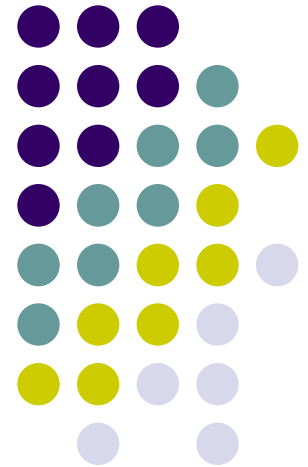
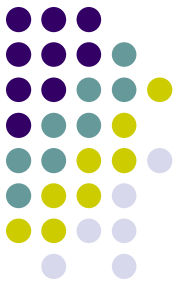


# The experimental approach to solving problems: The example of education

Abhijit Vinayak Banerjee  
Department of Economics and  
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Action Lab, MIT

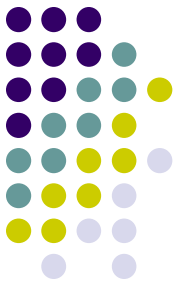




# Learning by experimenting

- Education is an area where there are a lot of strong views but not necessarily a lot of agreement.
- I will try to suggest how a series of experiments can help unravel this set of puzzles.

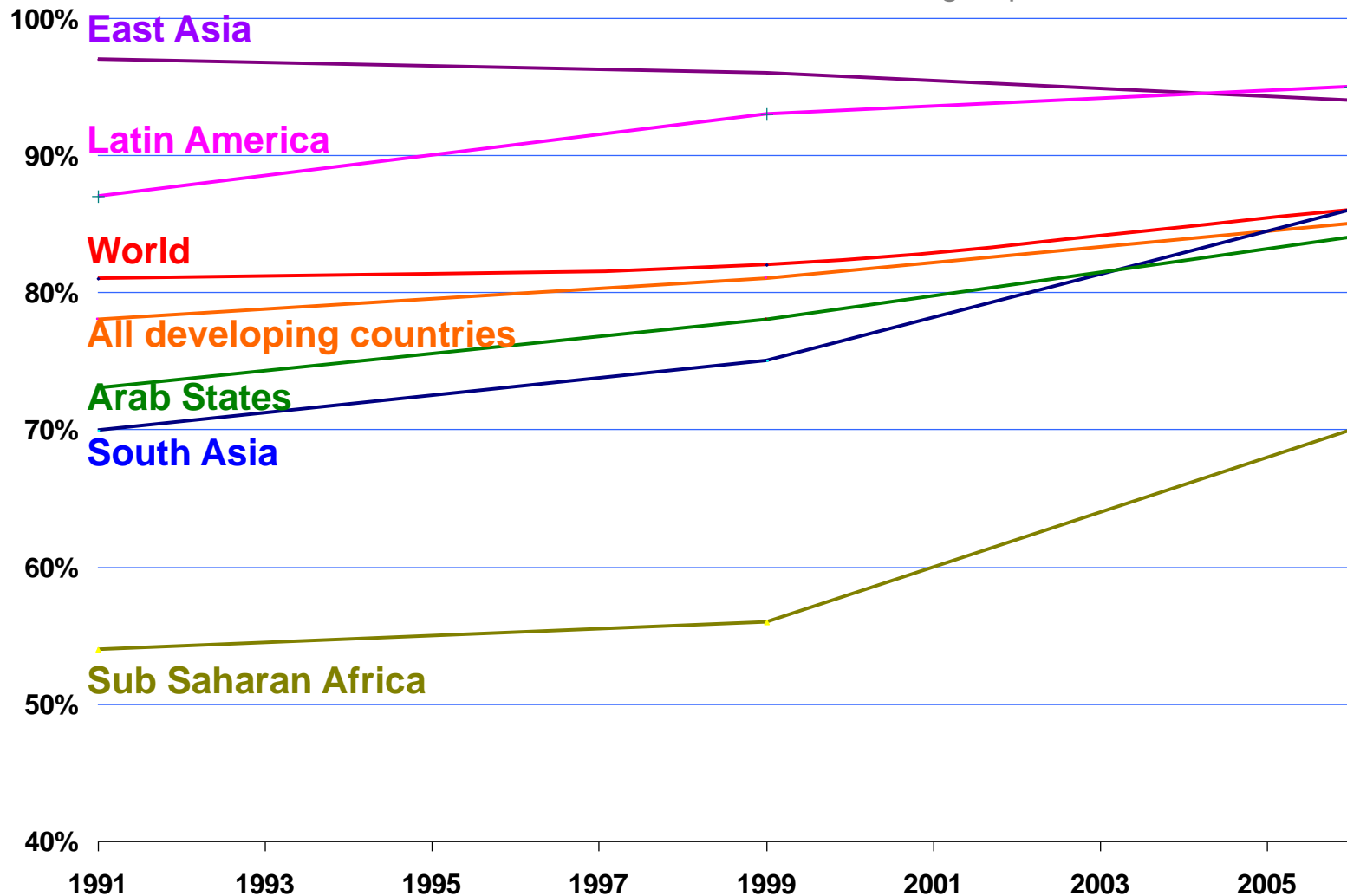
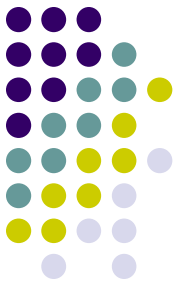
# We should have been celebrating



