Service Delivery in Education, Health, and Social Protection:

Empirical Evidence from India

Karthik Muralidharan
UC San Diego, NBER, and J-PAL

IGC Bihar Growth Conference, 18 Dec 2010

Agenda

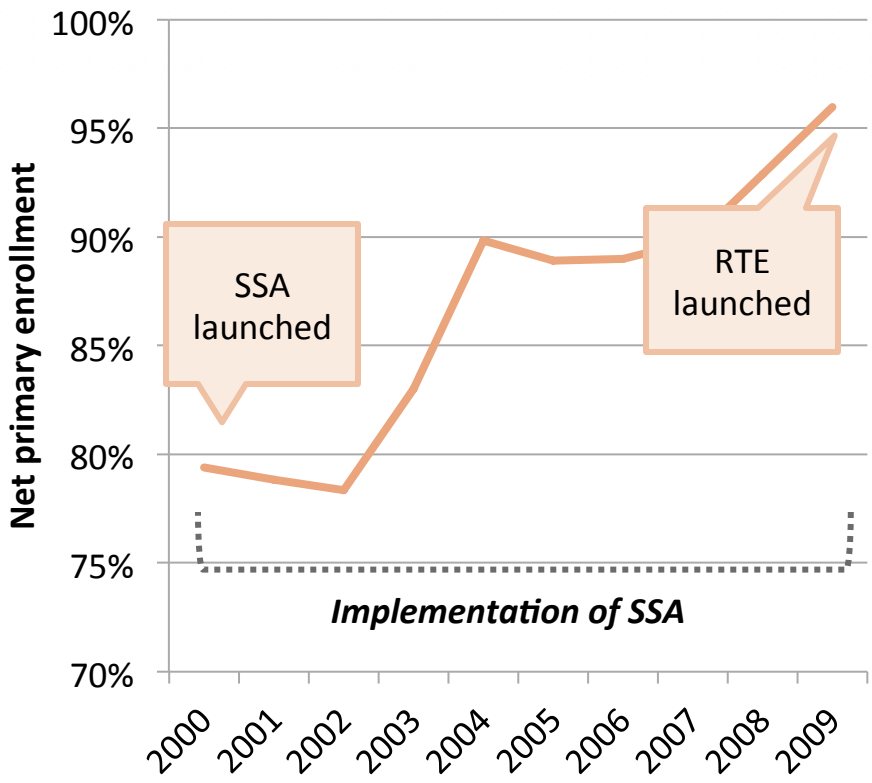
Education (AP RESt)
Health (MAQARI)
Social Protection (AP Smartcards)
Concluding Thoughts

AP RESt (Andhra Pradesh Randomized Evaluation Study)

Background / motivation
Design of APRESt
Results
Policy Implications

Right to Education (RTE) needs to focus on quality of education

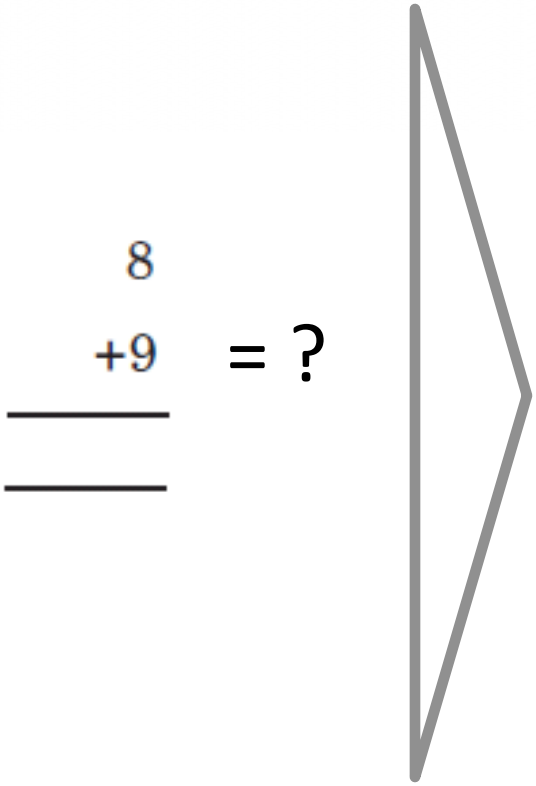
SSA has mostly been a success in expanding enrollment



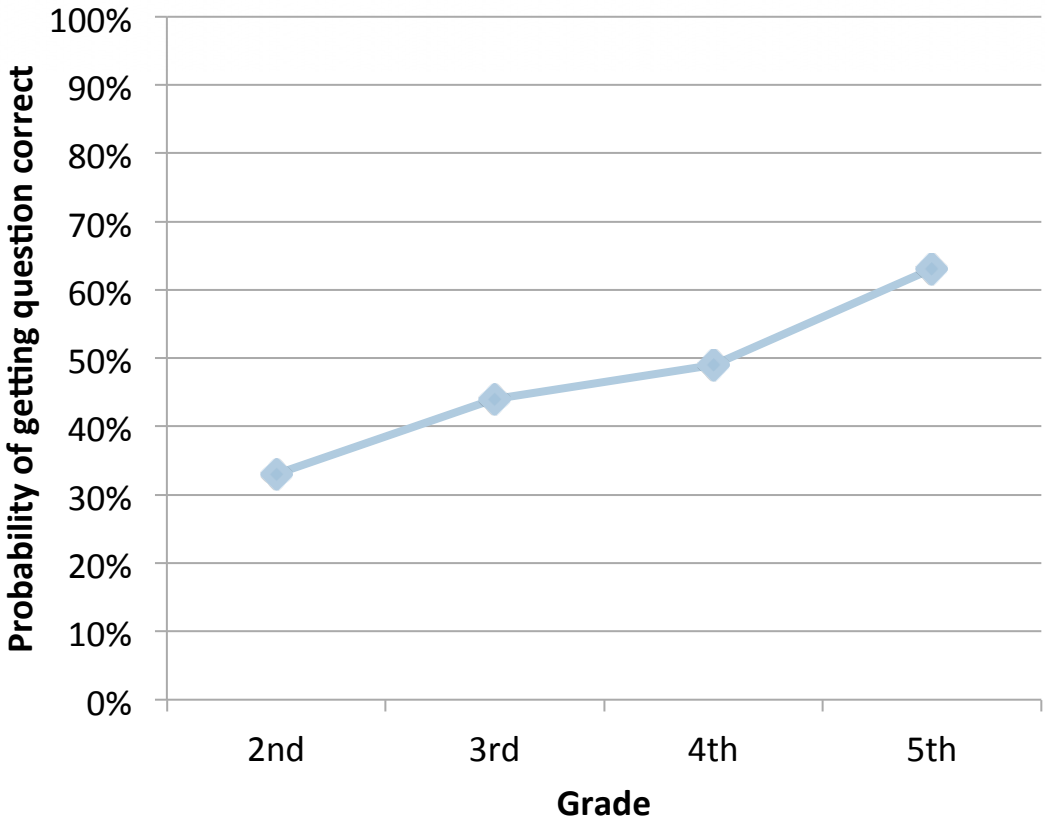
The launching of the RTE when net enrollment is already 96%, presents an opportunity to **shift focus from quantity** (i.e. just enrollment) **to quality** (i.e. learning)

Source: Data for 2000-2007 – World Bank; data for 2009 – Pratham. Definitions may be slightly different. No data for 2008 – extrapolated as mid-point of 2007 and 2009 figures.

Learning levels and *trajectories* are unacceptably low



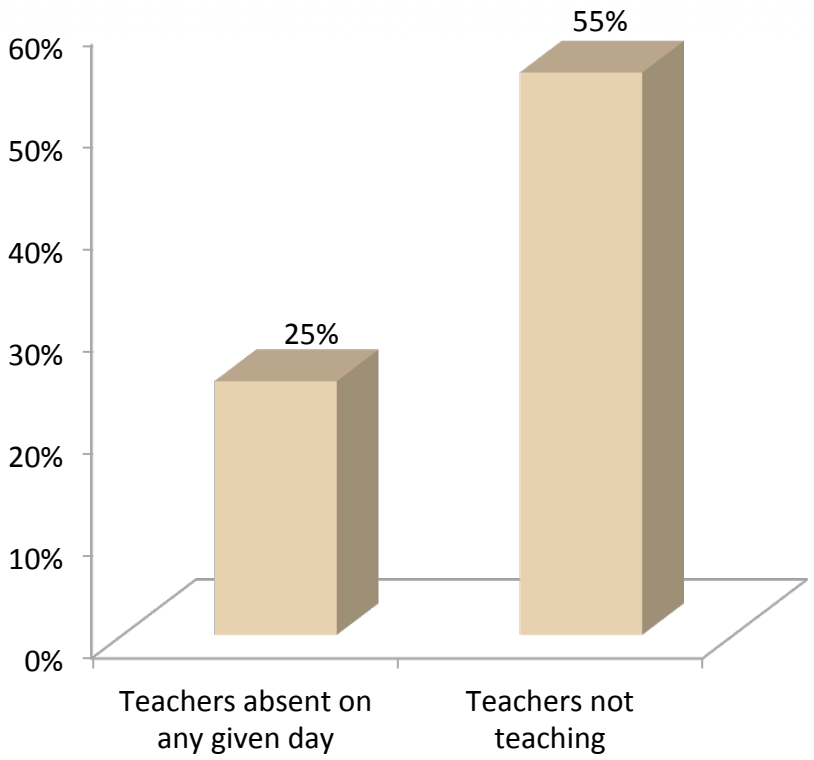
Less than half the students who don't know single digit addition in 2nd grade, learn it by the end of 5th grade!



