

# **Monitoring Works: Getting Teachers to Come to School**

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# Motivations

- Teacher absence is high in India: 24% nationally (Chaudhury et al.)
- When schools are remote and hard to monitor, absence rates can be even higher
- Project Area: Absence rate of teachers was 40% in baseline study

# Today's Talk

- Discuss the program evaluation of a teacher absenteeism program in rural India
- Designed to reduce absenteeism through monitoring & financial incentives
  - Explore whether teacher absenteeism fell
  - Test whether increased teacher presence affects student learning

# Background: The Schools

- Worked with NGO Seva Mandir
- Seva Mandir runs about 150 non-formal education centers (NFEs) in Udaipur district, Rajasthan
- Each center is one room, and has one teacher
- 1997: 21 million children served by NFEs

# The Children

- Completely illiterate
- Educate children in Hindi and Math, and get students in the habit of attending school
- Some children “graduate” to government schools, other continue to study in the NFE

# The Program

- 60 treatment NFEs (chosen randomly out of 120)
- Set up monitoring system for teacher attendance, and linked the pay of teachers to their attendance

# The Program: Monitoring

- Each teacher was given a camera, and instructed to take a picture of himself and the children twice a day
- Required at least 8 children (or  $\frac{1}{2}$  of the number of registered children)
- Rolls of film were collected and developed



# The Program: Payments

- Comparison Schools:
  - Paid Rs1000/month
  - Required to attend 20 days/month
- Program Schools:
  - Base salary Rs 1,000 for 20 days/month
  - Rs 50 bonus for each day above
  - Rs 50 fine for each day below
  - Fine capped at Rs 500

# Program Evaluation

- Teacher Attendance:
  - Pictures in treatment schools
  - Random checks
- Student Learning Achievement Tests:
  - September 03, April 04, Oct 04

# Roadmap

- Baseline study
- Program Outcomes
  - Teacher Attendance
  - Multitasking?
  - Child Attendance
  - Attrition
  - Child learning/Graduation Rates
- Cost Benefit

# Baseline Results

## Is School Quality Similar Prior to Program?

	Treatment	Control	Difference
	(1)	(2)	(3)
Number of Schools Open	0.66	0.63	0.02 (0.10)
	44	41	85
Number of Students Present	17.72	15.54	2.19 (2.23)
	29	26	55

No statistical difference in the probability that a treatment school is open

### Is School Quality Similar Prior to Program?

	Treatment (1)	Control (2)	Difference (3)
<i>Teacher Qualifications</i>			
Teacher Test Scores	34.99	33.62	1.37 (2.01)
	53	56	109
Teacher Highest Grade Completed	10.21	9.80	0.41 (0.46)
	57	54	111
<i>Teacher Performance Measures (Random Check)</i>			
Ratio of Children Within Classroom to Outside of Classroom	0.85	0.84	0.01 (0.09)
	29	26	55
Percent of Teachers Interacting with Students	0.79	0.73	0.06 (0.12)
	29	26	55
Blackboards Utilized	0.86	0.85	0.01 (0.11)
	22	26	48

# Are Students Similar Prior to the Program?

- Pre-test exam in Sept 2003
- Tested Hindi and Math Skills
- Students who could write were given written exam, and students who could not write were given an oral exam

## Are Students Similar Prior To Program?

	Treatment	Control	Difference
	(1)	(2)	(3)
Percent of Kids Taking Written Exam	0.17	0.19	-0.02
			(0.04)
	1136	1094	2230

Note: (1) Standard errors are clustered by school. (2) Sample includes every student present at pre-test exam.