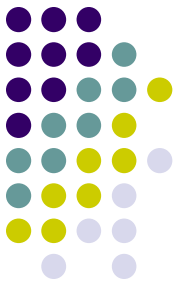
- The last two decades have been decades of enormous expansion in education
- In many parts of both East and West Africa and almost all over South Asia, school enrolment has grown very rapidly
- In many of these places school enrolment rates are now over 90% in the 6-12 age group

# Primary school enrollment rates

Source: UNESCO EFA Global  
Monitoring Report 2009



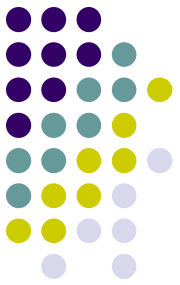
# Yet




- One senses a certain despondency
- Children enrolled in school does not seem to imply children are learning
- According to ASER, 59% of 4<sup>th</sup> graders and 44% of the 5<sup>th</sup> graders India read below the 2<sup>nd</sup> grade level
  - 76% of 4<sup>th</sup> graders and 63% of 5<sup>th</sup> graders cannot do simple divisions
- Very similar results in Pakistan (LEAPs report), Kenya (Duflo, Dupas and Kremer), Ghana

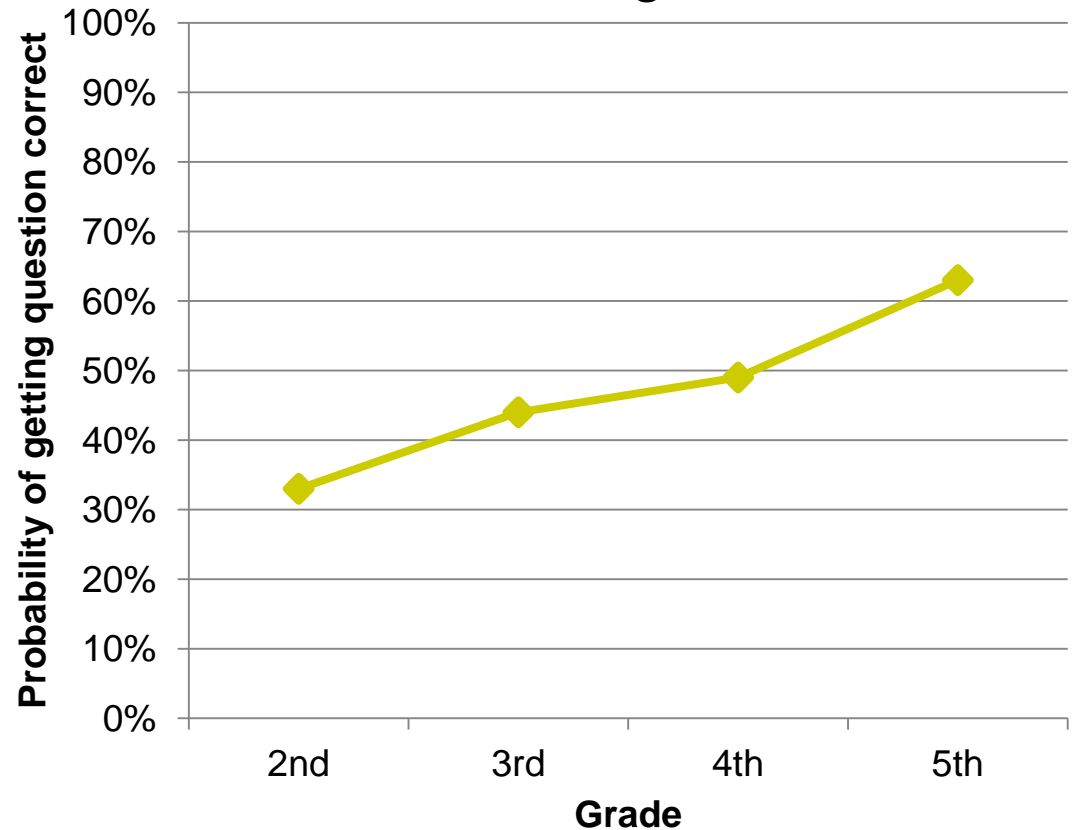


# Learning levels *and trajectories* are both very low



***Less than half the students who don't know single digit addition in 2<sup>nd</sup> grade, learn it by the end of 5<sup>th</sup> grade!***

$$\begin{array}{r} 8 \\ +9 \\ \hline \hline \end{array} = ?$$




Notes: Based on APRESt data for Control schools only, Oct-2009.



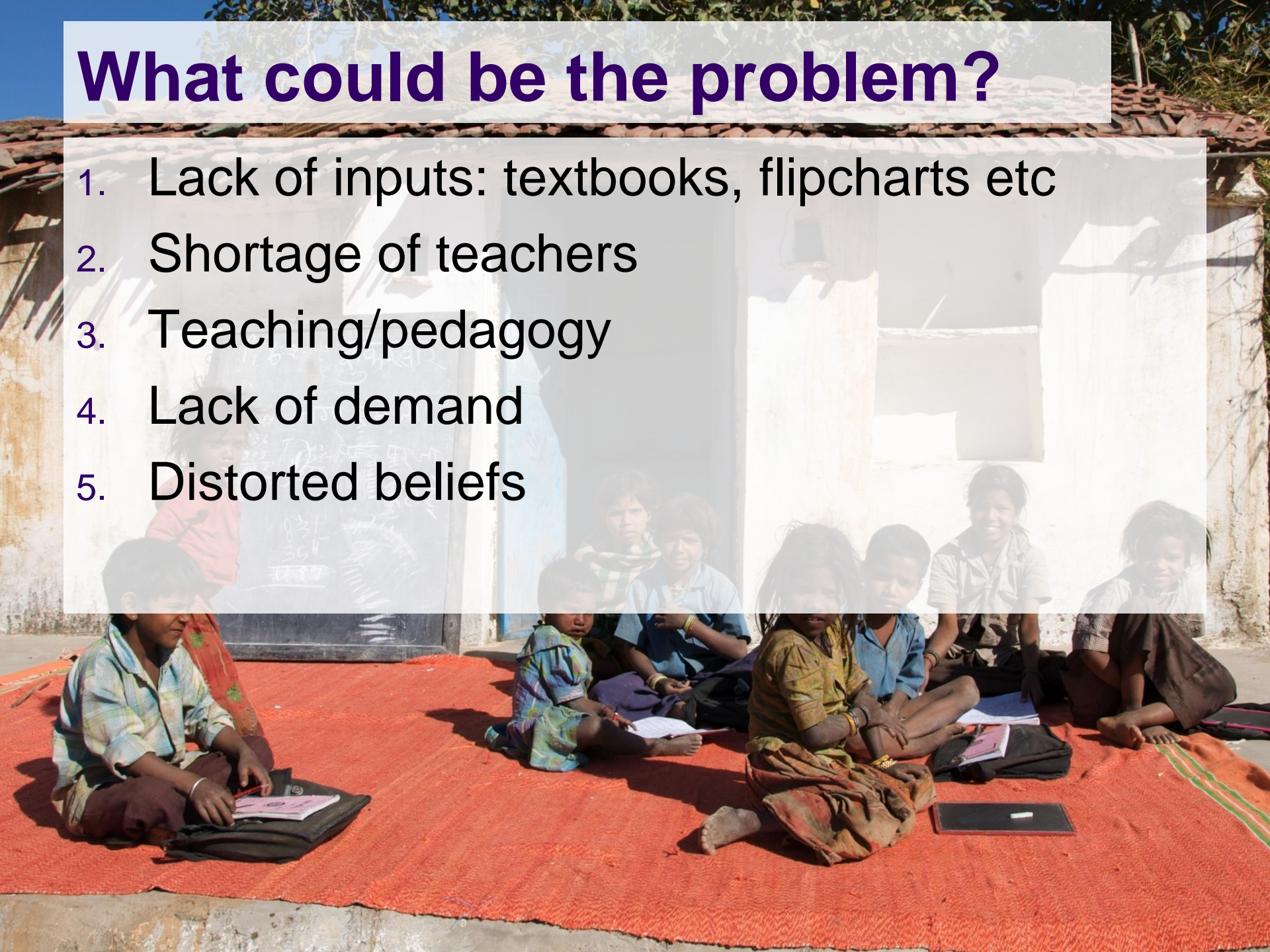
# What is the problem?