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

Higher spending in government schools alone may not be enough

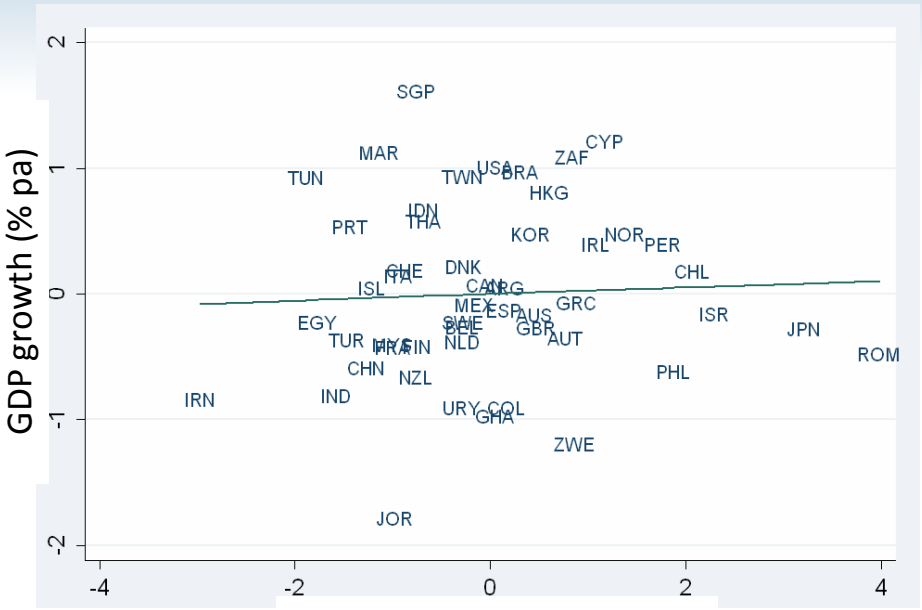
Motivation and effort-levels of government school teachers in India are a serious problem



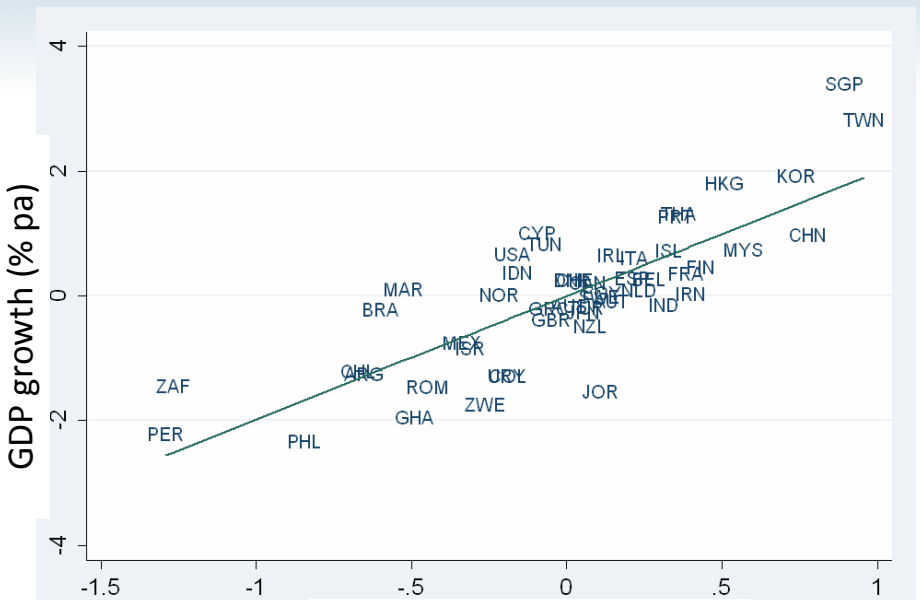
- High levels of teacher absence (25%) ranging from 15% to 42% across states
- 90% of non-capital spending goes to teacher salaries
- **Teacher that are paid more** – older teachers, more educated teachers and head teachers **– are more frequently absent**
- Higher absence rates in poorer states (additional spending has highest leakage where it is needed the most)

Source: "Teacher Absence in India", *Journal of the European Economic Association*

Ultimately, what matters is quality of education, not just quantity



Quantity of education
(years of schooling)



Quality of education
(standardized test scores)

- Expansion of school attainment has not guaranteed improved economic conditions
- Strong evidence that cognitive skills – rather than mere school attainment – are related to earnings, income equality and economic growth
- Skill deficits in developing countries are due to more than just deficits in enrollment and attainment

Source: Eric Hanushek and Ludger Woessman: "The Role of Education Quality for Economic Growth"

Broad objectives of APRESt (Andhra Pradesh Randomized Evaluation Studies)

- Move the focus of education policy **from outlays to outcomes**
  - Measure and document **levels and trajectories of student learning**

- Focus systematically on **institutional incentives for service delivery – with special attention to teacher motivation and effectiveness**
  - Strong suggestive evidence that teachers are the single most important factor in student learning and also the main lever of education policy

- **Improve the empirical basis** for education policy making by:
  - Rigorous evaluations of what works and relative effectiveness of policy options
  - Critical in a world of limited resources
  - Institutional commitment to large-scale randomized evaluations (5-year MoU)

APRESt is a multi-stakeholder partnership

- Government of Andhra Pradesh (GoAP)
  - Main client – project initiated at request of Principal Secretary, Education
  - All relevant letters of permission and administrative support
  - Financial contribution (cost of contract teachers; direct contribution)

- Azim Premji Foundation
  - Main counterpart to MoU with GoAP
  - Fully responsible for all aspects of project implementation, school communications, test administration, and data collection
    - Over 50 full time project staff and 750 part-time evaluators
    - Continuous engagement with government
    - Financial contribution as well

- World Bank
  - Technical support
  - Financial support (mainly through DFID)
  - Institutional continuity with government (6 secretaries in 6 years!)

Agenda

Background / motivation
Design of APRESt
Results
Policy implications

We tested five specific interventions

	MOTIVATION	INTERVENTION
Feedback + Monitoring	• One reason learning levels may be low is teachers don't know how to help students • Can better information help?	• Existing teachers provided with detailed feedback on students and subject to low-stakes monitoring
Block grants	• Significant amounts of money committed under RTE. • What is the effectiveness of such spending?	• Schools provided cash grants for student inputs
Contract teachers	• Use of contract teachers is widespread, but highly controversial • Are contract teachers effective?	• Schools provided with additional teacher (on contract)
Performance pay	• Teacher salaries are the largest component of education spending in India, but a poor predictor of outcomes • Can linking pay to performance improve outcomes?	• Teachers eligible for bonuses based on improved student performance (either in own class or whole school)

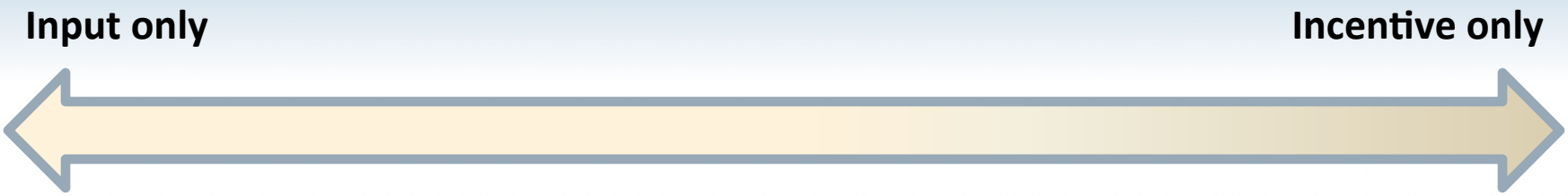
Location of study

- Andhra Pradesh (AP)
  - 5th most populous state in India
    - Population of 80 million
  - 23 Districts (2-4 million each)

- Close to All-India averages on many measures of human development

	India	AP
Gross Enrollment (6-11) (%)	95.9	95.3
Literacy (%)	64.8	60.5
Teacher Absence (%)	25.2	25.3
Infant Mortality (per 1,000)	63	62

Within two years we had tested 600 schools with five different interventions



Feedback + Monitoring
100 schools

Block Grant + Diagnostic Feedback
100 schools

Extra Contract Teacher + Diagnostic Feedback
100 schools

Individual Incentive + Diagnostic Feedback
100 schools

Group Incentive + Diagnostic Feedback
100 schools

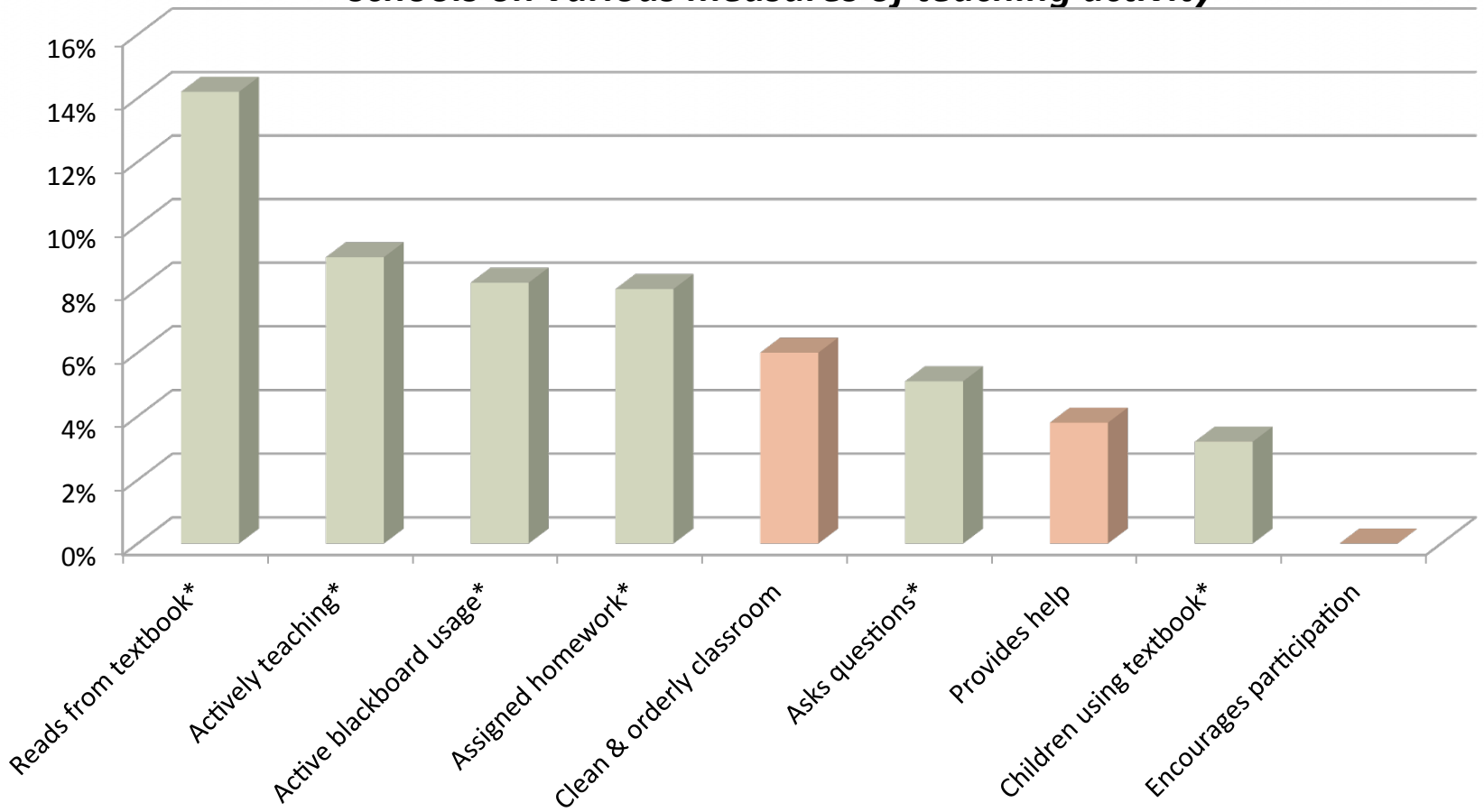
Business as usual
100 schools

Agenda

Background / motivation
Design of APRESt
Results - Feedback + Monitoring
Policy implications