Percent of students able to write similar prior to program

### Are Students Similar Prior To Program?

	Levels			Normalized		
	Treatment	Control	Difference	Treatment	Control	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Math Score on Verbal Exam	7.82	8.12	-0.30 (0.27)	-0.10	0.00	-0.10 (0.09)
Language Score on Verbal Exam	3.63	3.74	-0.10 (0.30)	-0.03	0.00	-0.03 (0.08)
Total Score on Verbal Exam	11.44	11.95	-0.51 (0.48)	-0.08	0.00	-0.08 (0.07)
Number of Students Verbal	940	888	1828	940	888	1828
Math Score on Written Exam	8.62	7.98	0.64 (0.51)	0.23	0.00	0.23 (0.18)
Language Score on Written Exam	3.62	3.44	0.18 (0.46)	0.08	0.00	0.08 (0.20)
Total Score on Written Exam	12.17	11.41	0.76 (0.90)	0.16	0.00	0.16 (0.19)
Number of Students Written	196	206	402	196	206	402

Note: (1) Standard errors are clustered by school. (2) Sample includes every student present at pre-test exam.

Student test scores similar prior to the program for both the oral and written exam

# Program Outcomes

# Teacher Attendance

- On average, teachers were present 58% of the times in comparison schools and 78% of the times in treatment schools
- Program eliminated delinquent teachers, and created a new class of “very regular” teachers

