Pricing Private Education in Urban India: Demand, Use and Impact*

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Abstract

Despite a dramatic increase in the prevalence of private education services in the developing world, we have a limited understanding of pricing policies and the behavior of agents in this market. Little is known about the factors influencing demand, utilization conditional on take-up (attendance), and the effectiveness of these services. We explore these issues with the help of a field experiment in Delhi's slums. Using a two-part pricing design, we identify whether willingness-to-pay is associated with higher utilization of these classes, and whether prices have causal impacts on attendance and dropout. Using assigned prices as instruments for take-up of the classes, we estimate the impacts of enrollment in the classes on student test scores. We find strong evidence that higher willingness to pay is associated with higher utilization, but that lower prices reduce dropout. While tuition classes do not impact test scores for the average student, test scores for children belonging to poorer households increase significantly at endline.

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1 Introduction

Primary and secondary education systems in developing countries have recently seen a sharp rise in the utilization of educational services offered by private providers (ASER, 2013; Tooley, 2009). These services often take the form of private tutoring, serving to complement the public system, or low-cost private schools, intended to supplant the public system entirely. For example, Tooley (2009) suggests that children in private schools attend more regularly than those in free public schools. However, it is unclear whether attendance is a response to perceived school quality, whether children in private schools are a selected group that is more likely to attend, or if prices themselves induce parents to send their children regularly because they have paid. Perhaps more importantly, willingness to pay could correlate with the treatment effects of these services, thus serving as an important selection mechanism (Chassang, Padro i Miquel, & Snowberg, 2010). In spite of the dramatic increase in the prevalence of private education services, we have a limited understanding of the behavior of agents in this market. In particular, little is known about the factors influencing demand, utilization conditional on take-up (that is, attendance), the effectiveness of these services, and how these differ by gender, ability, and other factors.

This paper explores the interplay between prices of private education services, and take-up, attendance, and treatment effects of these services. We do this with the help of a field experiment in the market for group-based, after-school, private tutoring services in 21 of Delhi's largest slum areas, to study demand and utilization of these private tutoring services. We complement this with detailed demand- and supply-side surveys of agents in this market, where the sample is close to a census of all households and suppliers within our catchment areas. We focus on the Delhi area for a number of reasons, but most importantly, as India's largest metropolitan area,

it is home to a large population of urban poor and, like the rest of India, has a very active and thick private market for education services. Our implementing partner for the project was Pratham, which is an education NGO that runs regular tuition classes primarily for children in primary and upper primary school, in addition to occasionally running vocational classes for older children. We complement the experiment with detailed market surveys of both the demand side, and well as private service providers to help inform our main experimental results.

In our experiment, we use a two-part pricing design to introduce exogenous variation in the price at which households are willing to enroll their children in private tuitions, and also random variation in the final, on-going price that households continue to pay for the school. In order to investigate demand, take-up and use of these private education services, we conducted a randomized trial among existing and potential clients for tutoring services among upper primary schoolchildren in slum areas in Delhi, India. We set four random prices for enrollment in these classes, and conditional on acceptance of that price, a randomly assigned discounted price was offered. Our methodology allows us to estimate the demand curve for these services, and estimate whether prices screen out those who are less likely to use the services. We next investigate which of the two (opposing) factors might be dominant in determining use of the classes through attendance: (i) credit constraints that prevent continued use of the classes when price is high, or if instead, (ii) high prices actually induce continued attendance through a psychological effect. Finally, we study whether the effectiveness of these classes (measured by test scores) varies by measured willingness to pay, and explore mechanisms for our results.

First, we observe several sensible correlations with these characteristics: being female is strongly negatively correlated with willingness to pay, and attending private school is negatively associated with willingness to pay, while prior experience

with having tuition classes is a strong predictor for take up at a higher price. This suggests that households, on average, use private schooling and private tuitions, as substitutes. We also see some suggestive evidence that those with slightly higher Math test scores are more likely to have greater willingness to pay.

Second, we find evidence for strong selection effects. That is, higher willingness to pay is associated with higher utilization, and in particular, those paying 100 Rupees higher price attended 5 percentage points more classes, and in fact, attendance is increasing across each of the 4 price groups.

Third, conditional on the initial willingness to pay, we find that a higher on-going (monthly) price that applicable for the entire school, leads to a high number of dropouts and hence lower utilization of the tuitions. While we find some suggestive evidence that at least in the shorter run, a higher on-going price may indeed increase utilization, such positive sunk cost (psychological) effects are ultimately outweighed by the negative effect of having to pay the higher on-going price in this market. This indicates that low prices may be required for high levels of utilization.

Next, we utilize both ordinary least squares (OLS) and instrumental variable (IV) approaches to investigate the effectiveness of the tuition classes, and find mixed results for the average student: the estimates for the OLS specification suggest that attending Pratham's tuitions is associated with a significant increase in test scores. However, these estimates may be biased since we do not have random variation in attending Pratham's classes. In order to address this endogeneity, we instrument attending Pratham's classes with the first price that was offered to the households in our sample, and find no evidence for effects of attending the Pratham classes on either English or math scores using this instrumental variables strategy.

One plausible explanation is that the difference in the reduced form and IV estimates is driven by selection since the IV may be picking up effects of attendance

on test scores for students that took up more at the low prices, and the results suggest that there is no detectable effect on this type of student. However, it is also plausible that the Pratham tuitions are effective on average, but that the students who do not attend Pratham classes attend *other* tuition classes in the local private tuitions market. We explore this possibility by testing whether take up at each first price that as offered also predicts use of *other* private tuitions. No clear negative relationship between first price and take up of these other tuitions would suggest that there is significant substitution towards other tuitions for those households that were unwilling to take up Pratham's tuitions at a higher price. However, we find that there is indeed a statistically significant negative relationship, but with relatively small point estimates suggesting that some, but not all, households do choose to take up other private tuitions even at higher prices. We finally test if attending *any* tuitions affects test scores, and both the reduced form and IV results are strikingly similar to the effect of attending Pratham's tuitions. Taken together, the results suggest that the students that take up at lower prices are not able to benefit from tuitions as much as those willing to pay a higher price.

Finally, we test for heterogeneous effects, and looking at children from poorer households, or children that had low scores before the study began. We find significant increases in English test scores for children belonging to the bottom half of the wealth distribution, indicating that pricing may indeed serve as a useful selection mechanism for this type of household.

Our paper relates to a growing literature that explores the effects of pricing on demand, utilization and effectiveness of health products[1]. The studies on the demand and use for health products typically find low willingness to pay and thus

1. Our paper is also related to work on effects of product pricing (for example, see Shiv et al., 2005), as well as to work that relates survey responses to incentivized choices in real markets (see for example, Karlan 2005; Ashraf et al., 2006.

little rationale for pricing as a means of raising revenue (Holla & Kremer, 2009). Evidence for a screening effect is mixed, while there is little evidence for psychological effects (Cohen & Dupas, 2010; Ashraf, Berry, & Shapiro, 2010). To our knowledge, there has been no similar work in the context of private educational services.

While there are multiple ways to elicit consumers' willingness to pay (WTP), we chose to implement take it or leave it (TIOLI) offers as part of our two part pricing design for a number of reasons. First, this is a method that can be easily implemented even for individuals with little to no numeracy skills. Second, implementing alternative, more sophisticated mechanisms that have been used in the literature, such as the Becker-DeGroot-Marschak (BDM) mechanism[2] can be problematic in a context like ours. The prices that consumers pay must be drawn from a continuous distribution, and implementing these prices by private education service providers for the school year, can be infeasible, as was the case for our partner NGO. Third, we wanted our offers to closely mimic the status quo method of the NGO of approaching, and communicating prices and other information, to households. We therefore use TIOLI offers in our experiment, and are able to estimate correlates of willingness to pay with the help of a discrete choice model. Finally, it is important to note that we designed the TIOLI offers in such a way as to shut down the channel of price as a signal of quality (Wolinsky, 1983; Milgrom & Roberts, 1986).

Our paper also relates to a recent, but growing literature on private education services in the developing world. This literature has, thus far, focused almost exclusively on private schools: their characteristics and their efficacy. For example,

2. Unlike TIOLI, which involves a binary decision, BDM elicits the exact willingness to pay for a good or service. The BDM method is like a second-price auction, where the "second price" is a random price that is drawn during the offer. In particular, once the individual states their bid, a random price is drawn from a continuous distribution, and if the bid is weakly greater than the randomly drawn price, they receive the good by paying the price that was randomly drawn. For example of related work, see Ashraf, Jack, and Kamenica (2013); Berry, Fischer, and Guiteras (2016).

Muralidharan and Sundararaman (2015) explore the differences in outcomes between private and public schooling, and find that relative to public schools, teachers in such schools have higher levels of education, private schools have lower teacher absence, as well as higher test scores. Meanwhile, the market for private tuitions still remains an area that we know little about, and there has been little to no work on understanding demand and supply, to our knowledge. In addition, there is a lack of evidence on the efficacy of private tutoring services. One recent study (Muralidharan et al., 2016) studies the impact of a program combining teaching at the right level (TARL) and computer-assisted learning (CAL) approaches, which was implemented privately, and which had very large impacts on test scores, However, the setting for this study was specific to a new pedagogical approach in one private school, and there is no work, to our knowledge, that investigates what impacts private tutoring services that exist in education markets, have on the average student's test scores.

This study serves as a starting point in understanding what determines demand for private tutoring in education markets, how effective are private tutoring services are, compared with those that are provided for free by the government (for example, after school or para teacher help), and how these effects vary by a household's willingness to pay for the services. Given the unique and broad set of pricing mechanisms available to an education provider, our study is a first step in determining what the optimal pricing strategy for take-up, utilization, and ultimately results, could be, and how pricing policy in education might differentially impact groups that are susceptible to higher dropout rates and lower overall educational attainment, such as children from poorer households.