Teachers in feedback + monitoring schools appeared to perform better on measures of teaching activity

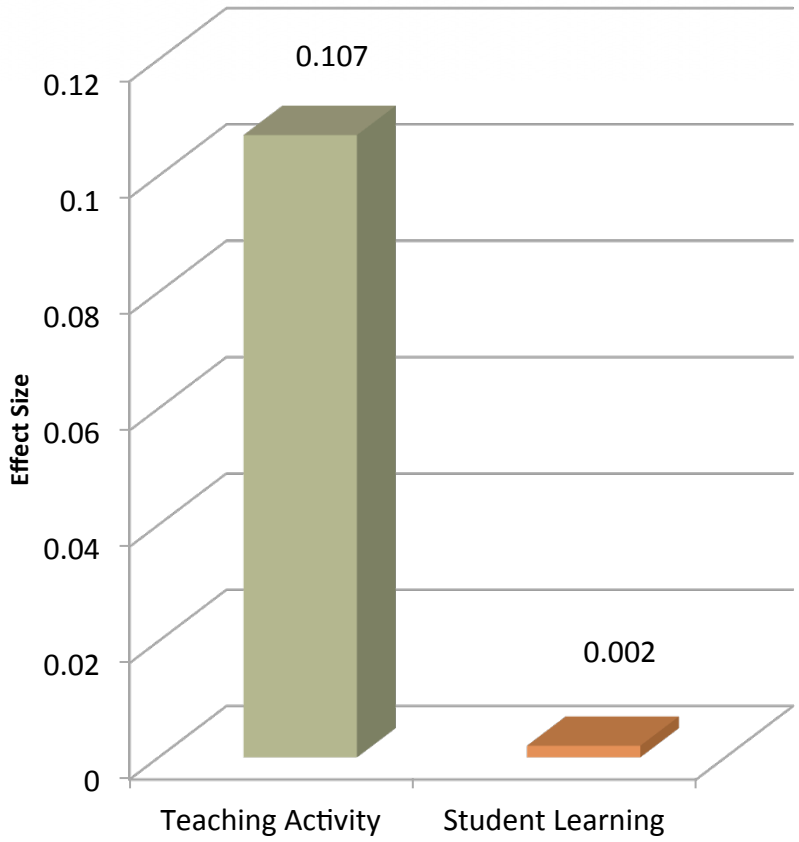
Difference between feedback + monitoring and comparison schools on various measures of teaching activity



**Statistically significant difference*

However, there was no difference in test scores between students in treatment and comparison schools

Outcomes for treatment schools relative to comparison schools



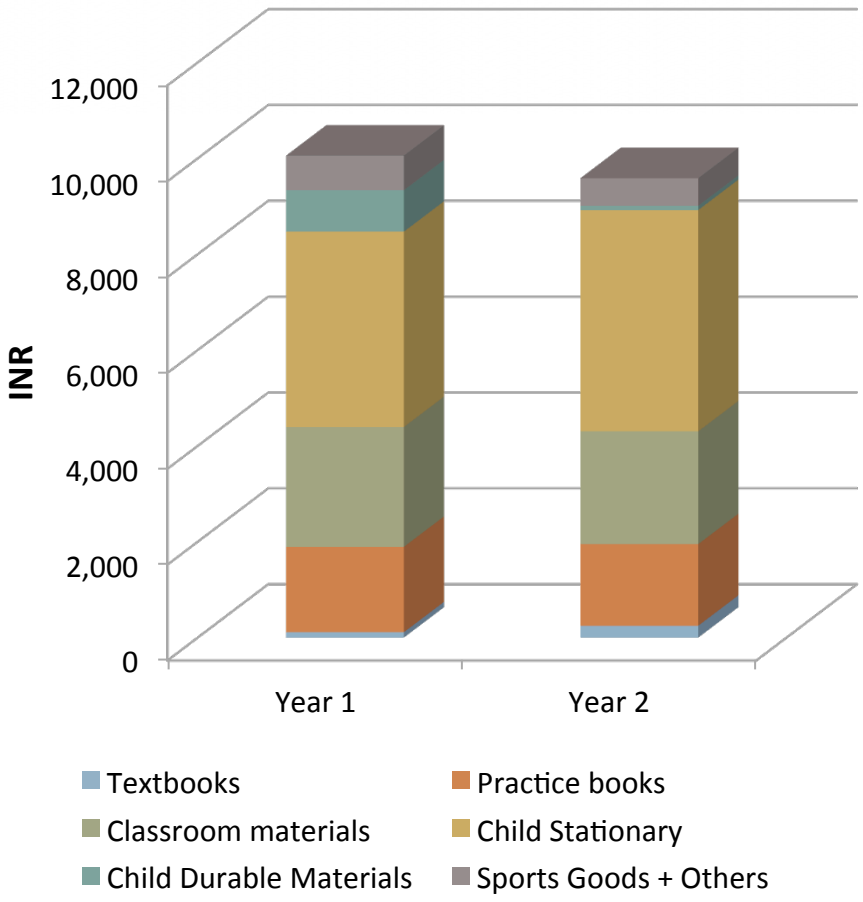
The lack of impact on test scores, despite enhanced teaching activity, suggests that **teachers temporarily changed behavior when observed, but did not actively use the feedback reports in their teaching**.

Agenda

Background / motivation
Design of APRESt
Results - Block grant
Policy implications

Schools spend most of the grant on non-durables – similar pattern in both years

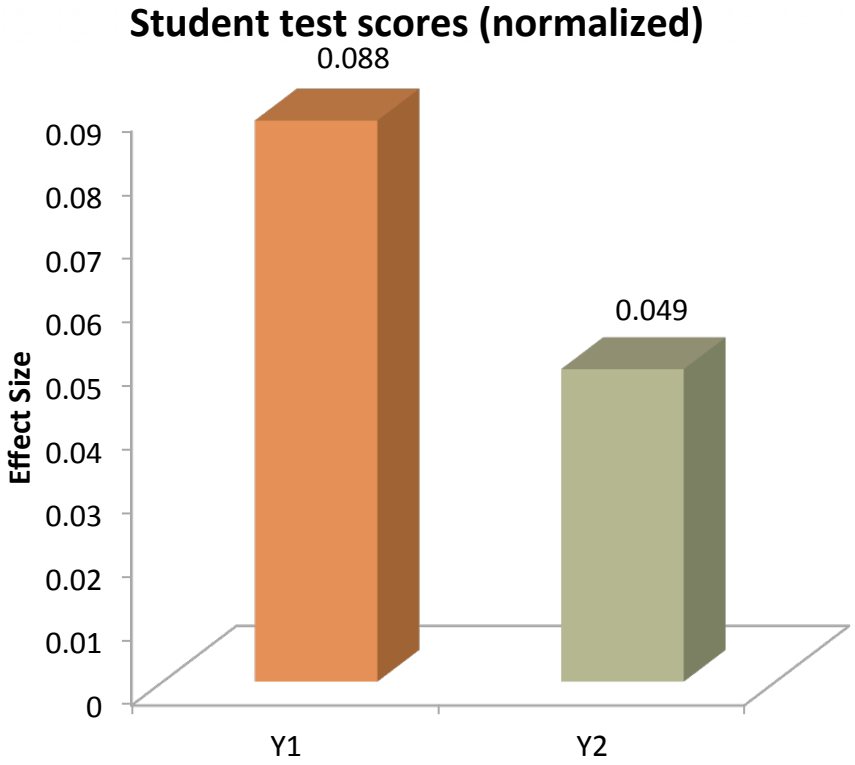
Average school annual grant allocation pattern



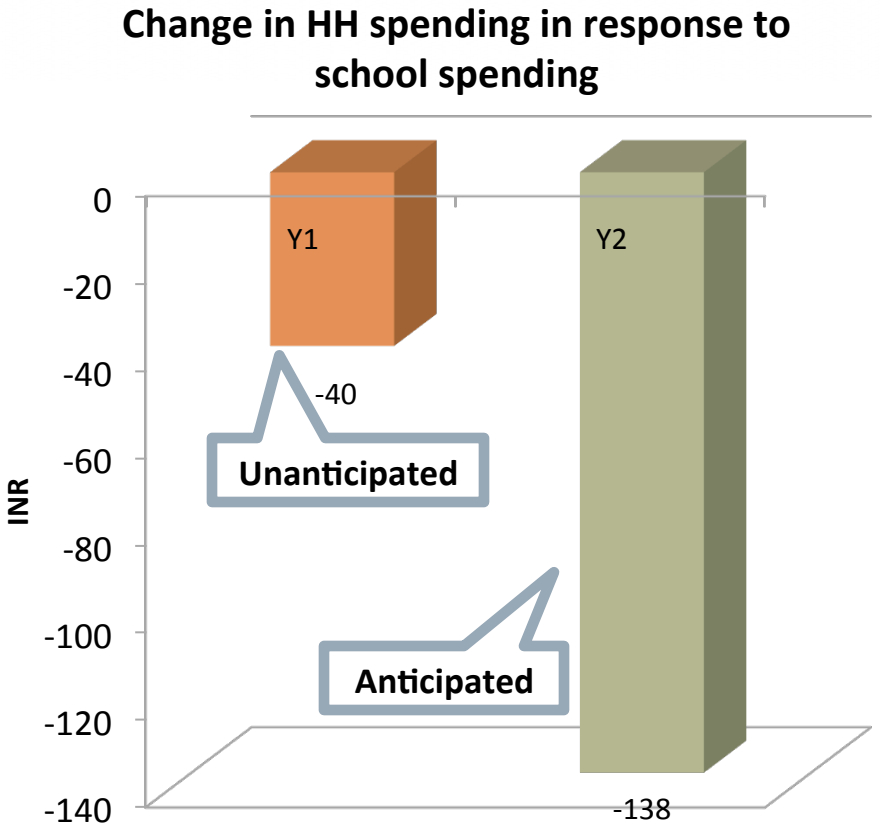
- Nearly half the grant allocation was spent on child stationary (notebooks, slates, chalks)
- Close to another 40% was spent on classroom materials (such as charts, maps and toys) and practice books (such as workbooks, exercise books, etc)
- Small amounts were allocated to durable materials and sports goods

Impact of the program is lower after 2 years than after 1 year

Student learning improved in the first year, but not the second



Household spending fell significantly when the grant was anticipated



Implications for Research & Policy

- The relation between school spending and learning outcomes is a fundamental question and has seen hundreds of empirical studies around the world

- But this literature has rarely accounted for HH re-optimization to public spending (unlike in the traditional public finance literature). This is a critical gap because:
  - HH responses will determine impact of policy on outcomes
  - Parameters of an EPF are not typically identified if there is re-optimization

- Key is matched data between schools and HH spending, an exogenous change in school spending, and a time horizon that allows us to distinguish between *unanticipated* and *anticipated* changes in school spending

- Policy needs to think about HH re-optimization and ideally focus on inputs that have more public good characteristics and less substitutable by HH

Agenda

Background / motivation
Design of APRESt
Results - Contract teacher
Policy implications

Contract teachers are significantly different from regular teachers

CTs are hired by school committees and typically tend to be young females, with no formal teacher training qualification and from the same village as the school in which they teach. CTs are paid significantly less than RTs.

