes in the type of school (i.e. switches either from public to private or vice versa). We hope to explore the effects of information on school choice effects in future research.

5 Conclusion

In this study, we investigate whether the quality of education can be improved by providing information on student performance to parents and schools in the market for schooling. We varied report cards by recipient (parents or schools) and whether information on intra and inter school quality was bundled or not. We then analysed the response of recipients by studying the performance of students in the subsequent academic year.

We find significantly different impacts on learning levels of children enrolled in private and public schools and by type of information. Test scores improved significantly when we informed parents of the position of their child relative to all others students across schools in the panchayat and schools received information both on their own students' performance and the average school performance relative to others in the panchayat. This impact is significant only in the private school sample. We do not find any impacts when only intra-school performance or information to schools alone is provided. These findings are supported by more recent evidence that the production of educational outcomes requires coordination between households and schools and that providing incentives to one side of the market alone may not be effective (Behrman et al. 2015).

What factors explain our results? We find a significant effect of providing relative school quality information to both schools and households on private school behavior but not public schools' – resonating recent research on public health service delivery (Das et al., 2016) which suggests that the public provider may lack incentives to improve performance. Thus greater stakeholder information may lead to better service delivery only when consumers can evaluate the relative quality of the service they receive and the incentives of service providers are such that they are responsive to the households' demands.

Our results support, but also nuance and reconcile, the contrasting findings of Banerjee et al. (2010) and Andrabi et al. (2017). The insignificant improvements in test scores of public school students echoes Banerjee et al. (2010) who find no effect of community level information campaigns on household behavior or learning outcomes in public schools. However, in our study, households in the public school sample may have responded to the intervention, as suggested by the school choice results, but without any concomitant support from the public schools themselves. Apart from lack of incentives, the ability of public schools to improve services may be limited as individual public schools have little control on the choice of teachers and reallocation of schools resources. They underline the relevance of the nature of the education market in mediating the responsiveness of the service providers. Leveraging the market, by redesigning schools' incentives along with increasing the awareness of relative school quality, could be an effective policy instrument for improving learning outcomes.

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Table 1: Study design

Report card recipient	**Control**	**T1**	**T2**	**T3**	**T4**
	Type of report card				
Household	None	P1	P1	P1	P1 and P2
School	None	None	S1	S1 and S2	S1 and S2
Number of schools	35	29	37	28	30
Private	17	13	11	12	10
Public	18	16	26	16	20
Number of students	1064	860	1319	918	996
Private	541	361	461	432	397
Public	523	499	858	486	599

P: parental report card; **S**: school report card

P1: (i) Child's score by subject (ii) Child's total (combined) score relative to all students' combined scores in her grade.

P2: (i) Child's total score relative to the total score of all students in the panchayat with each school marked out.

S1: (i) Average score by subject and grade (ii) Percentage of students correctly answering each question by grade.

S2: (i) Average score of schools in the panchayat in Hindi, Math and English, by grade.

Table 2: Timeline of study

Date	Round	Data	Sample
Jul, Aug, Sept, 2011	Baseline	Village survey	72 villages
		School survey	159 schools
		Household survey	1499 households
		Student test scores	5157 students
Oct, Nov 2011			159 schools
	Report card intervention		1499 households
Feb, Mar 2012	Midline	Student test scores	4000 baseline students
Aug, Sep, Oct 2012	Endline	School survey	139 baseline schools
		Household survey	1406 baseline households
		Student test scores	2996 baseline students

Table 3: Individual and household characteristics at baseline

		Treatment - Control			
	Control	**T1**	**T2**	**T3**	**T4**
	(1)	(2)	(3)	(4)	(5)
Individual characteristics	(N=1064)	(N=859)	(N=1319)	(N=918)	(N=995)
Overall raw test score	64.72	-8.66*	-5.23	-5.58	-2.64
	(2.422)	(4.527)	(4.430)	(5.910)	(2.802)
Hindi raw test score	27.77	-3.73*	-2.38	-3.06	-1.78
	(1.070)	(1.871)	(2.089)	(2.645)	(1.266)
Math raw test score	18.71	-1.96	-0.68	-0.99	-0.25
	(0.720)	(1.269)	(1.096)	(1.552)	(0.812)
English raw test score+	17.84	-2.87*	-2.10	-1.59	0.73
	(0.901)	(1.557)	(1.484)	(1.798)	(0.100)
Enrolled in private school	0.51	-0.09	-0.16	-0.04	-0.11
	(0.059)	(0.085)	(0.102)	(0.132)	(0.079)
Male child	0.54	0.10***	0.06*	0.05	0.00
	(0.024)	(0.036)	(0.034)	(0.041)	(0.035)
Child enrolled in grade 4	0.53	-0.03	-0.01	-0.02	-0.01
	(0.018)	(0.026)	(0.032)	(0.023)	(0.036)
Individual and household characteristics					
	(N=327)	(N=273)	(N=346)	(N=263)	(N=291)
Male child	0.50	0.07*	0.06**	0.04	0.01
	(0.022)	(0.040)	(0.027)	(0.044)	(0.100)
Age of child	10.71	-0.11	-0.11	-0.42**	-0.24
	(0.108)	(0.170)	(0.124)	(0.150)	(0.162)
Child enrolled in grade 4	0.50	0.01	0.02	-0.01	0.01
	(0.010)	(0.015)	(0.014)	(0.013)	(0.013)
Household head's education	1.94	-0.15	-0.07	-0.05	0.08
	(0.168)	(0.209)	(0.225)	(0.240)	(0.246)
Household head daily wage worker	0.47	-0.04	0.00	0.05	0.01
	(0.044)	(0.065)	(0.054)	(0.069)	(0.064)
Household's wealth index	4.87	0.04	-0.36*	-0.24	-0.49
	(0.165)	(0.227)	(0.197)	(0.231)	(0.335)
Household's education expenditure	1874.02	-0.365.55	-458.90	-482.76	-294.48
	(224.113)	(247.665)	(268.303)	(295.825)	(469.348)