# What could be the problem?

1. Lack of inputs: textbooks, flipcharts etc
2. Shortage of teachers
3. Teaching/pedagogy
4. Lack of demand
5. Distorted beliefs







# What do we know

- There is both evidence from RCTs and non-RCTs.
- I will focus on RCTs with an occasional mention of the non-RCT studies



# Evidence on inputs

- Multiple studies by Kremer et al. in Kenya
- Essentially none of them found any impact
- Limited exception: Textbooks matter for the best performing children
- On the other hand access to schools definitely matters.
  - Duflo on INPRES
- Spending time in school also matters
  - Spohr on Taiwan.



# Surprisingly, given this

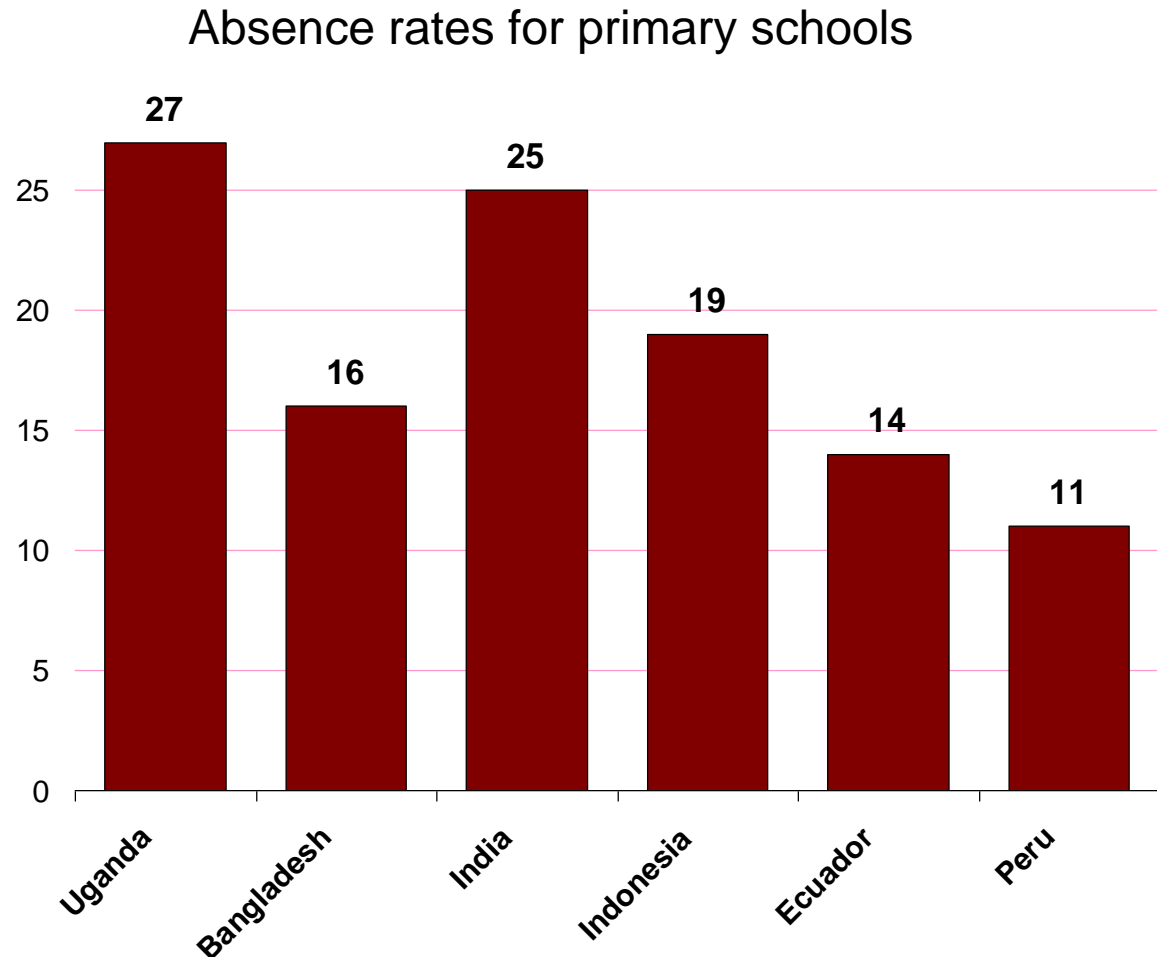
- Very little evidence of a positive effect of teacher-student ratio
- In Udaipur, RCT in the mid 1990s
  - 20 randomly chosen schools got an extra teacher
  - School attendance went up. No change in test scores
- In Vadodara and Mumbai, implementation of the Balsakhi (children's friend program) in the early 2000s.
  - Pull-out program for remedial education
  - No improvement in those predicted to be left behind
- Similar results from Kenya (Duflo-Dupas-Kremer) in the late 2000s