The remainder of the paper is organized as follows. Section 2 describes the contextual setting for the experiment, and describes the market for private tuitions. Section 3 describes the experimental design and our data. Section 4 describes each

of the main results: demand for classes, correlates of willingness to pay, selection effects, causal effects, and treatment effects of tuition classes on test scores. Section 5 concludes.

2 Experimental Setting and Design

2.1 The Market for Private Tuitions in India

There has been a rapid increase in the number of households using private tuitions in India, across all income groups. As shown in Figure 1, data from (ASER, 2013) demonstrates the steady increase in the use of private tuitions in India in both rural and urban areas, and across grades. Use of tuition services is estimated to be greater in urban areas, and Desai et al. (2008) documents that over 50 percent of all households in urban areas send children for private, after school tutoring. This market is considered to be well established in India, even among the poor, and makes for an ideal setting in which to address our research questions.

2.1.1 Our Setting: Delhi's Slums

We conducted a field experiment in the market for group-based, after-school tutoring services in 21 of Delhi's largest slum areas. The target population consisted of children (both girls and boys) in upper-primary school (grades 6-8, and roughly ages 11-14). We decided to focus on the Delhi area for two reasons: First, as India's largest metropolitan area, it is home to a large population of urban poor and, like the rest of India, has a very active private market for education services. Our implementing partner for the project, Pratham, is an education NGO that runs regular tuition classes primarily for children in primary and upper primary school, in addition to occasionally running vocational classes for older children.

The experiment was conducted over the 2014-2015 school year, from April 2014 through March 2015, with subsequent data collection that lasted through 2016. The study areas consisted of 21 slum areas located across Delhi, with one Pratham tuition center located in each of these slums. The core experiment consisted of randomly assigned initial offers to attend the local Pratham tuition center[3] at randomized prices, for grades 6 through 8. A second randomization of prices was then conducted for those who took up the initial offers (described in more detail in the next section).

The curriculum in these classes were based entirely on the official school curriculum, and the classes were held 6 days per week, for 2 hours each day, during the school year. Each class consisted of at most 20 students, and were segregated by gender[4]. While classes were free prior to 2010, Pratham subsequently changed this policy and started charging a fee. The two main reasons cited by the NGO were that (i) they wanted to raise revenue, and (ii) they felt (at least anecdotally) that students attended *irregularly* when classes were free. They eventually started charging fees across their centers, but there was slight variation in the actual fees charged, across slum areas. For our experiment, we worked with Pratham to come up with a "posted" price for the tuition classes: that is, the highest amount that Pratham would charge per month in the absence of a randomized discount. This fee amount was Rs 200 for grade 6, and Rs 250 for grades 7 and 8. The fees charged by Pratham were slightly under the average prevailing fees charged by other tuition providers in the local slum.

3. Note that each of these slums were at far enough away from each other, such that it would have been extremely unlikely for households to send their children to one of the other Pratham tuition centers in the city.

4. Public schools in Delhi are segregated by gender: girls attend in the morning, while boys attend in the afternoon. Since most children in the slum areas attend these public schools, the timings for group-based, private tuition classes in the city are typically segregated by gender.

2.2 First-Price Offers

The protocol for the offers replicated (to the extent possible) what Pratham's usual approach in recruiting students for their tuition classes. Pratham's status quo approach involves teachers going door-to-door to each household located around its tuition center, and providing parents with basic information about their classes: when and where they are held, what is taught, and how much the classes cost. Pratham teachers also conduct a Math and English assessment test during these visits. We followed the same protocol, except for the fact that one of our enumerators accompanied each teachers, and it was these teacher-enumerator pairs that approached households door-to-door, in order to tell parents about the classes, make the randomized offers (described below), conduct an education test, as well as a baseline household survey.

First-price offers for Pratham's tuitions took place over five rounds. The first three rounds of offers were made to households of those children, who had already been attending Pratham's tuitions in the recent past: the first round was conducted in April 2015 for approximately 1000 children who had been previously enrolled in Pratham tuition centers during the 2013-2014 school year. A second round was conducted in late April and early May with an additional 35 students who were added to the list of previously enrolled students by Pratham. A third round was conducted for approximately 100 students who had been recruited separately by Pratham to attend their "Summer School" classes in May, June, and July 2015. In these first three rounds prices were randomly pre-assigned separately by round, with stratification over tuition center and grade. Prices were assigned in equal proportions across the four prices in each grade.

Initial offers for *new* students were conducted over two rounds. The initial round of offers to new students took place in June through August 2015. Approximately

3800 children received offers. Because we did not have pre-existing lists of students for these rounds, households drew scratch cards from a bag to determine the offer price. Prices were again stratified by tuition center and grade. Anticipating that take up would be lower at higher prices, and in order to maximize power, more offers were made at higher prices in order to yield more even proportions of *accepted* offers across prices.

By August, the total number of accepted offers was lower than the capacity of Pratham's tuition centers, and additional offers were therefore conducted to fill the centers to capacity. Twelve hundred additional offers were therefore made in August and September. This time, the offers were made in equal proportions across prices to ensure that enough children would enroll to fill the centers to capacity.

A concern with randomly assigned prices for any good or service is that households may perceive a lower (higher) price to signal lower (higher) quality. In anticipation of this occurring, we designed the price offers in such a way that the channel of *price as a signal of quality* would be shut down to the extent possible. Price offers were made by using scratch cards (illustrated in Figure 4), which made the process appear truly random to households[5]. If the respondents asked, they were told the prices were randomly assigned, and were not told the posted prices (unless they asked, and very few did).

The details of the first-price offers are summarized in Panel A of Table A1 in the Appendix, while Table A2 in the Appendix provides a comparison of the characteristics of the previously enrolled, or "old" students, and the newly approached, or "new" student samples. Note that the teacher-enumerator pairs were jointly trained to make the offers according to the experimental protocol. Appendix B provides the

5. During pilots, there had also been some parents that did not want a "hand out" and had insisted on paying full price. It was therefore important for the assignment of prices to appear truly random.

script that was used for making the offers.

2.3 Second-Price Offers

Once a child was enrolled in the tuition classes, and payments were made for 1-3 months (depending on when the first offer had been made), the household was visited again. The randomized second price offer was then made, which would apply through the end of the school year. As done during the first price offers, scratch cards were once again used to make these offers.

The second prices were assigned in two batches. In each batch, the randomization was pre-assigned stratified by first price and grade, in equal proportions up to the initial offer price. Children who received an initial offer in the first four rounds were eligible for a second-price offer if they attended the classes in August. There were 843 such children, and their second-price offers were made at the end of September and beginning of October. For the fifth round of initial offers, eligibility for a second price offer was determined based on attendance in September. 227 children from this round received second-price offers.

The details of the second-price offers are summarized in Panel B of Table A1 in the Appendix.

2.4 Data Collection

Baseline household surveys and a pre-test (in Math and English) took place in conjunction with the first-price offers at the beginning of the school year in 2014. In addition to the baseline household surveys and education tests in Math and English, daily child-wise attendance data was collected from the Pratham tuitions centers. These data were verified through several unannounced checks at the centers by project staff during 2014-2015. We also collected data for the 2015-2016 school

year to track the study children after all prices had reverted to the fixed prices set by Pratham.

Endline surveys and education tests were conducted April through June of 2015, which provides us with information on schooling and tuition use information for our entire sample. That is, the sample includes those households that did not necessarily take up Pratham's tuitions, but which may have taken up *other* private tuitions in the local market for tuitions. Because many households were away during the summer, revisits continued through September. In all 3996 (91 percent) of households were successfully surveyed.

Finally, we conducted a market survey for private tuition providers in each of our 21 catchment areas. Table A3 in Appendix provides summary statistics of the characteristics of the providers. Also, recall that Pratham's "posted" price for the tuition classes was Rs 200 per month for grade 6, and Rs 250 for grades 7 and 8. The fees charged by Pratham were slightly under the average prevailing fees charged by other tuition providers in the local slum. For a comparison, Figure A1 in the Appendix illustrates the distribution of fees by tuition providers that we surveyed in our catchment areas, separately for grades 6, 7 and 8.

3 Results

3.1 Demand

Since the assignment of the of the first price was random, to estimate demand, we simply regress a dummy for take-up of the tuition classes (that is, enrollment), on the offer price:

$$Enrol_{igc} = \beta_0 + \beta_1 first_{igc} + S'_{igc}\psi + X'_{igc}\lambda + \epsilon_{igc} \tag{1}$$

Where $Enrol_{igc}$ is a dummy for enrollment of child i in grade g in tuition center c, $first_{igc}$ is a continuous variable for the initial offer price, S_{igc} are dummies for grade, tuition center, and round, and X_{igc} are child and household-specific controls.

Table 1 shows the results of this estimation. At a price of 0, nearly 69 percent of students enroll. Demand is strongly downward sloping: the point estimate implies that a 100 Rs. higher price results in 17 percent lower take up. At a price of Rs. 75, this implies an elasticity of demand of 0.27.

We also estimate a flexible specification, where we replace the $first_{igc}$ with dummies for each price, with the price of zero as the omitted category. The coefficient estimates are provided in Columns 3 and 4 of Table 1, and we see that demand is downward sloping across all 4 offer prices.

3.2 Correlates of Willingness-to-Pay

Next, we examine how willingness-to-pay correlates with observable student- and household-level characteristics. We do this by first defining a household as having "taken up" the classes. While a household may agree to attend classes when the first price offer is made, it is entirely plausible for a number of reasons, that the fee payment will not actually be made, and the child will not actually attend any classes. Since fees are paid when a child comes to the tuition center to enroll, we consider a child or household to have "taken up" if and only if the fee payment is made, and the child attends any classes.

