Preliminary Evaluation Results

Pricing of Private Education Services in India: Demand, Use, and Impact

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1 Introduction

This document summarizes preliminary analysis for a pricing experiment conducted in conjunction with the NGO Pratham's after-school tutoring centers in New Delhi. Through a two-part pricing design, we are able to isolate whether willingness-to-pay is associated with higher utilization of these classes, and whether prices have causal impacts on attendance and dropout. By using our assigned prices as instruments for take-up of the classes, we can estimate the impacts of enrolment 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. The classes do not appear to impact test scores, an unexpected result for which we are currently exploring the mechanisms.

2 Summary of Project Activities

The evaluation was conducted over the 2014-2015 school year, from April 2014 through March 2015. The core experiment consisted of initial offers to attend one of the 21 Pratham centers in New Delhi at randomized prices. A second randomization of prices was then conducted for those who took up the initial offers. Baseline surveys and student tests took place in conjunction with the first-price offers, with endline surveys and tests during the summer of 2015. Attendance data was collected throughout the 2014-2015 school year as well as in 2015-2016, when the full sample faced uniform prices in the tuitions.

2.1 First-Price Offers and Baseline Surveys

Details of first-price offers are summarized in Panel A of Table 1. First-price offers and baseline surveys took place over five rounds. 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 in 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. In order to maximize power, more offers were conducted at higher prices in order to yield more even proportions of accepted offers across prices.

By August, Pratham indicated that the total number of accepted offers was too low, and additional offers needed to be conducted to fill the tuition 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.

2.2 Second Price offers

Details of the second-price offers are summarized in Panel B of Table 1. 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.

2.3 Attendance Data

Daily child-wise attendance data were collected by 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.

2.4 Endline Surveys and Testing

Endline surveys and testing took place in April-June of 2015. Because many households were away during the summer, revisits continued through September. In all 3996 (91%) of households were successfully surveyed.

3 Preliminary Results

We present initial results below. Data cleaning is still ongoing, and thus these results should be considered preliminary. Note that some of the regressions, particularly in specifications with control variables, have lower number of observations due to imperfect child-wise merges between the baseline survey and other data sources. These issues are in the process of being rectified.

3.1 Demand

To estimate demand, we regress a dummy for take-up on the offer price:

$$Enrol_{igc} = \beta_0 + \beta_1 first_{igc} + \psi S_{igc} + \lambda X_{igc} + \epsilon_{igc}$$

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 2 shows the results of this estimation. At a price of 0, nearly 78% of students enroll. Demand is strongly downward sloping: the point estimate implies that a 100 Rs. higher price results in 16.6% lower takeup. At a price of Rs. 75, this implies an elasticity of demand of 0.25. As shown in Columns 3 and 4, demand is downward sloping across all 4 offer prices.

3.2 Correlates of Willingness-to-Pay

In this section we examine how willingness-to-pay correlates with observable student- and household-level characteristics. We do this by regressing the offer price on characteristics among those who attended any class:

$$first_{igc} = \beta_0 + \beta X_{igc} + \psi S_{igc} + \epsilon_{igc}$$

The results are shown in Table 3. While the majority of variables are not significantly predictive of willingness-to-pay, we observe several sensible correlations with these characteristics. Wealth, as measured through durables ownership, is strongly positively correlated with willingness to pay. Mother's education is negatively associated with willingness to pay, while prior experience with tuition classes is positively associated with willingness to pay.

3.3 Selection

We now examine whether those with higher willingness-to-pay for the classes are also those who utilize the classes more intensively through higher attendance. To examine this, we take those assigned a second price (i.e., those who were attending when second-price offers were assigned) and examine the percentage of classes attended in the months following the second-price offer. The regression is:

$$Y_{igc} = \beta_0 + \beta_1 first_{igc} + \delta second_{igc} + \psi S_{igc} + \lambda X_{igc} + \epsilon_{igc}$$

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.

As shown in Table 4, there is strong evidence for selection: those paying a 100 Rs. higher price attended over 6 percentage points more classes. As shown in Columns 3 and 4, attendance is increasing across all 4 price groups.

3.4 Causal Effects of Prices

Turning the effects of the second price on attendance, we run an estimation similar to () above:

$$Y_{igc} = \beta_0 + \beta_1 second_{igc} + \delta first_{igc} + \psi S_{igc} + \lambda X_{igc} + \epsilon_{igc}$$

Where we include the continuous variable for the second price and dummies for first price. Table 5 shows strong *negative* effects of the second price on subsequent attendance: a higher price by Rs. 100 is associated with 12 percentage points lower attendance, and attendance is monotonically decreasing in price.

Our initial interpretation of this result is that lower prices prevent dropout from the classes. In the initial months, parents are still evaluating whether they want to continue the classes, and price is a consideration in this process. Indeed, the results in Table 5 are driven by dropout in the 2-3 months after the second price offer is made.

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.

3.5 Treatment Effects

This section presents our estimation of treatment effects. Here we regress student test scores on attendance, instrumenting attendance with the offer price:

$$Y_{igc} = \beta_0 + \beta_1 Enrol_{igc} + \psi S_{igc} + \lambda X_{igc} + \epsilon_{igc}$$

Where Y_{igc} is the student's test score and $Enrol_{igc}$ represents enrollment in the classes as defined above. We instrument $Enrol_{igc}$ with a set of dummies for the first price offer.