Note: Column 1 shows the mean values for the control group while columns 2 to 5 show the difference of the treatment from the control. The top panel reports data from the entire school based sample of children. The lower panel reports characteristics from the subsample of 1499 children whose households were surveyed. Household head's education is a continuous variable with the following codes: 0= Illiterate, 1 =Literate but no formal schooling, 2 = Grades 1-5, 3= Grades 6-12, 4= Graduate or Professional degree. The wealth index is a score out of 10 for the following household assets: draft animal, cattle, four wheeler, refrigerator, telephone/mobile, TV, productive assets, 'pucca' house, electricity and tap water. The English test score excludes level 3 which was not administered to grade 4 students. Standard errors clustered at panchayat level in parenthesis. Significant at *** 1% **5% *10%

Table 4: Parental perception and student performance at baseline

Scholastic skill	Private			Public		
	Parental perception	Student performance	Difference	Parental perception	Student performance	Difference
Hindi	(1)	(2)	(1)-(2)	(3)	(4)	(3)-(4)
Alphabet recognition	0.99	0.91	0.087***	0.98	0.71	0.267***
			(0.014)			(0.019)
Word construction	0.99	0.96	0.027***	0.93	0.81	0.117***
			(0.010)			(0.017)
Sentence construction	0.89	0.87	0.018	0.64	0.49	0.149***
			(0.018)			(0.022)
Math						
Count	0.99	0.97	0.029***	0.98	0.87	0.115***
			(0.009)			(0.014)
2-digit operation without carry over	0.98	0.97	0.004	0.85	0.87	-0.016
			(0.011)			(0.018)
3-digit operation without carry over	0.87	0.60	0.269***	0.58	0.26	0.323***
			(0.026)			(0.025)
English						
Alphabet recognition	0.99	0.91	0.082***	0.93	0.67	0.264***
			(0.014)			(0.020)
Word recognition	0.80	0.95	-0.153***	0.51	0.74	-0.236***
			(0.021)			(0.024)

Notes: Parental responses and test scores of 1093 matched student-parent pairs from the household survey. The data are conditional on parental response to all questions on perceptions, separately for public and private schools. Parent's response is coded as 1 if she says "Yes" when asked if the child could perform a specific scholastic task. The child is considered to have a specific skill if she scored at least 50 percent marks on the questions for that skill in the tests administered at the baseline. Standard errors in parentheses. Significant at *** 1% **5% *10%.

Table 5: Impact of report cards on standardized test scores in the new academic year

	Private		Public	
	(1)	(2)	(3)	(4)
T 1	0.152	0.129	-0.149	-0.100
	(0.133)	(0.133)	(0.174)	(0.162)
T 2	0.125	0.111	0.024	0.009
	(0.137)	(0.147)	(0.148)	(0.167)
T 3	-0.053	-0.020	-0.039	-0.038
	(0.101)	(0.100)	(0.159)	(0.139)
T 4	0.367**	0.308***	0.047	-0.047
	(0.107)	(0.108)	(0.104)	(0.104)
Baseline z - score	0.553***	0.584***	0.466***	0.598***
	(0.079)	(0.046)	(0.119)	(0.048)
Constant	0.037	-0.809**	0.870**	-0.157
	(0.244)	(0.335)	(0.339)	(0.566)
Joint Significance of treatment	[0.000]	[0.001]	[0.688]	[0.938]
T1=T2	[0.754]	[0.848]	[0.241]	[0.476]
T2=T3	[0.060]	[0.218]	[0.743]	[0.795]
T3=T4	[0.000]	[0.000]	[0.629]	[0.953]
T2=T4	[0.018]	[0.078]	[0.841]	[0.675]
Sample	All students at endline	Balanced student panel	All students at endline	Balanced student panel
All Controls	Yes	Yes	Yes	Yes
N	1756	1338	2198	1658
R^2	0.135	0.368	0.125	0.280

Note: Baseline z-score at school-grade level in columns 1 and 3 (sample includes all students tested at endline) and at individual level in columns 2 and 4 (sample includes panel of students tested at both baseline and endline). Controls include child's grade and gender, school characteristics- pupil-teacher ratio, highest grade taught, total enrolment, village characteristics - female literacy rate, distance to town, proportion of SC population and a dummy for census block. Standard errors, clustered at panchayat level, in parentheses. *p*-values in square brackets. Significant at *** 1% **5% *10%.