	Regular Teachers (RTs)	Contract Teachers (CTs)	Significantly different?
Proportion male	63.1%	31.8%	✓
Average age	40.35	25.81	✓
College degree or higher	84.3%	45.5%	✓
Formal teacher training degree or certificate	98.3%	9.1%	✓
Received any training in last twelve months	93.5%	54.5%	✓
From the same village	7.2%	81.8%	✓
Distance to school (km)	11.9	1.1	✓
Average salary (Rs./month)	8,698	1,250	✓

There have been several concerns with respect to contract teachers

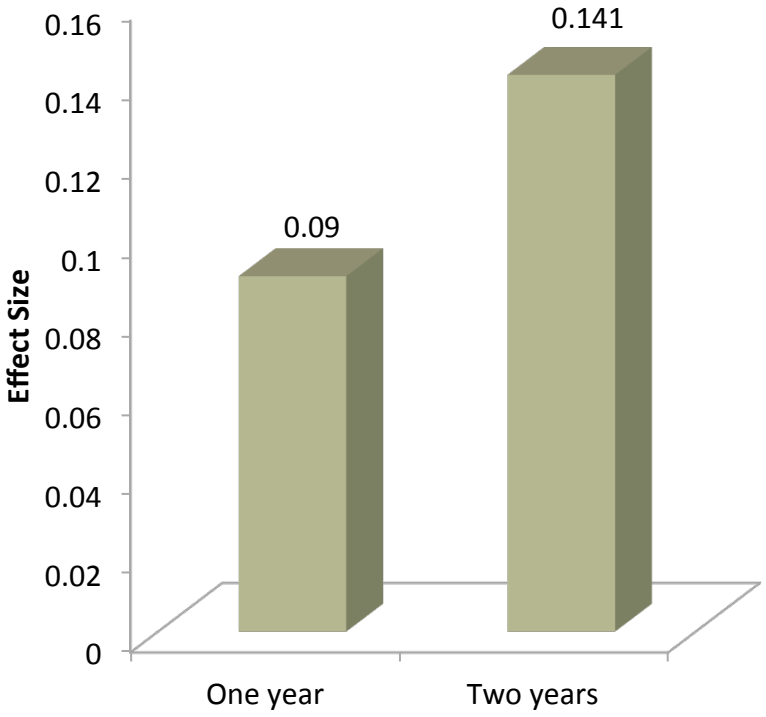
1. • Using untrained and less qualified CT's will not improve learning
2. • Decentralizing hiring will lead to local elite capture of the teacher post
3. • CTs are exploited as a result of being paid significantly less than RTs

Two main questions:

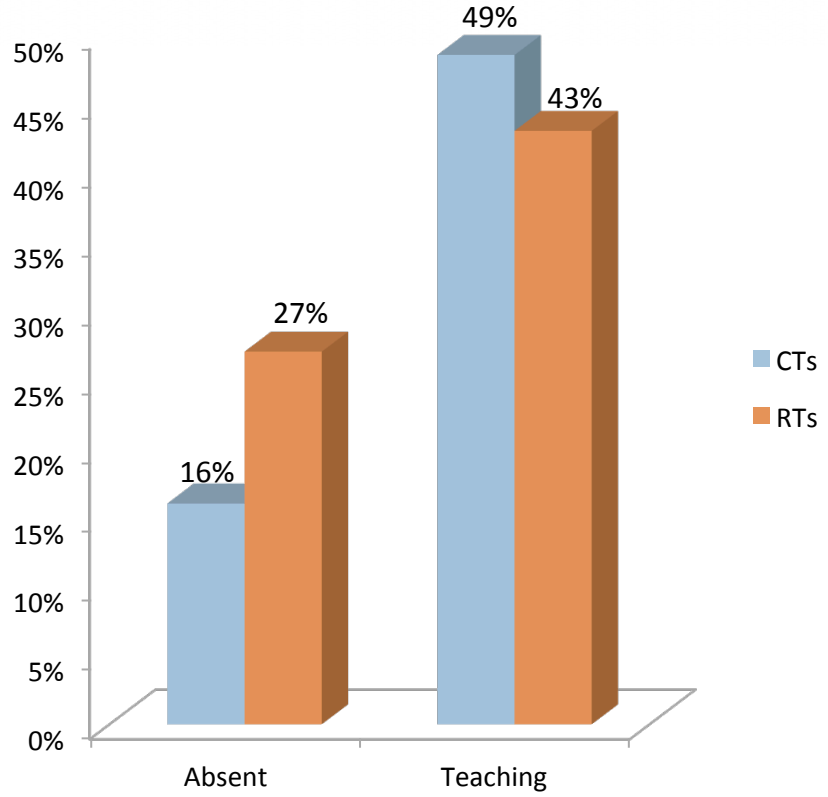
1) "What is the impact of an extra CT" hired in a "business as usual" way?
2) How would reducing PTR with a CT compare with doing so with an RT?

We find that students perform better in schools given an extra CT

Students in extra CT schools significantly outperform students in comparison schools

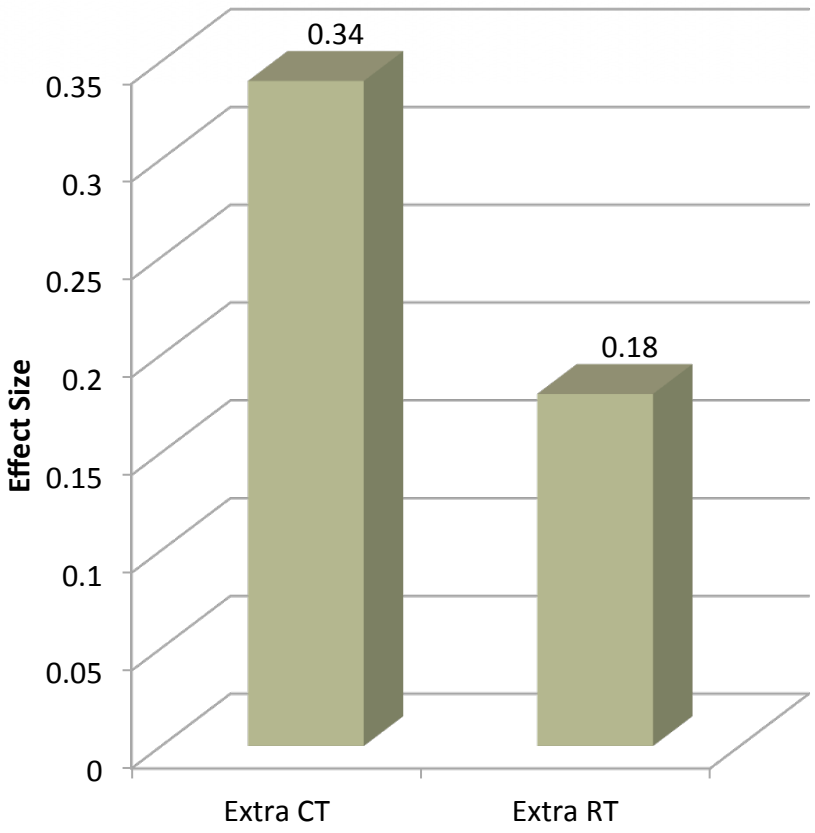


CTs have lower rates of absence and higher rates of teaching activity



Further, we also compare the effect of reducing PTR with an extra CT versus an extra RT

