Achieving universal quality primary education in India:

Lessons from the Andhra Pradesh Randomized Evaluation Studies (AP RESt)

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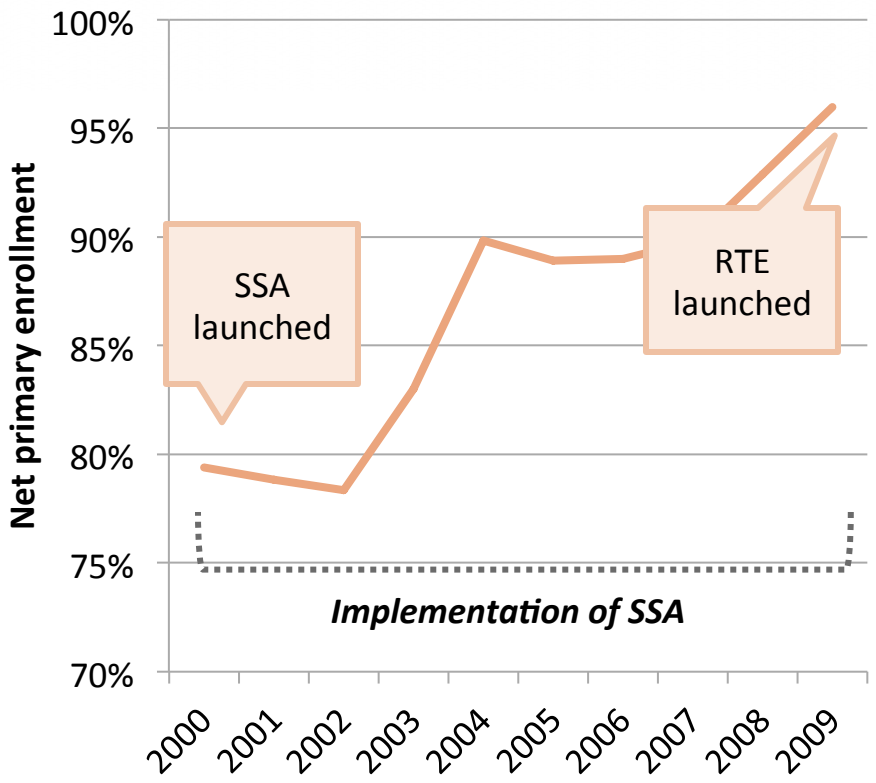
Agenda

Background / motivation
Design of APRESt
Results
Policy implications

Right to Education (RTE) provides an opportunity to focus on *quality* of education

SSA has mostly been a success in expanding enrollment

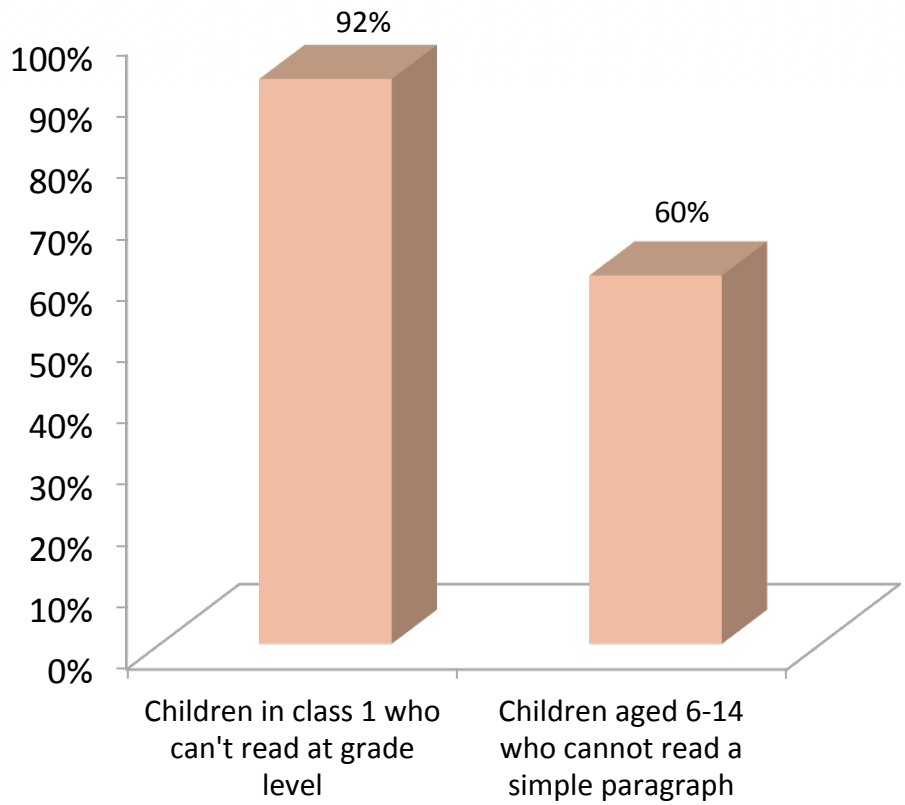


The launching of the RTE when net enrollment is already 96%, presents an opportunity to **shift focus from quantity** (i.e. just enrollment) **to quality** (i.e. learning)

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.

But, there is an urgent need to shift focus to *quality* of education

Children are unable to read at acceptable levels

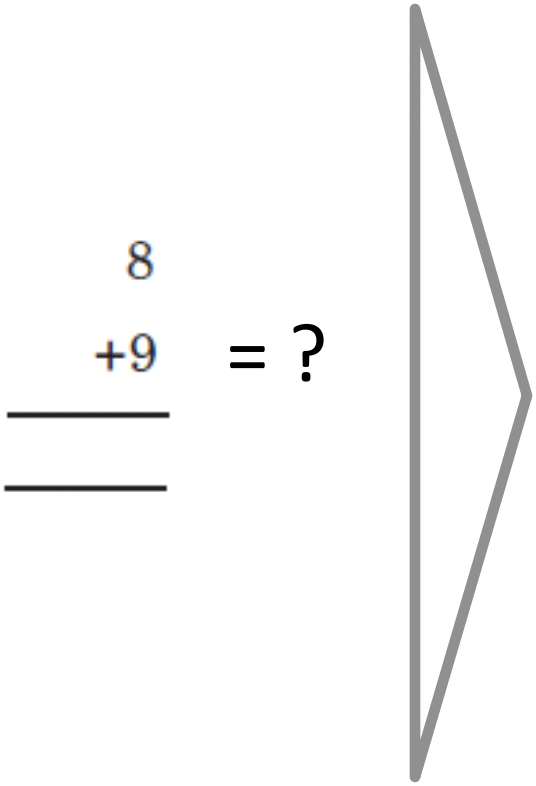


- India is **both 'shining' and 'drowning'** at the same time
  - Because of its high population, India has the 5th largest number of children in the world meeting an advanced TIMMS benchmark, as well as largest number not meeting a low benchmark