The take-it-or-leave-it (TIOLI) nature of our experimental pricing design does not allow us to measure the willingness to pay directly, and what we actually observe is the decision to take up at a given price. The underlying latent model for Willingness-to-Pay (WTP) for a child i in grade g in center c is:

$$WTP_{igc} = \beta_0 + X'_{igc}\beta_1 + S'_{igc}\psi + \epsilon_{igc} \quad (2)$$

Where S_{igc} are dummies for grade for a child i in grade g in center c, and X_{igc} are child and household-specific controls.

What we observe is take up: $Enrol_{igc}$, which takes value 1 if $WTP_{igc} \geq first_{igc}$, and 0 otherwise. Let $first_{igc}$ be a continuous variable for the initial offer price that was made to a household for a child i in grade g in center c. The sample consists of all households that were approached with the first price offers. Then:

$$Enrol_{igc} = 1(\beta_0 + X'_{igc}\beta_1 + S'_{igc}\psi + \epsilon_{igc} - first_{igc} \geq 0) \quad (3)$$

We estimate this discrete choice model using a constrained probit regression[6], where we normalize the coefficient on $first_{igc}$ to be -1.

The results are presented in Table 2. While some of variables are not significantly predictive of willingness-to-pay, we observe several sensible correlations with these characteristics. Gender, and in particular, being female, is negatively correlated with willingness to pay. The latent variable here, WTP, is measured in hundreds of Rupees, and hence the results indicate the having a household is willing to pay Rs. 12 less on average, for a female child. Household size and attending private school are negatively associated with willingness to pay, while prior experience with having tuition classes is a strong predictor for take up at a higher price. There is also evidence that a household that has a child with higher test scores, has a greater willingness to pay, indicating that parents feel it may be more worthwhile to invest in their child if he or she has higher ability. Finally, attending private school is a very strong predictor of lower take up: having a child enrolled at a private school

6. The results are similar for a logit model, and in fact, the effect sizes are even larger. We present these results in Appendix Table A4.

reduces willingness to pay by approximately Rs. 41. This suggests that parents view private school and private tuitions as substitutes.

3.3 Selection Effects

Next, we examine whether there were any selection effects, that is, whether those with a higher willingness-to-pay for the tuition classes are also the ones that utilize the classes more intensively (through higher attendance). To examine this, we consider the sample that of those households that were assigned a second price (that is, those who were attending when second-price offers were assigned), and examine the percentage of all classes attended in the months following the second-price offer. The model we estimate is:

$$Y_{igc} = \beta_0 + \beta_1 first_{igc} + \delta second_{igc} + S'_{igc}\psi + X'_{igc}\lambda + \epsilon_{igc} \tag{4}$$

Here, Y_{igc} represents the percentage of classes attended, $first_{igc}$ is the continuous variable for the offer price as before, and $second_{igc}$ reflects a set of dummy variables for the second price assignment. The sample here consists of subjects that took up the classes: that is, those who enrolled and attended any class at least once.

We also estimate a flexible specification, where we replace $first_{igc}$ with dummies for each of the four prices that were offered as first price.

As shown in Table 3, there is strong evidence for selection. In particular, we find that those paying a Rs. 100 higher price attended 5 percentage points more classes. Columns 3 and 4 provide the estimates for the flexible specification, and we see once again that attendance is increasing across all 4 price groups.

3.4 The Effect of Paying a Higher Price

3.4.1 Causal Effects

Next, we investigate how the *ongoing* (that is, the second) price influences continued use of the tuition classes. We define this effect as the "causal" effect. Given the dynamic nature of continued payments over the entire academic year, it is unclear what this effect might be: on the one hand, higher prices may increase dropout if households decide to continue on an ongoing basis. However, this negative effect could potentially be offset by commitment or a sunk cost or psychological effect. That is, utilization of the classes might be higher if parents are paying more.

We explore this net causal effect of the second price on attendance, by estimating a model similar to the equation used to estimate the selection effects above:

$$Y_{igc} = \beta_0 + \beta_1 second_{igc} + \delta first_{igc} + S'_{igc}\psi + X'_{igc}\lambda + \epsilon_{igc} \tag{5}$$

Each of the variables in this equation is defined as before, with the only change being that we include a continuous variable for the second price, and dummies for first price. We also estimate a flexible specification, where we replace the continuous variable for second price with dummies for each of the four prices that were offered.

The results are presented in Table 4. We find strong negative effects of the second price on subsequent attendance: according to the estimates in Columns 1 and 2, a higher price by Rs. 100 is associated with 12 percentage points lower attendance. Columns 3 and 4 provide estimates for the flexible specification, and we see once again that higher prices are associated strongly with lower use of the tuitions, and that in fact, attendance is monotonically decreasing in price.

This is consistent with the mechanism that lower prices prevent dropout from the classes, and that any potential sunk cost effects are outweighed by the negative effect

of the higher price. In the initial months, parents are still evaluating whether they want to continue sending their children to the classes, and price is a consideration in this process. Indeed, the results in Table 4 are driven by dropouts in the 2-3 months after the second price offer is made.

3.4.2 Sunk Cost Effects

Even though dropout is clearly a margin that a policy maker would care about, the two-part pricing design is nevertheless an ideal setting for testing whether there are any sunk costs effects associated with a higher price in the initial months after the second price is assigned. That is, we can investigate whether higher prices stimulate greater use of the classes. We already noted above that the net effect of the higher on-going (second) price is negative. However, note that this may be primarily driven by dropouts in subsequent months. We can therefore test whether price affects use (attendance) differentially within the very first few months after the second prices are offered, with the prior that the negative effects of credit constraints are less likely to set in by that time. In doing so, we restrict to the sample to those students that did not dropout in the months whose attendance we consider.

With these sample restrictions, we estimate equation (5), using both the linear and flexible specifications. Columns (1) to (4) report the results for the time period after the second prices had been offered to everyone, through December, by restricting the sample to those students that had attended at least one class in December. Columns (5) to (8) considers the time period until February, and those students who attended at least one class in each of the months December, January, and February. We find suggestive evidence that there is indeed a sunk cost effect that operates soon after the on-going (second) price is assigned. That is, conditional on not dropping out, households are slightly more likely to use the tuition classes (as measured by

percentage of classes attended), when paying a higher price. Specifically, a Rs 100 increase in price is associated with about a 2 percent increase in attendance in October and November. This effect however, is small relative to the subsequent negative effects driven by dropouts at the higher prices, leading to the strongly negative net causal effect we saw above.

Taken together, the causal effect of higher prices more than offsets the selection effect: although a higher initial willingness-to-pay is associated with higher attendance, a higher on-going price paid is also associated with higher dropout. This highlights a trade-off between intensity of attendance and retention of students that an NGO faces in setting the price of the classes.

3.5 Treatment Effects

Using both reduced form and instrumental variable (IV) approaches, we next investigate whether the tuition classes run by Pratham affected test scores. The reduced form model we estimate is one where we regress student test scores on attendance as follows:

$$Y_{igc} = \beta_0 + \beta_1 Enrol_{igc} + S'_{igc}\psi + X'_{igc}\lambda + \epsilon_{igc} \tag{6}$$

Where Y_{igc} is the student's test score and $Enrol_{igc}$ represents enrollment and any attendance in the Pratham classes, as defined before. Once again, S_{igc} are dummies for grade for a child i in grade g in center cf, and X_{igc} are child and household-specific controls.

The estimates for this ordinary least square specification are presented in Columns (1) to (4) of Table 6. Attending the Pratham classes is associated with about a .08 standard deviation higher English test score, and a 0.06 standard deviation higher

score on the Math test. These estimates may be biased however, since we do not have random variation in attending Pratham's classes. In order to address this endogeneity, we instrument attending Pratham's tuition classes with the first price that was offered. From the discussion on selection effects above, we already know that a lower price is strongly associated with higher take up, relative to higher prices. This implies a strong first stage fort the proposed instrument. We therefore instrument $Enrol_{igc}$ with a set of dummies for the first price offer and present the results in Columns (5) to (8) in Table 6. We find no evidence for effects of attending the Pratham classes on either English or math scores using this instrumental variables strategy, for the average student.

Given the striking difference between the reduced form and instrumental variables results, a plausible explanation is that the difference is driven by selection. The IV is picking up effects of attendance on test scores for students that took up more at the lower prices, and the results suggest that there is no detectable effect on this type of student.

Another possibility is that the Pratham tuitions are effective on average, but that the students who do not attend Pratham classes attend *other* tuition classes in the local private tuitions market that are just as effective. We explore this possibility next.

3.6 Substitutes in the Market

3.6.1 Do Households Enroll Children Elsewhere?

The market for private tuitions in Delhi's urban slums is thick, and it is plausible that households in our sample choose other providers in the local market. This might be one reason for not seeing any detectable effects of Pratham's tuitions on test scores. To test this hypothesis, we check if take up by the first price also predicts

use of any tuitions, that is the use of Pratham or *other* private tuitions. If there is no clear negative relationship between first price and take up of these other tuitions, then this would suggest that there is significant substitution towards other tuitions for those households that were unwilling to take up Pratham's tuitions at a higher price.

We investigate this mechanism by estimating equation (1), first with the dependent variable defined as attending any tuitions, and another specification where the dependent variable is defined as attending a non-Pratham tuition. We present these results in Table 7, which illustrates a statistically significant negative relationship between the first price and enrolling in any (that is, Pratham or alternative) tuitions. However, the point estimates are economically insignificant as shown in Columns (1) to (4), which provide the point estimates for attending any tuitions, with both the linear and flexible specifications. Note that while there is indeed a negative relationship, the point estimates are much smaller than what we observed in Table 1. This points to some, but not all, households taking up other private tuitions even at higher prices.