Table 6: Impact of report cards on standardized test scores in the new academic year (Inverse Probability Weights and Lee bounds estimates)

	Private				Public			
Inverse Probability Weights	N=1338				N=1658			
	T1	T2	T3	T4	T1	T2	T3	T4
	0.504***	0.410***	0.308**	0.569***	-0.040	-0.074	-0.128	-0.093
	(0.153)	(0.148)	(0.150)	(0.157)	(0.330)	(0.078)	(0.109)	(0.094)
Lee bounds								
Lower bound	-0.012	-0.074	-0.349***	0.163**	-0.529***	-0.118	-0.395***	-0.143
	(0.080)	(0.123)	(0.097)	(0.068)	(0.144)	(0.109)	(0.134)	(0.135)
Upper bound	0.266***	0.093	0.132	0.486***	-0.232*	0.063	0.012	0.149
	(0.087)	(0.086)	(0.109)	(0.060)	(0.127)	(0.127)	(0.154)	(0.117)
N	902	1002	973	938	1022	1381	1009	1122

Note: The sample includes the balanced student panel. All control variables are included in IPW estimates, except the dummy for census block which fails the common support requirement. The Lee bounds estimates do not include any covariates. Significant at *** 1% **5% *10%.

Table 7: Impact of report cards on index of school behavior in the new academic year

	Private				Public			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
T1	0.125	0.120	0.127	0.168	-0.001	-0.068	0.033	-0.049
	(0.187)	(0.134)	(0.150)	(0.117)	(0.213)	(0.138)	(0.161)	(0.105)
T2	0.190	0.152	0.096	0.121	0.097	0.174	0.051	0.107
	(0.225)	(0.117)	(0.167)	(0.099)	(0.179)	(0.163)	(0.102)	(0.097)
T3	0.168	0.160	0.152	0.155	-0.059	-0.017	-0.033	-0.024
	(0.197)	(0.133)	(0.131)	(0.107)	(0.190)	(0.142)	(0.150)	(0.106)
T4	0.433**	0.272*	0.361**	0.262**	-0.173	-0.167	-0.161	-0.112
	(0.169)	(0.135)	(0.133)	(0.124)	(0.176)	(0.111)	(0.114)	(0.086)
Constant	-0.380	-0.233	-0.156	-0.176	0.340	0.285	0.259	-0.261
	(0.331)	(0.185)	(0.270)	(0.161)	(0.393)	(0.356)	(0.305)	(0.256)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School response on								
Fees	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pupil-teacher ratio	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Information to parents	No	Yes	No	Yes	No	Yes	No	Yes
School effort	No	No	Yes	Yes	No	No	Yes	Yes
N	548	524	471	455	817	743	638	598
R^2	0.230	0.198	0.193	0.157	0.468	0.183	0.155	0.109

Note: Sample consists of purposively tracked 1499 students whose households were also surveyed. Controls as elucidated in Table 5, including the relevant index at baseline. Standard errors clustered at panchayat-level in parenthesis. Significant at *** 1% **5% *10%.

Table 8: Impact of report cards on index of household behavior in the new academic year

	Private			Public		
	(1)	(2)	(3)	(4)	(5)	(6)
T1	-0.107	-0.055	-0.027	-0.068	-0.030	-0.002
	(0.109)	(0.151)	(0.117)	(0.157)	(0.131)	(0.117)
T2	-0.033	-0.187	-0.078	-0.072	-0.159	-0.096
	(0.116)	(0.180)	(0.129)	(0.126)	(0.122)	(0.090)
T3	-0.083	0.104	0.060	-0.205	0.047	0.034
	(0.126)	(0.203)	(0.160)	(0.129)	(0.130)	(0.093)
T4	-0.024	-0.089	-0.069	-0.098	0.088	0.030
	(0.143)	(0.241)	(0.175)	(0.133)	(0.131)	(0.108)
Constant	-0.113	0.016	-0.090	0.200	0.024	-0.299
	(0.234)	(0.299)	(0.243)	(0.199)	(0.375)	(0.248)
All controls	Yes	Yes	Yes	Yes	Yes	Yes
Household response on						
School expenditure	Yes	Yes	Yes	Yes	Yes	Yes
Parental effort	Yes	No	Yes	Yes	No	Yes
Private tuition	No	Yes	Yes	No	Yes	Yes
N	500	553	499	718	828	717
R^2	0.172	0.078	0.073	0.119	0.174	0.135

Note: Sample consists of purposively tracked 1499 students whose households were also surveyed. Controls as elucidated in Table 5, including the relevant index at baseline. Standard errors clustered at panchayat-level in parenthesis. Significant at *** 1% **5% *10%.