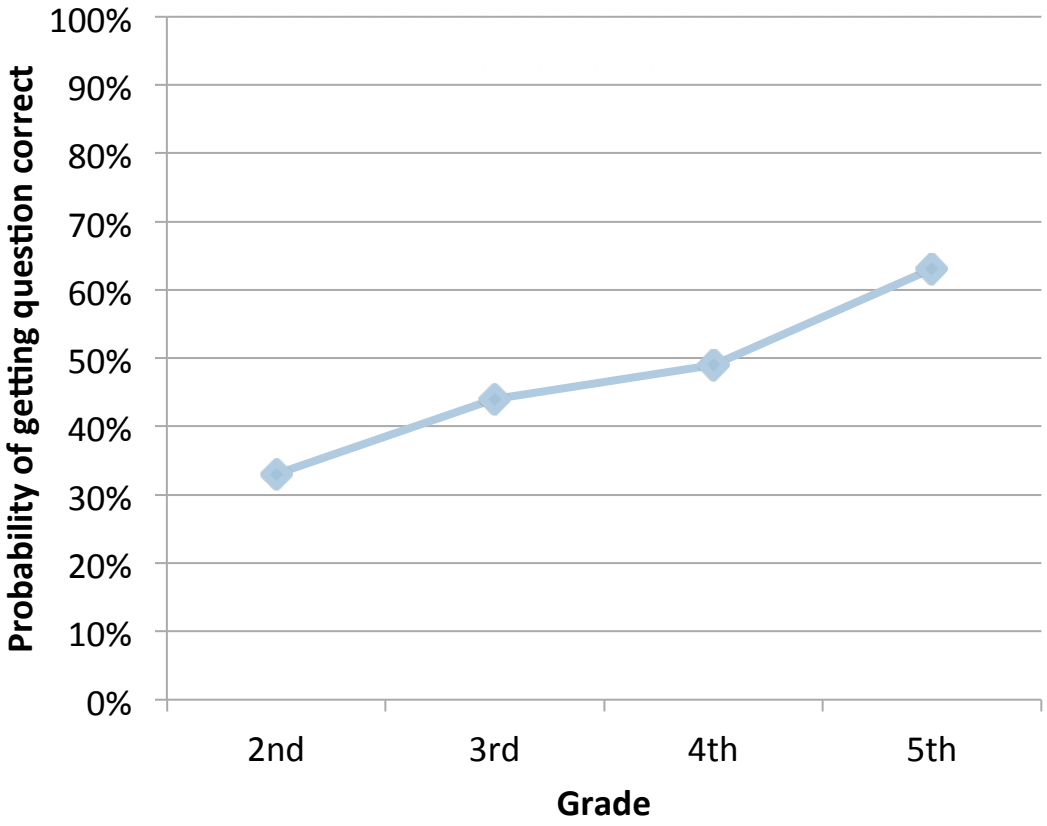
- **Difference in learning levels between top 5% and bottom 5% in India is second highest in the world** (after South Africa)

Source: LHS: Pratham; RHS: Jishnu Das and Tristan Zajonc , "India Shining, and Bharat Drowning", *Journal of Development Economics*, 2008

Learning levels and *trajectories* are unacceptably low



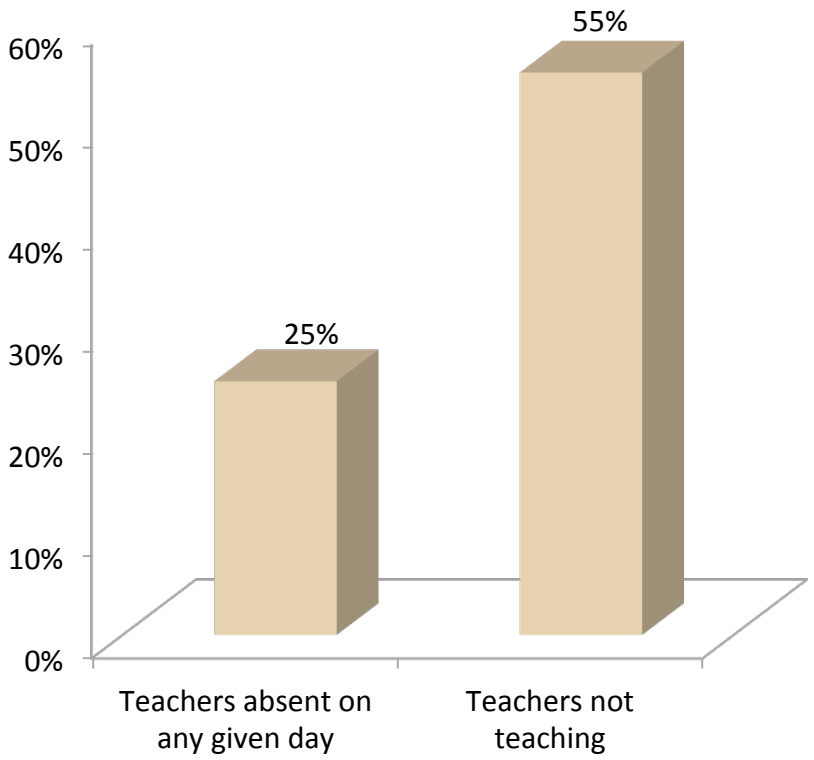
Less than half the students who don't know single digit addition in 2nd grade, learn it by the end of 5th grade!



