Education Markets: Part 2

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This lecture is Part 2 of a two part series on “Education Markets”, jointly with Jishnu Das. It is based on joint work with Tahir Andrabi, Jishnu Das, Selcuk Ozyurt, and Niharika Singh.

Recap

In Yesterday's Lecture (part 1) we illustrated FOUR Key points

1. **Optimism & Agency:** Despite all the educational challenges, we have made substantial progress in education, especially in low-income countries; And can do more!
2. **The Educational Ecosystem**: There is an active education market-place with significant variation (price, quality, etc.) and choice in schooling and parents/students value this variety
3. **Data helps:** It provides a rich description of the educational ecosystem, relevant actors and the frictions they face, and underlying market-failures that need to be addressed
4. **Theory helps**: It underscores why we have such an active education ecosystem, and helps us design and understand the impact of educational interventions that can raise quality and educational productivity

What we will cover in this lecture

- Demonstrate through two examples (papers) how “market-level” interventions can help raise educational quality
  - Example 1: Addressing Informational Frictions
    - Paper: Andrabi, Tahir, Jishnu Das, and Asim Ijaz Khwaja. "Report cards: The impact of providing school and child test scores on educational markets." American Economic Review, 2017.
  - Example 2: Addressing Financial Frictions
    - Andrabi, Tahir, Jishnu Das, Asim I. Khwaja, Selcuk Ozyurt, and Niharika Singh. "Upping the ante: The equilibrium effects of unconditional grants to private schools." American Economic Review 110, 2020.
- In doing so we will learn the importance of:
  - Taking a systems-approach that stresses accounting for all relevant educational actors & their responses
  - Using basic data description to help identify underlying market-failures
  - The importance of (general) equilibrium thinking
  - Careful causal inference

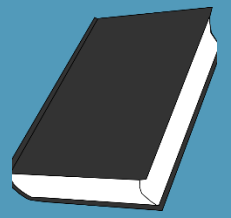
Outline

- Systems Approach: Brief Intro (10 m)
- Question break
- Example 1: Addressing Informational Frictions (30m)
- Question break
- Example 2: Addressing Financial Frictions (30m)
- Question break
- Concluding Thoughts (5m)

A systems approach to raising educational quality

A Common Policy Approach:

Input Augmentation



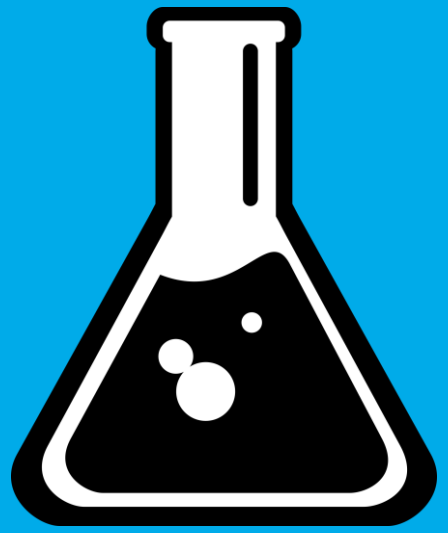
Pick a particular standardized educational input (textbooks, teachers, technology, etc.) to provide

Test how well it does and scale-up if doing well

Challenges:

- ***How do we know which input to pick?***
- ***What if we need a context-specific approach?***

A Different Approach:
Inverting the Question



Why aren't schools innovating to perform better?

Two possible Reasons

1. There isn't really any issue: Schools may be at equilibrium (quality is what people want/can afford)

2. There is an underlying market-friction (failure) that is preventing schools from improving
   - Opportunity: Addressing it can allow us to improve outcomes while decreasing costs (productivity goes up)

Addressing Frictions

Schools don't function in isolation – they are part of a large ecosystem with multiple actors

STEP 1:

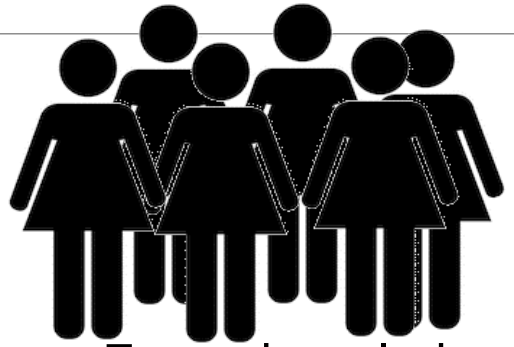
Identify system-level frictions in education

STEP 2:

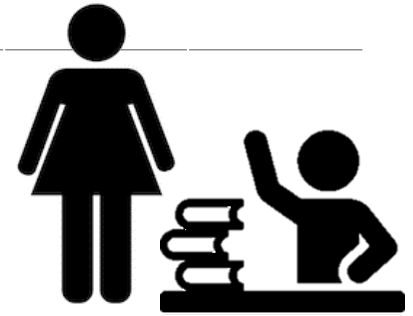
Address frictions through experimentation & iteration

Think of all the actors …

Parents and students

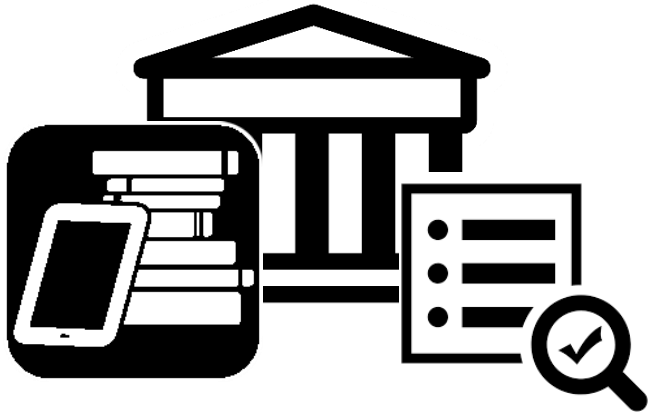


Teacher labor market



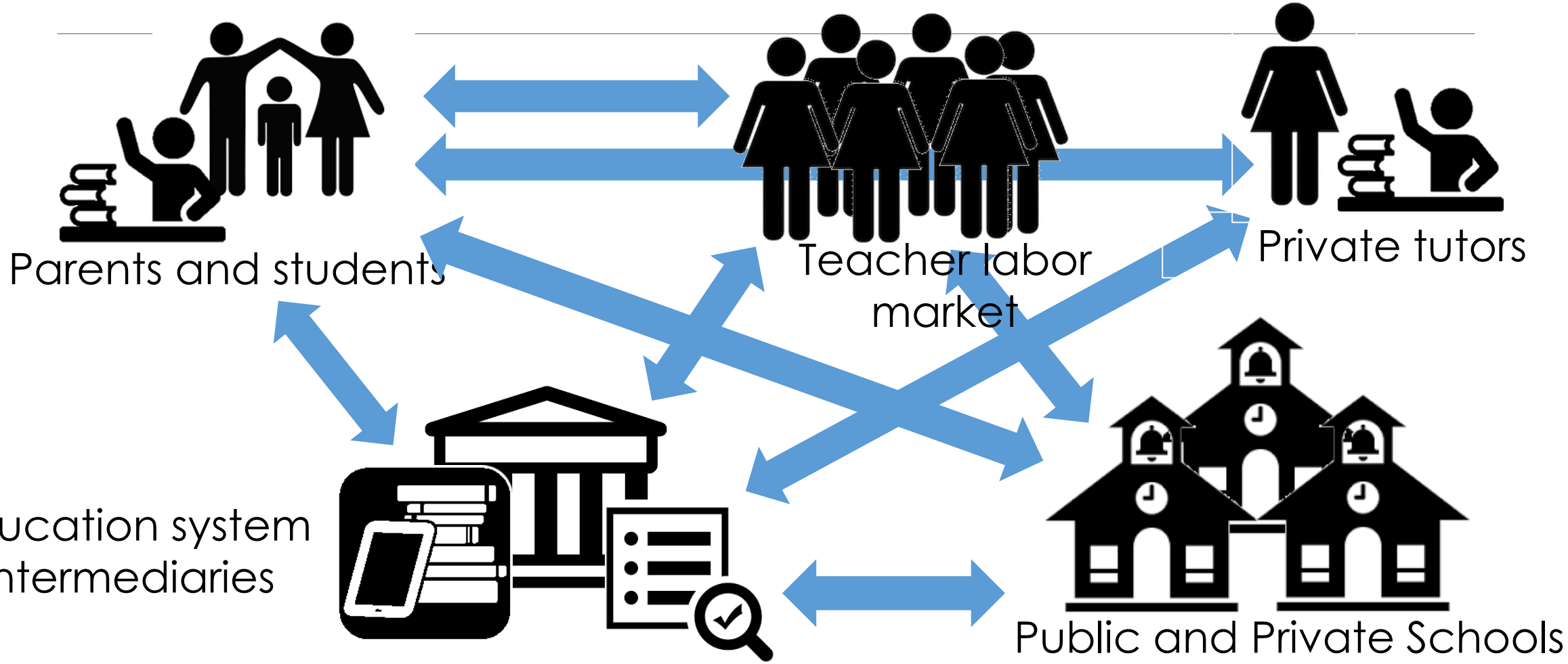
Private tutors

Education system intermediaries

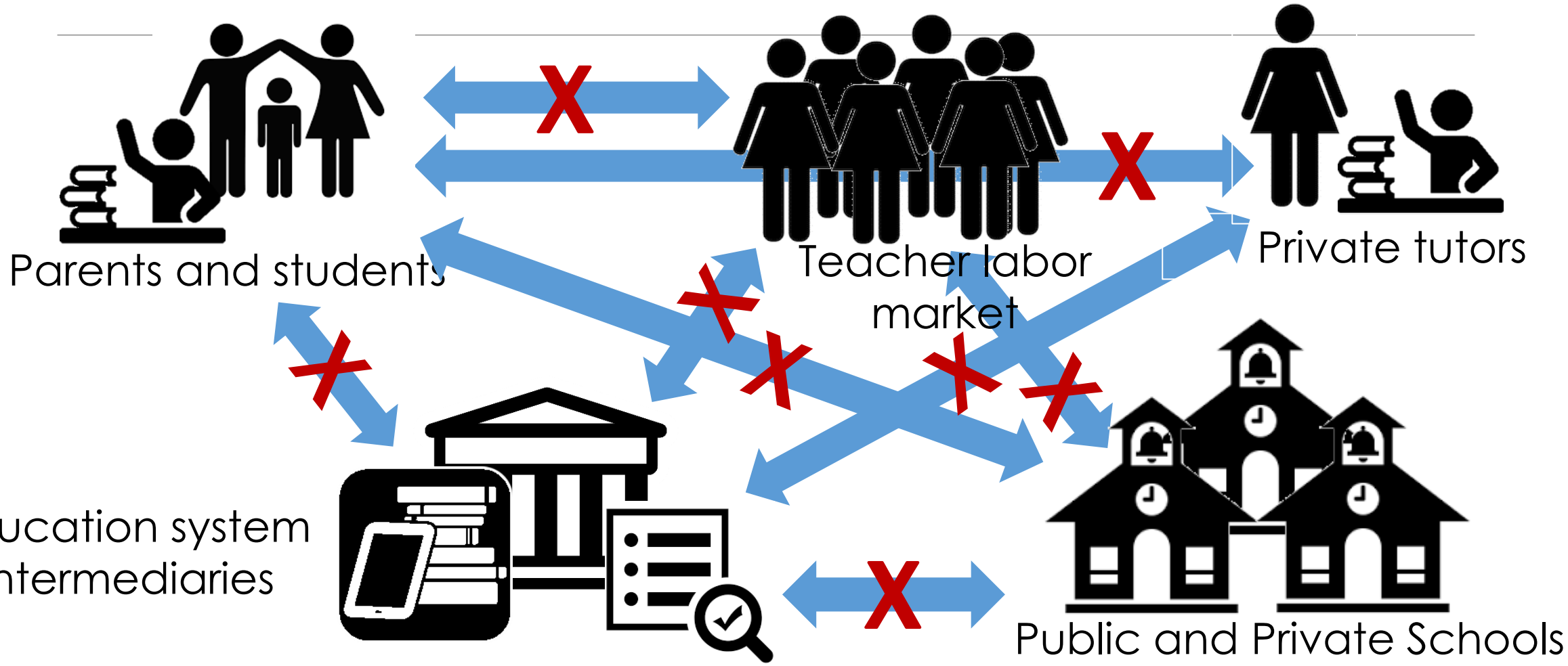


Public and Private Schools

All need to be engaged in effective exchange



But frictions can block these exchanges



Need to address frictions to enable effective exchange between actors

Benefits:

Empower actors to find out what input is needed

Individualized & Context-specific

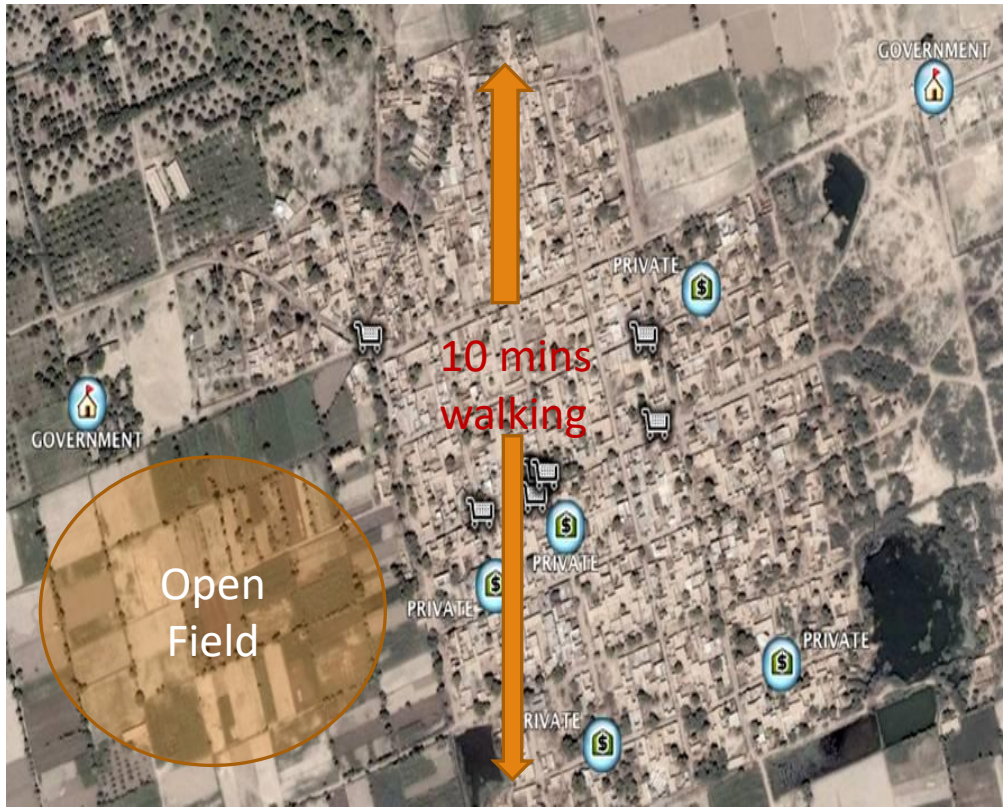
Market-based Evaluation approach

Growth of private schools in LMIC offers opportunity to experimentally link supply side responses to policy changes in local markets (ANDRABI ET AL. 2013, ANDRABI ET AL. 2017)

Three requirements

- **Closed Markets:** >95% of children in village go to school in village; >95% of school enrollment drawn from village
- **Flexibility:** Private school owners can adjust behavior to respond to localized changes
- **Variation:** Experimental (or natural) variation in local environment

Key evaluation point: Allows for Market-level randomization



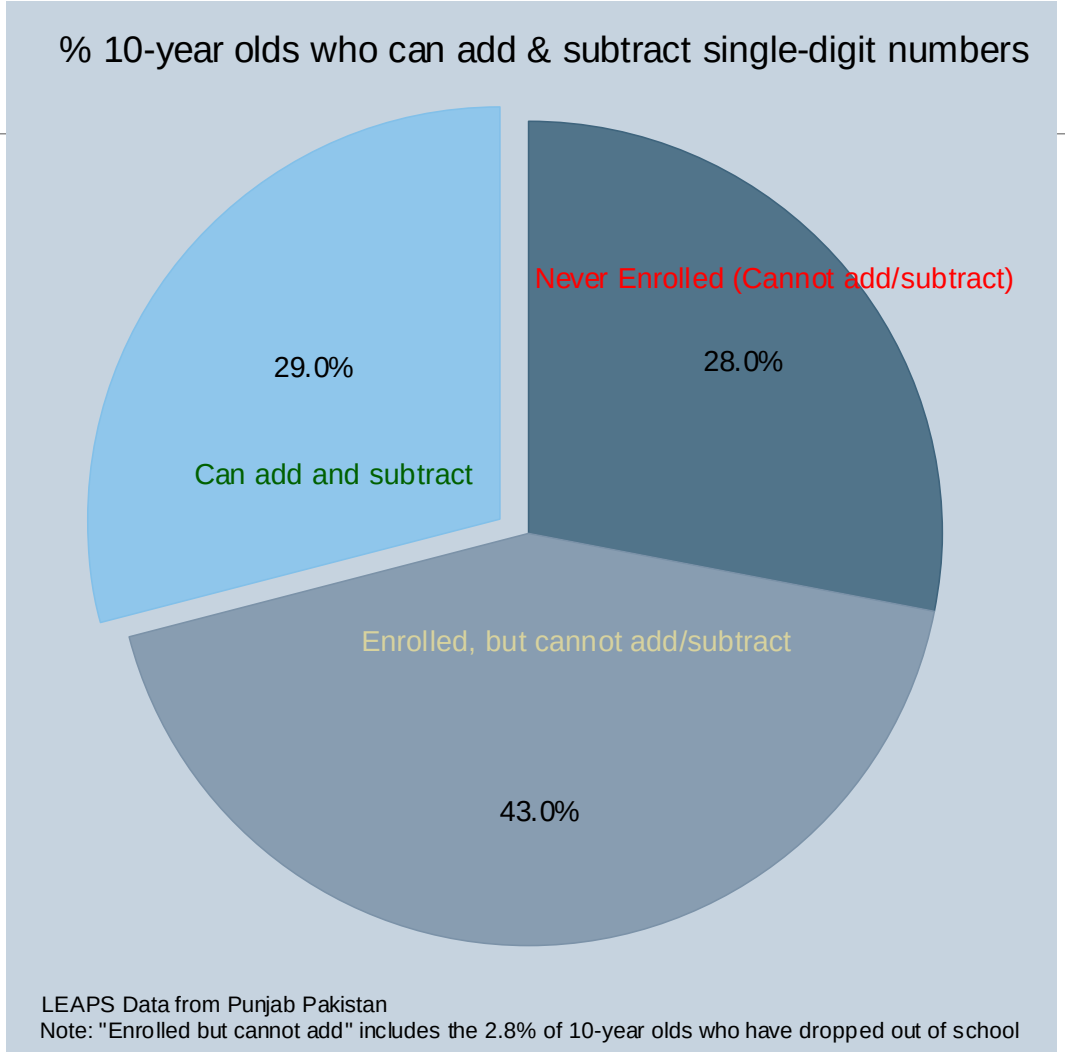
Question Break

Post-Break agenda

1. Example 1: Addressing Informational Frictions
2. Example 2: Addressing Financial Frictions
3. Concluding discussion

The Case of Pakistan: Quality- Look at levels and growth

Learning levels are poor



Growth: And quality is stagnant

Between 2003 and 2006:

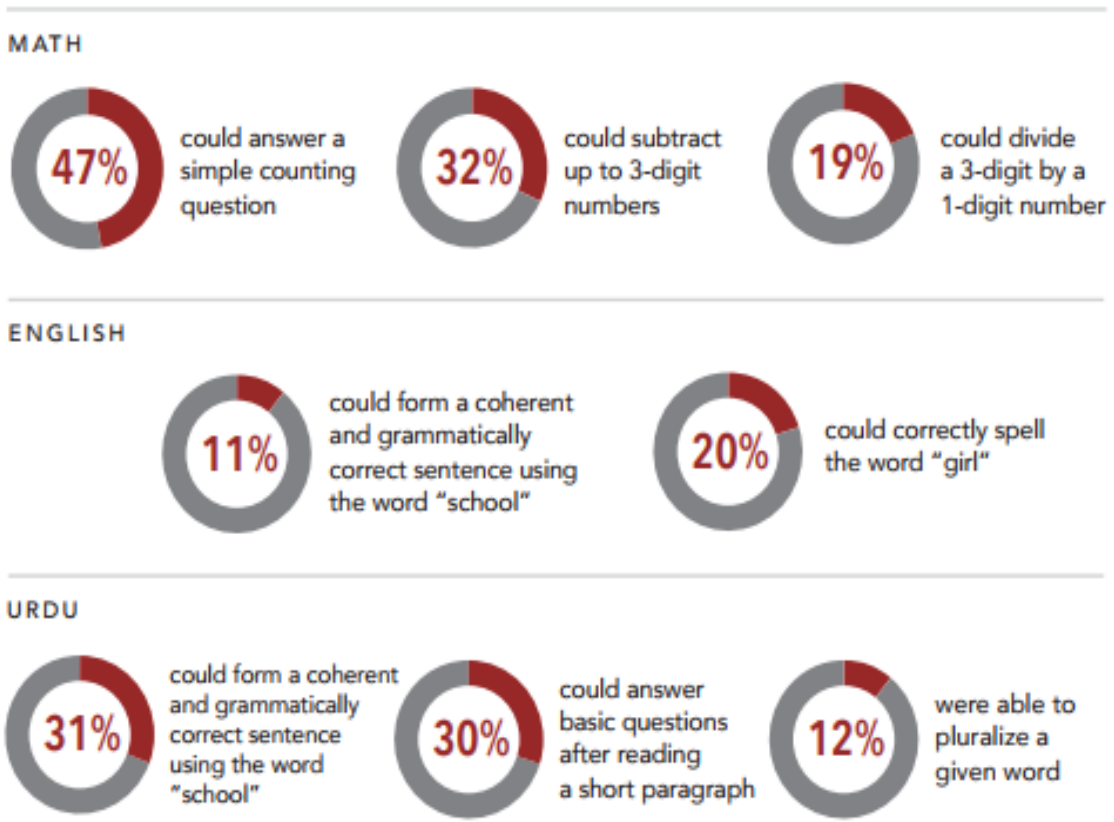
- English scores remained stagnant
- Urdu and Mathematics scores dropped slightly

Table 1.4: Rising Enrollment, Lagging Learning

Subject	First Cohort Class 3 in 2003			Second Cohort Class 3 in 2006	
	Knowledge score	Percent Score		Knowledge score	Percent Score
English	500	30	→	502	31
Urdu	500	29	↘	463	27
Mathematics	500	38	↘	479	34

Pakistan's Learning Situation

LEAPS, 2008



Grade 3, rural Punjab, 3 districts

ASER, 2016

MATH

can do 2-digit subtraction:
29.3%

ENGLISH

can read a sentence:
14.7%

URDU

can read a sentence in Urdu/Pashto/Sindhi:
41.6%

A child who drops out in Grade 3 will most likely not be functionally literate or be able to do basic arithmetic.