(ONLINE SUPPLEMENTARY MATERIAL, NOT FOR PUBLICATION)
APPENDIX

Table A1: Village and school level characteristics at baseline

	Control	T1	T2	T3	T4
	(1)	(2)	(3)	(4)	(5)
Village characteristics	(N=15)	(N=13)	(N=16)	(N=13)	(N=15)
Number of households	354	-47.92	-47.00	-44.08	-94.80
	(78.364)	(82.169)	(87.366)	(85.682)	(88.443)
Female literacy rate	0.30	-0.07	-0.01	0.02	-0.08*
	(0.036)	(0.049)	(0.077)	(0.048)	(0.042)
Distance to town	12.47	0.92	4.03	2.23	2.87
	(1.979)	(4.036)	(3.660)	(4.387)	(2.410)
Proportion of SC population	0.12	-0.03	-0.02	-0.02	0.02
	(0.019)	(0.025)	(0.029)	(0.024)	(0.025)
Number of private schools	1.13	-0.13	-0.51	-0.29	-0.47
	(0.357)	(0.439)	(0.393)	(0.441)	(0.426)
School characteristics	(N=35)	(N=29)	(N=37)	(N=28)	(N=30)
Private school	0.49	-0.04	-0.19**	-0.06	-0.15
	(0.068)	(0.095)	(0.090)	(0.137)	(0.103)
Monthly teacher salary (Rs.)	19261.09	-4549.67	-4228.60	-5510.87	-4219.19
	(6741.121)	(6850.155)	(6996.064)	(7152.688)	(6928.337)
Annual school tuition (Rs.)	755.09	-271.50	-184.64	-249.74	-19.88
	(158.356)	(194.637)	(249.061)	(202.536)	(280.305)
Proportion of graduate	0.83	-0.08	-0.12**	-0.02	-0.07
	(0.033)	(0.072)	(0.053)	(0.051)	(0.062)
Proportion of local teachers	0.25	-0.05	-0.01	-0.08	0.01
	(0.066)	(0.092)	(0.082)	(0.085)	(0.086)
Total enrolment in school	204.63	-19.25	-2.14	-9.13	1.44
	(14.495)	(22.532)	(20.679)	(34.441)	(30.219)
Pupil-teacher ratio	28.24	2.02	6.47***	3.18	3.07
	(1.055)	(3.045)	(1.658)	(2.200)	(2.380)
Presence of SMC in school	0.89	-0.14	-0.07	-0.14	-0.10
	(0.037)	(0.096)	(0.068)	(0.097)	(0.072)
Grade level	2.03	-0.20	-0.35**	-0.24	-0.03
	(0.154)	(0.192)	(0.167)	(0.169)	(0.182)
School infrastructure index	3.69	-0.41**	-0.50***	-0.47**	-0.45***
	(0.094)	(0.160)	(0.135)	(0.220)	(0.142)

Notes: This table shows the balance of baseline characteristics of 72 villages and 159 schools. Column 1 shows the means for the control group while columns 2 to 5 show the difference of the treatments from the control. SMC – school management committee. Grade level is a continuous variable – (1) grades 1-5 (2) grades 1-8 (3) grades 1-10 (4) grades 1-12. School infrastructure index is the school's score on having a 'pucca' school building, drinking water facility, functional toilets and electricity connection, with a maximum possible score of 4. Standard errors, clustered at panchayat level, in parenthesis. Significant at *** 1% **5% *10%.

Table A2: Private and public school characteristics at baseline

	Resources				Incentives		
	Primary grade enrolment	Infrastructure index	Prop. Graduate teachers	Pupil – teacher ratio	SMC exists	Prop. local teachers	Monthly teacher salary (Rs.)
Private [N=63]	216.41 (13.008)	3.44 (0.108)	0.768 (0.030)	29.14 (1.423)	0.58 (0.063)	0.350 (0.040)	2825.658 (197.792)
Public [N=96]	188.04 (13.370)	3.25 (0.074)	0.770 (0.029)	32.63 (1.280)	0.95 (0.024)	0.151 (0.033)	23792.8 (2476.687)
Difference	-28.371 (19.587)	-0.194 (0.126)	0.001 (0.044)	3.487* (1.957)	0.366*** (0.059)	-0.199*** (0.052)	20967.12*** (3137.245)

Notes: SMC (School Management Committee). School infrastructure index is the school's score on having a pucca school building, drinking water facility, functional toilets and electricity connection, with a maximum possible score of 4. Standard errors in parentheses. Significant at *** 1% **5% *10%**.**

Table A3: Private and public household characteristics at baseline

	Education of household head	Daily wage worker	Wealth index	Education expenditure (Rs.)	Desired level of schooling for child	Know of presence or absence of SMC
Private [N=602]	2.30 (0.054)	0.38 (0.020)	5.26 (0.056)	3108.43 (77.069)	9.25 (0.082)	0.44 (0.020)
Public [N=897]	1.64 (0.047)	0.55 (0.017)	4.56 (0.046)	520.76 (16.514)	8.57 (0.091)	0.34 (0.016)
Difference	-0.661*** (0.072)	0.169*** (0.026)	-0.698*** (0.072)	-2587.66*** (66.267)	-0.677*** (0.130)	-0.096*** (0.025)

Notes: The wealth index is a score out of 10 for the following household assets: draft animal, cattle, four wheeler, refrigerator, telephone/mobile, TV, productive assets, 'pucca' house, electricity and tap water. Desired level of schooling is response to question "How much education do you wish (sampled) child to complete?" 0= none, 1= less than primary, 2= primary, 3=grades 6-9, 4= grade 10, 5= grade 12, 6= graduate, 7=post graduate, 8=professional degree 9= diploma 10= as much as child wishes. Standard errors in parentheses. Significant at *** 1% **5% *10%.