**Figure 2: Percentage of Schools Open during Random Checks**

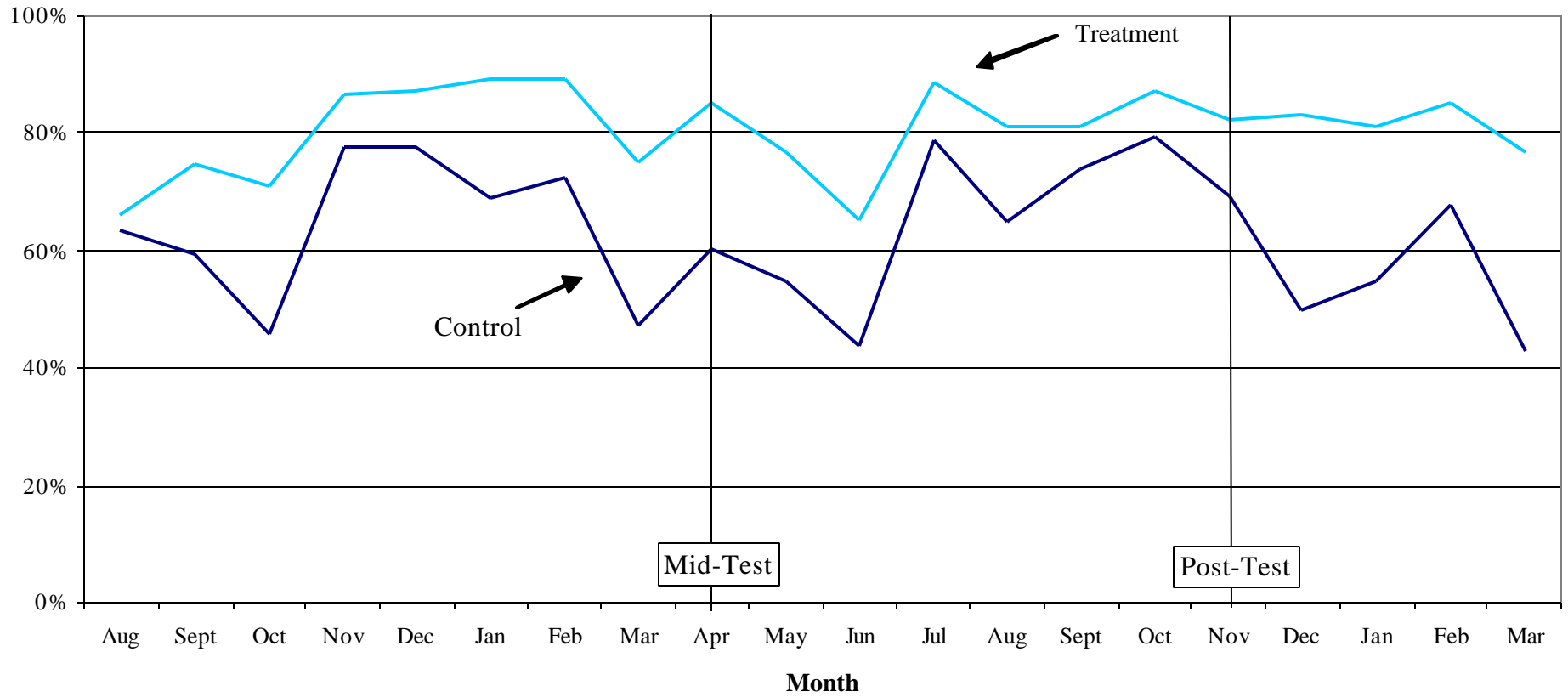
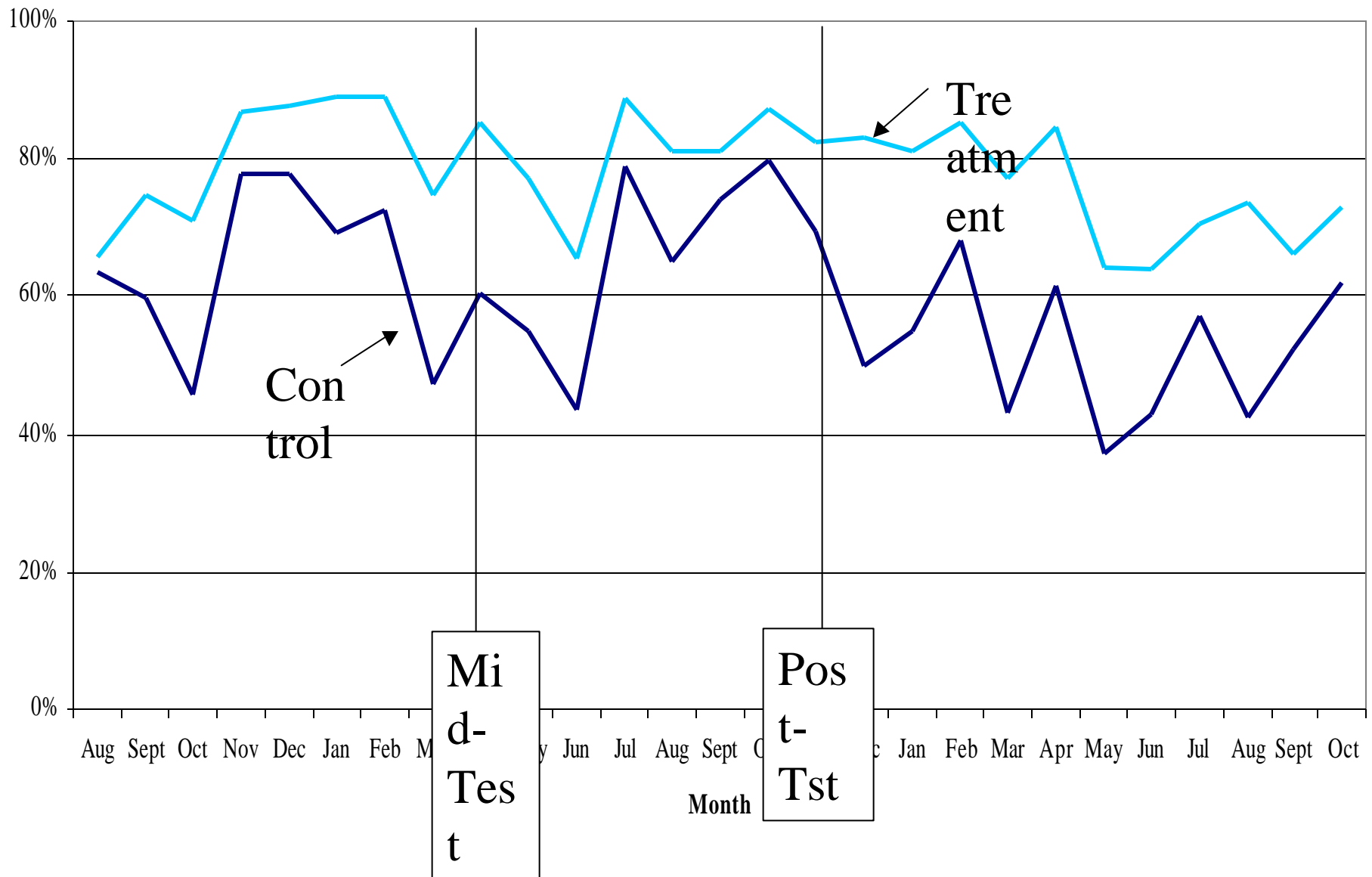