3.6.2 The Effect of Attending *Any* Tuition

We also explore whether attending *any* tuition affected test scores, and instrument attendance in *any* tuition by using the randomly assigned first price, $first_{igc}$. The discussion above provides evidence for a first stage for using the randomly assigned first price as an IV for take up of other tuitions, so we use this IV to estimate the effects of any tuitions on test scores by estimating equation (6) with the dependent variable as a dummy for whether a child attended *any* tuition in the 2014-15 school year. Table 8 provides these IV estimates in Columns (5) to (8), while the first four columns provide the reduced form estimates. We find results very similar

to those we found for the effectiveness of attending Pratham's tuition classes, but the point estimates are larger. The difference between the reduced form and instrumental variables results once again suggest that there is selection in who takes up tuition classes. The IV is picking up effects of attendance on test scores for students that took up more due to credit constraints, and the null IV results suggest that there is no detectable effect on this type of student.

3.7 Heterogeneous Treatment Effects

A natural question to ask, is whether there may have been heterogeneous treatment effects of attending the tuitions for different types of students. We test for differences in treatments effects based on the child's economic background, and the student's ability, as captured by her or his baseline test scores. We present the results for each of these heterogeneous effects in Tables 9 and 10. Table 9 presents the results for children from those households that belonged to the bottom half of the asset ownership distribution[7]. We find significant increases in the English scores: attending Pratham's classes increases the score by 0.17 standard deviations. Appendix Table A5 presents the results with the independent variable defined as the percent of classes attended, and we see larger point estimates of 0.23 standard deviations. Table 10, on the other hand, suggests that there are no significant differences by pre-test scores that we measured at baseline.

4 Conclusion

We conduct a randomized trial among existing and potential clients for an NGO, Pratham's tutoring services among upper primary schoolchildren, across 21 slum

7. We see similar effects using other similar points in the wealth distribution, and the results are robust.

areas in Delhi. In order to disentangle selection and causal effects, we employ a two-part pricing methodology by first setting random prices for enrollment in these classes, and second, conditional on acceptance of that price, giving a randomly assigned discounted price was offered. Our methodology allows us to estimate the demand curve for these services, and estimate whether prices screen out those who are less likely to use the services. We investigate what the causal effect of prices is: that is, is there less continued use of the classes because the price is high, or if instead, high prices actually induce continued attendance through a psychological effect.

We observe downward-sloping demand, along with sensible correlates of willingness-to-pay. We further find that after enrollment, those with higher willingness to pay attend more often conditional on the ongoing price. Conditional on willingness to pay, higher ongoing price increases the likelihood of dropout. This negative effect on attendance outweighs both a short-term (albeit weak) positive sunk cost effect, as well as the positive selection effect, indicating that low prices may be required for higher levels of utilization.

Finally, we use an instrumental variable (IV) approach to study the effect of the tuition classes on test scores, and find no effect on the average student, but significant increases in English test scores for children belonging to the bottom half of the wealth distribution. We also investigate channels for why the average student may see no improvements in test scores, and find evidence to suggest that some, but not all, households choose to take up non-Pratham private tuitions even at higher prices. We finally test if attending either Pratham, or in fact, *any* tuitions, affects test scores. Overall, we cannot rule out that richer households realize other benefits of having their adolescent children attend the tuition classes during the the week.

Taken together, the causal effect of higher prices more than offsets the selection

effect: although a higher initial willingness-to-pay is associated with higher attendance, a higher long-run price paid is also associated with higher dropout. This highlights a trade-off between intensity of attendance and retention of students that an NGO faces in setting the price of the classes. An important policy implication is that prices may indeed serve as a useful screening mechanism, especially if a policy maker or NGO decides to provide subsidies to households. Our results on the treatment effects also suggest that it would make more sense to target poorer households, since they were more likely to benefit from these services.

While the market for private education services, and especially private tutoring services has been growing rapidly over the decades across developing countries, we still know very little about these markets. This study is a first step in understanding the determinants of demand for private tutoring in education markets, and their effectiveness. In the same vein, we know very little about suppliers in this private tutoring market, and further research is needed to understand the private tutoring market as a whole.

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Figures

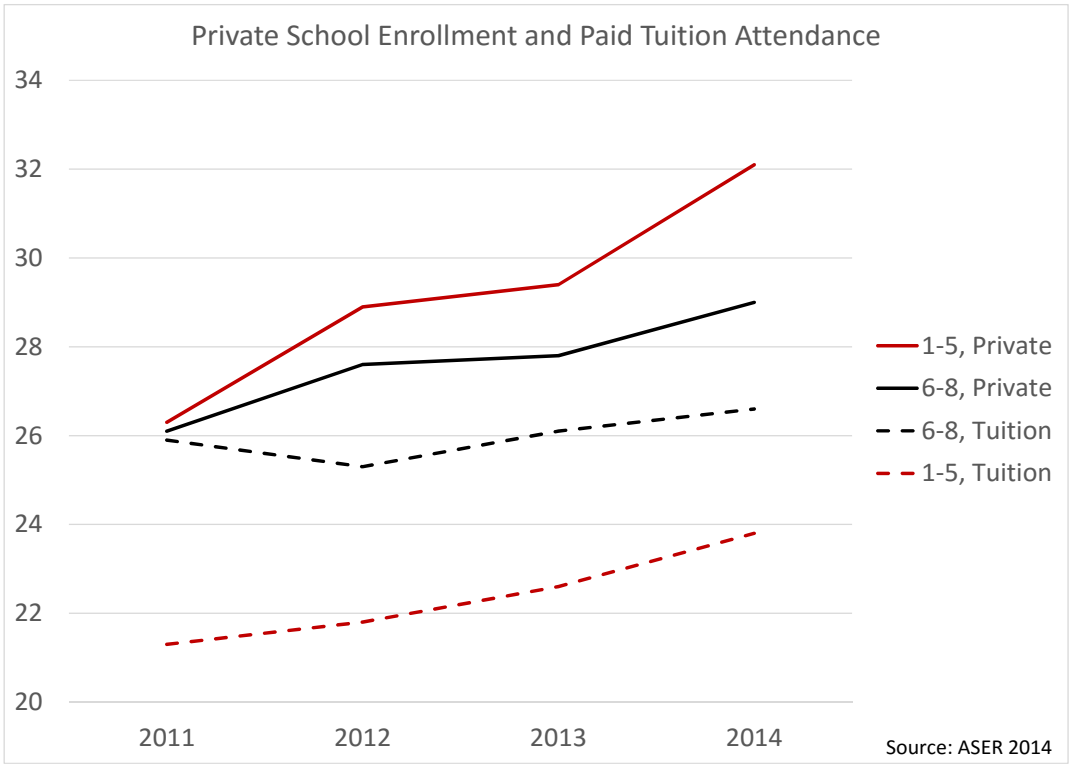
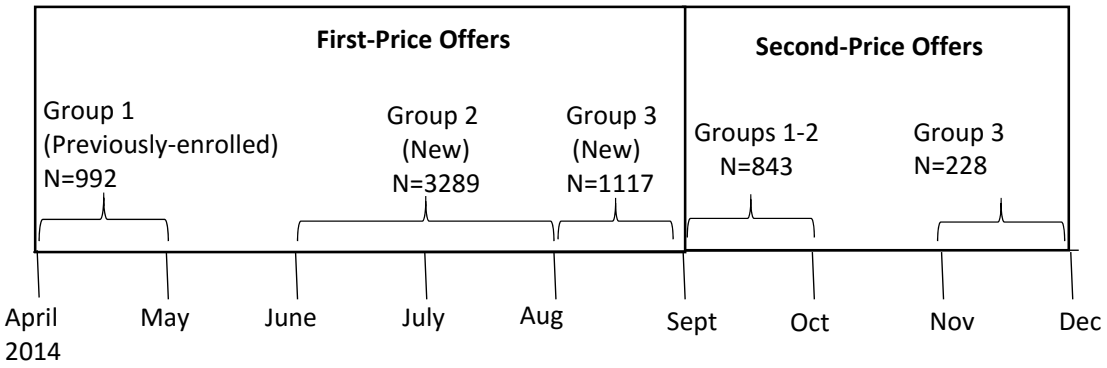


Figure 1: Rural Participation in Private Education



Groups 1 and 2 had to be enrolled by August to be included in second-price randomization
Group 3 had to be enrolled by September to be included in the second-price randomization.