Table A4: Sample attrition between baseline and endline

	All	Private	Public
	(1)	(3)	(2)
Baseline z-score	-0.061***	-0.078***	-0.055***
	(0.016)	(0.019)	(0.019)
T 1	-0.034	-0.050	-0.007
	(0.046)	(0.054)	(0.069)
T 2	-0.057	-0.020	-0.053
	(0.045)	(0.060)	(0.066)
T 3	-0.113**	-0.133**	-0.113*
	(0.047)	(0.062)	(0.056)
T 4	-0.044	-0.160***	0.026
	(0.050)	(0.053)	(0.062)
Male	-0.015	0.029	-0.046**
	(0.016)	(0.026)	(0.018)
Grade 4	-0.035	-0.065*	-0.014
	(0.023)	(0.033)	(0.028)
Pupil-teacher ratio	0.003*	0.001	0.003
	(0.002)	(0.003)	(0.002)
School level	-0.055***	-0.024	-0.082***
	(0.018)	(0.034)	(0.023)
Total enrolment	0.001***	0.001**	0.001***
	(0.000)	(0.001)	(0.000)
Female literacy rate	-0.101	-0.124	-0.051
	(0.132)	(0.199)	(0.157)
Distance to town	-0.002	0.001	-0.006**
	(0.003)	(0.004)	(0.003)
Prop. of SC population	0.019	0.160	-0.180
	(0.188)	(0.266)	(0.222)
Block dummy	0.029	0.115	0.014
	(0.045)	(0.071)	(0.038)
Private school	0.029		
	(0.029)		
Constant	0.381***	0.257**	0.524***
	(0.087)	(0.097)	(0.103)
N	5151	2192	2959
R^2	0.0545	0.0816	0.0593

Notes: The dependent variable equals 1 if the student was present at baseline but absent at endline and 0 if the student was present both at baseline and endline. Standard errors clustered at panchayat-level in parenthesis. Significance *** 1% **5% *10%.

Table A5: Difference-in-difference estimate of z-scores

Treatment Group	Treatment - Control: Baseline	Treatment - Control: Endline	Difference
	(1)	(2)	(2) – (1)
	Private Schools		(N=1338)
T 1	-0.040	0.081	0.122*
			(0.063)
T 2	-0.088	0.051	0.139**
			(0.061)
T 3	-0.171	-0.190	-0.019
			(0.059)
T 4	0.178	0.279	0.101*
			(0.059)
	Public Schools		(N=1658)
T 1	-0.319	-0.355	-0.036
			(0.089)
T 2	0.040	-0.046	-0.085
			(0.077)
T 3	-0.114	-0.247	-0.133
			(0.086)
T 4	0.065	0.032	-0.033
			(0.085)

Note: Balanced panel of students.
Standard errors in parentheses. Significant at *** 1% **5% *10%.

Table A6: Impact of report cards on standardized test scores (balanced panel)

	Midline		Endline	
	Private	**Public**	**Private**	**Public**
	(1)	(2)	(3)	(4)
T 1	-0.097	-0.028	0.087	-0.046
	(0.111)	(0.140)	(0.137)	(0.148)
T 2	0.008	-0.096	0.077	-0.025
	(0.138)	(0.159)	(0.146)	(0.154)
T 3	-0.108	-0.152	-0.070	-0.065
	(0.104)	(0.177)	(0.096)	(0.123)
T 4	-0.079	-0.106	0.246**	-0.037
	(0.080)	(0.151)	(0.107)	(0.093)
Baseline z-score	0.726***	0.739***	0.574***	0.599***
	(0.040)	(0.045)	(0.051)	(0.046)
Constant	0.627**	1.147**	-0.824**	-0.260
	(0.277)	(0.502)	(0.329)	(0.528)
Joint Significance of treatment	[0.644]	[0.885]	[0.001]	[0.983]
T1=T2	[0.268]	[0.584]	[0.922]	[0.878]
T2=T3	[0.343]	[0.699]	[0.172]	[0.811]
T3=T4	[0.767]	[0.778]	[0.000]	[0.828]
All Controls	Yes	Yes	Yes	Yes
N	1208	1428	1208	1428
R^2	0.499	0.415	0.364	0.287

Notes: The sample is restricted to 2636 students present in all three rounds. P-values in square brackets. Controls as elucidated in Table 5. Standard errors clustered at panchayat-level are in parenthesis. Significance *** 1% **5% *10%.

Table A7: Impact of report cards on standardized test scores in the new academic year (CGM bootstrap)

	Private	Public
	(1)	(2)
T 1	0.129	-0.010
	(0.191)	(0.204)
T 2	0.111	0.009
	(0.211)	(0.104)
T 3	-0.020	-0.038
	(0.090)	(0.098)
T 4	0.308**	-0.047
	(0.156)	(0.116)
Baseline z - score	0.584***	0.598***
	(0.000)	(0.000)
Constant	-0.194	0.52
	(0.336)	(0.368)
All Controls	Yes	Yes
N	1338	1658
R^2	0.368	0.277

Notes: Balanced panel of students. Controls, as elucidated in Table 5. Bootstrapped, clustered standard errors reported in parentheses. Significant at *** 1% **5% *10%.