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

Higher spending in government schools alone may not be enough

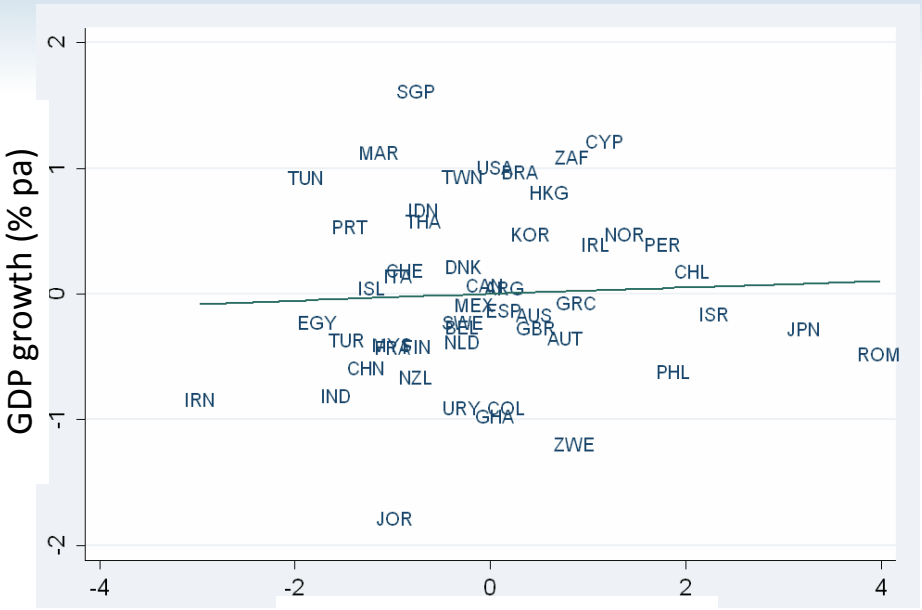
Motivation and effort-levels of government school teachers in India are a serious problem



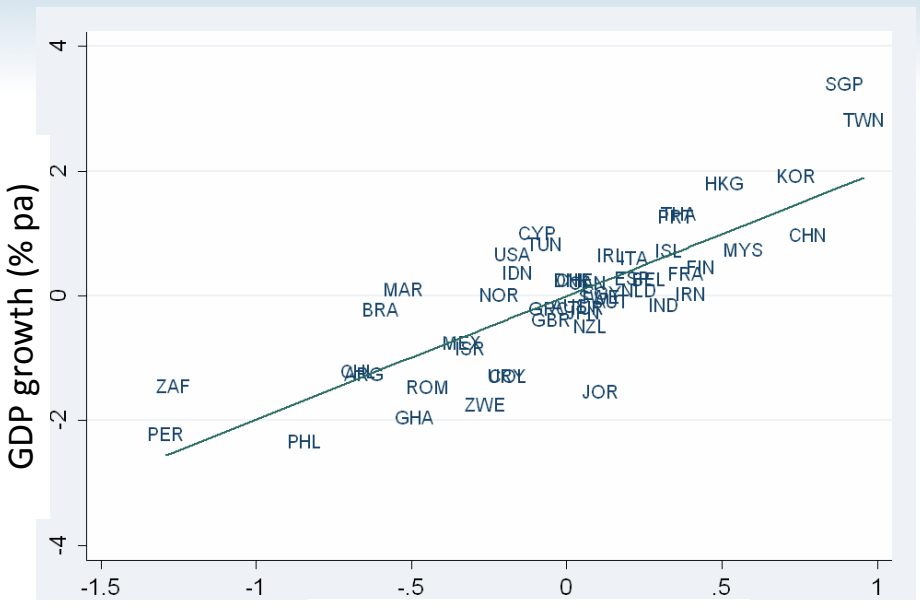
- High levels of teacher absence (25%) ranging from 15% to 42% across states
- 90% of non-capital spending goes to teacher salaries
- **Teacher that are paid more** – older teachers, more educated teachers and head teachers **– are more frequently absent**
- Higher absence rates in poorer states (additional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

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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)

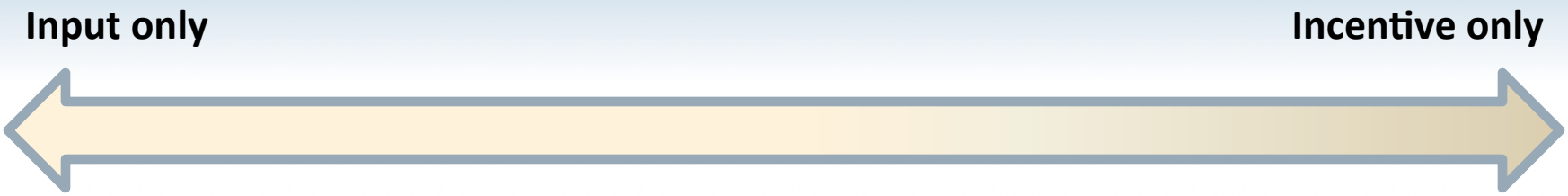
Location of study

- 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

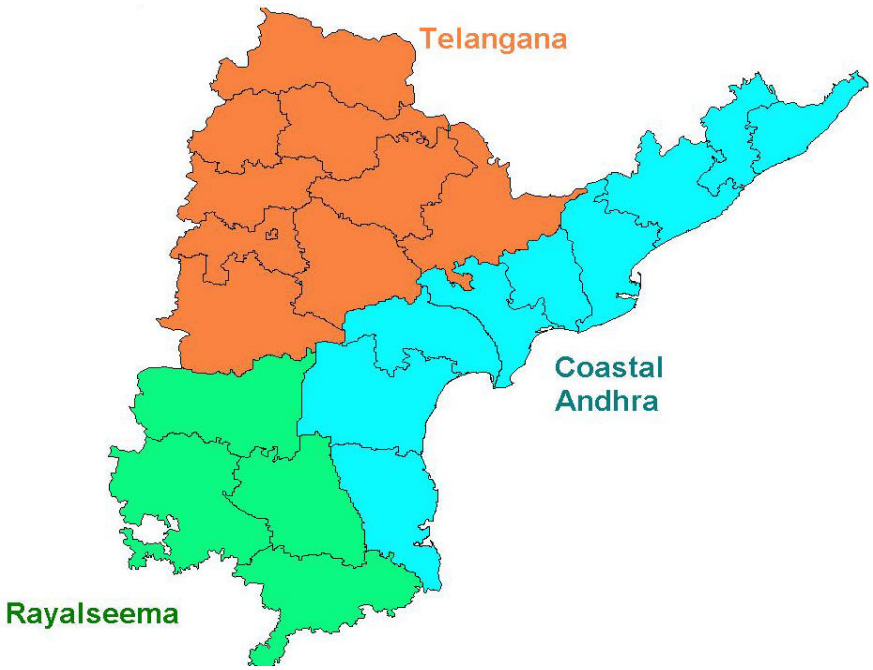
Individual Incentive + Diagnostic Feedback
100 schools