# Teachers often do not Teach



- High absence rates have now been documented in many countries (World Absenteeism Survey)

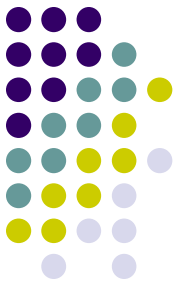


# Teaching works

- Is absence a serious problem: evidence from a randomized trial of cameras in Rajasthan, India, for monitoring teacher presence with presence based incentives in NGO schools (Duflo, Hanna, Ryan)
- Absence dropped from 42% to 21%. Test scores went up by about 0.2 standard deviations
- Muralidharan's results



# Evidence on pedagogy: Remedial teaching



- The remedial education program mentioned before tested in two cities
- High school educated teachers help paid Rs.1000 a month
- Very large effects on test scores of the lowest performing children after a year.
- Even bigger after two years (0.6 sd)



# Learning to read



- Results from a randomized experiment in Jaunpur, India
- This is an area where child attendance is 50%
- 15 percent of children age 7 to 14 could not recognize a letter;
- Only 39 percent could read and understand a simple story (of grade 1 level);
- 38 percent could not recognize numbers.
- In 65 randomly chosen villages Pratham, an educational NGO, recruited volunteers through information and discussion of learning levels.
- In each village several “volunteers” with high school education were given one week training on how to teach reading

# Children can learn fast...





# Children can learn fast...

- Volunteers conducted evening “camp” for 2 months.
- A year later, the average child who could not read anything at baseline and who attended the camp was 60 percentage points more likely to decipher letters
- The average child who attended the camp and who could decipher letters, but not words, in the baseline was 26 percentage points more likely to be able to read and understand a story compared to control
- Combined with natural progress over a year, this means that 100% of those who attended could read letters
- 35% of those who could do letters now read stories





# Summer schools

- Bihar.
- *Government school teachers* were given some special training and conducted summer school classes for four to six weeks
- Large gains (0.2 sd in treatment villages but only 17.5% attended)
- The average child who attended gained  $\frac{1}{2}$  a level (i.e nothing to word, word to para, para to story)