Table A8: Impact of report cards on test scores in the new academic year by subject

	Private			Public		
	Hindi	**English**	**Math**	**Hindi**	**English**	**Math**
T 1	-0.001	0.0840	0.303	-0.234	0.017	-0.091
	(0.112)	(0.111)	(0.188)	(0.156)	(0.171)	(0.166)
T 2	-0.009	0.169	0.191	-0.031	-0.029	0.062
	(0.128)	(0.107)	(0.189)	(0.131)	(0.172)	(0.149)
T 3	-0.047	-0.037	0.008	-0.120	-0.003	-0.009
	(0.087)	(0.083)	(0.141)	(0.106)	(0.132)	(0.190)
T 4	0.315***	0.260**	0.281*	-0.057	-0.090	0.074
	(0.089)	(0.096)	(0.150)	(0.080)	(0.135)	(0.133)
Baseline z - score	0.556***	0.445***	0.415***	0.499***	0.486***	0.309***
	(0.037)	(0.045)	(0.032)	(0.047)	(0.045)	(0.051)
Constant	-0.377	-0.896***	-1.033**	0.243	-0.541	-0.093
	(0.297)	(0.312)	(0.440)	(0.469)	(0.523)	(0.608)
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1338	1338	1338	1658	1658	1658
R^2	0.309	0.246	0.237	0.258	0.202	0.113

Notes: Balanced panel of students. Controls as elucidated in Table 5 above. Standard errors clustered at panchayat-level are in parenthesis. Significant at *** 1% **5% *10%.

Table A9: Impact of report cards on test scores in the new academic year by individual and school performance at baseline

	Private				Public			
	Individual		School		Individual		School	
	Below median	Above median	Below median	Above median	Below median	Above median	Below median	Above median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
T 1	0.121	0.099	0.203	-0.0601	-0.218	0.010	0.0570	-0.147
	(0.264)	(0.103)	(0.147)	(0.113)	(0.194)	(0.120)	(0.184)	(0.246)
T 2	0.040	0.100	0.344*	-0.238*	-0.139	0.219*	0.264	-0.0502
	(0.254)	(0.109)	(0.172)	(0.119)	(0.191)	(0.125)	(0.181)	(0.191)
T 3	-0.114	-0.012	0.0782	-0.151	-0.159	0.090	-0.281	0.279
	(0.203)	(0.081)	(0.115)	(0.126)	(0.197)	(0.126)	(0.184)	(0.182)
T 4	0.435*	0.237***	0.358**	0.222**	0.021	-0.140	0.345	-0.288*
	(0.217)	(0.085)	(0.155)	(0.0873)	(0.183)	(0.138)	(0.206)	(0.148)
Baseline z-score	0.529***	0.538***	0.614***	0.517***	0.565***	0.474***	0.676***	0.553***
	(0.086)	(0.057)	(0.0601)	(0.0696)	(0.079)	(0.059)	(0.0561)	(0.0697)
Constant	-1.107*	-0.548*	-0.296	0.283	-0.438	0.114	-0.0986	1.275***
	(0.577)	(0.315)	(0.289)	(0.171)	(0.774)	(0.596)	(0.449)	(0.273)
t test of equality of coefficient on T4								
Below median = Above median	0.198		0.135		0.161		0.632**	
	(0.184)		(0.181)		(0.268)		(0.294)	
All Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	323	1015	670	668	1012	646	791	867
R^2	0.342	0.205	0.390	0.257	0.132	0.216	0.286	0.281

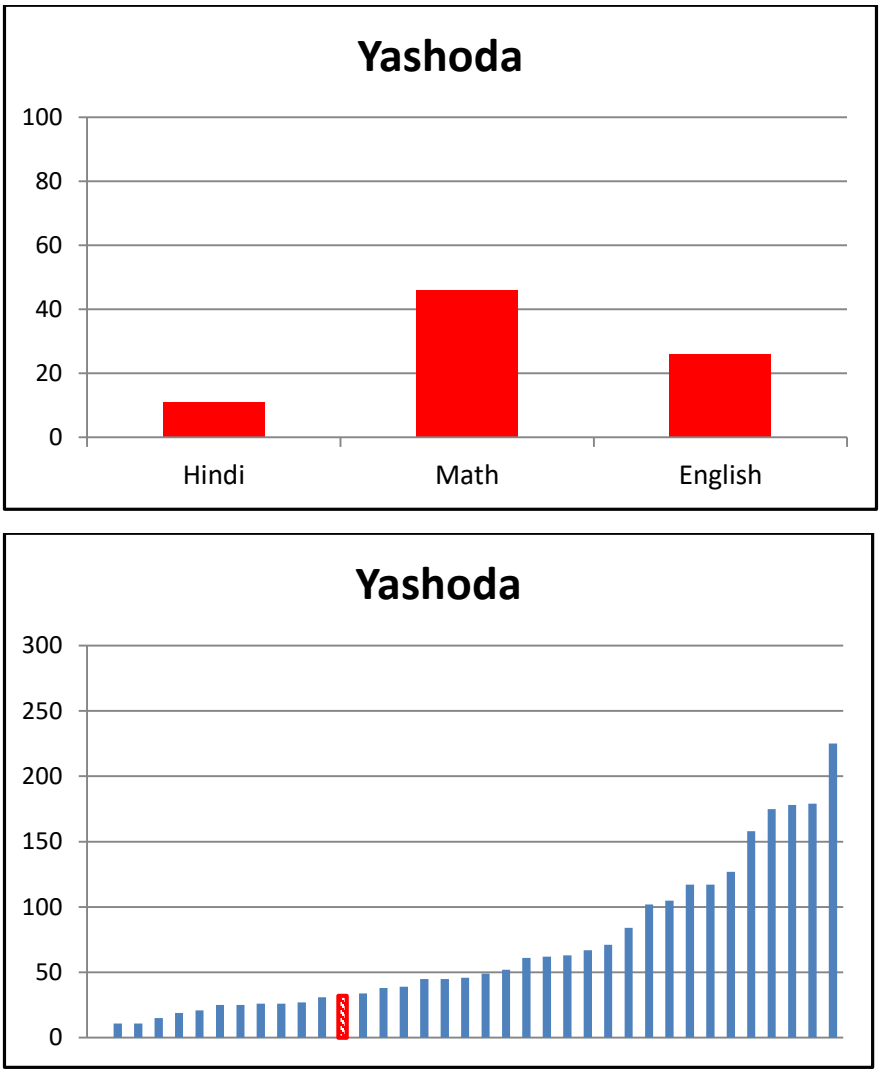
Note: Balanced panel of students. Columns 1-2 and 5-6 classify individual student test score at baseline into below and above median. Columns 3-4 and 7-8 classify schools into above median and below median performers at baseline. Standard errors clustered at panchayat-level are in parenthesis. P-values of F-stats in brackets. Controls as elucidated in Table 5. Significance *** 1% **5% *10%.