1: INFORMATIONAL FRICTIONS

- Why is Quality so low?

  ….Especially in the private sector where we would think market forces should work?

- For markets to function well they need to be competitive and **consumers (parents/students) need to be well-informed**

- Let’s look at the data to see if that is the case

Market seems competitive

Fees are relatively low:

- Median fee equivalent to days unskilled labor
- Total cost only 50% of public sector

Median profits are low

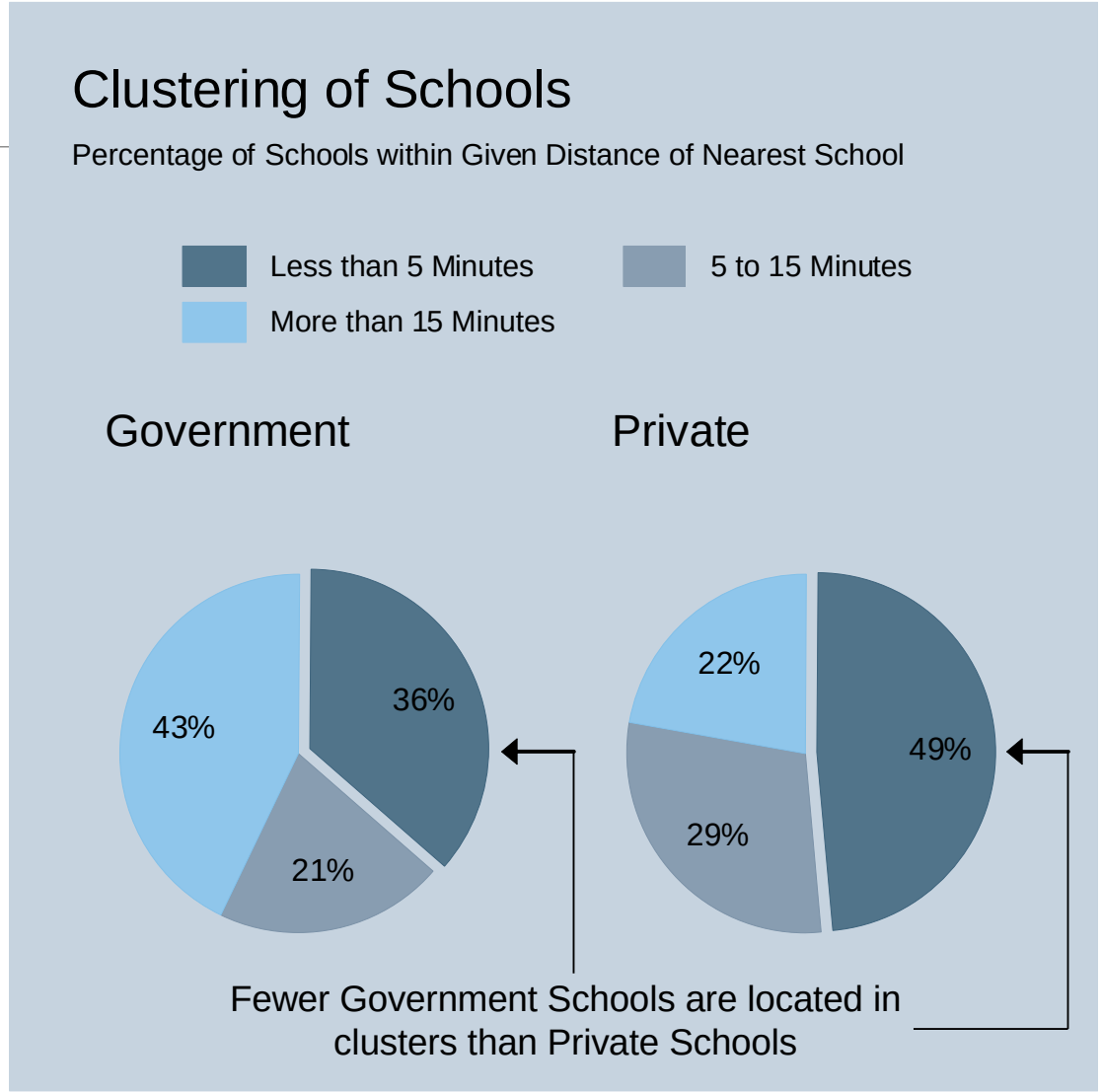
- Median is about the same as a private school teachers' monthly wage

Lots of variation in fees and profits

- Most variation at the village level
- Variation in fees driven by school quality/inputs, not village differences
- One standard deviation higher scores charge 20% more

Private schools cluster

- Average of 8 schools/village



Parents

Parents – Illiterate but active and engaged:

- For most choice is not to enroll or not but which school to choose & how much to invest
- HHs spend 3-5% per child of their overall budgets on schooling expenditures
- Even a poorest third of households, have out-of-pocket expenditures ~ ¾ government educational spending

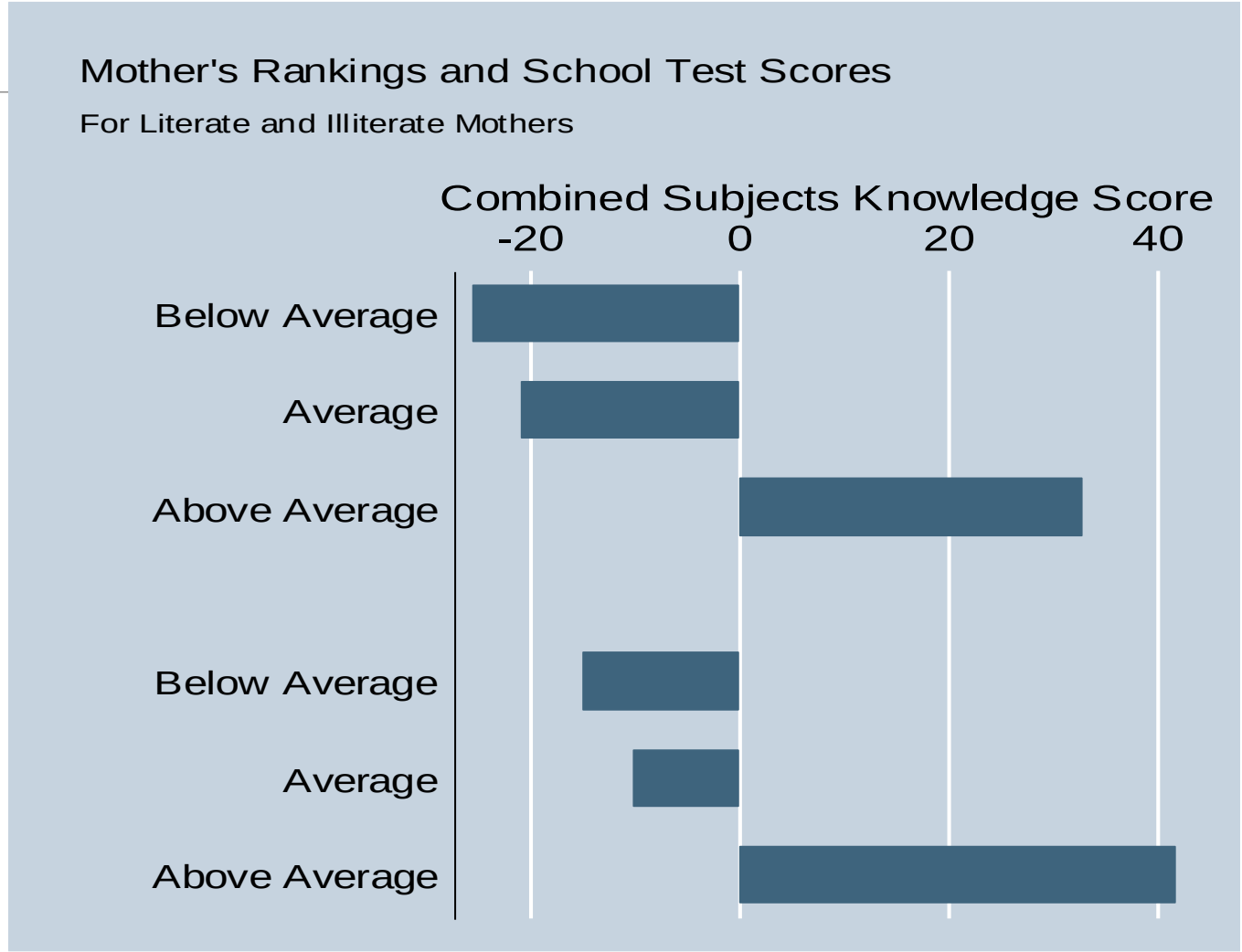
Demand for Information:

- Parents would often ask us to evaluate their child
- Mothers (fathers) haven't heard of all schools in their village – 60% (70%)
- BUT can (roughly) rank schools they know of, own children (although worse at average/below ave. quality)

While Parent's know something about school quality …

Parents are:

- Worse at distinguishing between lower performers
- Quite a bit of "noise" & "imprecision) in assessments (within village, across parents)
  - A 10 percentage point increase in school test scores improves parents' perception of quality (on a scale of 1 to 5) by 0.1



Can we improve market structure by providing information?

Always ask: Why hasn't the market solved this problem?

- You must be able to identify a potential market failure
- Otherwise, you may have misdiagnosed the problem

Information as a public good

- Costly to acquire, but non-rival and relatively non-excludable
- So, there is a possible market failure

Next – how do we design an intervention to address this problem?

- Must be cost-effective, replicable, scalable

STUDY 1: "Report cards: The impact of providing school and child test scores on educational markets." American Economic Review, 2017.

Sample:

- 112 villages from 3 districts in the Punjab, Pakistan
- Randomly selected from list of villages with at least one private school in 2000 (3rd of villages & 50% of pop); somewhat bigger/richer than average village

Survey Instruments & Timeline:

- HH census (80,000 hhs) – 2003
- Round 1 (Baseline):
  - School-Based (Jan-Feb 04): (i) 823 primary schools + class 3 teachers; (ii) 800+ Class 3 teachers; (iii) 6,000 class 3 kids (brief info)
  - HH-Based (March-Apr 04): Detailed HH surveys (1,800); part matched on class 3 children
  - Child-Tests (Jan-Feb 04): 12,000+ Class 3 children – Norm-referenced test to maximize variation – Use Item Response Theory to get at underlying child knowledge; we administer (minimize cheating etc.)
- Report Card Intervention – Sept/Oct
- Round 2 (2005): Report all of Round 1 Surveys/Tests (96% children tracked)

Designing the report cards intervention

Needed to answer three key design questions:

- **Content:** What information is missing?
  - What do parents want to know?
  - What information shapes schooling decisions?
- **Delivery:** How is information best communicated & understood?
- **Credibility:** How to ensure information provided is believed?

Inputs into design

Main Method: Intensive focus groups with parents

Content:

- Found that parents wanted information both about school quality and child ability
- Because of a high choice environment, need information across schools
- They wanted to know how much children knew relative to others
- This fed into design of tests (norm-referenced testing as opposed to criterion-referenced) and of report cards
- Timing – when to present the information?

Understandable:

- Smiley faces or numbers?
- Levels or Value-add Measures?