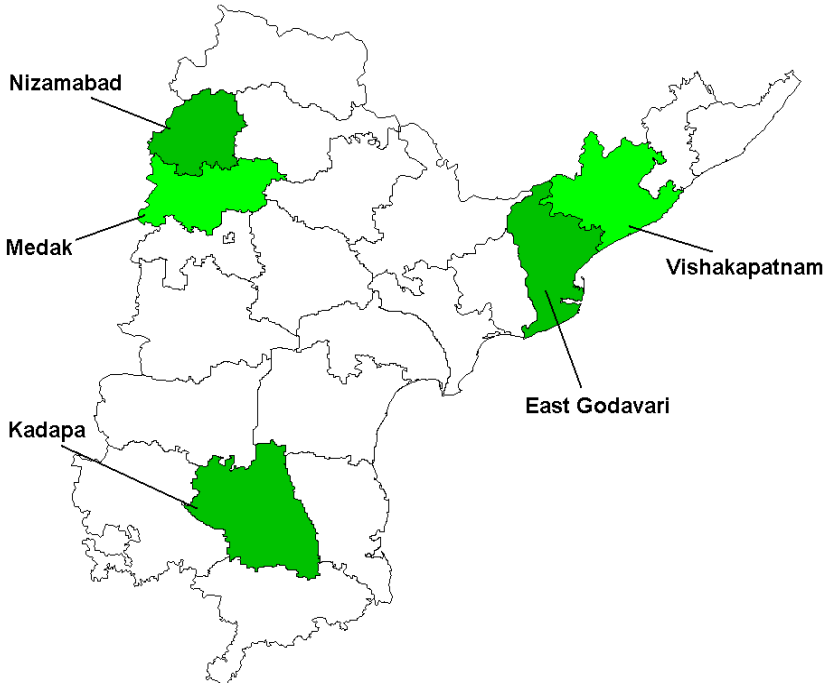
Group Incentive + Diagnostic Feedback
100 schools

Business as usual
100 schools

Randomization was stratified at the sub-district level

1. First, we chose 5 districts across three distinct 'regions' within AP
2. Then, within each district we randomly chose 10 mandals (blocks)
3. Then, within each mandal we randomly chose 12 schools
4. Finally, of these, we assigned 2 to each treatment and 2 to control





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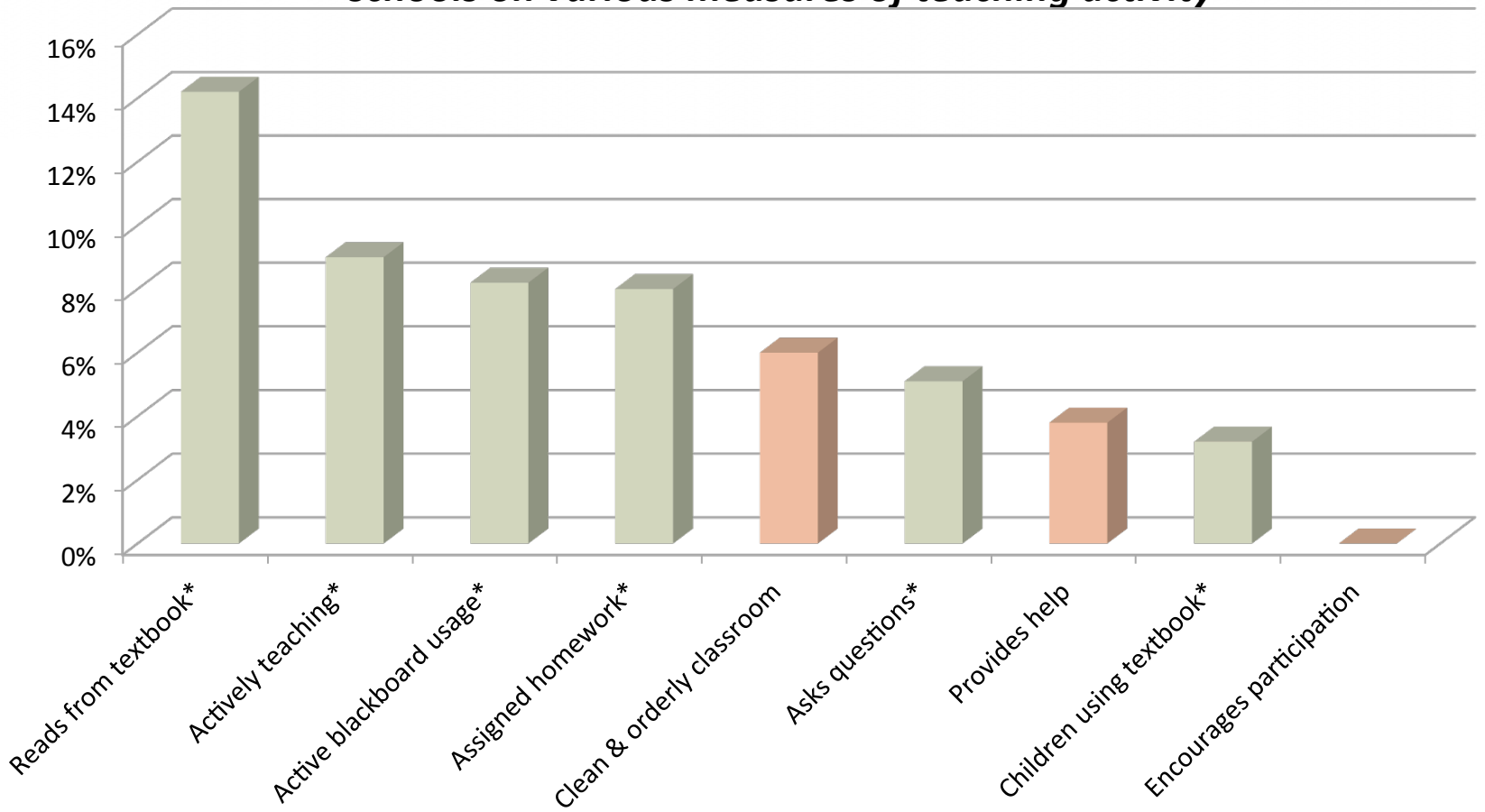
Background / motivation
Design of APRESt
Results - Feedback + Monitoring
Policy implications