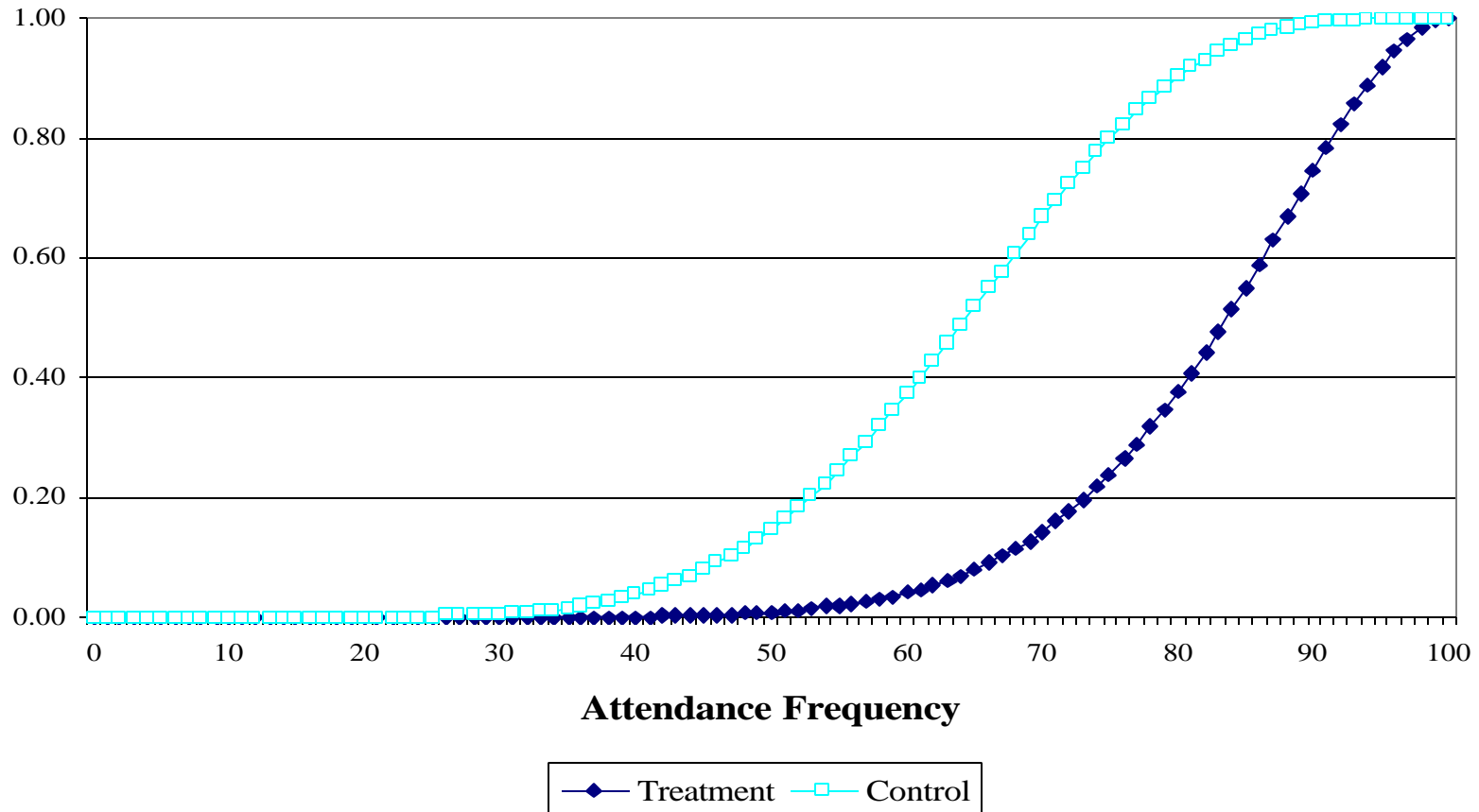
Figure 2: Percentage of Schools Open during Random Checks