Credible:

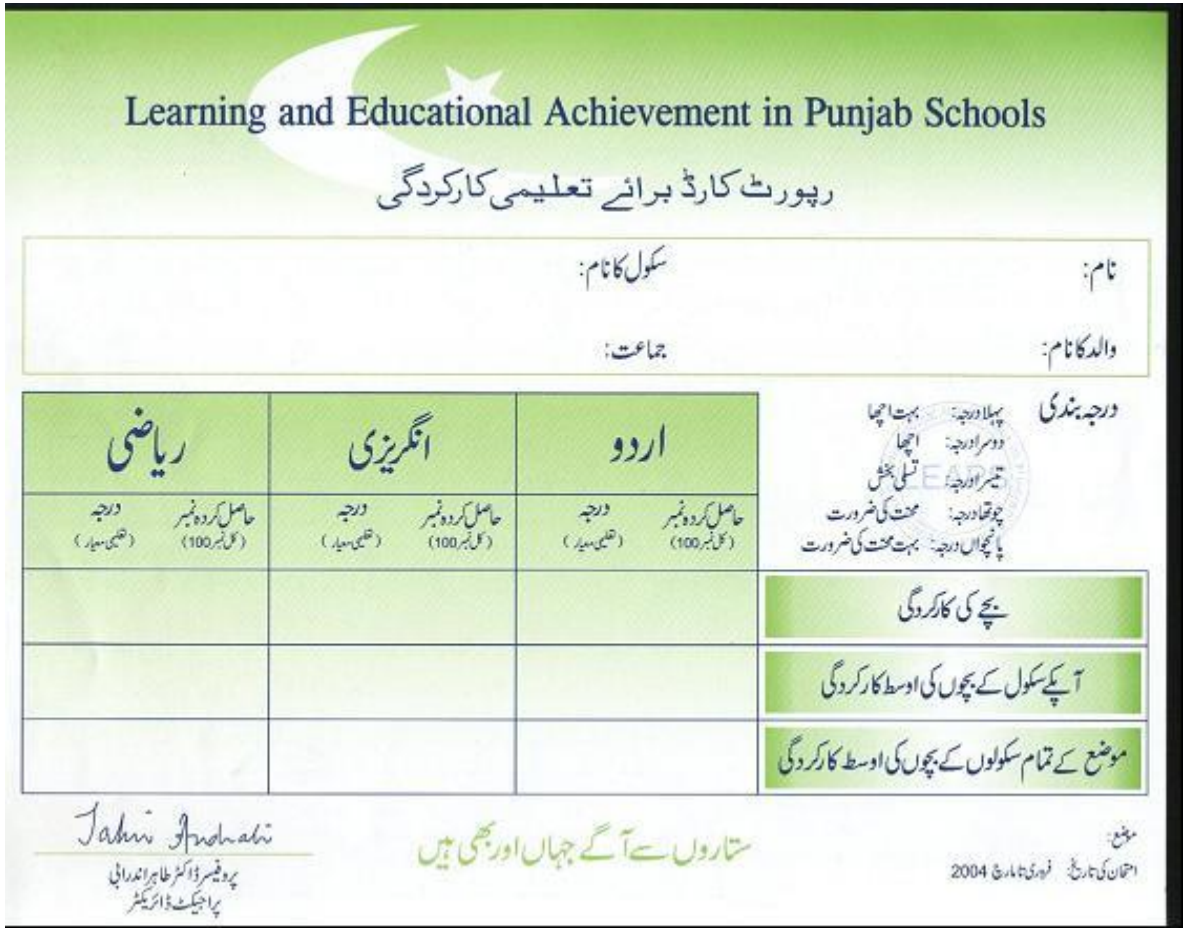
- State testing vs. Private ?

The Report Card Intervention

Provided to each Class 3 kid parent in school-meeting – explain scores

Parent Card 1: Child Info

- In all 3 subjects (Maths, Urdu & English):
  - Child score and quintile
  - Child's School score & quintile
  - Child's village score and quintile
- Quintile described as "needing a lot of work" to "very good"



Learning and Educational Achievement in Punjab Schools

رپورٹ کارڈ برائے تعلیمی کارکردگی

نام: سکول کا نام:

والد کا نام: جماعت:

درجہ بندی
پہلا درجہ: بہت اچھا
دوسرا درجہ: اچھا
تیسرا درجہ: تسلی بخش
چوتھا درجہ: محنت کی ضرورت
پانچواں درجہ: بہت محنت کی ضرورت

	اردو		انگریزی		ریاضی	
	حاصل کردہ نمبر (کل نمبر 100)	درجہ (تعلیمی معیار)	حاصل کردہ نمبر (کل نمبر 100)	درجہ (تعلیمی معیار)	حاصل کردہ نمبر (کل نمبر 100)	درجہ (تعلیمی معیار)
بچے کی کارکردگی						
آپکے سکول کے بچوں کی اوسط کارکردگی						
موضع کے تمام سکولوں کے بچوں کی اوسط کارکردگی						

Tahir Andrabi

پروفیسر ڈاکٹر طاہر اندرابی
پراجیکٹ ڈائریکٹر

ستاروں سے آگے جہاں اور بھی ہیں

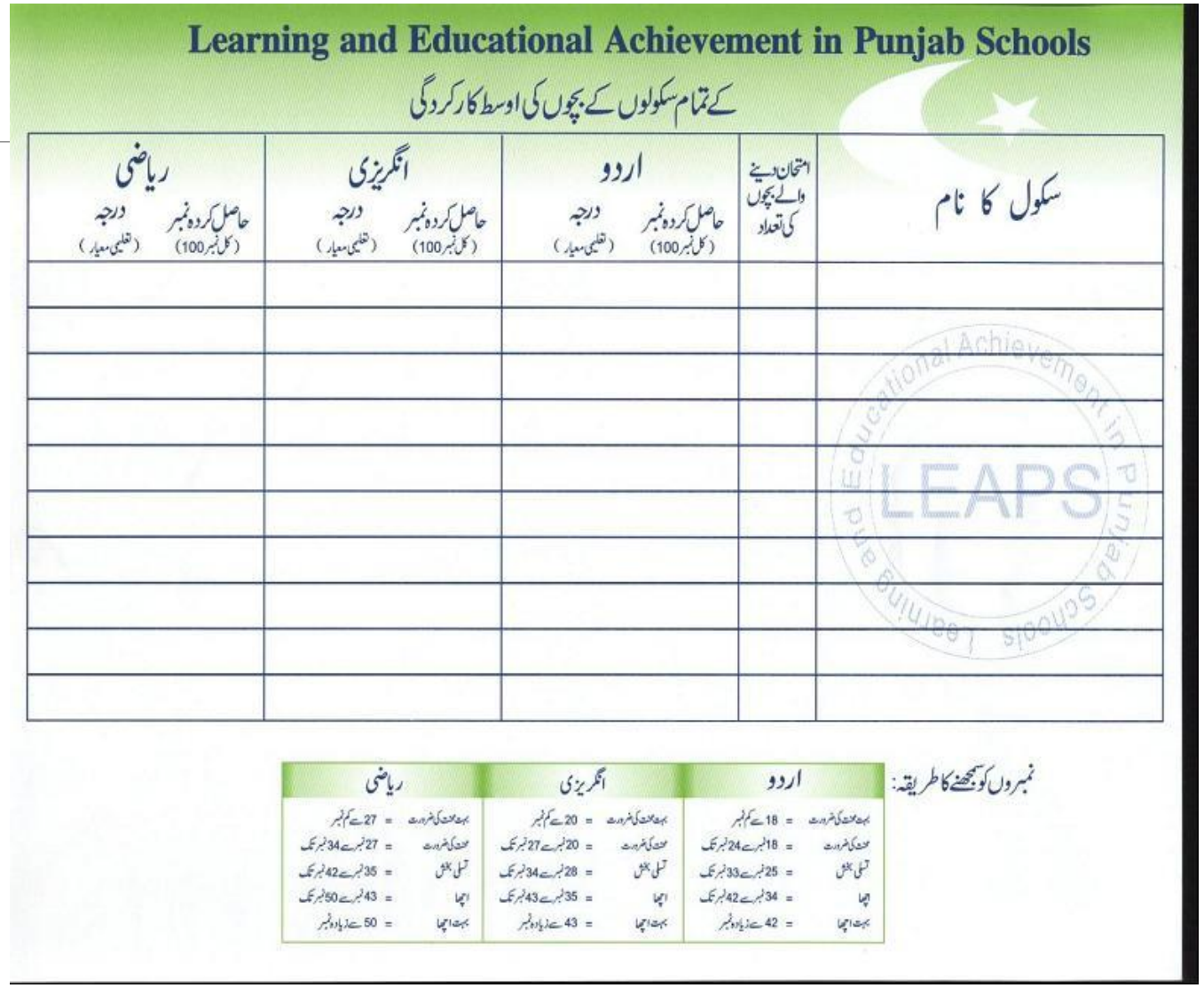
موضع:
امتحان کی تاریخ: فروری تا مارچ 2004

The Report Card Intervention

Parent Card 2: Village Schools Info

- For all Primary schools in villages give :
  - School Name
  - Tested Children
  - School scores and quintiles in all 3 subjects

- "Bundled-Impact":
  - Information (child, schools)
  - Increase precision, verifiability
  - Meeting effect?



Learning and Educational Achievement in Punjab Schools

کے تمام سکولوں کے بچوں کی اوسط کارکردگی

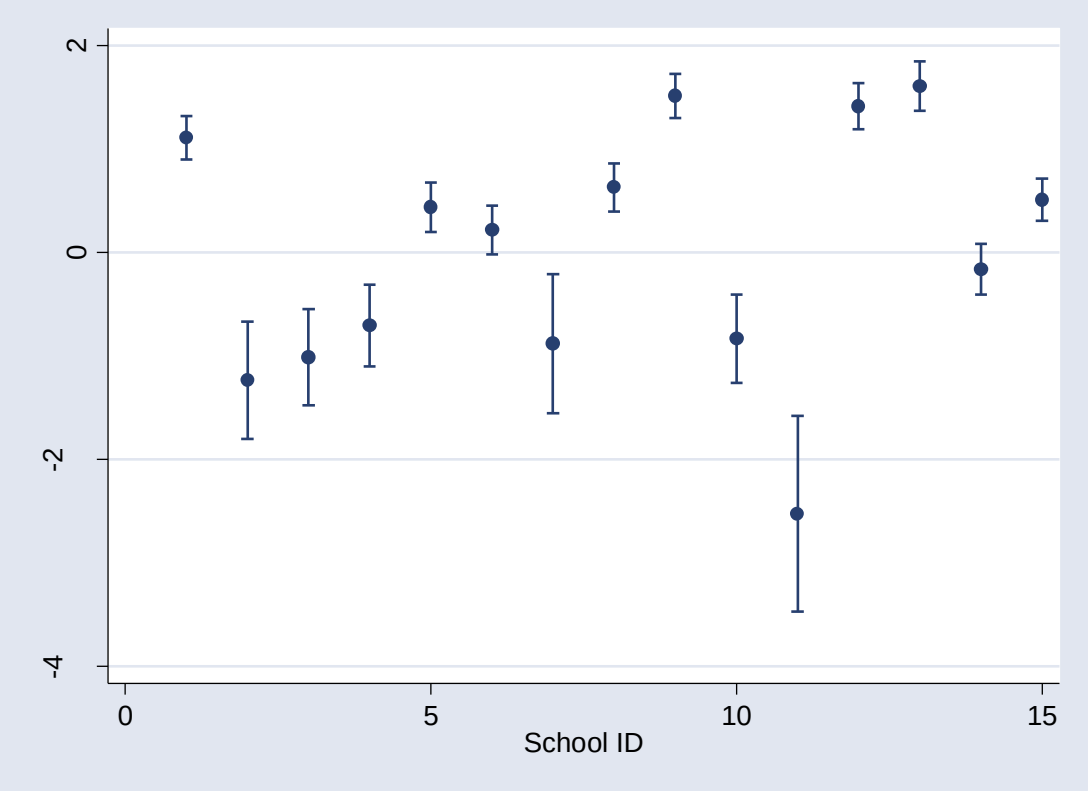
سکول کا نام	امتحان دینے والے بچوں کی تعداد	اردو		انگریزی		ریاضی	
		حاصل کردہ نمبر (کل نمبر 100)	درجہ (تعلیمی معیار)	حاصل کردہ نمبر (کل نمبر 100)	درجہ (تعلیمی معیار)	حاصل کردہ نمبر (کل نمبر 100)	درجہ (تعلیمی معیار)