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

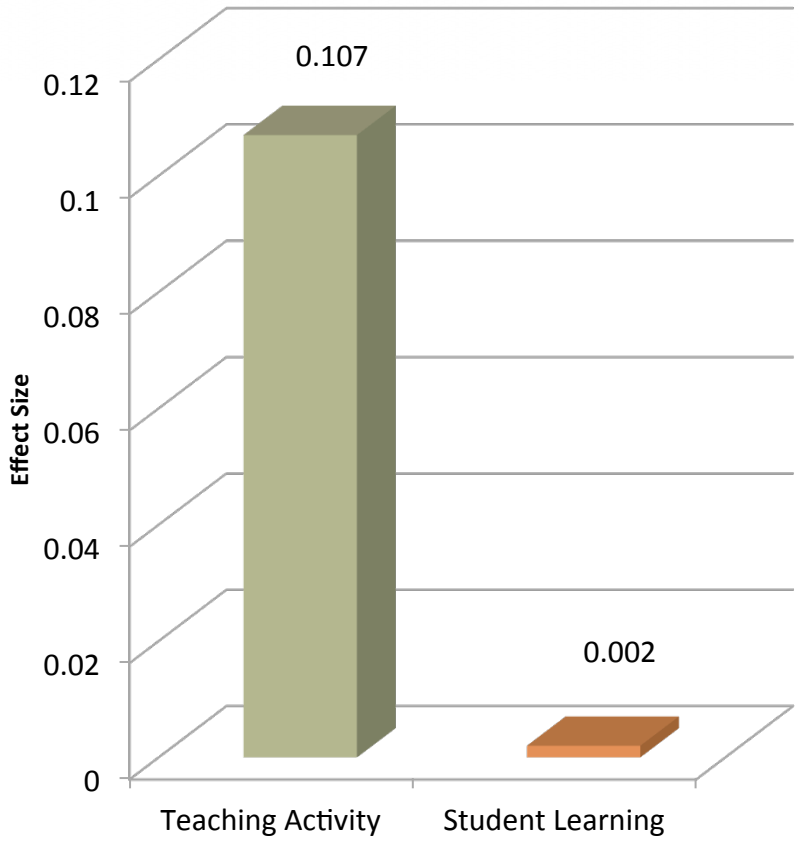
Difference between feedback + monitoring and comparison schools on various measures of teaching activity



**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**.

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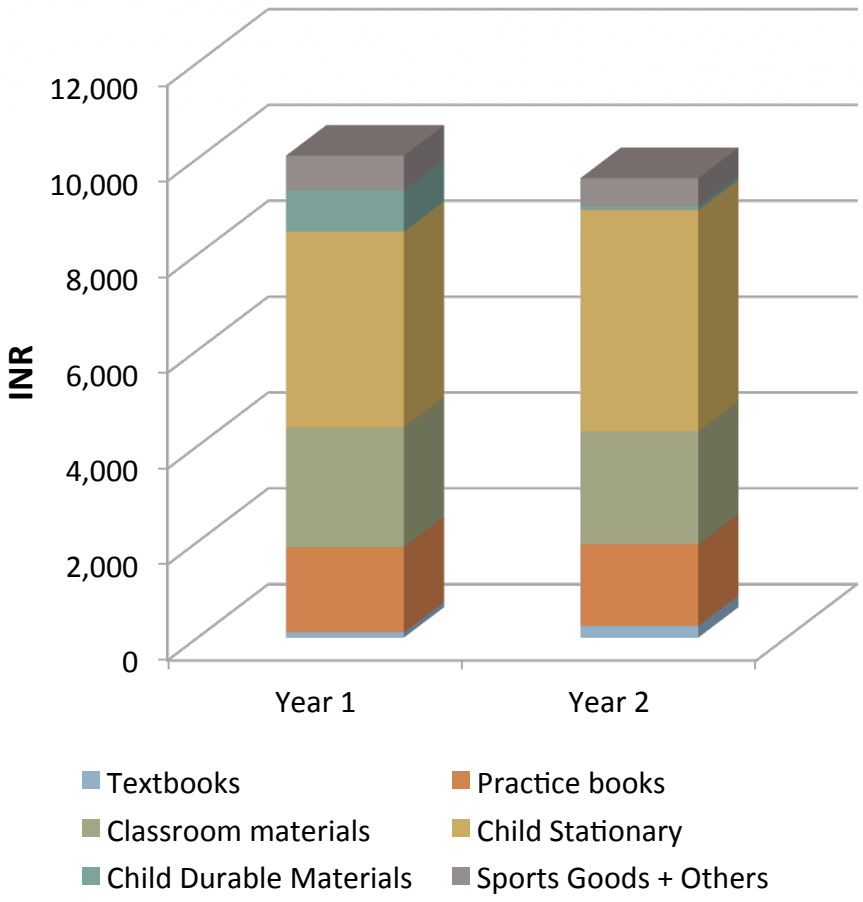
Background / motivation
Design of APRESt
Results - Block grant
Policy implications

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

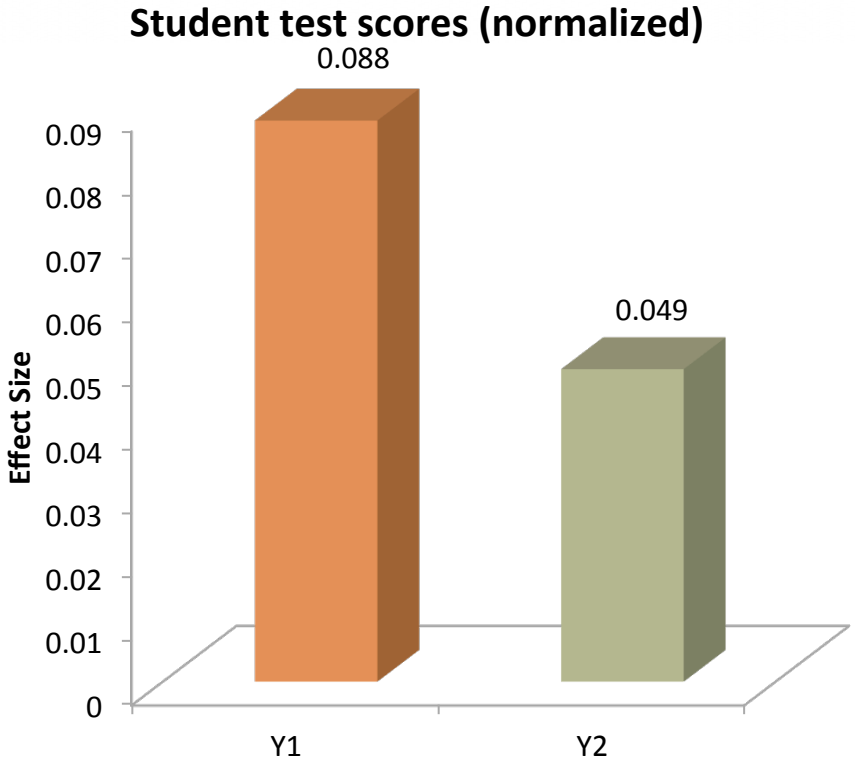
Average school annual grant allocation pattern