Figure 2: Timeline of the Experiment



Figure 3: Scratch Cards

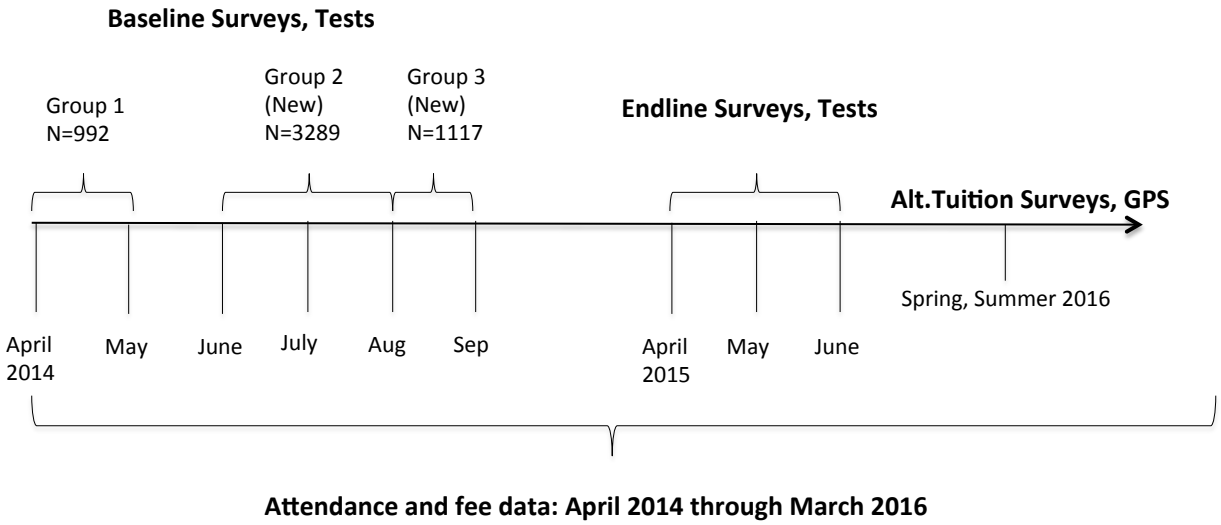


Figure 4: Data Collection Timeline

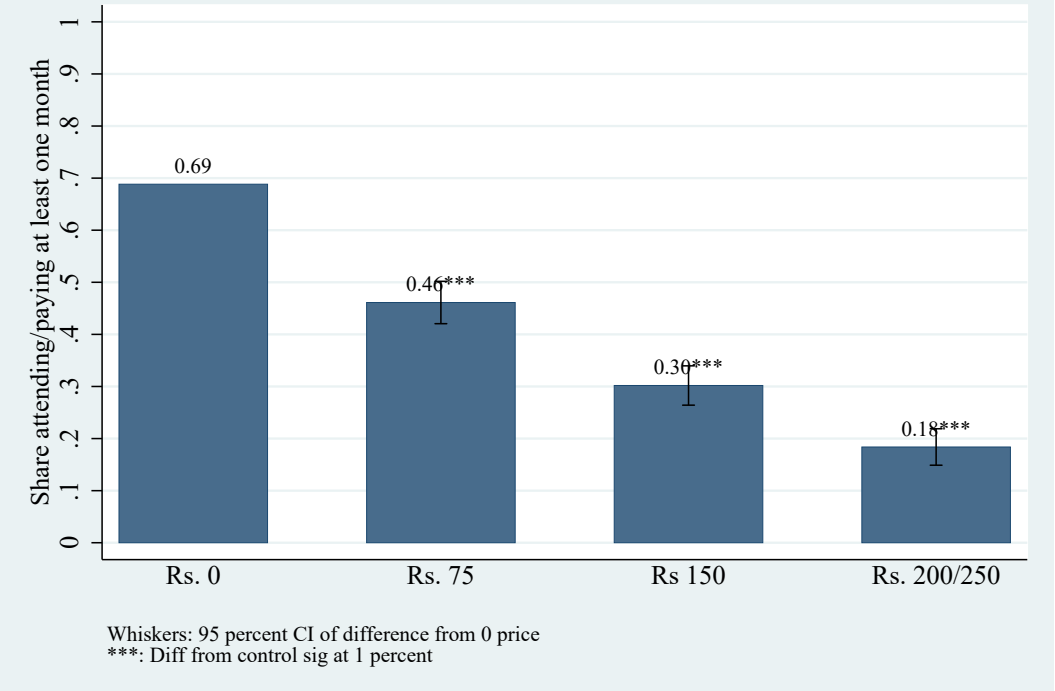


Figure 5: Demand by First Price

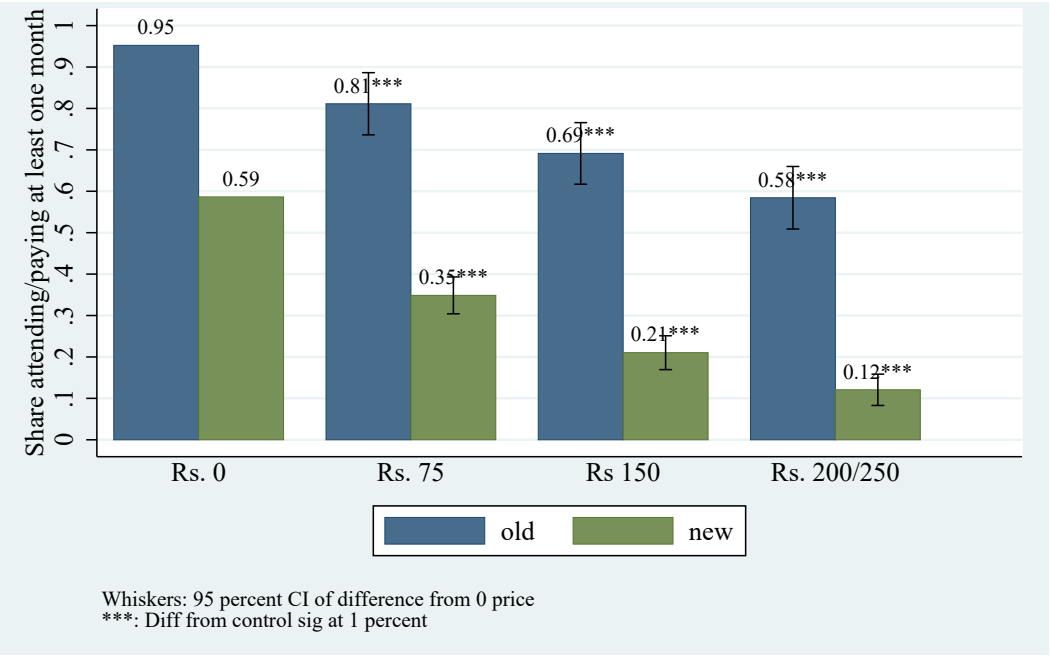


Figure 6: Demand by First Price, by Previous Enrollment

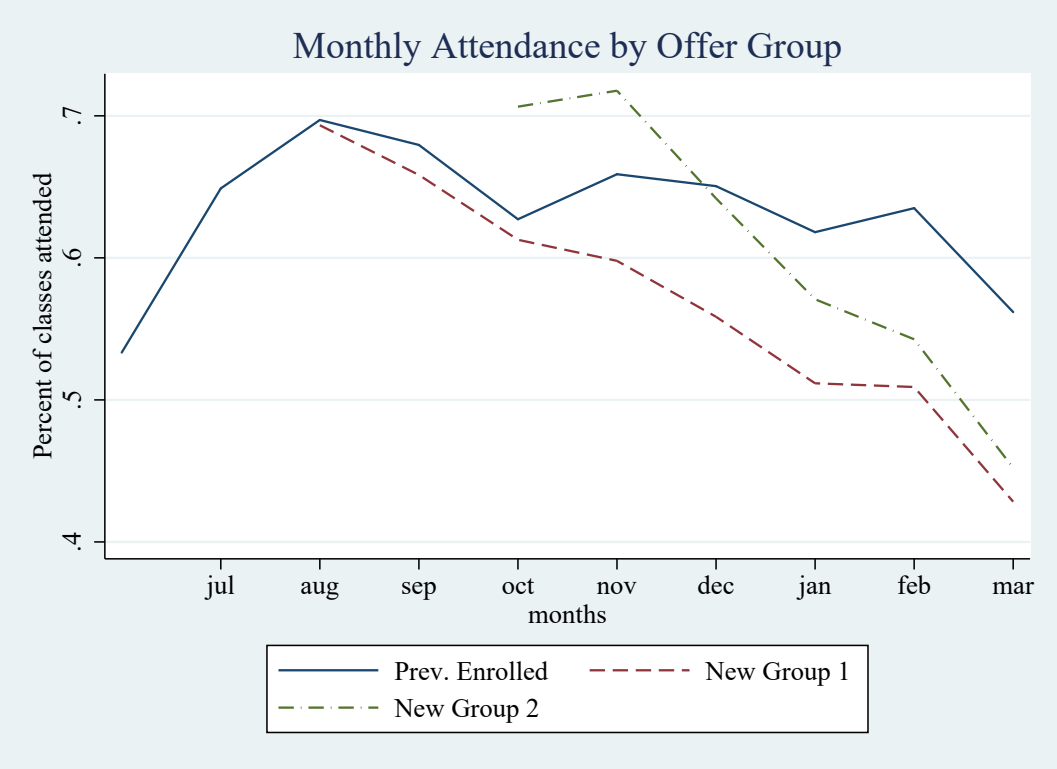


Figure 7: Monthly Attendance by Offer Group

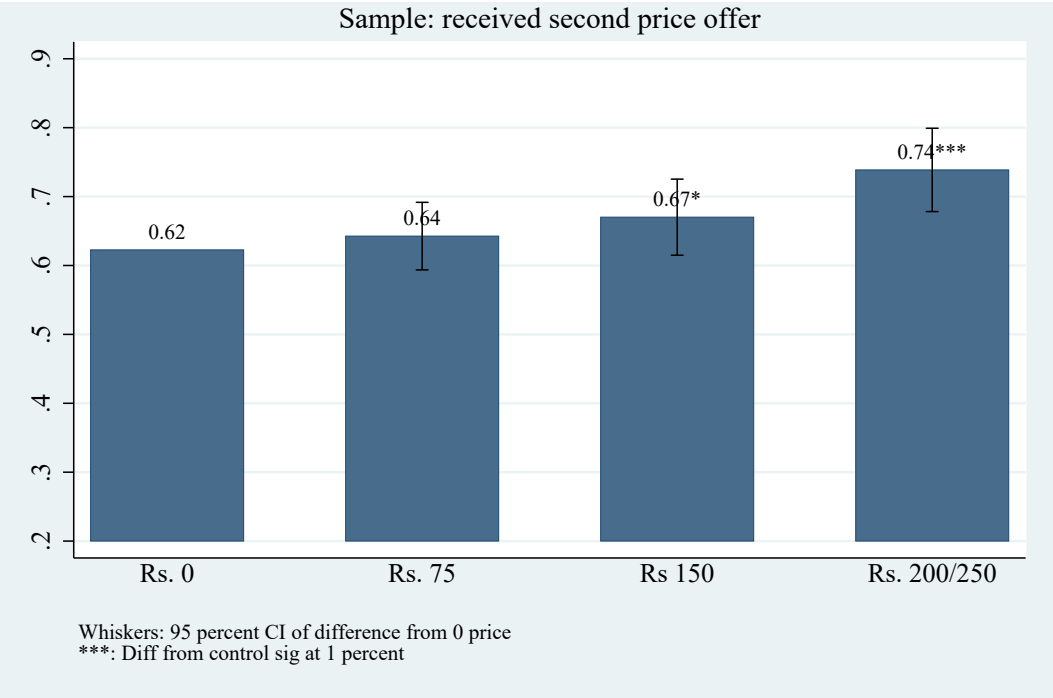


Figure 8: Percent Classes Attended by First Price

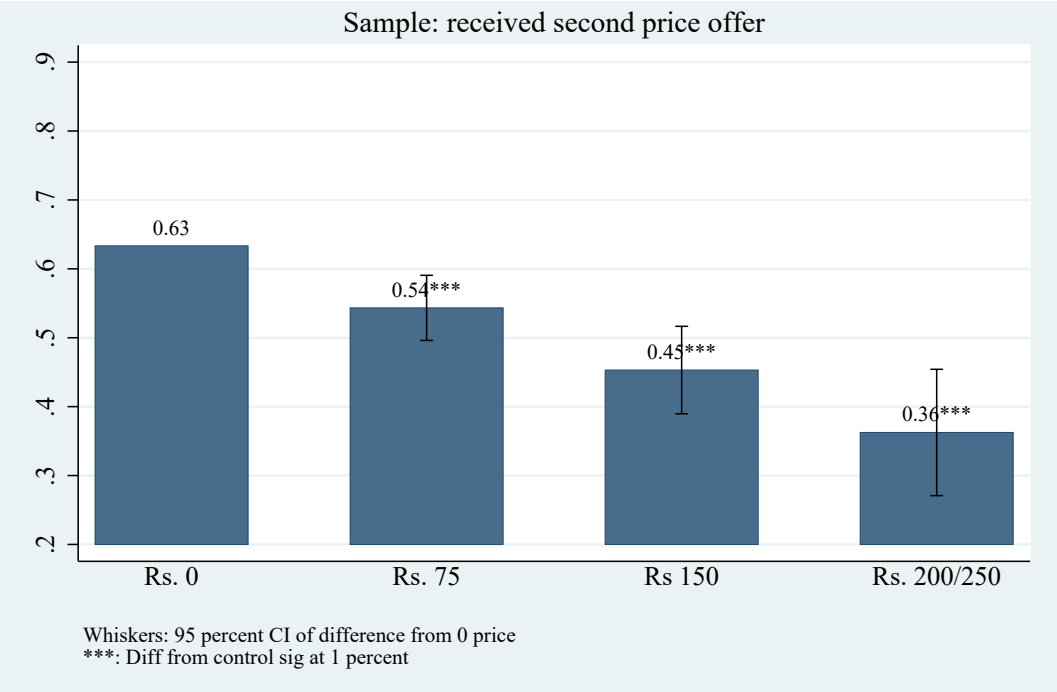


Figure 9: Percent Classes Attended by Second Price

Tables

Table 1: Demand for Pratham Tuition Classes

	Dependent Variable: Attended (1/0)			
	(1)	(2)	(3)	(4)
Price in 100's	-0.172***	-0.171***		
	(0.00658)	(0.00684)		
Price=Rs.75			-0.196***	-0.228***
			(0.0186)	(0.0207)
Price=Rs.150			-0.339***	-0.387***
			(0.0175)	(0.0192)
Price=Rs.224/250			-0.426***	-0.506***
			(0.0166)	(0.0178)
Controls	NO	YES	NO	YES
Mean of Dep. Var	0.686	0.689	0.686	0.689
R2	0.341	0.345	0.345	0.211
N	5439	5067	5439	5067

Notes: This table provides estimates for equation (1) in Columns 1 and 2. In Columns (3) and (4), we estimate a flexible specification, where we replace the first price with dummies for each first price that was offered. The omitted category in this case is a price of 0. Controls include: number of household members aged 6-14, the first principal component of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in the past year, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 2: Correlates of WTP-Constrained Logit Model

	Dependent Variable: Attended Any Class	
	(1)	(2)
# HH Members Age 15+	-0.100***	-0.0733***
	(0.0270)	(0.0254)
# HH Members Age 6-14	0.0632	0.0596
	(0.0389)	(0.0367)
# HH Members Age 0-5	0.0783	0.0827
	(0.0581)	(0.0551)
1st PCA of Durables	-0.0184	-0.0246
	(0.0269)	(0.0254)
Mother Education (years)	0.00616	0.00514
	(0.00980)	(0.00934)
Female	-0.136*	-0.200***
	(0.0766)	(0.0729)
Attends private school	-0.612***	-0.707***
	(0.146)	(0.139)
Attended tuition past yr	0.122	0.116
	(0.104)	(0.0993)
Normalized math score	0.0572	0.0791*
	(0.0444)	(0.0415)
Normalized English Score	0.0400	0.0740
	(0.0478)	(0.0451)
Attended Pratham tuition prior yr.		2.071***
		(0.103)
Grade 7		0.0662
		(0.0867)
Grade 8		0.0808
		(0.0885)
First Price	-1.007***	-1.015***
	(0.0459)	(0.0432)
Mean of Dep. Var	0.319	0.329
N	4968	5067

Notes: This table provides estimates for a logit model for estimating the parameters for equation (3), with equation (2) as the latent model.
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 3: Selection Effects

Sample:	Attended Any Class After Second Price Offer			
Dependent Variable:	Fraction of Classes Attended			
	(1)	(2)	(3)	(4)
First Price in 100's	0.0481***	0.0501***		
	(0.0126)	(0.0129)		
Price=Rs.75			0.0339	0.0198
			(0.0243)	(0.0250)
Price=Rs.150			0.0436	0.0471*
			(0.0274)	(0.0282)
Price=Rs.225/250			0.113***	0.115***
			(0.0302)	(0.0310)
Controls	NO	YES	NO	YES