**Table 3: Teacher Attendance**

Sept 2003-Oct 2005			Difference Between Treatment and Control Schools		
Treatment	Control	Diff	Until Mid-Test	Mid to Post Test	After Post Test
(1)	(2)	(3)	(4)	(5)	(6)
<i>A. All Teachers</i>					
0.76	0.57	0.20	0.19	0.15	0.22
		(0.03)	(0.04)	(0.04)	(0.05)
1461	1421	2882			
<i>B. Teachers with Above Median Test Scores</i>					
0.77	0.63	0.15	0.15	0.16	0.14
		(0.04)	(0.05)	(0.06)	(0.06)
762	629	1391			
<i>C. Teachers with Below Median Test Scores</i>					
0.77	0.53	0.25	0.21	0.08	0.33
		(0.05)	(0.06)	(0.07)	(0.06)
565	711	1276			

**Figure 3B: Teacher Attendance**



- Cdf of the distribution of attendance
- Program moved the the entire distribution of attendance rather than moving some teachers

## Random Checks vs. Photos: Treatment Schools

	No.	% of Total
<i>A. Possible Scenarios</i>		
School Open and Valid Photos	673	69%
School Open and Invalid Photos	131	13%
School Closed and Valid Photos	43	4%
School Closed and Invalid Photos	129	13%

- Random checks and cameras are strongly correlated
- Very few instances of a “valid” day, with a random check finding out that the school was closed
- Very few instances of a teacher present, but not photo submitted

*B. Out of 131 where School is Open, the photos are invalid because....*

School not open for full 5 hours	31	24%
Only one photo	44	34%
Not enough Children	28	21%
Instructor not in Photo	8	6%
No photograph	20	15%

*C. Out of 43 where School is Closed and the photos are valid.....*

Random check completed after the school closed	4	9%
Teacher left in the middle of the day	19	44%
Random Check Time Missing	17	40%
Photo Data Missing	3	7%

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- Valid photo/school closed:
  - Only several cases (19 of 976) where teacher left in the middle of the day (i.e. multitasked)

	Sept 2003-March 2005		
	Treat	Control	Diff
	(1)	(2)	(3)
Percent of Children Sitting Within Classroom	0.89	0.88	0.01 (0.01)
	865	633	1498
Percent of Teachers Interacting with Students	0.68	0.69	-0.02 (0.03)
	865	633	1498
Blackboards Utilized	0.93	0.93	0.00 (0.01)
	843	615	1458

No difference in teacher activity given the school is open (i.e. no evidence of multitasking)

# Student Attendance

Sept 03-Oct 05

	Treatment	Control	Diff
	(1)	(2)	(3)
Attendance of Students Present at Pre-Test Exam	0.48	0.47	0.01
	21495	14965	36460
Attendance for Children who did not leave NFE	0.63	0.60	0.03
	13475	10071	23546
Presence for Students Present at Pre-Test Exam	0.38	0.29	0.09
	26906	24141	51047
Presence for Student who did not leave NFE	0.51	0.38	0.13
	16698	16020	32718

- No significant difference between no. of children found in Treat and Control schools on day of RC
- More teacher presence and same number of children results in significant increase in kid-days: 54 more kids-days per month in treatment school.