Table A10: Impact of report cards on school choice in the new academic year

	Private				Public			
	Student level		School-grade level		Student level		School-grade level	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.068*	0.011	0.100**	0.004	0.040*	0.037	0.069***	0.066*
	(0.033)	(0.041)	(0.045)	(0.050)	(0.021)	(0.025)	(0.024)	(0.037)
Constant	0.065	0.115	0.027	-0.088	0.116	0.134	0.295**	0.248
	(0.146)	(0.165)	(0.146)	(0.208)	(0.098)	(0.101)	(0.136)	(0.193)
Student level controls	Yes	Yes	-	-	Yes	Yes	-	-
School and village	No	Yes	No	Yes	No	Yes	No	Yes
N	525	525	111	111	747	747	161	161
R^2	0.018	0.074	0.033	0.314	0.011	0.020	0.040	0.070

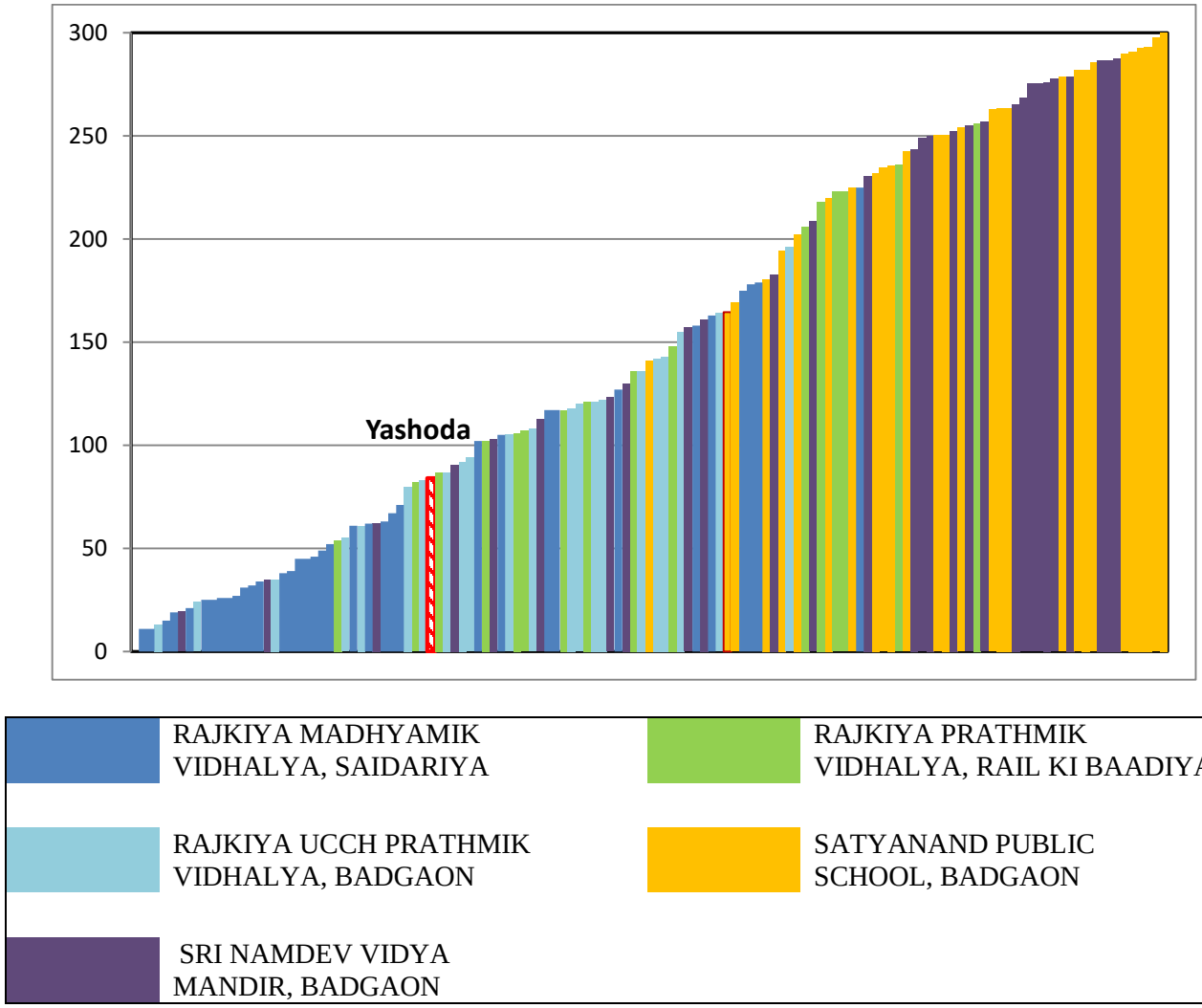
Note: The sample is restricted to the purposively tracked 1499 students. Treatment is a dummy variable that equals 1 if the unit was in T1, T2, T3 or T4 and 0 if it was in the control group. The dependent variable is dichotomous and equals 1 if the child has changed school between baseline and endline and 0 if there was no change or the child dropped out in columns 1-2 and 5-6. In columns 3-4 and 7-8 the dependent variable is the proportion of students who changed schools at endline in a grade in a school. All regressions are OLS. Controls as elucidated in Table 5. Student level controls include baseline z-scores. Standard errors clustered at panchayat-level in parenthesis. Significance *** 1% **5% *10%.