Mean of Dep. Var	0.604	0.602	0.604	0.602
R2	0.272	0.303	0.272	0.303
N	1625	1512	1625	1512

This table provides estimates for equation (4) in Columns 1 and 2. In Columns (3) and (4), we estimate a flexible specification, where we replace the first price with dummies for each first price that was offered. The omitted category in this case is a price of 0. Controls include: number of household members aged 6-14, the first principal component of an asset index, mother's years of schooling, a dummy for wether he/she attended tuition in the past year, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 4: Causal Effects

Sample: Dependent Variable:	Attended Any Class After Second Price Offer Fraction of Classes Attended			
	(1)	(2)	(3)	(4)
Second Price in 100's	-0.114***	-0.118***		
	(0.0162)	(0.0166)		
Price=Rs.75			-0.0819***	-0.0882***
			(0.0235)	(0.0241)
Price=Rs.150			-0.178***	-0.181***
			(0.0316)	(0.0324)
Price=Rs.225/250			-0.257***	-0.267***
			(0.0455)	(0.0468)
Controls	NO	YES	NO	YES
Mean of Dep. Var	0.604	0.602	0.604	0.602
R2	0.275	0.305	0.275	0.305
N	1625	1512	1625	1512

Notes: This table provides estimates for equation (5) in Columns 1 and 2. In Columns 3 and 4, we estimate a flexible specification, where we replace the second price with dummies for each second price that was offered. The omitted category in this case is a price of 0. Controls include: number of household members aged 6-14, the first principal componenet of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in the past year, adn normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 5: Sunk Cost Effects

Sample:	Attended Any Class in December				Attended Any Class in Dec, Jan, Feb			
DependentVariable:	Fraction of Classes Attended after Second Price up to December				Fraction of Classes Attended after Second Price			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Second Price in 100's	0.0204**	0.0172			0.0175*	0.0114		
	(0.0101)	(0.0104)			(0.00950)	(0.00987)		
Price = Rs.75			0.0265*	0.0256*			0.0243*	0.0244*
			(0.0140)	(0.0144)			(0.0131)	(0.0137)
Price = Rs.150			0.0377*	0.0272			0.0271	0.0144
			(0.0198)	(0.0203)			(0.0191)	(0.0198)
Price = Rs.225/250			0.0234	0.0238			0.0318	0.0195
			(0.0298)	(0.0309)			(0.0275)	(0.0284)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Mean of Dep. Var	0.803	0.802	0.803	0.802	0.787	0.785	0.787	0.785
R2	0.315	0.350	0.316	0.351	0.336	0.363	0.337	0.365
N	1315	1222	1315	1222	1175	1093	1175	1093

Notes: This table provides estimates for equation (5) in columns 1, 2, 5, and 6. In Columns 3, 4, 7, and 8, we estimate a flexible specification, where we replace the secondn price with dummies for each second price that was offered. The omitted category in this case is a price of 0. Controles include: number of household members aged 6-14, the first principle component of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in the past year, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 6: Treatment Effects of Going to Pratham Tuition