# Tracking

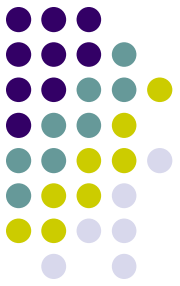
- In Kenyan government schools
- Started with huge class sizes; extra local teachers hired to allow smaller classes
- Some randomly chosen classes were divided in two based on past performance of the children
- Others were divided randomly.
- The children in both the tracked classrooms did better at all points of the distribution (0.2 sd)



# Reading to learn

- Also in Bihar
- Version of remedial education targeted at children who can read
- Materials plus volunteers trained in how to use them
- Large gains among high performing kids as well.
- No gains in the absence of the volunteers





# Computer assisted learning

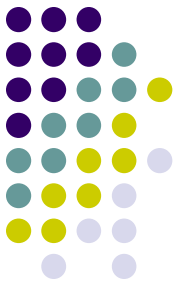
- Most evidence from the OECD suggest computers do not help
- Potentially very different in developing countries
- RCT in India at the same time as the Balsakhi study. Gains of 0.47 sd in math scores.
- On the other hand OLPC study found nothing
- Structured curriculum versus “freedom”



# Evidence on demand

- Some evidence of low child/parent motivation
- Child attendance rates in ASER is around 70% on days when school is open
- However child motivation is in part an outcome of the teaching/learning environment.
- If you are totally lost in class then it is hard to be motivated

# The Jaunpur program worked but...

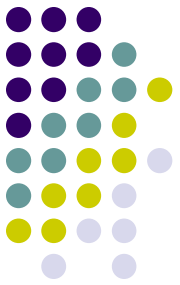


- Only 8% of children (13% of those who could not read) attended camp
- Did parents know that there was a problem?
- Pratham did an extensive campaign in 130 of these villages testing a large fraction of the children, teaching parents how to test, and sharing the results
- Did not do anything to complain to the school system or shift children to a better school (even absent the camps)
- Consistent with evidence from Pakistan that parents in (randomly chosen) villages that got a negative “school report card” don’t shift their children.



**Part of the other 92%**

# Direct evidence of demand effects



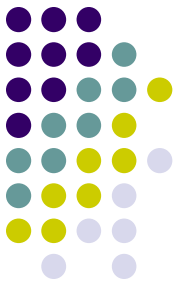
- Foster and Rosenzweig: effect of HYV
- Kremer, Miguel, Thornton (2008): effect of \$20 scholarship for top 15% performers
  - Girls in Kenya
  - Effect of 0.2 sd on girls
  - Effect on teacher effort
  - Effect of 0.1 sd on boys and on girls unlikely to win the prize





# More on demand effects

- Jensen (2009): effect of information about opening of call centers on school participation among girls In India
- Jensen (2005): Effect of information about returns to education in Dominican Republic on school attendance
- In Madagascar Nguyen (2009) gave parents information on the average returns on education
- 0.2 standard deviation gains in test scores overall
- 0.4 among those parents who underestimate returns
  - Child attendance went up by 3.5 percentage points
- Berry (2008): Small bonus for doing well for first graders either for child or for parent improves test scores

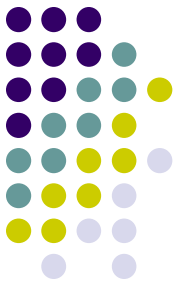


# Is demand the main story?

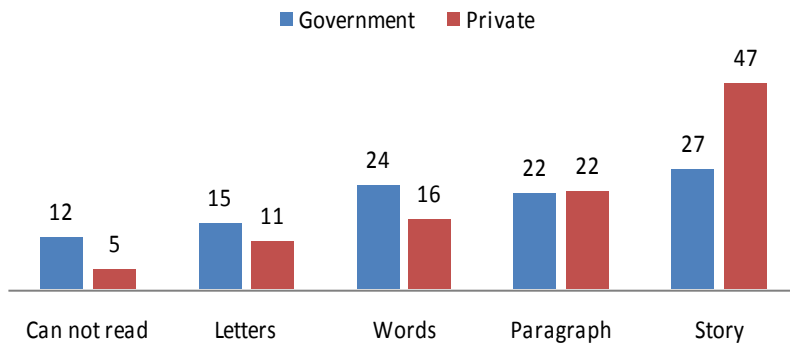
- One way to look at this is to look at children who go to private schools. Demand driven
- Lot of self-selection (though in South Asia, less than one would imagine because of the \$1 a month private schools).
- Without taking self-selection into account (from Desai et al.):