نمبروں کو سمجھنے کا طریقہ:

اردو		انگریزی		ریاضی	
بہت محنت کی ضرورت	= 18 سے کم نمبر	بہت محنت کی ضرورت	= 20 سے کم نمبر	بہت محنت کی ضرورت	= 27 سے کم نمبر
محنت کی ضرورت	= 18 نمبر سے 24 نمبر تک	محنت کی ضرورت	= 20 نمبر سے 27 نمبر تک	محنت کی ضرورت	= 27 نمبر سے 34 نمبر تک
تسلی بخش	= 25 نمبر سے 33 نمبر تک	تسلی بخش	= 28 نمبر سے 34 نمبر تک	تسلی بخش	= 35 نمبر سے 42 نمبر تک
اچھا	= 34 نمبر سے 42 نمبر تک	اچھا	= 35 نمبر سے 43 نمبر تک	اچھا	= 43 نمبر سے 50 نمبر تک
بہت اچھا	= 42 سے زیادہ نمبر	بہت اچھا	= 43 سے زیادہ نمبر	بہت اچھا	= 50 سے زیادہ نمبر

Pay attention to Implementation details

- Carefully monitor delivery of information
- Check whether parents understand, update their beliefs
- What information does this card convey?
  - *Reliable*
    - Low measurement error of test
    - Large variation across schools
  - *Clear and understandable*
    - Households may be better able to back out value-added
  - *Feasible*
    - Methods based on multiple year test-scores hard to implement in low-income countries



village with 15 schools, showing test-score and a (2) SE band around each score

Obtain Causal Inference

- Evaluating the intervention – Randomized Controlled Trial
  - An important step is defining the unit of evaluation
    - Randomizing across households gives the greatest statistical power
    - But there are spillovers across households
    - And we are interested in market-wide outcomes
    - **So intervention was randomized at the market-level (across villages within districts)**

- Provided/Explained Report Cards to parents,& teachers in schools in a (randomly selected) half of the markets (112 villages)

- Standard Randomized Control-Treatment Design:

$$\Delta Y_{ijk} = \alpha_d + \beta \cdot RC_i + \gamma \cdot X_{ijk} + \epsilon_{ijk}$$

- Change (Post-Pre) in Outcome Y (e.g. score) for Village *i*, School *j*, Child *k*
- Run above @ Village, Child, School, and HH level

POLL: What would you expect?

Question: What would you predict the effect of information provision in Report Card Villages will be on

1. Test Scores : (i) Increase (ii) Decrease (iii) No Change
2. Prices: (i) Increase (ii) Decrease (iii) No Change

Results I: Average Impact in Treatment Villages

Quality:

- Report card intervention increased test scores by 0.1 standard deviations in treatment villages (1/3 of average yearly gain for children)

Fees:

- Private school fees declined by 21%

Enrollment :

- Modest increase in village level enrollment (3.5%) but little switching across schools

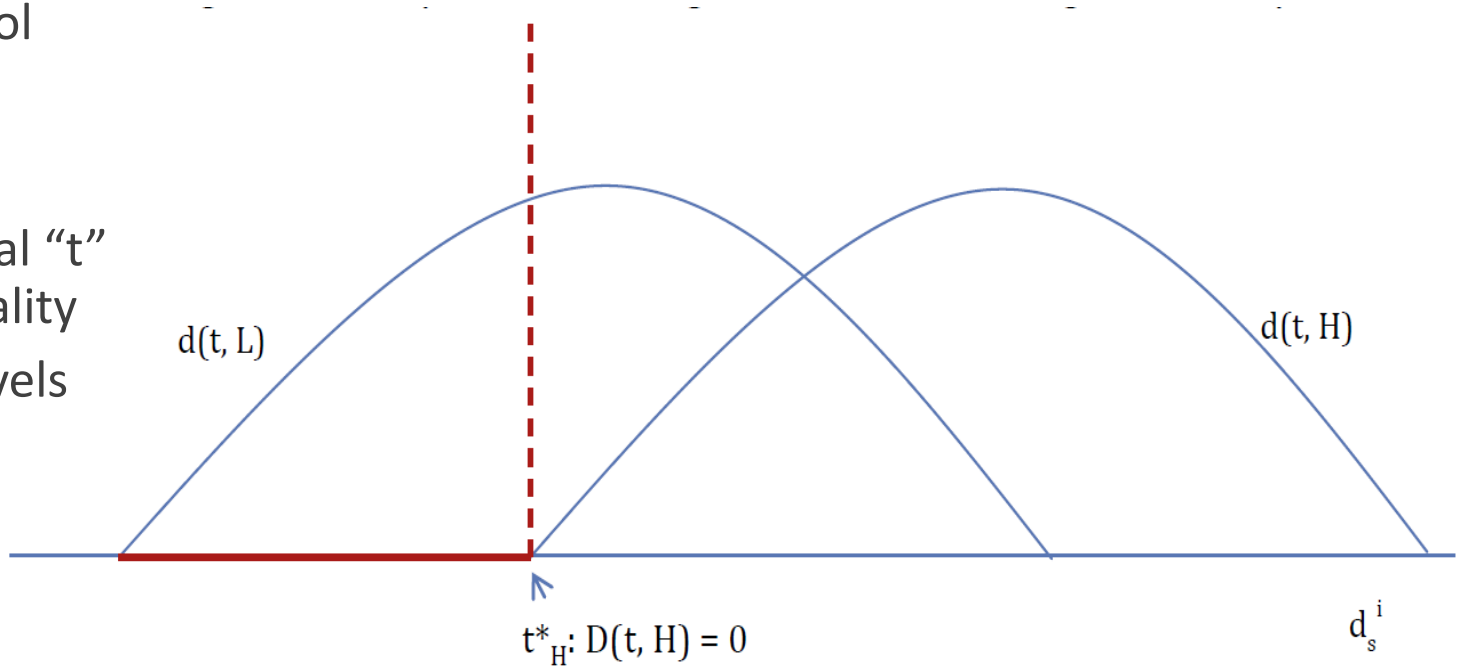
Quality/fees went up (& little switching) !!!

How did this happen?

Sketch of a theory (Wolinsky, 1983)

- Consumers:
  - Max U=u(P,Q,θ), consume 1 unit; P=school fee; Q= school quality, θ= consumer valuation of quality
- Firms:
  - Max π = (P –c(Q))x – z x= enrollment; z= school entry costs
- Information:
  - D(t,Q) = prob($d^i_f \leq t \mid q_f = q$) (consumers get signal "t" of quality – if signal below t^*_Q fully reveals quality
  - See Figure for simple case with two quality levels
  - Q= L(ow) or H(igh) quality

Density Functions of Signal with Low (L) or High (H) Quality



Increase in t* implies a better information environment

Sketch of a theory (Wolinsky, 1983)

Recall: Two central tenets of information theory:

1. Under imperfect information, separation induced by paying an informational "rent" to high quality firms (Price is a credible signal of Quality)
2. Size of information rent increases as quality difference declines →when information is poor, markets cannot separate firms that are very close in quality space (so can get "excess" quality differentiation)

Solve for Incentive compatibility condition:

- In a separating equilibrium, look for (P,Q) combinations s.t. every firm offers a different P and Q and the choice of P completely reveals the choice of Q

- Consider 2 schools H and L. Suppose H tries to "cheat" by producing Q_L(low quality) but charging P_H
  - Gains $(c_H\text{-}c_L)[1 – D(t(H), L)]x$ - (revenue from parents who get non-revealing signal and get tricked)
  - Loses $(P_H\text{-}c_H)[D(t(H), L)]x$ - (missed revenue from parents who get revealing signal & realize school is L)

- IC equates the two and pins down P_H
- Solve to obtain markup (that prevents cheating) : $\mathbf{P_H = c_H + (c_H\text{-}c_L)(1- D)/D}$

Sketch of a theory (Wolinsky, 1983)

This basic IC $\mathbf{P_H = c_H + (c_H - c_L)(1- D)/D}$ leads to 2 results

1. As information improves (t* increases), markup decreases for the high type
2. For any given information and demand structure, markup increases as L comes closer to H (this is identical to information worsening

Key insight: Information and markups are substitutes

Implications of Theory:

Higher markups for higher types; so after report cards:

- Expect to see larger price declines for initially high performing (good) schools
- Expects to see a *decline* in the P-Q gradient

Excessive differentiation when information is poor; so after report cards:

- May see more “medium” performing schools (depends on cost & demand structure)
  - Likely easier for low quality schools to improve than for high quality schools to “throw” away quality
  - So may see quality improvements for some low quality schools

Recap: Key theoretical Insight

Impact of information depends on what the initial equilibrium is

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Conventional View

- "Let there be Light" i.e. before information provision people didn't know much at all
- In this case initial eql is pooling (high and low quality charge same price)
- Information provision will allow for greater separation
  - i.e. better schools increase prices; worse schools drop prices or improve quality

But what is people know something initially?

- Now initial eql can be a separating one & can get informational rents for high quality school and excessive quality differentiation
- In this case Information provisions leads to less separation
  - i.e. higher quality schools drop prices and lower quality raise quality.

Results II: Heterogeneous Impact

Private Schools

- **Quality:**
  - (Initially) Bad private schools increased test scores by 0.33 standard deviations
  - No quality improvements for (initially) good schools
- **Fees:**
  - Driven by 19% fee decline for good private schools
  - No significant fee change for bad private schools

Public Schools:

- Quality: Public school increased test scores by 0.1 standard deviations, with no difference across (initially) good and bad schools

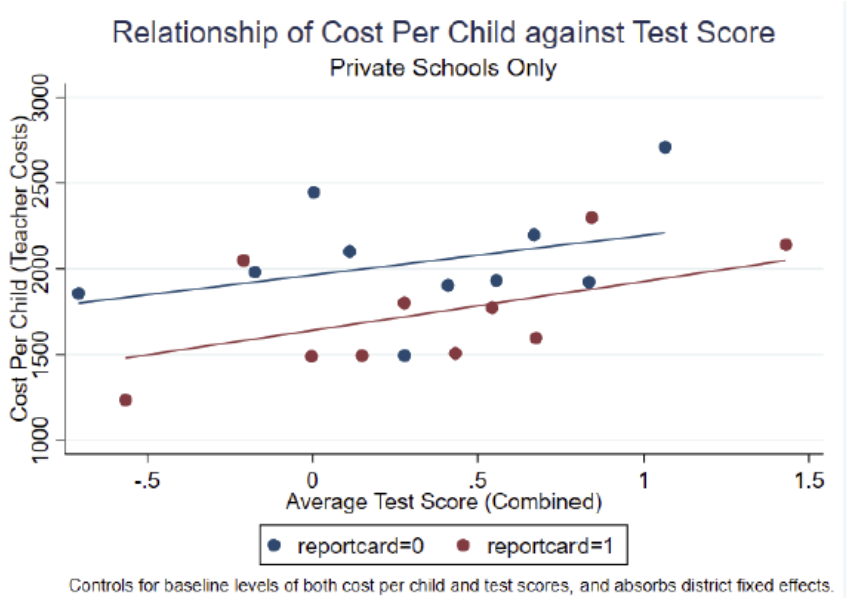
What about Welfare?