Improving student learning from adding an extra teacher to school

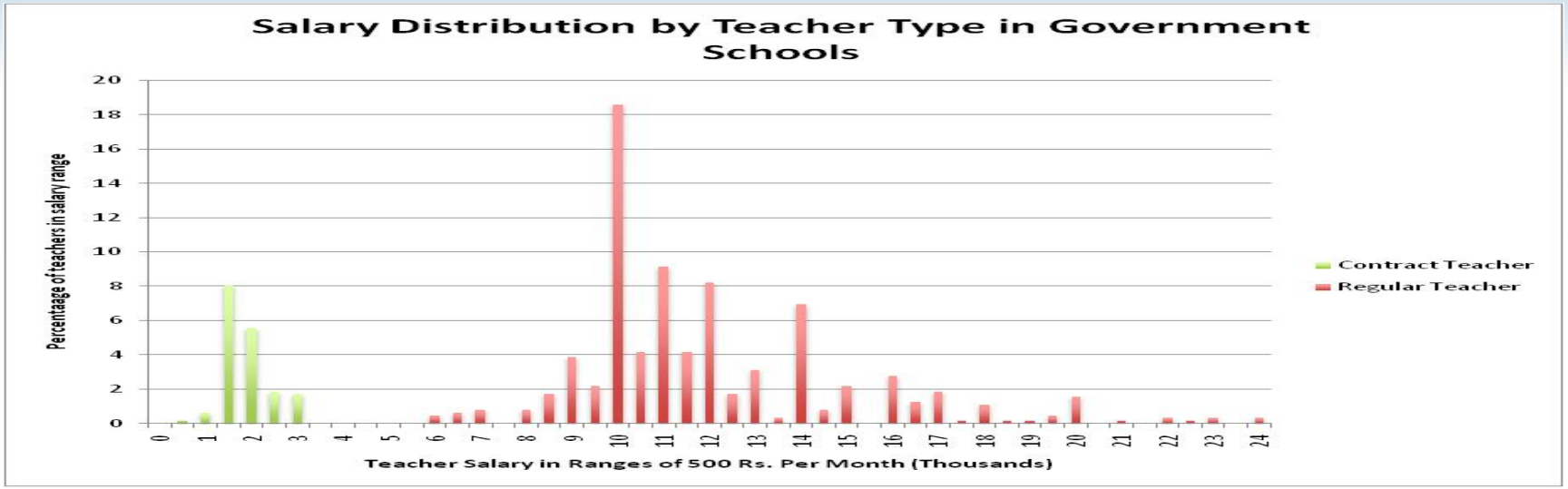


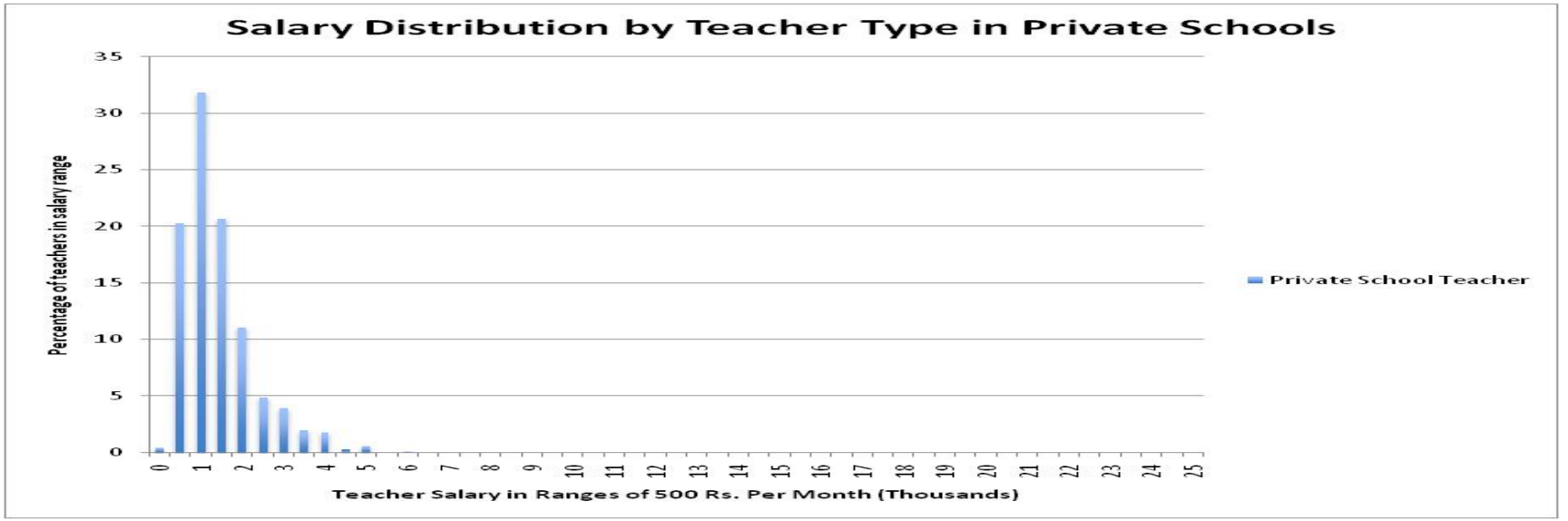
Difference is not statistically significant.

Why might contract teachers perform better or equal to regular teachers even though less qualified, less trained and paid 5 times less?

1. Greater intrinsic motivation: from local area, hence feel **more connected to community**
2. Greater extrinsic motivation: **superior incentives** due to annually renewable contracts
3. Convenience: **live much closer** to the school, therefore find it easier to attend

Evidence also suggests that CTs are not exploited vis-à-vis the market



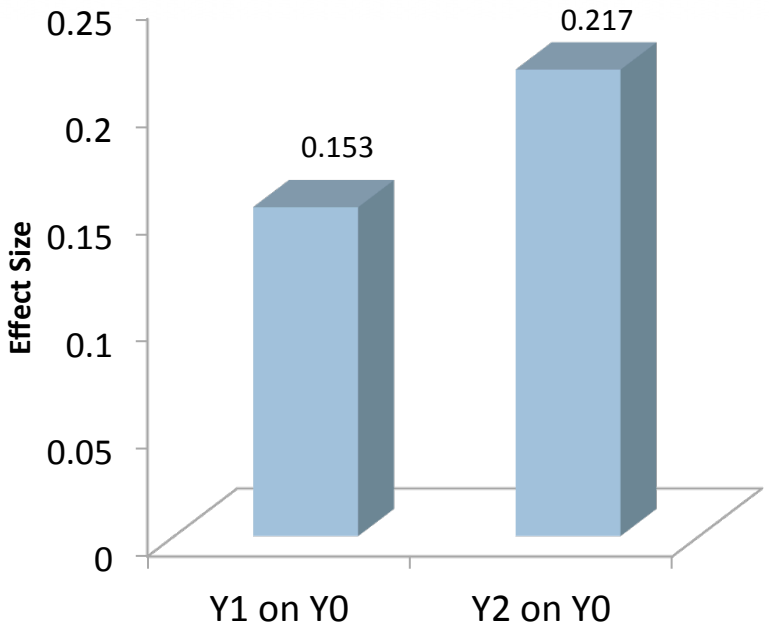


Agenda

Background / motivation
Design of APRESt
Results - Performance pay
Policy implications

Bonus schools perform better across the board

Outcomes for bonus schools relative to control schools

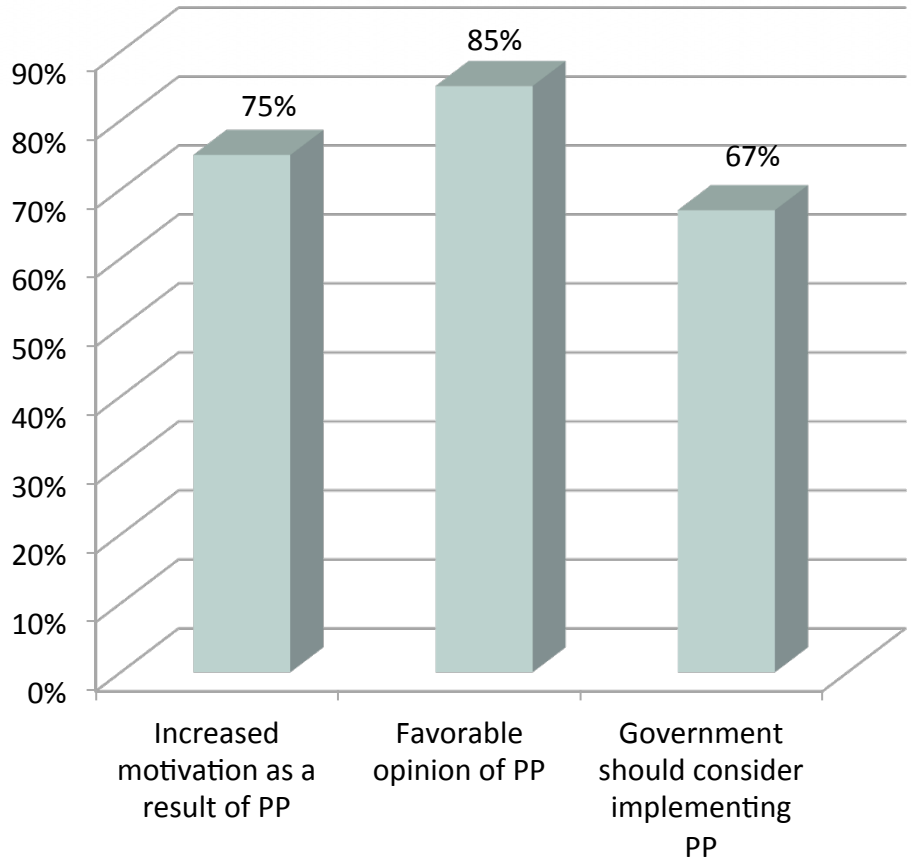


- Students in ***bonus schools do better for all major subgroups***, including: all five grades (1-5); both subjects; all five project districts; and levels of question difficulty
- ***No significant difference by most student demographic variables***, including household literacy, caste , gender, and baseline score
- Lack of differential treatment effects is an ***indicator of broad-based gains***

Overall, no child in a bonus school was worse off relative to a comparable child in a control school

Teacher opinion on performance pay is overwhelmingly positive

Strong teacher support for performance pay



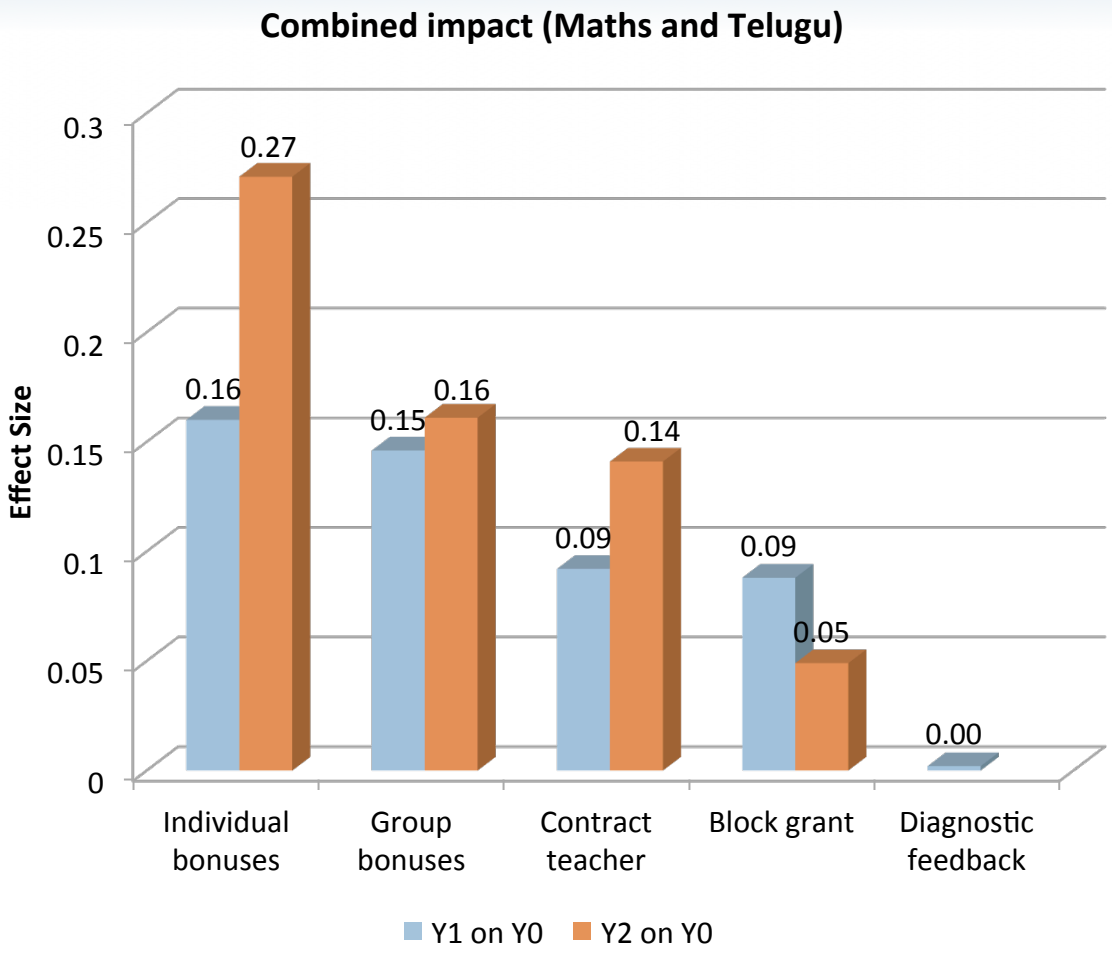
- It is easy to support a program when it only offers rewards and no penalties
- However, teachers also **support performance pay under an overall wage-neutral** expectation