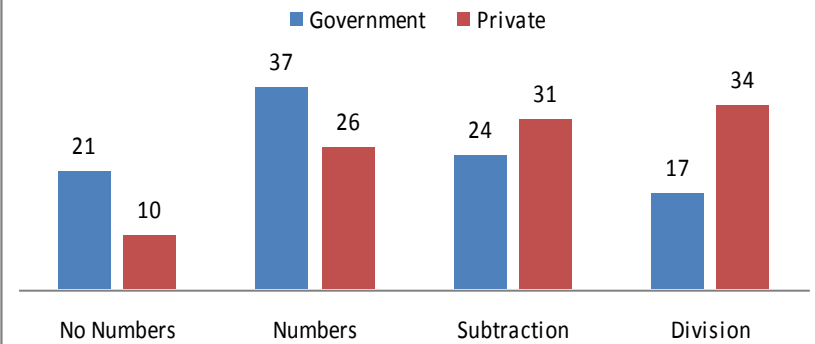
# But do private schools offer better education?



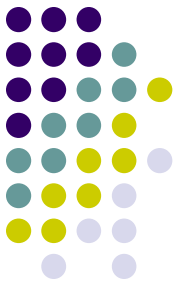
**Fig. 4. Distribution of Reading Skill by School Type**



**Fig. 5. Distribution of Arithmetic Skills by School Type**



# Controlling for Selection into private schools



- Educated, higher income parents send their children to private schools
- Using family fixed effects the private school effect
  - **+0.31\*\*\* for reading skills**
  - **+0.22\*\*\* for arithmetic skills**
- There is probably some self-selection in that since parents discriminate.
- Comparable to the Rajasthan incentive study (the benefit of pure attendance)

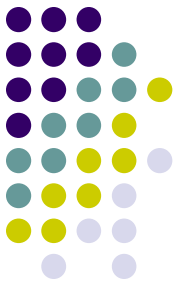




# On the other hand

- Much bigger effects from pedagogical interventions
  - In other words, private school teaching is often much less effective, than these often brief interventions by motivated but poorly trained teachers.
- Significant gains when the AP government gave govt. school teachers token rewards based on child performance (even after 5 years)
- Suggests that demand is not the only problem
- What else?

# What could be going on: some hypotheses



- The universally shared (private schools/public schools) pedagogy is grossly inappropriate
- Based on covering material rather than generating learning.
  - Right to Education in India legislates that schools must cover a fixed syllabus



# Education as a lottery

LOTTO

Ball 1:

Ball 2:

Ball 3:

Ball 4:

Powerball:





# Education as a lottery

- Consistent with a theory that says that parents see education as a gamble with long odds: if my child is smart she will make it and get a government job. Otherwise too bad. No point fighting fate
- Happy to give it a shot, but starting from a premise that a child's capacity is mostly given
- Teachers also take the same view and aim to serve the top students only.
- All the evidence suggest that they are probably wrong





# Self-fulfilling prophecy

- At some very early age, kids either get it or miss something very basic about reading and math.
- Once they have missed it, everyone basically decides that they are stupid. Nobody bothers to help them catch up.
- They start believing that they are stupid and give up.
- Which reinforces what their parents and teachers believe.



# The theory fits with..

- Parents discriminate between children, want to pick the “intelligent” child for private schooling (evidence in LEAPS in Pakistan)
- Parents in Madagascar say that 70% of those who will complete schooling will get a government job. The truth is 33%
- On average get the returns to schooling right
  - But enormous dispersion—some overestimate, many underestimate (and under-invest)