- Welfare Increased
  - Increase in quality
  - Increase in quantity
  - Prices (school fees) fell
    - Prices are transfers, so welfare impact depends on relative weight given to households versus schools
- Incredibly high return!
  - Drop in price paid for cost of providing information, with potential (positive) equity considerations!

Long term effects persist : 8 years later !!

- Continued improvements in test-scores (0.15 sd) & lower fees (– 14.5%)
  - Larger, but not significantly so in private schools (0.25 sd) compared to public (0.1 sd)
- No change in private share; no change in observed characteristics of children/parents
- Effects operate primarily through teachers for private schools
  - Decline in costs through a decline in #teachers and non-teacher bill
  - Teachers in existing public and private schools now have higher test-scores in treated villages
    - Bau & Das (2019) show that teacher test scores highly correlated with TVA in this context
- Improvements primarily reflect improvements in always-open schools

Productivity increases!



Question Break

Post-Break agenda

1. Example 1: Addressing Informational Frictions
2. Example 2: Addressing Financial Frictions
3. Concluding discussion

Example 2: Financial Frictions

Previous theoretical discussion showed why good private schools may have ended up dropping prices

But why didn't these good private schools improve quality instead?

Suggests that other constraints may also be binding

Demand?

- Evidence that demand exists for higher quality, higher price schools
- A few schools have been able to grow, improve quality, and charge higher fees
- Top quartile of profit earners in LEAPS earned ten times the profits of the median school
  - These schools are bigger (higher enrollment)
  - And have better quality
  - And these schools *aren't* located in wealthier or larger villages, on average

Lack of capital as a market failure ?

Take market failure approach one step farther to investigate potential role of credit constraints in these settings

SME literature consistently shows that credit to small firms increases profits in short and long-run (De Mel et al. 2009, 2012; Banerjee and Duflo, 2012),

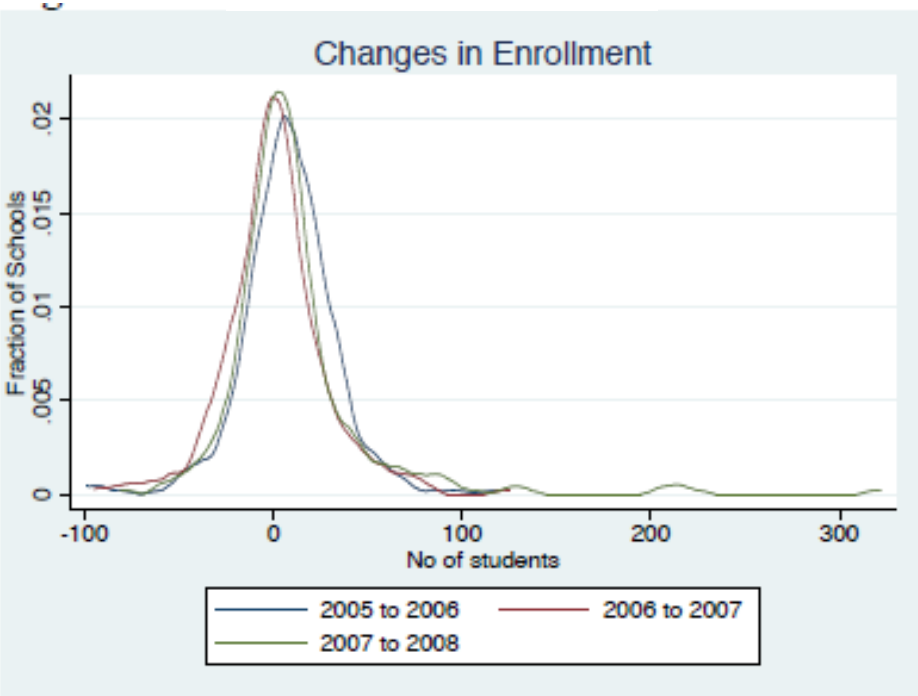
- However, directed credit to some firms may lead to spillovers (Rotemberg 2014)

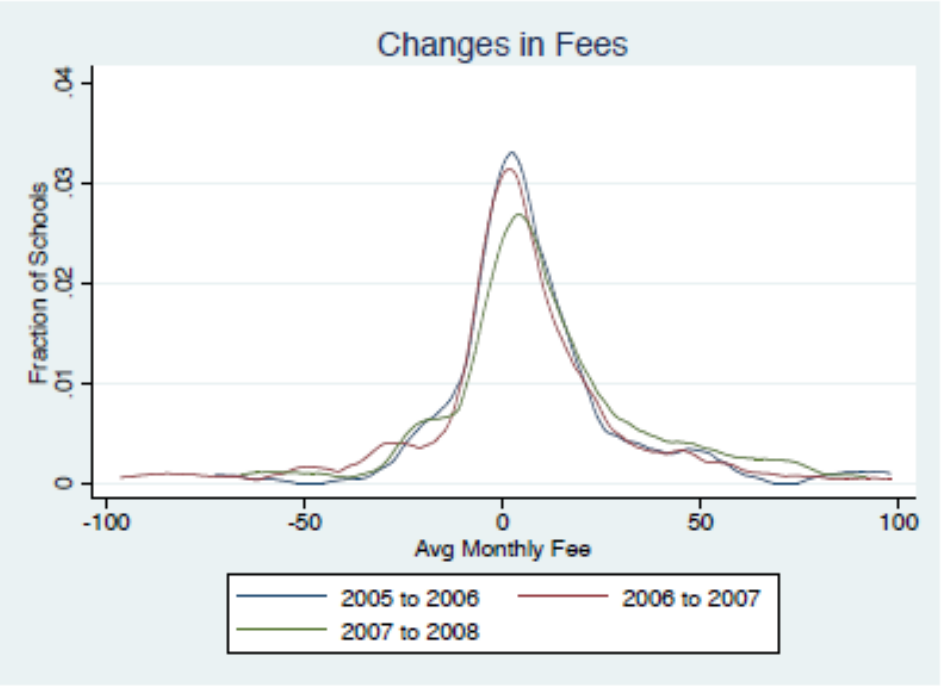
We broaden the literature to schools, where importance of capital constraints is unknown

- Perhaps credit constraints not that important
- Perhaps hard to evaluate quality of service (if parents find it hard to evaluate, then hard to pay for quality improvements)
  - Some improvements may be easier to monetize
- Schools may not have technical know-how to produce higher quality service
  - Importance of pedagogical or management skills

Is access to finance a problem for schools?

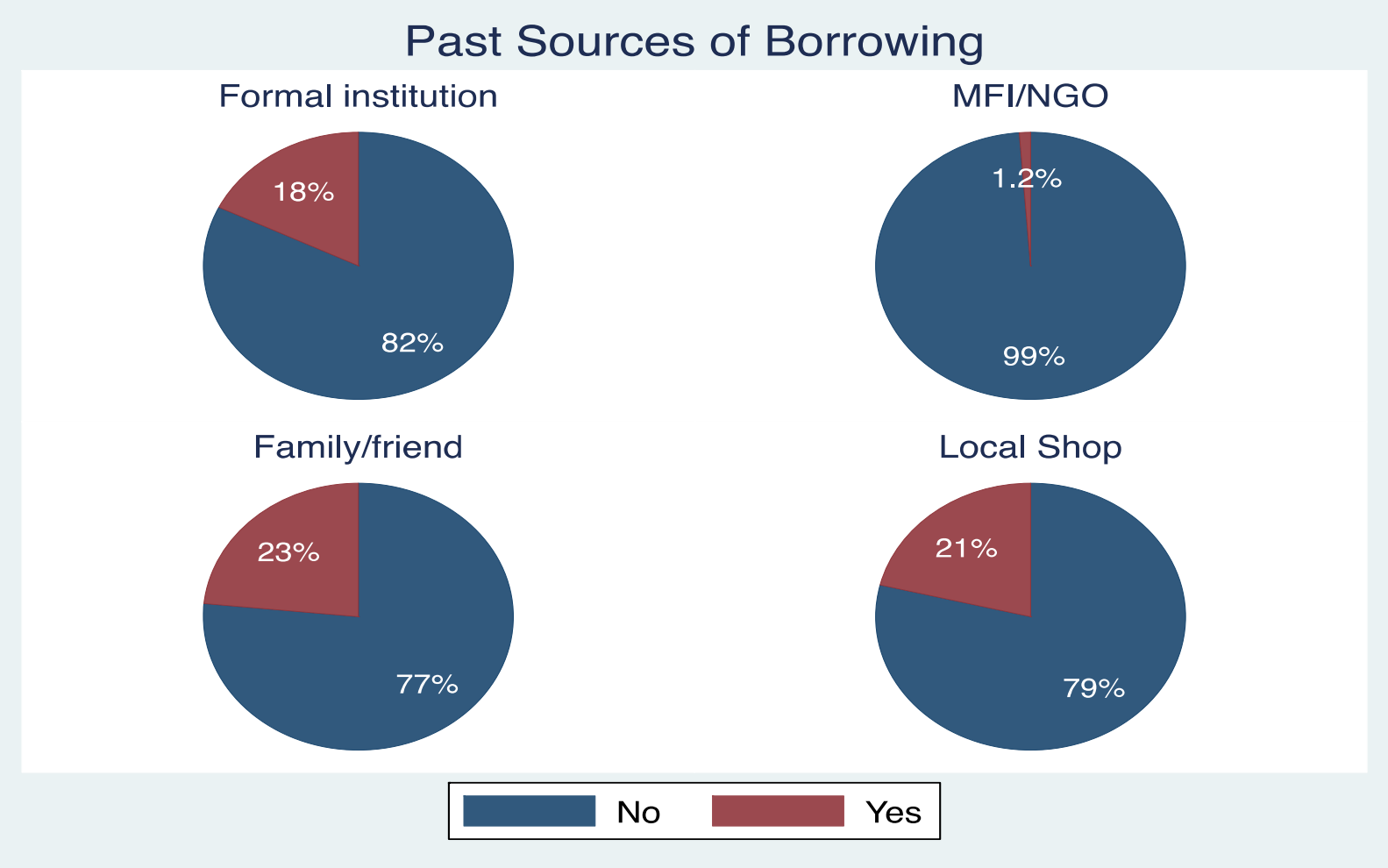
Private schools are very small and grow very slowly over time





Profits are low ($1.45/day in Faisalabad) and 54% of schools do not save (90% of these report insufficient revenue as the reason)

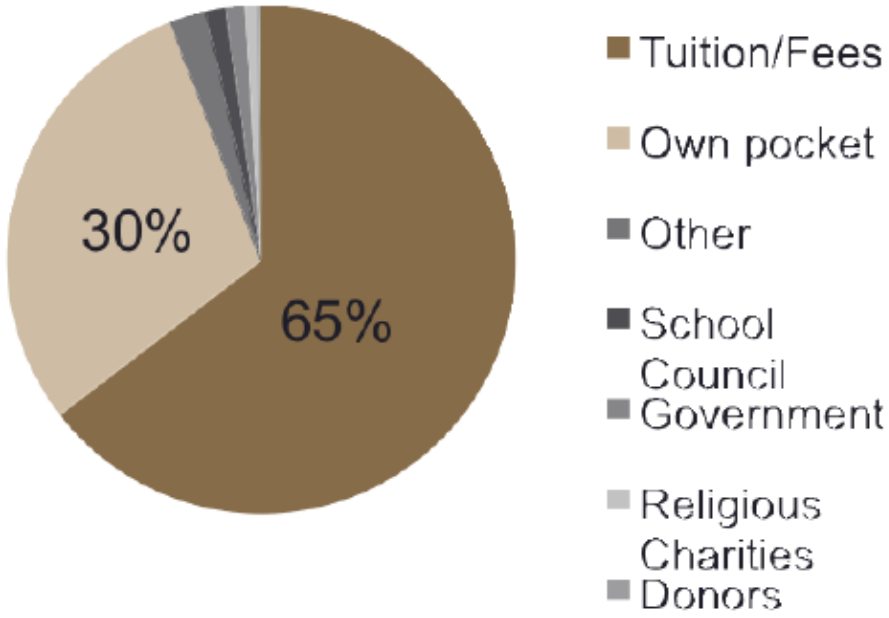
Few (private) schools report past borrowing