Table 6 displays the results of this estimation. Surprisingly, we find no evidence for effects of attending the Pratham classes on either English or math scores. We are currently investigating the potential reasons behind this null effect. One possibility is that students who do not attend Pratham classes attend other tuition classes that are just as effective. Our endline data will help us shed light on this and other potential mechanisms.

Table 1. 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

Table 2. Demand for Pratham Tuition Classes

	Dependent Variable: Attended (1/0)			
	(1)	(2)	(3)	(4)
Price in 100's	-0.166***	-0.165***		
	(0.00664)	(0.00701)		
Price = Rs.75			-0.185***	-0.218***
			(0.0188)	(0.0214)
Price = Rs.150			-0.325***	-0.379***
			(0.0177)	(0.0198)
Price = Rs.225/250			-0.410***	-0.496***
			(0.0168)	(0.0184)
Controls?	NO	YES	NO	YES
Fixed Effects	Center x Grade x Round	Center x Grade x Round	Center x Grade x Round	Center x Grade x Round
Mean of Dep. Var	0.341	0.340	0.341	0.340
R2	0.338	0.347	0.341	0.206
N	5437	4929	5437	4929

Notes: Omitted category in Columns (3) and (4) is a price of 0.
Controls include all variables listed in Table 3.
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 3. Correlates of WTP

	Sample: Attended Any Class Dependent Variable: First Price in 100's	
	(1)	(2)
# HH Members Age 15+	-0.000311	0.00210
	(0.0168)	(0.0153)
# HH Members Age 6-14	0.0130	0.00822
	(0.0237)	(0.0218)
# HH Members Age 0-5	0.0412	0.0486
	(0.0362)	(0.0334)
1st PCA of Durables	0.0466***	0.0441***
	(0.0159)	(0.0145)
Mother education (years)	-0.0124**	-0.0112**
	(0.00594)	(0.00544)
Female	-0.0379	-0.0392
	(0.0470)	(0.0429)
Attends private school	-0.0638	-0.111
	(0.0939)	(0.0858)
Attended tuition past yr	0.172**	0.131*
	(0.0734)	(0.0674)
Normalized math score	-0.0355	-0.0362
	(0.0264)	(0.0239)
Normalized English score	0.0279	0.0343
	(0.0278)	(0.0255)
Attended Pratham tuition prior yr.		0.178***
		(0.0637)
Grade 7		0.0825
		(0.0508)
Grade 8		0.0851
		(0.0523)
Fixed Effects	Center x Grade x Round	Center, Round
Mean of Dep. Var	1.042	1.042
R2	0.149	0.0729
N	1674	1674

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

Table 4. 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	0.0639***	0.0666***		
	(0.0130)	(0.0135)		
Price = Rs.75			0.0674***	0.0596**
			(0.0251)	(0.0263)
Price = Rs.150			0.0789***	0.0801***
			(0.0283)	(0.0295)
Price = Rs.225/250			0.151***	0.157***
			(0.0312)	(0.0323)
Fixed Effects	Center x Grade x Round, Second Price	Center x Grade x Round, Second Price	Center x Grade x Round, Second Price	Center x Grade x Round, Second Price
Controls	NO	YES	NO	YES
Mean of Dep. Var	0.592	0.592	0.592	0.592
R2	0.263	0.293	0.263	0.293
N	1625	1469	1625	1469

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

Table 5. Causal Effects

	Sample: Attended Any Class After Second Price Offer Dependent Variable: Fraction of Classes Attended			
	(1)	(2)	(3)	(4)
Second Price in 100's	-0.115***	-0.120***		
	(0.0167)	(0.0173)		
Price = Rs.75			-0.0820***	-0.0859***
			(0.0243)	(0.0252)
Price = Rs.150			-0.179***	-0.181***
			(0.0326)	(0.0337)
Price = Rs.225/250			-0.261***	-0.276***
			(0.0470)	(0.0486)
Fixed Effects	Center x Grade x Round, First Price	Center x Grade x Round, First Price	Center x Grade x Round, First Price	Center x Grade x Round, First Price
Controls	NO	YES	NO	YES
Mean of Dep. Var	0.592	0.592	0.592	0.592
R2	0.265	0.295	0.265	0.295
N	1625	1469	1625	1469

Notes: Controls include all variables listed in Table 3.
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 6. Treatment Effects

	Dependent Variable:			
	English Score		Math Score	
	(1)	(2)	(3)	(4)
Attended Any Classes	0.0203	0.000853	-0.0346	-0.0721
	(0.0580)	(0.0600)	(0.0728)	(0.0764)
Baseline English Score	0.782***	0.745***	0.344***	0.328***
	(0.00995)	(0.0111)	(0.0134)	(0.0150)
Baseline Math Score	0.0594***	0.0572***	0.354***	0.352***
	(0.0102)	(0.0104)	(0.0138)	(0.0141)
Fixed Effects	Center x Grade x Round	Center x Grade x Round	Center x Grade x Round	Center x Grade x Round
Controls	NO	YES	NO	YES
Mean of Dep. Var	-0.00313	-0.00490	0.00576	0.0103
R2	0.644	0.651	0.346	0.351
N	4427	4183	4789	4508

Notes: Controls include all variables listed in Table 3.
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.