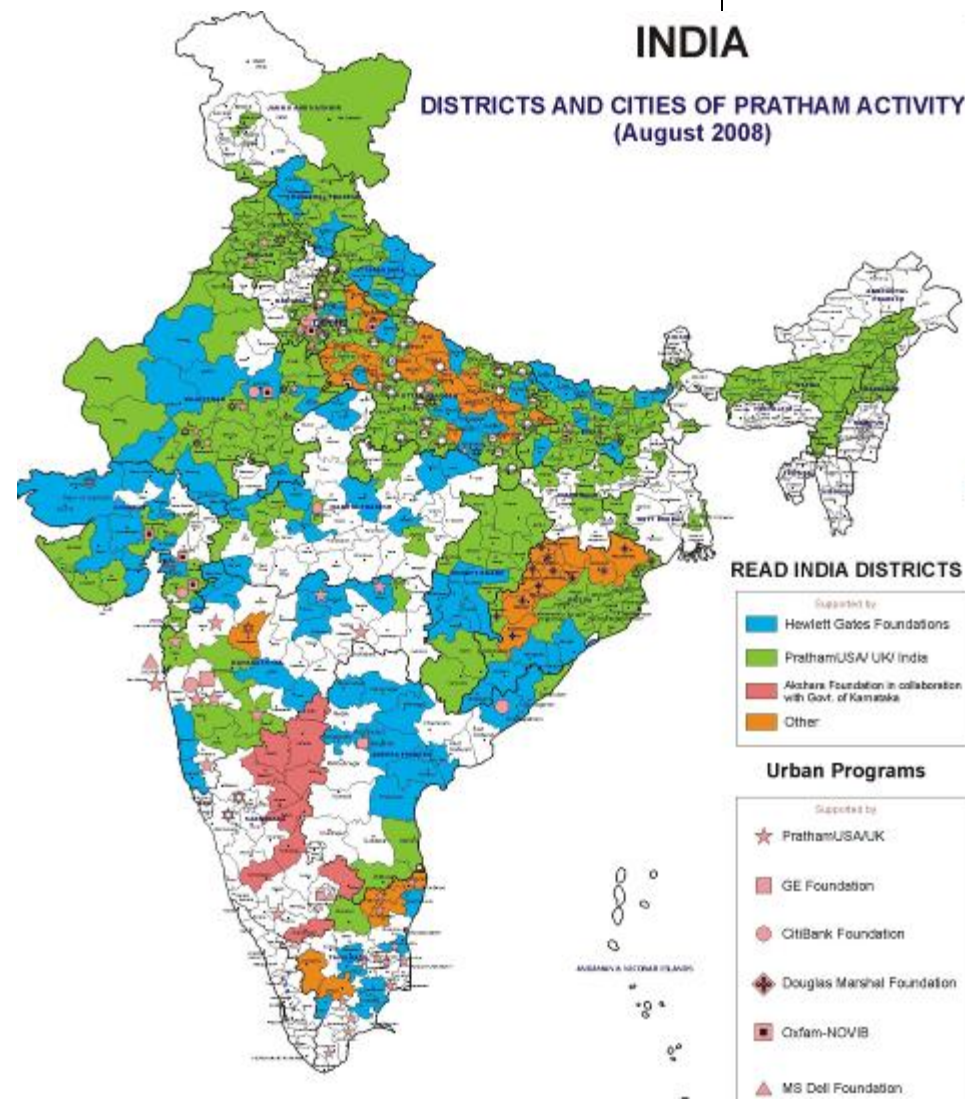


# It explains

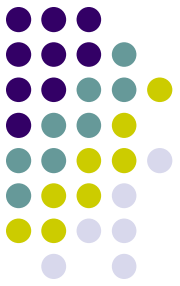
- Why the returns to remedial education are so high
- Why learning is so slow after the first two years.
- Why even small bonuses might work
- Why tracking works
- Why government teachers perform so differently in summer schools?
- Why textbooks only work for the best children
- Why being in school does generate learning but changing the teacher student ratio does not
- Why private schools do not do much better

# What is to be done?

- Change pedagogy: focus on integrating the various Pratham innovations, for example, into regular teaching.
  - This is what Pratham is trying to do all over India:
  - Doesn't seem to work yet with government teachers
- Tracking?
- More flexible schooling
- More scholarships







# What more

- Change incentives: create more proximate goals that teachers can hit rather than focus on one public exam
- Change parental perceptions
- More use of ICT