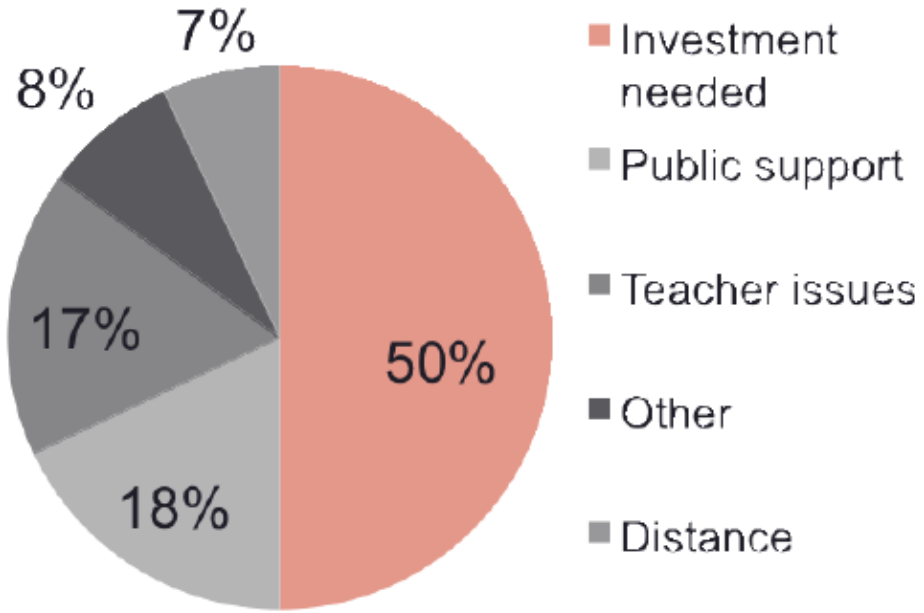
Prima Facie evidence of capital constraints

Private schools largely self-finance through school fees and owner income; report lack of funds as a major obstacle to improvements

Funding Sources



Reported Obstacles



Question: Can Financing help?

Movement from state financing and provision to alternate models

- State financing, private provision: Extensive use of vouchers (HSEIH AND URQUILOA 2006, MURALIDHARAN ET AL. 2015, BARRERA-OSORIO ET AL. 2017); Charter schools in the U.S.(HOXBY AND ROCKOFF 2004; HOXBY, MURARKA AND KANG 2009, ABDULKADIROGLU ET AL. 2016; ANGRIST ET AL. 2013), PPP arrangements (ROMERO ET AL. 2017)

- One key finding: Market structure and intervention design matters (EPPLE ET AL. 2017, MURNANE ET AL. 2017, NIELSEN 2017)

- Nevertheless, difficult to attribute supply side responses to policy changes in the literature (see, for instance, debate on Chile: FEIGENBERG, RIVKIN & YAN 2017)

Can financial access allow (private) schools to upgrade capacity and quality?

- **Study 2: "Upping the ante: The equilibrium effects of unconditional grants to private schools." American Economic Review, 2020.**
- Market level randomization again
- Provide (unconditional) cash grants to rural private schools in Pakistan (Rs 50K ~ two years worth of profits)
- Village level treatment - Vary grant coverage level:
  - Low Saturation (only one (randomly selected) school in village receives grant)
  - High Saturation (all (usually 3) schools in village receive grant)

Key differences with existing models

- No prior selection of schools
  - Low and high saturation villages are randomly chosen
  - Low saturation schools are randomly picked from an average of 3.3 private schools in the village

- No regulation
  - Our scheme requires no adherence to standards

- No assistance in terms of training or additional human resource intensive tasks

- Very light “business” plan that schools are to produce prior to receiving money
  - Almost no monitoring, and all schools received the money

- In short, as close to a `helicopter’ drop of cash as possible

- **Key point: Didn’t use a (lender’s) “heavy hand” at all**

Sample

Villages with at least 2 private schools in a single district in Punjab, Pakistan

Identified through National Education Census (2005), verified through field visits

Of 334 eligible villages (42% of all villages in district), randomly chose 266 villages based on power calculations with 855 schools

Mean village has 2.45 public schools, 3.3 private schools and 524 children enrolled in private schools

Mean private school enrollment is 164, with fees of Rs.238.4 ($2.8) per month and monthly revenues of Rs.40,400 ($400)

Considerable heterogeneity due to random sample from population

- Fees range from Rs.81 (5^{th} %tile) to Rs.502 (95^{th} %tile)
- Enrollment ranges from 45 (5^{th} %tile) to 353 (95^{th} %tile)

Experiment Protocols

GRANT SIZE: Direct cash grants of Rs.50,000 ($500), which is 15% of median annual revenue of schools in sample

- 25-100 additional desks and chairs depending on quality
- 2 additional teachers at median private school wage
  - Teacher with 1sd higher TVA costs 40% percent, or Rs.10,000 more (Bau and Das 2017), which would imply a 0.15sd increase in test scores
- Not high enough to drive out other schools by subsidizing tuition: At an average fee of Rs.240, can fully subsidize 18 additional children, relative to total private enrollment in mean village of 523

GRANT DISBURSEMENT

Visit 1: Contract signed

Visit 2: First tranche disbursed (2 schools did not complete investment plan)

Visit 3: Monitoring visit and 2nd tranche disbursed (all schools receive the money)

Why the Low and High financial saturation?

Motivated by theory:

- Allows us to test partial versus general equilibrium (GE) returns to capital – GE more relevant for policy

- Crowd-Out effects?
  - Money to more schools lowers impact

- Crowd-In effects?
  - Money to more schools lowers impact

POLL: What would you expect?

Question: What would you predict the effect on enrollment and school quality when

1. Only One school is given the grant (low saturation case)
   a. On Enrollment: (i) Increase (ii) Decrease (iii) No Change
   b. On Test scores: (i) Increase (ii) Decrease (iii) No Change
2. All schools are given the grant (high saturation case)
   a. On Enrollment: (i) Increase (ii) Decrease (iii) No Change
   b. On Test scores: (i) Increase (ii) Decrease (iii) No Change

Results: What do we Find?

Schools do seem credit constrained

- Expenditures increases by Rs 29-35K in schools
- Is this a sufficient test of credit constraint?
  - Need to look at overall borrowing (if unchanged then more consistent w/ credit constraints)

Low (treatment) Schools:

- Enrollment gains but little price/quality change
- Invest in basic hard infrastructure

High (treatment) Schools

- Some enrollment gains and substantial price/quality change
- Invest in basic& extra hard & soft infrastructure & teachers

What's going on? (Theory)

Partial vs General Eql results quite different - Competitive structure such that GE credit alleviation impact crowds in (rather than out) school investments

Why?

- Strategic interactions between schools imply that the degree of financial saturation will affect school investments
- Trade-off: Invest in capacity but risk price competition versus invest in quality at higher costs but decreased risk of price competition
- Therefore: As financial saturation increases, investing in capacity makes price war more likely and schools will be "more likely" to invest in quality

Theory outline: How does the provision of grants in this context change the market equilibrium

Approach: Build quality into canonical model of capacity constraints (Kreps and Scheikman 1983) to generate predictions under low and high saturation and then test these predictions against our experiment

Theory hinges on 3 main intuitions

- The first is the *nature of the trade-off between capacity and quality*
- The second is the *notion of the price war and how it plays out*
- The third is the idea of a *rationing rule* and what it implies

Theory Overview

PLAYERS: Schools and households

ACTIONS: Schools choose capacity, quality and price. Households choose whether to attend school, and if so, which school to attend

PAYOFFS: Schools maximize profits; households maximize utility

- Can incorporate certain type of social behavior among school owners, such as intrinsic utility from having children in school

TIMING: Schools choose capacity and quality and then price

- Note that price discrimination is competed out in oligopoly in simple settings; we don't see much in the data (Andrabi et al. 2016)

TWIST: Schools face credit constraints

Trade-off: Invest in capacity but risk price competition versus invest in quality at higher costs but decreased risk of price competition

Main Result: As financial saturation increases, investing in capacity makes price war more likely and schools will be "more likely" to invest in quality

Intuition

Give money to one school

- School can expand without poaching from other school
- This allows it to increase revenues from new students

Give money to all schools

- If all schools expand, too few students to compete over and therefore price competition
- Bertrand-like equilibrium with lower prices for all
- If instead, expand quality, can escape the price war

Trade-off between capacity and quality more likely to favor quality when all schools can expand

Theorem: If treated school in low saturation invests in (high) quality, then there exists an equilibrium of the high saturation arm in which at least one school invests on quality. The converse is not true.

RECAP: Predictions of Theory

Greater enrollment increase per school in low saturation

Increase in quality and prices more likely in high saturation

Greater (private) profit in low saturation

Detailed Results

But first just some Notation for the Results Tables:

Control: Villages with no grants (249 schools in 77 villages)

High-Saturation Village: We gave the grant to all the private schools in the village (228 schools in 75 villages)

Low-Saturation Village: We gave the grant to only one private school, randomly selected from among all private schools in the village (114 villages)

- **Treated Low-Saturation**: The treated school in the low-saturation villages (114 schools in 114 villages)
- **Untreated Low-Saturation**: The schools that were *not* treated in the low-saturation villages (264 schools in 114 villages)

Results: “First Stage” Grant usage

No evidence of substitution, either in school or household accounts of school-owner

	Spending	School funding sources (Y/N)		HH borrowing (Y/N)			HH Loan Value
	(1) Fixed	(2) Self-financed	(3) Credit	(4) Any	(5) Formal	(6) Informal	(7) Any
High	34950.439***	-0.001	0.002	-0.010	0.020	-0.033	1063.026
	(9915.07)	(0.01)	(0.01)	(0.05)	(0.02)	(0.05)	(15092.81)
Low Treated	30719.202**	0.003	-0.006	-0.039	0.010	-0.053	17384.174
	(11883.92)	(0.00)	(0.01)	(0.05)	(0.02)	(0.05)	(29982.80)
Low Untreated	5086.919	-0.006	-0.011	-0.005	0.035*	-0.055	13611.930
	(10107.93)	(0.01)	(0.01)	(0.04)	(0.02)	(0.04)	(21581.81)
Baseline	0.161***	-0.000	-0.017	0.080**	0.208***	0.003	0.064*
	(0.04)	(0.00)	(0.01)	(0.04)	(0.05)	(0.04)	(0.03)
R-Squared	0.11	0.02	0.02	0.04	0.14	0.02	0.03
Obs	794	795	795	784	784	784	784
Test pval (H=0)	0.00	0.84	0.88	0.83	0.23	0.47	0.94
Test pval (LT = 0)	0.01	0.45	0.68	0.45	0.64	0.27	0.56
Test pval (LT = H)	0.73	0.31	0.56	0.60	0.65	0.69	0.60
Midline Control Mean	63117.10	1.00	0.02	0.30	0.06	0.25	44782.73