# Attrition

**Table 7: Descriptive Statistics for Mid Test and Post Test**

	Mid Test			Post Test		
	Treat	Control	Diff	Treat	Control	Diff
<i>A. Attrition Process</i>						
Percent Attrition	0.11	0.22	-0.10 (0.05)	0.24	0.21	0.03 (0.04)
Difference in Percent Written of Pre-Test attriters-stayers	0.01	0.03	0.02 (0.06)	0.06	-0.03	0.10 (0.06)
Difference in Verbal Test of Pre-Test attriters-stayers	0.05	0.08	-0.03 (0.14)	0.02	0.12	-0.10 (0.14)
Difference in Written Test of Pre-Test attriters-stayers	-0.41	-0.23	-0.18 (0.34)	-0.19	-0.13	-0.06 (0.29)

Little or no difference treatment and control  
(esp in Post-Test)

# Test Score Outcomes

- Mid- and post-tests: everyone given a chance to take both the oral and written portion of the test
- Score is the sum of the oral and written score (std dev of the comparison group test score distribution )

$$\text{Score}_{is} = \beta_1 + \beta_2(\text{Treat}_s) + \beta_3(\text{Oral\_score}_{is}) + \beta_4(\text{Written\_score}_{is}) + \beta_5(\text{Write}_{is}) + e_{is}$$

**Table 11: Does the Random Check Predict Test Scores?**

Method:	OLS	OLS	OLS	2SLS
Sample:	Control Schools	Treatment Schools	Treatment Schools	All Schools
Data:	Random Check	Random Check	Photographs	Random Check
	(1)	(2)	(3)	(4)

*A. Mid-test (Sept 03-April 04)*

Total Score	0.20	0.39	0.87	1.07
	(0.19)	(0.21)	(0.22)	(0.43)

*B. Post-test (Sept 03 -Oct 04)*

Total Score	0.58	1.17	0.98	0.97
	(0.35)	(0.36)	(0.53)	(0.47)

**Treatment Effects: Post-Test**

	Math	Lang	Total
(5)	(6)	(7)	(8)
<i>A. All Children</i>			
0.06	0.21	0.16	0.17
(0.04)	(0.12)	(0.08)	(0.09)
1760	1760	1760	1760
<i>B. Took Pre-Test Oral</i>			
	0.2	0.13	0.16
	(0.14)	(0.09)	(0.10)
	1454	1454	1454
<i>C. Took Pre-Test Written</i>			
	0.28	0.28	0.25
	(0.18)	(0.11)	(0.12)
	306	306	306
<i>D. Below Median Rank on Pre-Test</i>			
	0.07	0.01	0.05
	(0.16)	(0.11)	(0.11)
	897	897	897
<i>E. Above Median Rank on Pre-Test</i>			
	0.32	0.32	0.28
	(0.12)	(0.09)	(0.08)
	863	863	863

**Table 10: Dropouts and Movement into Government Schools**

	Treatment	Control	Diff
	(1)	(2)	(3)
Child Left NFE	0.38	0.34	0.03 (0.04)
Child Enrolled in Government School	0.20	0.14	0.06 (0.03)
Child Dropped Out of School	0.17	0.21	-0.03 (0.03)
N	1136	1061	2197

# Comparison to other programs

- The effect size (0.17 of a standard deviation) is comparable to the effects of other interventions that have been considered to be highly successful (such as the Tennessee Star experiment in the United States (Krueger), or the remedial education experiment in India during its first year (Banerjee et al., 2004))

# Cost Benefit Analysis

## Cost of Program Per Center over 12 Month Period

<u>Item</u>	<u>Cost</u>
<i>A. Camera Cost</i>	
Camera Cost <sup>1</sup>	1133
Film Cost	1392
Battery Cost	552
Photo Development and Printing:	1852
<i>B. Salaries</i>	
Teacher Salaries <sup>2</sup>	0
Labor Cost to Run Program <sup>3</sup>	450
<u>Total Costs to Run Program</u>	<u>5379</u>

- Only Rs 268 (\$6) per child per year
- Less cost effective than Balsakhi program, but as effective as girl scholarship program in Kenya
- Twice as cost effective as hiring a second teacher for the NFE in term of presence (and that program had no impact on test scores).

# Conclusions

- External, mechanical monitoring coupled with high powered incentive succeeds where internal systems or community monitoring have failed
- Extending to government schools?
- Extending to health care center?
- Nevertheless shows that the barriers for teachers coming to school are not large, and that teacher presence has positive impact