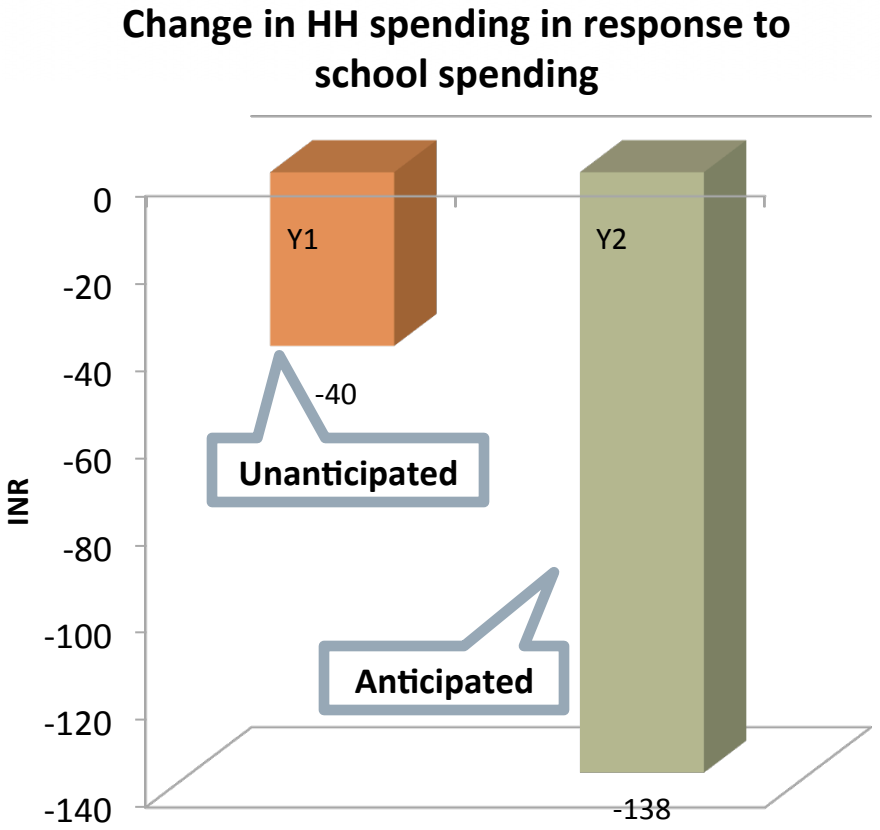
- Nearly half the grant allocation was spent on child stationary (notebooks, slates, chalks)
- Close to another 40% was spent on classroom materials (such as charts, maps and toys) and practice books (such as workbooks, exercise books, etc)
- Small amounts were allocated to durable materials and sports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

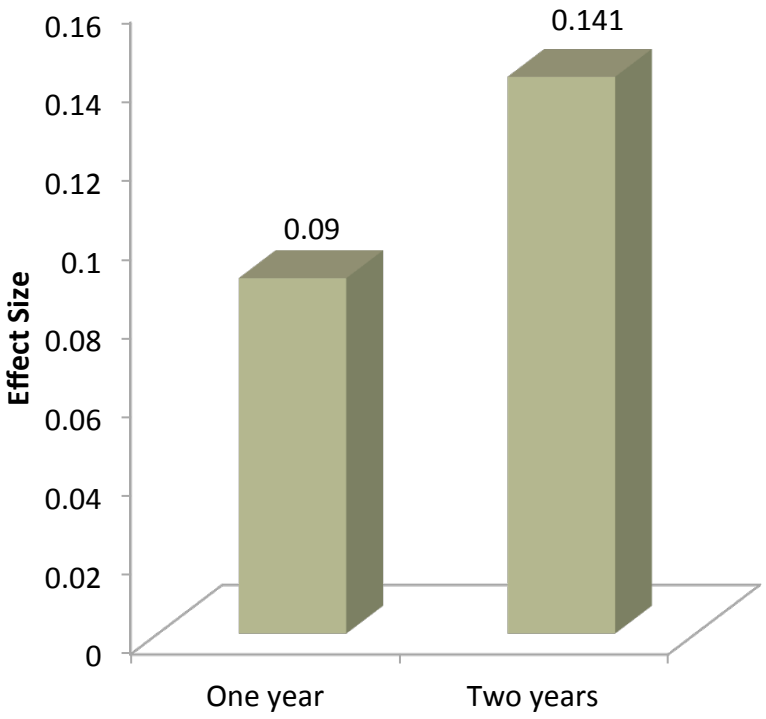
1. • Using untrained and less qualified CT's will not improve learning
2. • Decentralizing hiring will lead to local elite capture of the teacher post
3. • CTs are exploited as a result of being paid significantly less than RTs

Two main questions:

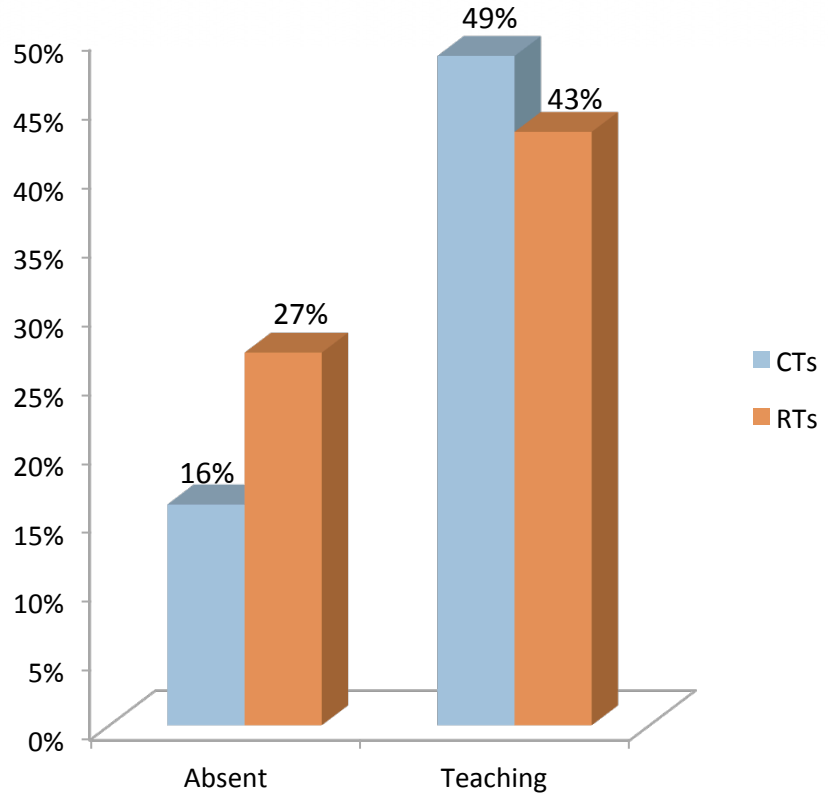
1) "What is the impact of an extra CT" hired in a "business as usual" way?
2) How would reducing PTR with a CT compare with doing so with an RT?

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



Importantly, we also find that CTs are at least as effective as RTs at improving learning outcomes

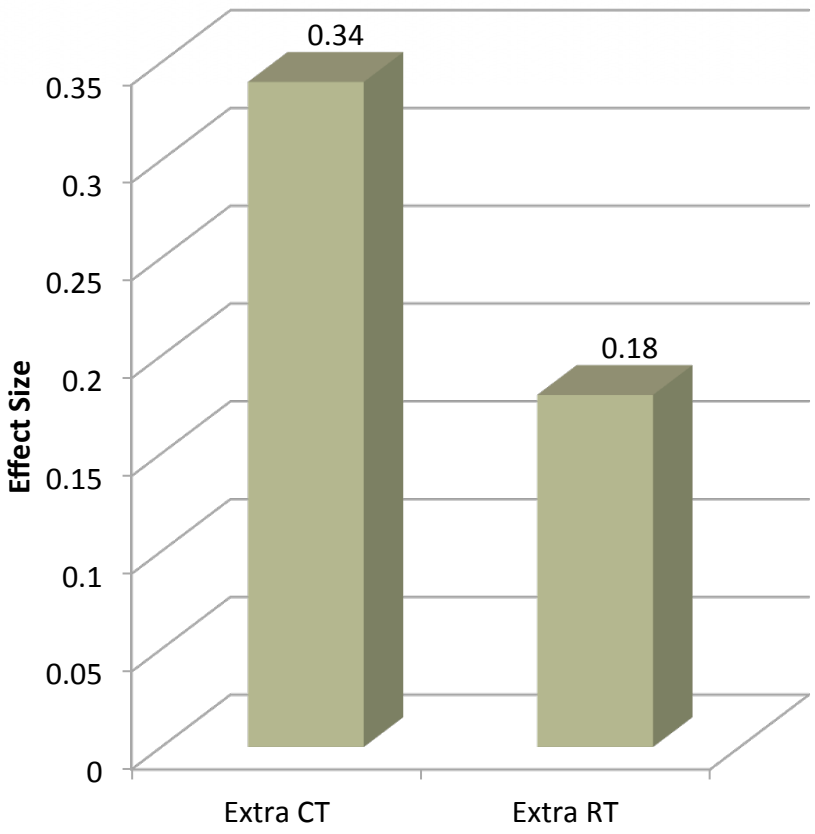
We compared CTs to RTs using several different non-experimental techniques

1. We compare learning gains by children by whether they had a contract teacher or a regular teacher (with and without school fixed effects)
2. We look at the learning trajectory of the same student over time and whether this differed when this student had a contract teacher versus a regular teacher (student fixed effects)
3. Holding other factors (such as PTR) constant, we look at the impact of the percentage of contract teachers in a school

In all three cases we find contract teachers to be equally as effective as regular teachers