- Significant positive correlation between teacher performance and the extent of performance pay desired beforehand
  - Suggests that **effective teachers know who they** are and there are likely to be sorting benefits from performance pay

Agenda

Background / motivation
Design of APRESt
Results - Summary
Policy implications

Overall, bonuses conditional on performance had a larger impact than unconditional provision of inputs…



- Pure incentives (individual and group bonuses) are most effective
- The mixed input-incentive program (contract teachers) is next most effective
- Pure inputs (block grants and diagnostic feedback) are least effective

… And were significantly more cost effective

	Avg cost for 2 years (INR)	Impact (SD)	Cost per 0.1 SD impact (INR)
Contract teacher	20,000	0.141	14,184
Block grant	20,000	0.049	40,816
Group bonus	12,000	0.161	7,453
Individual bonus	20,000	0.271	7,380

- Overall, the incentive programs are 3× as cost effective as the input programs
- **Performance pay was twice as cost effective** as an extra contract teacher, and **a contract teacher is five times more cost effective than a regular teacher**
- Suggests that **expanding a performance pay program would be 10 times more cost effective** than hiring additional regular teachers

There are three key policy implications from the results so far

1. Focus on learning levels

- Right to education (RTE) needs to be about quality and not just access
- Identify learning gaps early and **provide remedial instruction** immediately

2. Hire new teachers as contract teachers

- RTE is making the financial allocation to reduce PTR from 40:1 to 30:1
  - Same financial allocation can be used to **hire several CTs and reduce PTR even more and eliminate multi-grade teaching**
- Can **hire new teachers as CTs** and regularize into civil-service **based on performance over time**

3. Roll out systems for teacher performance measurement and management

- **Performance pay** is **likely to be a highly cost-effective policy** for improving learning
- The broader point is that of **creating a meaningful career ladder for teachers** so that their professional trajectories depend on performance
  - **Teachers are also broadly supportive** of instituting a performance pay mechanism

Bibliography

- Michael Kremer, Karthik Muralidharan, Nazmul Chaudhury, Jeffrey Hammer, F. Halsey Rogers: **"Teacher Absence in India: A Snapshot"**

- Karthik Muralidharan and Venkatesh Sundararaman: **"The Impact of Diagnostic Feedback to Teachers on Student Learning: Experimental Evidence from India"**

- Jishnu Das, Stefan Dercon, James Habyarimana, Pramila Krishnan, Karthik Muralidharan and Venkatesh Sundararaman: **"When Can School Inputs Improve Test Scores?"**

- Karthik Muralidharan and Venkatesh Sundararaman: **"Contract Teachers: Experimental Evidence from India"**

- Karthik Muralidharan and Venkatesh Sundararaman: **"Teacher Performance Pay: Experimental Evidence from India"**

- Karthik Muralidharan and Venkatesh Sundararaman: **"Teacher Opinions on Performance Pay: Evidence from India"**

Agenda

Education (AP RESt)
Health (MAQARI)
Social Protection (AP Smartcards)
Concluding Thoughts

Medical Advice, Quality, and Availability in Rural India (MAQARI)

- Panel study of our 2003 work on teacher/medical worker absence (expanded scope)
  - 3 major components on the health side (parallel education modules)

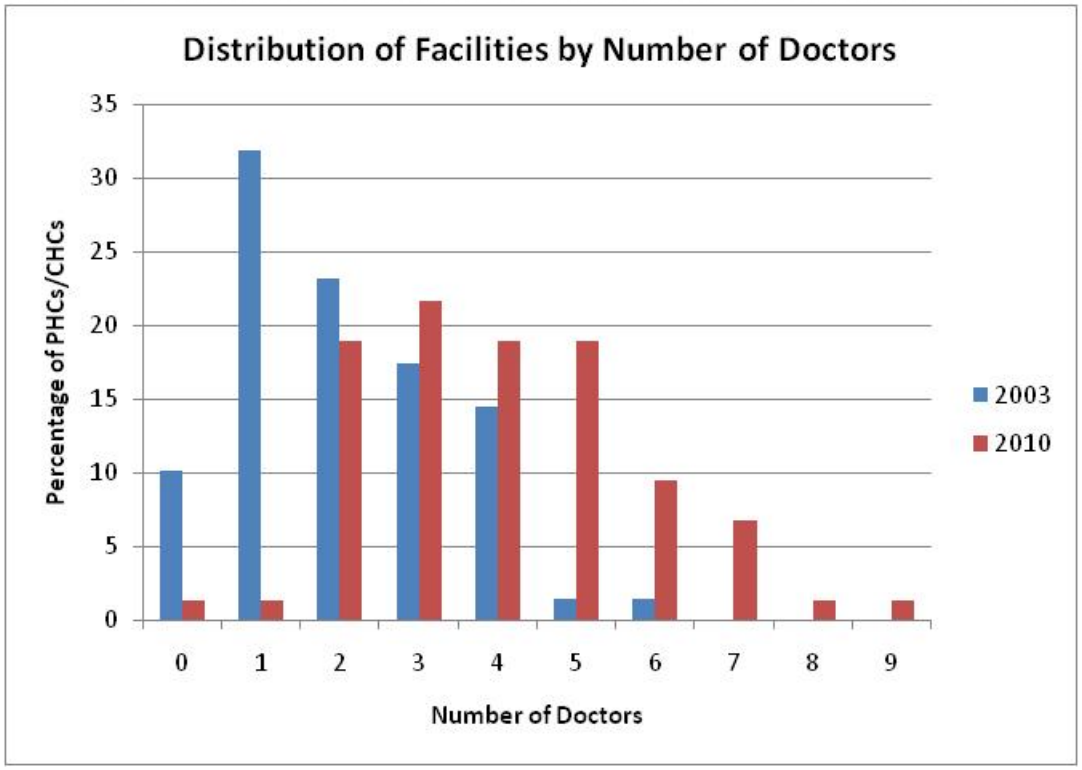
- M1: Nationwide mapping of **healthcare availability and quality** across rural India
  - 19 states, ~10 districts/state, ~8 villages/district (>1500 villages total)
  - Full census of all healthcare providers in these villages
  - Provider quality measured with 'vignettes' (testing doctor **knowledge**)

- M2: Very detailed understanding of rural **healthcare markets** in one state (MP)
  - 100 villages across 5 districts
  - Full census of households and all providers they go to (even outside the village)
  - Provider quality measured with 'standardized patients' (testing doctor **practice**)

- M3: Randomized **evaluations of interventions to solve the last mile problem** in delivering quality health care in rural India (in MP)

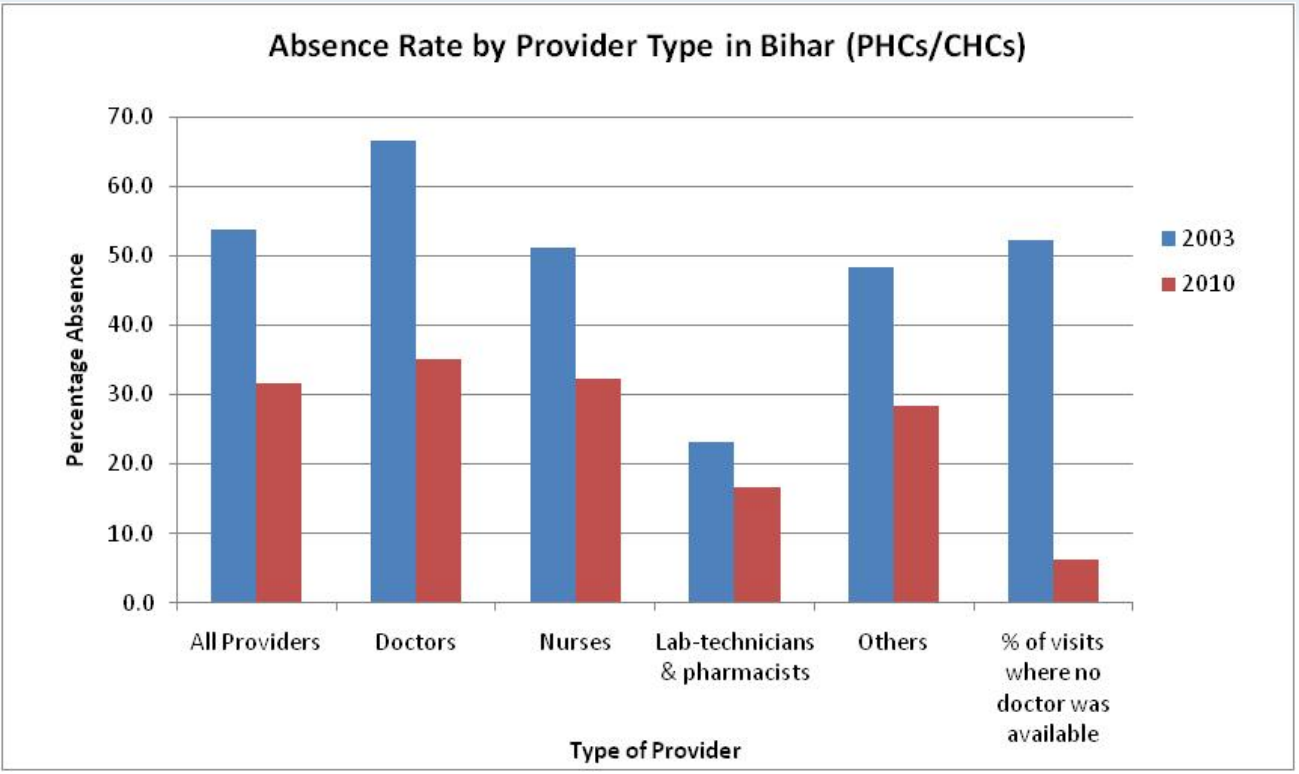
- With Jishnu Das, Alaka Holla, Michael Kremer, Manoj Mohanan