Dependent Variable:	Reduced Form Estimates				Instrumental Variable Estimates			
	English Score		Math Score		English Score		Math Score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Attended any Pratham Classes	0.0787***	0.0795***	0.0687**	0.0588*	0.0502	0.0353	-0.0538	-0.0856
	(0.0176)	(0.0185)	(0.0324)	(0.0327)	(0.0540)	(0.0557)	(0.0705)	(0.0735)
Baseline English Score	0.792***	0.757***	0.352***	0.331***	0.786***	0.753***	0.348***	0.334***
	(0.0111)	(0.0116)	(0.0169)	(0.0183)	(0.00950)	(0.0105)	(0.0132)	(0.0148)
Baseline Math Score	0.0517***	0.0476***	0.354***	0.350***	0.0520***	0.0481***	0.348***	0.343***
	(0.0111)	(0.0106)	(0.0167)	(0.0167)	(0.00973)	(0.00990)	(0.0135)	(0.0138)
Mean of Dep. Var	0.00363	0.00292	0.00417	0.00966	0.00363	0.00292	0.00417	0.00966
R2	0.642	0.648	0.345	0.350	0.642	0.649	0.344	0.349
N	4887	4625	4903	4640	4887	4625	4903	4640

Notes: Thiss table provides estimates for equation (6) in Columns 1 to 4. In Columns 5 and 8, we estimate equation (6), using first price as an instrumental variable. Controls include: number of household members aged 6-14, the first principle component of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in the past year, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 7: First Stage for Attending Tuition Classes

Dependent Variable:	Attended Any Tuition (1/0)				Attended Any Non-Pratham Tuition (1/0)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Price in 100's	-0.0775***	-0.0756***			0.0459***	0.0441***		
	(0.00725)	(0.00726)			(0.00789)	(0.00801)		
Price = Rs.75			-0.0926***	-0.109***			0.0566**	0.0681***
			(0.0206)	(0.0206)			(0.0223)	(0.0232)
Price = Rs.150			-0.127***	-0.145***			0.131***	0.153***
			(0.0194)	(0.0191)			(0.0210)	(0.0215)
Price = Rs.225/250			-0.194***	-0.221***			0.114***	0.158***
			(0.0184)	(0.0177)			(0.0200)	(0.0199)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Mean of Dep. Var	0.720	0.723	0.720	0.723	0.408	0.413	0.408	0.413
R2	0.120	0.188	0.121	0.139	0.131	0.183	0.133	0.102
N	5439	5067	5439	5067	5439	5067	5439	5067

Notes: This table provides estimates for equation (1) for different samples: Columns 1 to 4 consist of those students that attended any tuition at all in the 2014-15 academic year, while Columns 5 to 8 consist of students that attended any non-Pratham tuition that year. Columns 3, 4, 7, and 8 provide the flexible specification estimates, where the first price variable is replaced with dummies for each first price that was offered, with the price of 0 as the omitted category. Controls include: number of household members aged 6-14, the first principle component of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in the past year, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 8: Treatment Effects of Going to Any Tuition

Dependent Variable:	Reduced Form Estimates				Instrumental Variable Estimates			
	English Score		Math Score		English Score		Math Score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Attended Any Tuition Classes	0.127***	0.108***	0.194***	0.182***	0.136	0.0890	-0.163	-0.265
	(0.0204)	(0.0227)	(0.0277)	(0.0299)	(0.146)	(0.148)	(0.197)	(0.205)
Baseline English Score	0.786***	0.754***	0.343***	0.327***	0.781***	0.752***	0.355***	0.339***
	(0.0110)	(0.0115)	(0.0173)	(0.0186)	(0.0113)	(0.0111)	(0.0160)	(0.0159)
Baseline Math Score	0.0502***	0.0469***	0.351***	0.348***	0.0499***	0.0474***	0.351***	0.347***
	(0.0111)	(0.0107)	(0.0167)	(0.0168)	(0.0103)	(0.0101)	(0.0144)	(0.0144)
Mean of Dep. Var	0.00363	0.00292	0.00417	0.00966	0.00363	0.00292	0.00417	0.00966
R2	0.644	0.650	0.351	0.356	0.644	0.650	0.330	0.325
N	4887	4625	4903	4640	4887	4625	4903	4640

Notes: This table provides estimates for equation (6) in Columns 1 to 4. In Columns 5 to 8, we estimate equation (6), using first price as an instrumental variable. The dependent variable as a dummy for whether a child attended any tuition in the 2014-15 school year. Controls include: number of household members aged 6-14, the first principle component of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in teh past year, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 9: Treatment Effects of Going to Pratham Tuition for Poorer Households

Sample:	Bottom half hh (Asset Index)			
Dependent Variable:	English Score		Math Score	
	(1)	(2)	(3)	(4)
Any Pratham Classes Attended	0.166**	0.166**	-0.0696	-0.0674
	(0.0679)	(0.0692)	(0.0916)	(0.0928)
Baseline english Score	0.784***	0.770***	0.345***	0.349***
	(0.0137)	(0.0147)	(0.0197)	(0.0210)
Baseline Math Score	0.0250*	0.0185	0.318***	0.299***
	(0.0136)	(0.0139)	(0.0194)	(0.0198)
Mean of Dep. Var	-0.170	-0.168	-0.0699	-0.0589
R2	0.633	0.638	0.309	0.316
N	2383	2269	2389	2275

Notes: This table provides estimates for equation (6) for children from households belonging to the bottom half of the distribution for asset ownership, using first price as and instrumental variable. Controls include: number of household members aged 6-14, the first principle component of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in the past, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table 10: Treatment Effects of Going to Pratham Tuition for Low Pre-Test Score Sample

Sample:	Bottom half Pre-Test Score			
Dependent Variable:	English Score		Math Score	
	(1)	(2)	(3)	(4)
Percent Pratham Classes Attended	0.0350	0.0482	-0.110	-0.149
	(0.0679)	(0.0690)	(0.0943)	(0.0981)
Baseline english Score	0.772***	0.742***	0.284***	0.278***
	(0.0256)	(0.0269)	(0.0189)	(0.0211)
Baseline Math Score	0.0152	0.0114	0.245***	0.240***
	(0.0140)	(0.0144)	(0.0372)	(0.0384)
Mean of Dep. Var	-0.659	-0.663	-0.416	-0.412
R2	0.270	0.272	0.117	0.127
N	2527	2385	2470	2322

Notes: This table provides estimates for equation (6) for children from households belonging to the bottom half of the distribution for asset ownership, using first price as an instrumental variable Controls include: number of household members aged 6-14, the first principle component of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in the past year, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Appendix - for Online Publication

Table A1: Offer Details

Panel A: First-price offers

Round	No. Offers	Pre-Assigned?	Proportions	Offer Dates
(1) Old	856	Yes	Even	Apr
(2) Old - supplement	35	Yes	Even	Apr-May
(3) Summer	101	Yes	Even	Jul-Aug
(4) New 1	3289	No	52% (highest), 26%, 13%, 9% (lowest)	Jun-Aug
(5) New 2	1157	No	Even	Aug-Sep

Panel B: Second-price offers

Round	No. Offers	Pre-Assigned?	Proportions	Offer Dates
(1), (2), (3), (4)	843	Yes	Even, up to first price	Sep-Aug
(5)	228	Yes	Even, up to first price	Nov

Notes: This table provides details of how the first and second price offers were made to households in 2014. "Old" refers to the sample of students that had been enrolled at Pratham in the previous (2013-14) academic year. "New" students are those that we (along with the partner NGO, Pratham) approached for the first time.

Table A2: Summary Statistics of Old and New Samples at Baseline

	Sample		
	All	Old	New
	(1)	(2)	(3)
# HH Members Age 6-14	2.376	2.433	2.364
	(1.010)	(0.957)	(1.019)
1st PCA of Durables	0.00636	-0.255	0.0573
	(1.657)	(1.636)	(1.657)
Mother education (years)	3.725	3.549	3.759
	(4.223)	(4.054)	(4.255)
Female	0.486	0.467	0.489
	(0.500)	(0.499)	(0.500)
Attends Private School	0.107	0.0689	0.114
	(0.309)	(0.253)	(0.318)
Attended Tuition Past Yr	0.820	0.994	0.786
	(0.384)	(0.0776)	(0.410)
Normalized Math Score	0.00562	0.455	-0.0820
	(1.001)	(0.984)	(0.980)
Normalized English Score	0.00358	0.340	-0.0621
	(1.001)	(0.942)	(0.999)
N	5067	827	4240

Notes: This table provides summary statistics of houshold characteristics measured in the baseline survey. Column (1)provides the summary for the entire study sample, while Columns (2) and (3) provide the statistics for "Old" (previously enrolled at Pratham), and "New" (newly approached) students, respectively. Means are provided and standard deviations are provided in parentheses.

Table A3. Private Tuition Characteristics in the Market

	N	Mean	Std. Dev.
Tuition Center (>1 teacher)	713	.1290323	.335471
Single Teacher Tuition	713	.8176718	.3863858
Number of Teachers	713	1.774194	3.952073
Num. Teachers for Grade 6	713	1.088359	.518524
Num. Teachers for Grade 7	713	1.068724	.3468003
Num. Teachers for Grade 8	713	1.081346	.4326589
Tuition in Teacher's Home	713	.8457223	.3614683
Tuition in Child's Home	713	.0112202	.1054034
Tuition has Grades 6-8	713	.8401122	.3667592
Grade 6 Fee	667	321.024	350.6152
Grade 7 Fee	619	343.5509	354.1829
Grade 8 Fee	585	389.0991	389.1844

Notes: This table provides summary statistics (sample size, mean, and standard deviation) of characteristicsof non-Pratham private tuition providers in each of our catchment areas.