Results summary: Main outcomes

Treatment Arm	Enrollment	School Closure	Posted Fees	Posted Monthly Revenues	Collected Monthly Revenues	Fees based on collection	Test Scores
Treated Low Saturation	+22***	-.09***	+0	+9,327**	+6,992**	-8	-0
High Saturation	+9	-0	+19**	+5,005*	+4,642*	29.5	+0.17**
Untreated Low Saturation	-0	-0	-0	-0	+0	-0	+0
Baseline/Control (School Level)	164	13.7	238	38,654	38,654	238	-0.21

What did schools do? (1)

	Spending	Number purchased		Facility present (Y/N)			Other
	(1) Amount (PKR)	(2) Desks	(3) Chairs	(4) Computers	(5) Library	(6) Sports	(7) # Rooms Upgraded
High	25460.31***	5.97***	3.76***	0.20***	0.11***	0.10**	0.70***
	(8787.82)	(1.63)	(1.40)	(0.05)	(0.04)	(0.04)	(0.26)
Low Treated	19251.19**	8.71***	6.13**	0.17***	-0.03	-0.03	0.47
	(8702.52)	(2.45)	(2.76)	(0.06)	(0.05)	(0.04)	(0.40)
Low Untreated	-1702.36	1.31	0.87	0.04	-0.03	0.02	0.16
	(8376.89)	(1.40)	(1.19)	(0.04)	(0.04)	(0.03)	(0.26)
Baseline	0.09***	0.10*	0.12*	0.26***	0.32***	0.23***	0.71***
	(0.03)	(0.05)	(0.07)	(0.04)	(0.04)	(0.05)	(0.06)
R-squared	0.06	0.09	0.08	0.20	0.20	0.11	0.57
Obs	798	810	811	822	822	822	822
Test pval (H=0)	0.004	0.000	0.008	0.000	0.006	0.020	0.008
Test pval (LT = 0)	0.03	0.00	0.03	0.01	0.58	0.49	0.24
Test pval (LT = H)	0.50	0.31	0.45	0.60	0.01	0.01	0.59
Baseline Mean Depvar	57258.48	14.59	10.92	0.39	0.35	0.19	6.36

What did schools do? (2)

	School Costs (monthly)		Teacher Roster		Teacher Salaries (monthly)		
	(1) Total	(2) Wage Bill	(3) Total	(4) Num New	(5) All	(6) New	(7) Existing
High	3,147.48*	2,741.83*	0.42	0.46**	519.52**	580.05**	492.01*
	(1,894.67)	(1,510.50)	(0.32)	(0.18)	(257.94)	(265.80)	(284.29)
Low Treated	-1,127.41	-838.26	0.32	0.27	-175.63	-89.45	-223.10
	(1,716.66)	(1,520.25)	(0.33)	(0.24)	(273.11)	(406.49)	(246.45)
Low Untreated	-302.25	65.14	0.25	0.25	194.48	89.47	253.39
	(1,374.56)	(1,106.67)	(0.29)	(0.18)	(202.53)	(236.07)	(201.69)
Baseline	0.88***	0.85***	0.77***				
	(0.07)	(0.08)	(0.05)				
R-Squared	0.69	0.63	0.50	0.19	0.20	0.23	0.20
Observations	1,470	1,470	1,590	1,645	11,725	3,903	7,818
# Schools (Rounds)	797 (2)	797 (2)	816 (2)	840 (2)	802 (2)	723 (2)	793 (2)
Mean Depvar	25,387.0	19,491.2	6.7	2.0	2,676.6	2,665.5	2,681.9
Test pval (H=0)	0.10	0.07	0.19	0.01	0.05	0.03	0.08
Test pval (L^t=0)	0.51	0.58	0.33	0.25	0.52	0.83	0.37
Test pval (L^t=H)	0.05	0.05	0.78	0.45	0.04	0.13	0.04

Two ways to approach policy

The policy **is** the grant (McKenzie 2017)

- Evaluate giving grant to 3 villages in low-saturation model versus 1 village in high-saturation model

The policy is a **loan-loss guarantee**: If you lend in the high saturation model, I will cover any losses you face due to additional default

- Using the increased closure rates in high compared to low saturation, appropriately accounting for loan tenure, we calculate the value of the loan-loss guarantee at Rs.17,363 over a 2-year period

In both cases, we can try and compare test-score increases or, more ambitiously, consumer surplus

Returns

ROI: Two models

- Model 1: Returns only for 2 years, but can sell assets after 2 years at 60%
- Model 2: Returns for 5 years and full depreciation

Low-saturation: 61% (2 year) and 83% (5 year)

High-saturation: 12% (2 year) and 32% (5 year)

Compare to market interest rate of 15-20%

Therefore the program is profitable without government subsidies

- (Following the experiment and further work, loans from banks to private schools are scaling up rapidly)

But where public subsidies may be required is moving from the low to the high saturation model, which raises the question of benefit to consumers under the two arms

Implications

Social Returns?

- High intensity: 23sd learning for every $100 (per child)
- Highly cost-effective compared to other educational interventions

Results confirm importance of financial access:

- Need: Schools indeed credit constrained
- Viability: In both cases schools could afford to pay grant back of it was a loan

Design of government subsidies?

- If care about financial return only: prefer low saturation
- If care about social return: likely prefer high saturation
- **Move from standard "priority sector" lending to subsidizing higher saturation lending (target on "*density*" not just location of offerings)**

Systems approach: continue onto next frictions ….

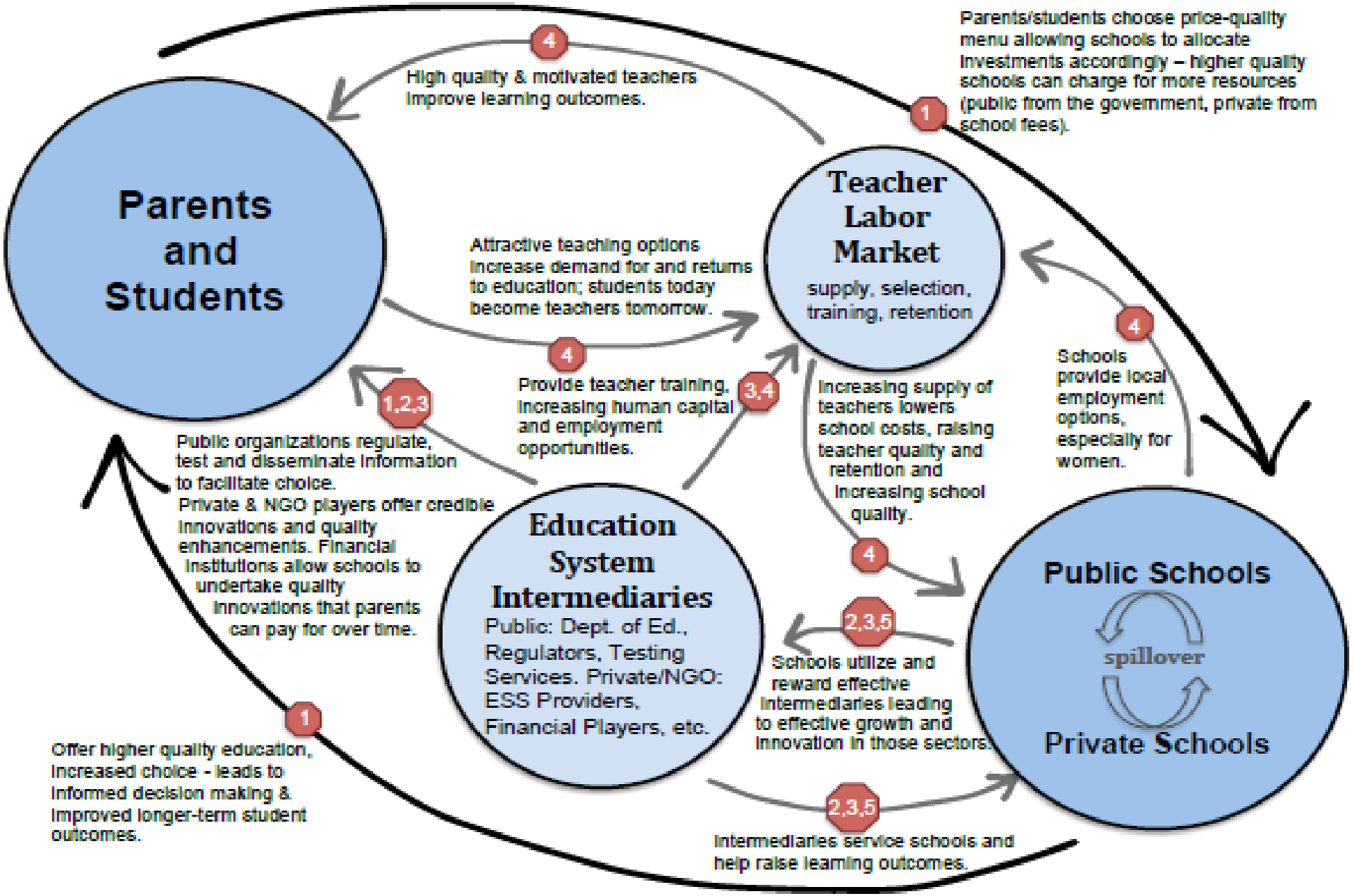
Address two potential market failures

1. **Financial Market Failures**
   - Have developed two loan products (including one quasi-equity one) for sector in partnership with an MFI and currently rolling out to ~1,000 schools
2. **Educational Support Service Market Failures**
   - Have developed ESS with several suppliers (curriculum reform, teacher training, e-learning) for low cost private schools

In Progress Studies:

- Offering combination of Financing & ESS services to schools to study impact (X-randomized RCT design)
- Look at political economy failures
- Examining private tutoring market

Education A Systems Based view



System Failures: (1) Information (2) Financial Resources (3) ESS access (4) Teacher Constraints (5) School Management

LEAPS
Learning and Educational Achievement in Pakistan Schools

Question Break

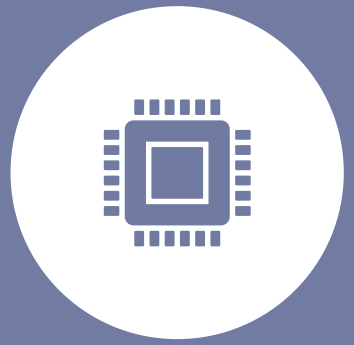
Post-Break agenda

1. Example 1: Addressing Informational Frictions
2. Example 2: Addressing Financial Frictions
3. Concluding thoughts

Concluding Thoughts

Conclusion

- The reality of Education the world over: An active educational landscape with substantial and real choice and schools reacting to what parents and children want
- We need to shift our thinking from Focusing on individuals (schools, students) to focusing on *markets/systems*
- And enable local actors (schools, parents/students, teachers, educational suppliers, financiers, regulators) to better solve their own problems by addressing the (exchange(frictions they face
- And doing so can lead to more sustainable and contextually relevant reforms that can raise educational quality and productivity !



The Big-Opportunity for Technology

Tech Solutions are Emerging Locally

Ed-Tech Solutions

Attempting to fill Knowledge/Capacity Gaps

- Distance Teaching Programs
- Distance Teacher-Training Programs
- Supplementing Teaching Inside Classrooms
- Individualizing Content
- Tutoring & Video-based Lessons

Information Management Systems

- Easing Administrative Tasks
- Improving Parent Engagement
- Tracking Test Scores

FinTech Solutions

- Easier Fee Collection
- School credit scoring for loans

Some Popular Providers

tele taleem Education Without Boundaries

Edkasa

knowledge platform What will you learn today?

karismath Turning Minds

MERA SABAQ

خان اکیڈمی اردو

RADEC

One Integrated Tech Solution: A (Digital) Education Marketplace