Figure A1: Parental Report Card P1



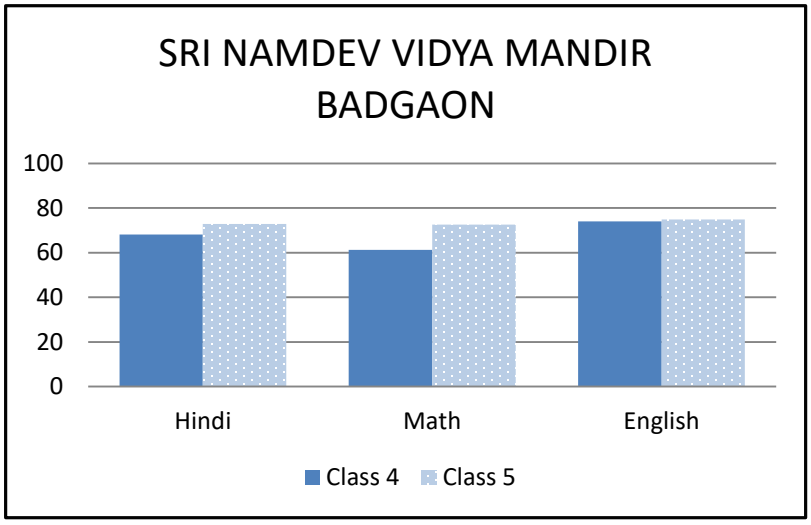
Notes: The graph on top shows the student's (Yashoda) score out of 100 in each subject. The bottom graph shows the combined scores (out of 300) of all students in her class with the student's score highlighted by the shaded, red bar.

Figure A 2: Parental Report Card P2



Notes: This graph shows the combined scores (out of 300) of all students of the same grade in the panchayat. Each bar shows the score of one student. Students of the same schools are depicted by bars of the same color. The index maps the colors to the schools. The target student's name is mentioned and her score is highlighted by the shaded, red bar.

Figure A3: School Report Card S1



Hindi	**Class 4**	**Class 5**	**Math**	**Class 4**	**Class 5**	**English**	**Class 4**	**Class 5**
Alphabet and word recognition	10	20	Counting	10	20	Alphabet and word recognition	8	16
Word and sentence writing	8	7	Addition: 1-digit 2- digit 3-digit	 8 6 6	 15 15 15	Word and sentence writing	10	15
Simple comprehension	10	4	Subtraction: 1-digit 2- digit 3-digit	 8 5 4	 15 12 10	Simple comprehension	9	11
Difficult comprehension	9	4	Multiplication: 2-digit x 1-digit 2-digit x 2-digit	 7 7	 20 13			
Composition	7	6	Measurement	6	17			
			Word problem solving	5	12			
Total students	**10**	**28**		**10**	**28**		**10**	**28**

Notes: The graph on top shows the average score in each subject (out of 100) of grade 4 (in blue) and grade 5 (in light blue) of a school. The table below reports the number of students in the school-grade who achieved a particular cognitive skill.

Figure A4: School Report Card S2

Class 4	School Name	Village	Hindi	Math	English
1	RAJKIYA MADHYAMIK VIDHALYA, SAIDARIYA	Saidariya	26	24	18
2	RAJKIYA PRATHMIK VIDHALYA, RAIL KI BAADIYA	Saidariya	45	50	57
3	RAJKIYA UCCH PRATHMIK VIDHALYA, BADGAON	Badgaon	38	35	29
4	SATYANAND PUBLIC SCHOOL, BADGAON	Badgaon	77	81	85
5	SRI NAMDEV VIDYA MANDIR, BADGAON	Badgaon	68	61	74

Class 5	School Name	Village	Hindi	Math	English
1	RAJKIYA MADHYAMIK VIDHALYA, SAIDARIYA	Saidariya	27	34	28
2	RAJKIYA PRATHMIK VIDHALYA, RAIL KI BAADIYA	Saidariya	69	70	78
3	RAJKIYA UCCH PRATHMIK VIDHALYA, BADGAON	Badgaon	54	55	63
4	SATYANAND PUBLIC SCHOOL, BADGAON	Badgaon	85	92	87
5	SRI NAMDEV VIDYA MANDIR, BADGAON	Badgaon	73	73	75

Notes: This table reports the average score in each subject (out of 100) of all schools in a panchayat, by grade.

Figure A5: Map of India, Rajasthan and Ajmer district (study area demarcated in red)