Table A3: Correlates of WTP-Constrained Logit Model

	Dependent Variable: Attended Any Class	
	(1)	(2)
# HH Members Age 15+	-0.100***	-0.0733***
	(0.0270)	(0.0254)
# HH Members Age 6-14	0.0632	0.0596
	(0.0389)	(0.0367)
# HH Members Age 0-5	0.0783	0.0827
	(0.0581)	(0.0551)
1st PCA of Durables	-0.0184	-0.0246
	(0.0269)	(0.0254)
Mother Education (years)	0.00616	0.00514
	(0.00980)	(0.00934)
Female	-0.136*	-0.200***
	(0.0766)	(0.0729)
Attends private school	-0.612***	-0.707***
	(0.146)	(0.139)
Attended tuition past yr	0.122	0.116
	(0.104)	(0.0993)
Normalized math score	0.0572	0.0791*
	(0.0444)	(0.0415)
Normalized English Score	0.0400	0.0740
	(0.0478)	(0.0451)
Attended Pratham tuition prior yr.		2.071***
		(0.103)
Grade 7		0.0662
		(0.0867)
Grade 8		0.0808
		(0.0885)
First Price	-1.007***	-1.015***
	(0.0459)	(0.0432)
Mean of Dep. Var	0.319	0.329
N	4968	5067

Notes: This table provides estimates for a logit model for estimating the parameters for equation (3), with equation (2) as the latent model.
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Table A4: Treatment Effects of Going to Pratham Tuition, on Poorer Households

Sample:	Bottom half hh (Asset Index)			
Dependent Variable:	English Score		Math Score	
	(1)	(2)	(3)	(4)
Percent Pratham Classes Attended	0.234**	0.239**	-0.0973	-0.0894
	(0.0989)	(0.102)	(0.135)	(0.138)
Baseline english Score	0.781***	0.767***	0.346***	0.351***
	(0.0138)	(0.0148)	(0.0200)	(0.0214)
Baseline Math Score	0.0250*	0.0176	0.318***	0.300***
	(0.0136)	(0.0139)	(0.0195)	(0.0199)
Mean of Dep. Var	-0.170	-0.168	-0.0699	-0.0589
R2	0.637	0.642	0.307	0.314
N	2383	2269	2389	2275

Notes: This table provides estimates for equation (6) for children from households belonging to the bottom half of the distribution for asset ownership, using first price as an instrumental variable. Controls include: number of household members aged 6-14, the first principle component of an asset index, mother's years of schooling, a dummy for whether the student is female, whether the student attends private school, whether he/she attended tuition in the past year, and normalized Math and English test scores.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

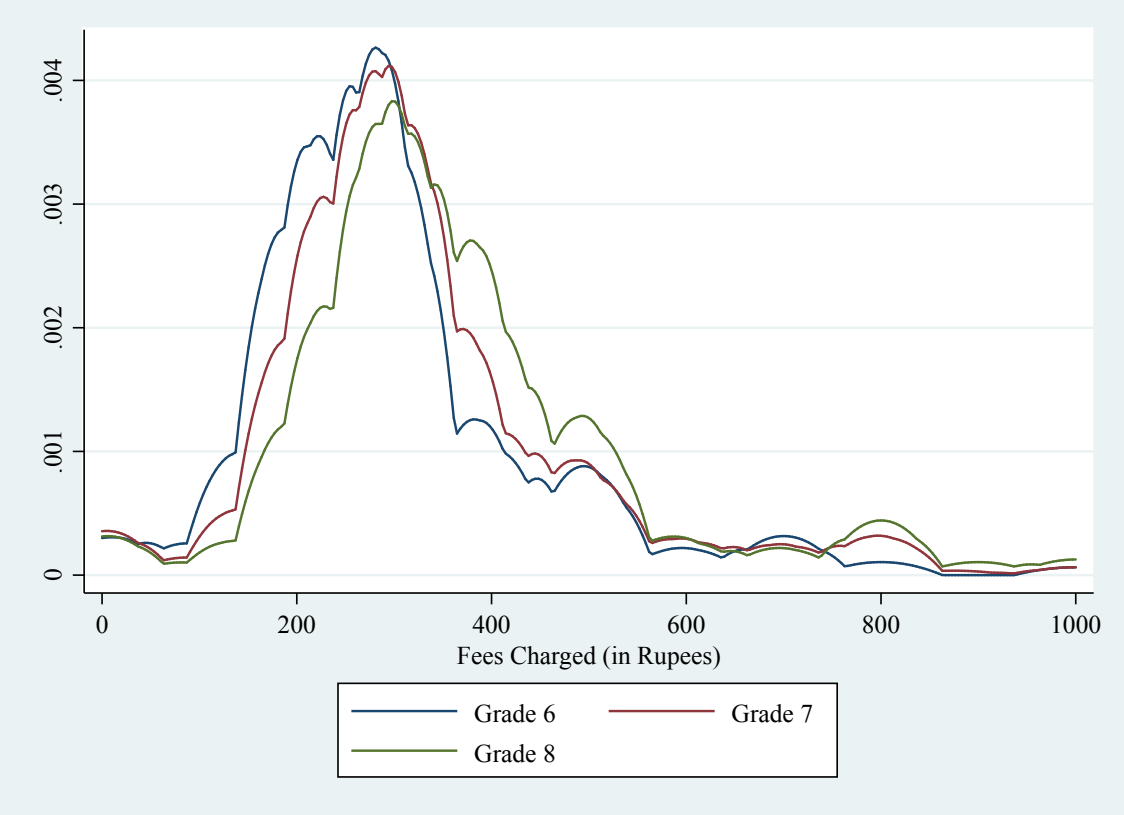


FIGURE A1. FEES CHARGED BY PRIVATE TUITION PROVIDERS IN CATCHMENT AREAS

We are working with an NGO called Pratham Education Foundation. Pratham provides tuition classes to children in your area.

[LC TEACHER CAN TALK ABOUT CLASSES AT PRATHAM]

Today, we are bringing you a special offer on Pratham's tuition classes for your children who are in classes 6, 7, or 8. We will ask you to pick a scratch card for each child from one of these bags.

[DRAW A SCRATCH-CARD FROM BAG AND SHOW IT, THEN PLACE IT BACK IN THE BAG]

The number that is under the silver foil on the scratch card will be the monthly fees for that child if you wish to enroll him/her in Pratham's tuition class. This fee will be valid from whenever you choose to use this offer at the learning center until March 2015.

1.1	1.2	1.3	1.4		1.5	1.6
Child's Name **[LIST ALL CHILDREN IN HOUSEHOLD IN CLASS 6, 7, 8]**	Enrolled in School **01: YES 02: NO**	Class	Sex **01: MALE 02: FEMALE**	**>> OFFER SCRATCH-CARD BAG FOR CLASS 6, 7, OR 8 BASED ON CHILD'S CLASS.** Please draw one scratch-card for ..... (child's name) from this bag **>> AFTER SCRATCH-CARD IS DRAWN, WRITE CHILD'S NAME ON CARD.** **>> ASK RESPONDENT TO SCRATCH THE FOIL ON THE CARD DRAWN.**	Child ID **[FILL FROM SCRATCH-CARD]**	Fee in scratch-card (Rs.)

FIGURE A2.1 OFFER SCRIPT PART 1

You can use this offer to enroll your child at Pratham this month or anytime until March 2015.
I will fill out a voucher as proof of this offer.
Please remember to take the voucher with you to the LC when you wish to enroll your child.

2.1	2.2	2.3	2.4
Child's ID **[AS IN 1.5]**	Would you like to enroll your child at Pratham using this offer? **01 : YES 02: NO→SKIP TO 2.4 999 : DON'T KNOW → END**	When would you like to enroll your child? **01 : JULY 2014→SKIP TO 3.1 02: LATER→SKIP TO 3.2 999 : DON'T KNOW → END**	Can you tell us why you don't want to take this offer? **[DO NOT PROMPT WITH OPTIONS]** **01 : CHILD ATTENDS TUITIONS ELSEWHERE→END 02 : FEE IS TOO HIGH→END 03 : PAST EXPERIENCE WITH PRATHAM NOT GOOD→END 04 : LC IS TOO FAR FROM HOME→END 888 : OTHER, SPECIFY …….. →END**

3.1	Can you come to the LC by next week with the voucher and fees?	**01 : YES → END 02 : NO**
3.2	On which date and time would you prefer to come to the LC?	/ /
		:

FIGURE A2.2 OFFER SCRIPT PART 2



Figure A3.1 Inside a Tuition Classroom

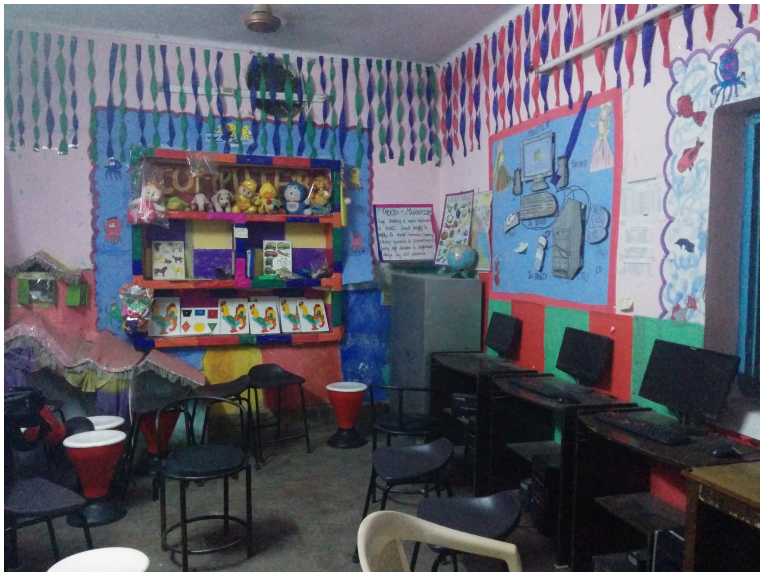


Figure A3.2 Inside another Tuition Classroom



Figure A4.1 A Pratham Tuition Center



Figure A4.2 A Pratham Tuition Center