Some Good News from Bihar



- Sharp increase in doctor availability in PHCs/CHCs
- Average doctors/facility has doubled from 2 to 4
- Fraction of facilities with 0 or 1 doctors has gone down from over 40% to under 3%

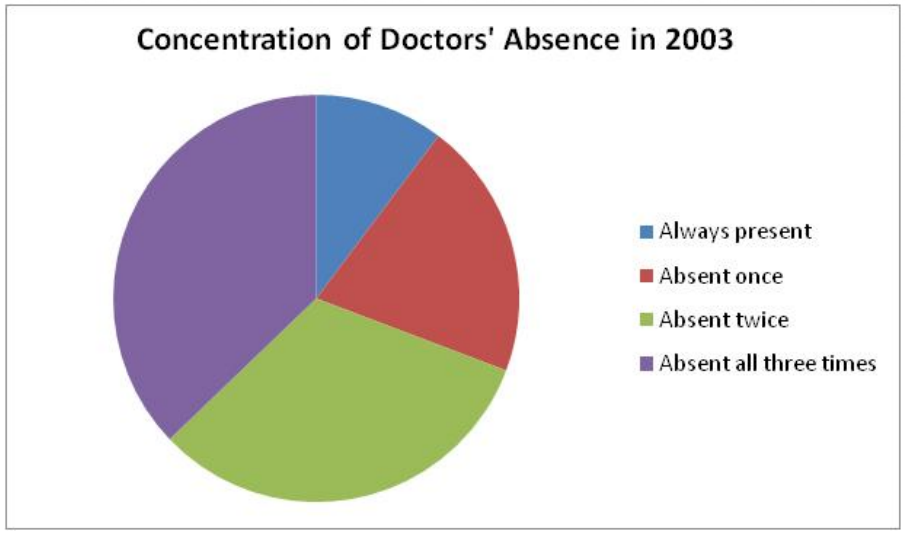
More Good News from Bihar!

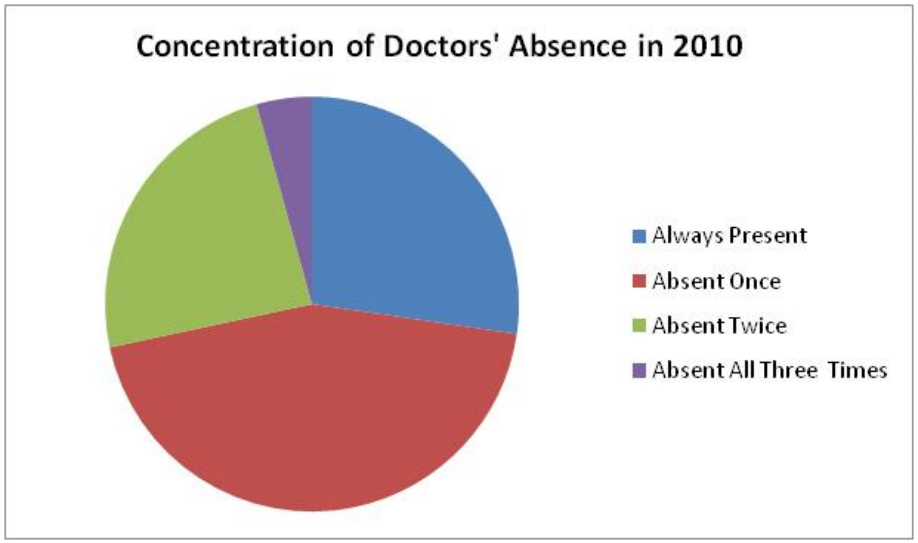


- Sharp reduction in absence in PHCs/CHCs across all types of medical workers
- Improved from highest doctor absence in India in 2003 to better than the 2003 all-India average
- Dramatic reduction in cases where a patient would find NO doctor at the PHC/CHC (>50% to <10%) – driven by both increased hiring AND increased accountability
- Voters probably knew this before the academics!!

*All numbers are **very preliminary** and should not be cited/quoted till a working paper is released (expected Summer 2011)*

Ghost Doctors Seem to have Vanished (or "appeared" if you may!)





- ~40% of doctors in the 2003 round were never found at the facility across 3 random unannounced visits spread out across 3 months – this has come down to ~10%
- The 2010 numbers are much more consistent with the idea that absences may have been legitimate (rural outreach work etc.) than the 2003 numbers

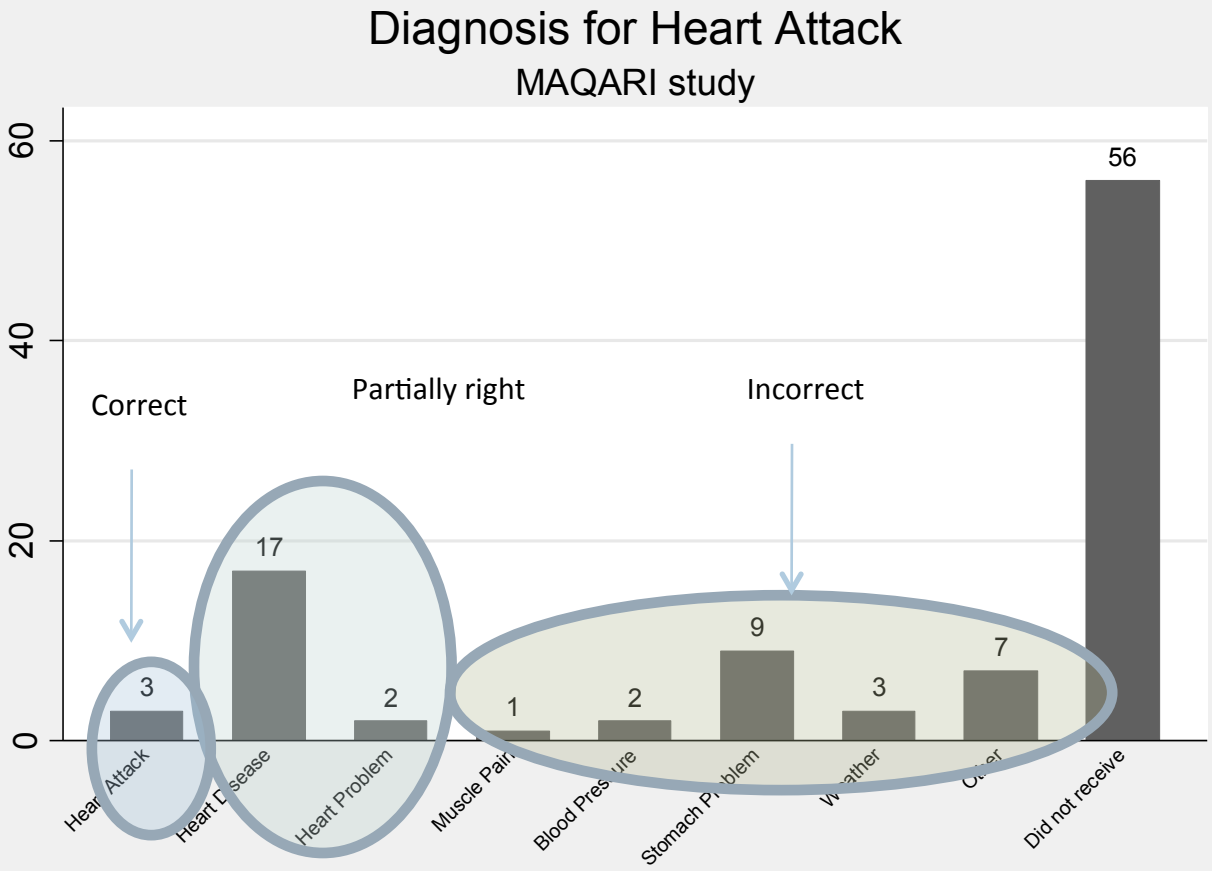
*All numbers are **very preliminary** and should not be cited/quoted till a working paper is released (expected Summer 2011)*

Improvements across regions, but with some variations

Figure 1. Absence Rates of Doctors in Bihar by Socio-Cultural Region, 2003 and 2010

*All numbers are **very preliminary** and should not be cited/quoted till a working paper is released (expected Summer 2011)*

But quality challenges are probably even greater in health than education

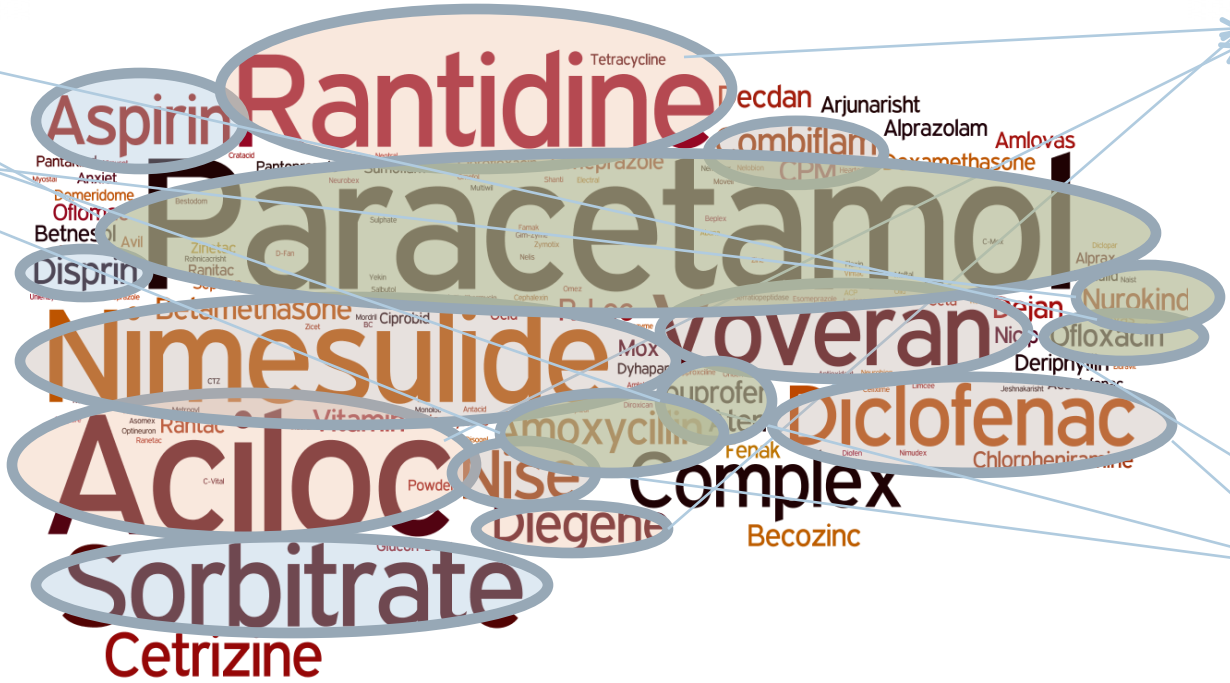


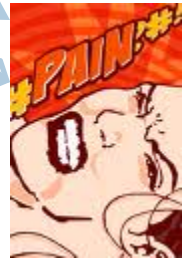
- The graph documents range of diagnoses offered by health care providers in response to a standardized "fake" patient with symptoms of a heart attack
- Caveat – ALL providers (public, private, RMP), **Reminder – Madhya Pradesh**
- Cases of "no diagnosis" are not missing at random (worse providers are less likely to offer a diagnosis)
- Heckman corrected **rates of correct diagnosis are under 5%**

*Based on 218 interactions between SSP's (Simulated Standardized Patients) and rural health care providers in **Madhya Pradesh – very preliminary***

Many interactions with a medical care provider may make a patient *worse off*

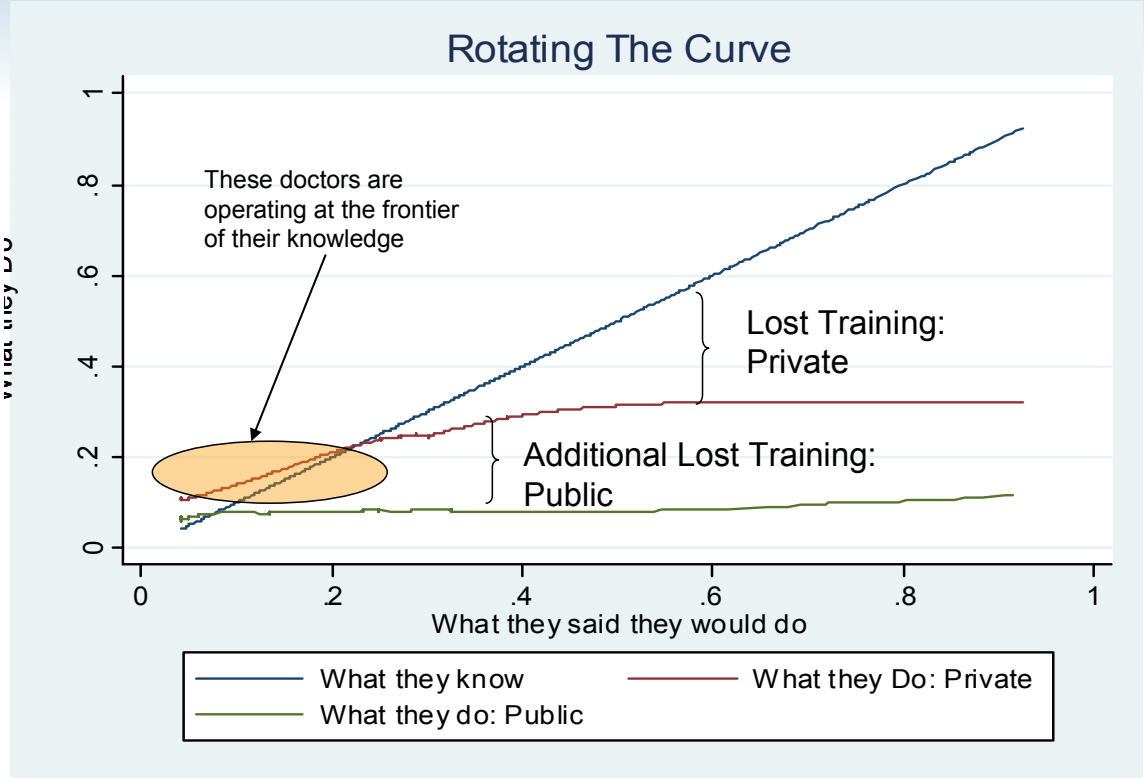
- In 7 out of 218 interactions, a provider gave aspirin (the correct action)
- In most cases, patients would have been better off without most of the medicines they were given (***increased*** cost, ***reduced*** quality)





Based on 218 interactions between SSP's (Simulated Standardized Patients) and rural health care providers in ***Madhya Pradesh – very preliminary***

More training by itself may not be very effective



- Vignettes capture competence; Observation/SP's capture practice
- Large gaps between knowledge and practice – even larger for public doctors
- Gradient between training/knowledge practice is almost flat for most parts
- Role of incentives and/or selection on intrinsic motivation

Source: Das, Hammer and Leonard, *Journal of Economic Perspectives* (based on Delhi)

Agenda

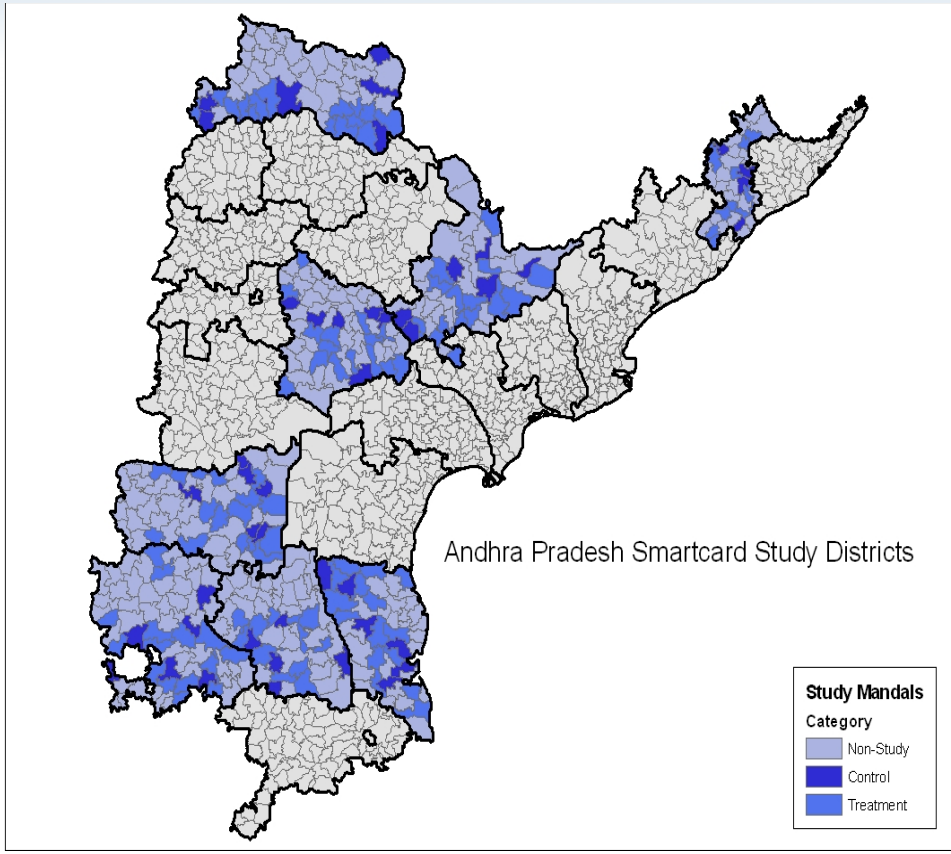
Education (AP RESt)
Health (MAQARI)
Social Protection (AP Smartcards)
Concluding Thoughts

Building State Capacity to Effectively Reach Beneficiaries of Social Welfare

- Problem: Large amounts of leakage in NREGS and other welfare programs (TPDS, Pensions, etc.). Channels include:
  - Ghost workers
  - Over-reporting work done
  - Underpayment to beneficiaries
- Proposed solution: Require payments to be authenticated with biometric smartcards (E-Shakti, AP Smartcards, etc.). Hope to:
  - Eliminate ghost workers
  - Reduce incentives for officials to over-report work because payment goes directly to worker and cannot be skimmed off
  - Reduce underpayment by generating receipts
  - Enable financial inclusion and direct targeting of beneficiaries
- Questions:
  - Will it work? If so, what is the impact? RoI?
  - Are there negative side effects?
- AP Smartcard Project (with Paul Niehaus, Sandip Sukthankar)

Evaluation Design & Data Collection

- MoU with Govt of Andhra Pradesh to randomize rollout of Smartcards at the mandal (sub-district) level in 8 districts
- Mandals randomized into three waves: treatment, non-study, and control
  - Feasible because the roll out needs to be phased anyway for logistical reasons
- Official data on payments directly from govt.
- We conduct ~8500 household surveys
  - Detailed measurement of: income, employment, receipts from programs, consumption, and assets
  - Gap between official data and survey data is the measure of leakage
  - Track leakage in carded and un-carded areas to quantify program impact
- Can do something similar with the rollout of E-Shakti in Bihar



Concluding Thoughts (1 of 2): Summary

- Service Delivery is a complex subject with many sides to consider (Maitreesh)
  - But it is one of the most critical components of good governance and is the face of the government that is most visible to citizens and voters

- Bihar has made remarkable progress in the last 5 years on many fronts
  - Nearly halving doctor absence, reducing cases of no doctor in clinic by 80%
  - Hiring 200,000 **contract** teachers

- But getting to the next level will be more challenging because these are intrinsically difficult problems (especially in health)

- The most important asset for Bihar is the **political commitment** to providing good governance and improving service delivery, and the **mandate** to do so

- Returns to investing in research to find solutions are much higher when there is a higher chance of follow through – knowledge for Bihar and spillovers beyond

Concluding Thoughts (2 of 2): Principles of Effective Service Delivery

- Focus on outcomes and not just on outlays
  - Need to define the outcomes, and invest in high-quality **measurement**
- Align the **incentives** of the administrative machinery from top to bottom to deliver outcomes
  - Special focus on the front-line service provider (teachers, health workers)
- Encourage departments (and district-level staff) to innovate towards these goals; provide analytic support to **rigorously evaluate** these innovations
  - Use evaluation data for decisions on scale up and program modifications
- Partnership with academics (IGC, J-PAL) can help with each of these goals (measurement, incentive-compatible design, and evaluation)