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

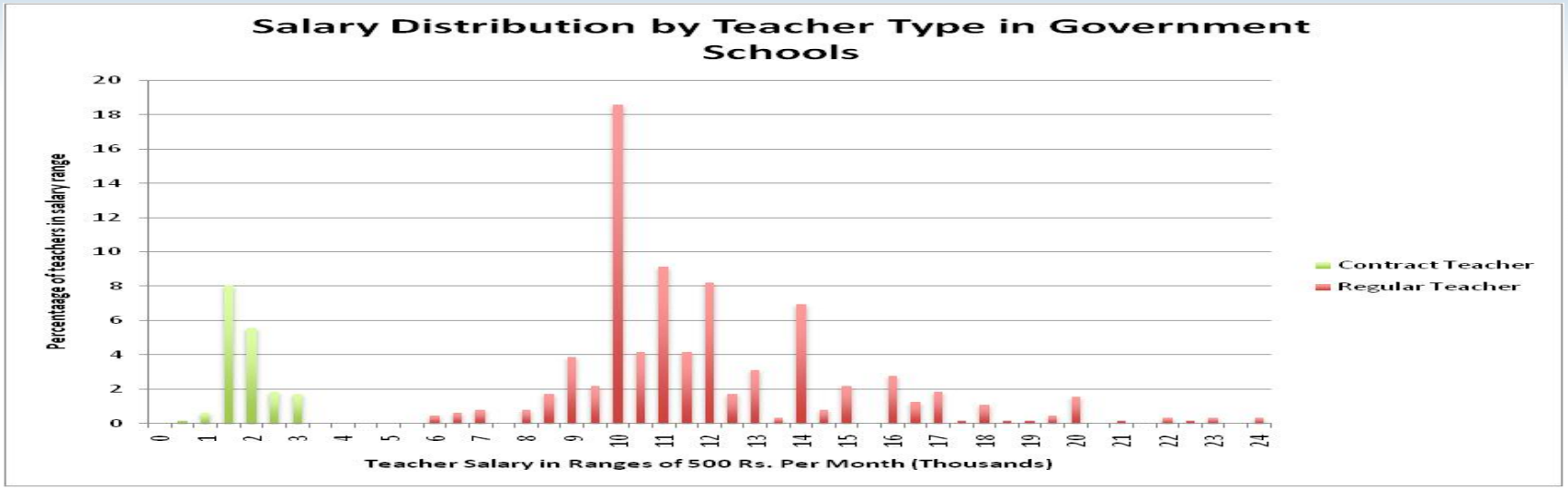


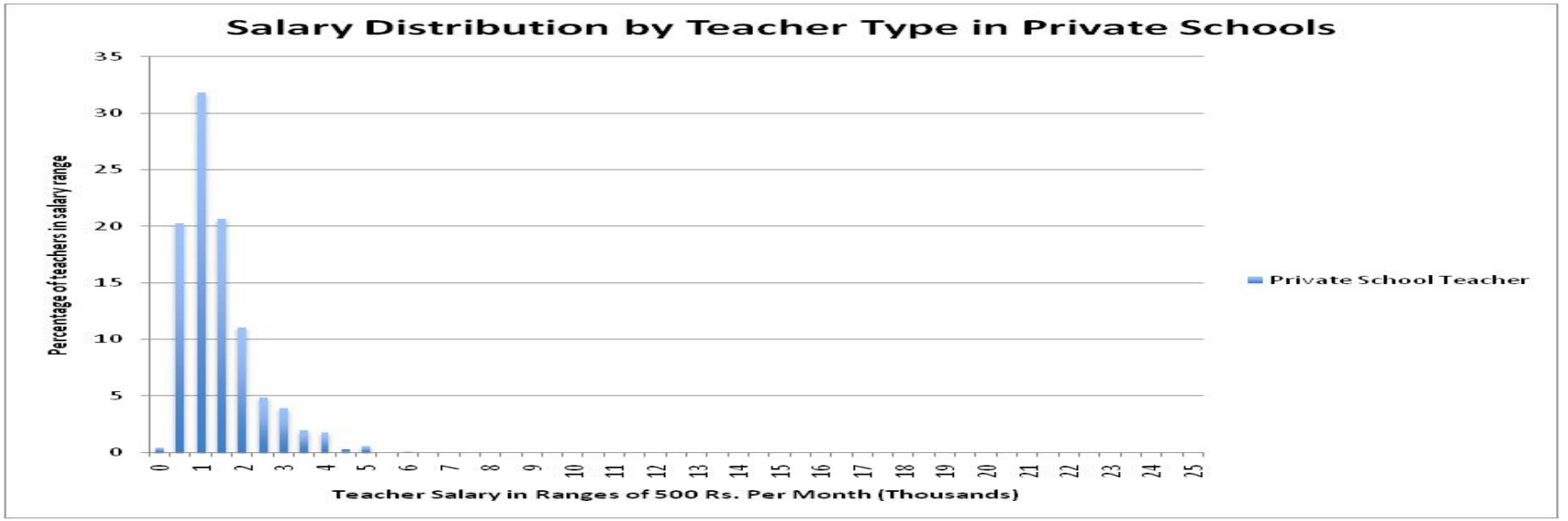
Difference is not statistically significant.

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

Performance Pay : Background and Research Questions

Motivation

- Lack of differentiation by performance is a major demotivator for teachers
  - Teachers with highest job satisfaction were most absent
- Program was designed to recognise and reward good performance

Key questions addressed

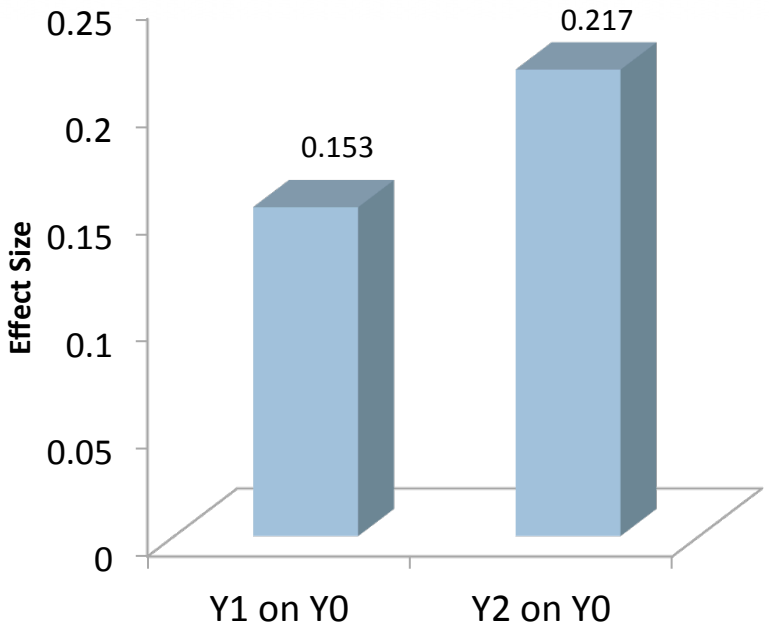
1. Can teacher performance-pay improve test scores?
2. What, if any, are the negative consequences?
3. How do group and individual incentives compare?
4. How does teacher behaviour change in response to incentives?
5. How does program impact vary by student, school, and teacher traits?
6. What is teacher opinion on performance pay?

Potential concerns with such a program are addressed pro-actively in the study design

Potential concern	How addressed
Reduction of intrinsic motivation	• Recognize that framing matters • Program framed in terms of recognition and reward for outstanding teaching as opposed to accountability
Teaching to the test	• Test design is such that you cannot do well without deeper knowledge / understanding • Less of a concern given extremely low levels of learning • Research shows that the process of taking a test can enhance learning
Threshold effects/ Neglecting weak kids	• Minimized by making bonus a function of average improvement of all students, so teachers are not incentivized to focus only on students near some target; • Drop outs assigned low scores
Cheating / paper leaks	• Testing done by independent teams from Azim Premji Foundation, with no connection to the school

Bonus schools perform better across the board

Outcomes for bonus schools relative to control schools

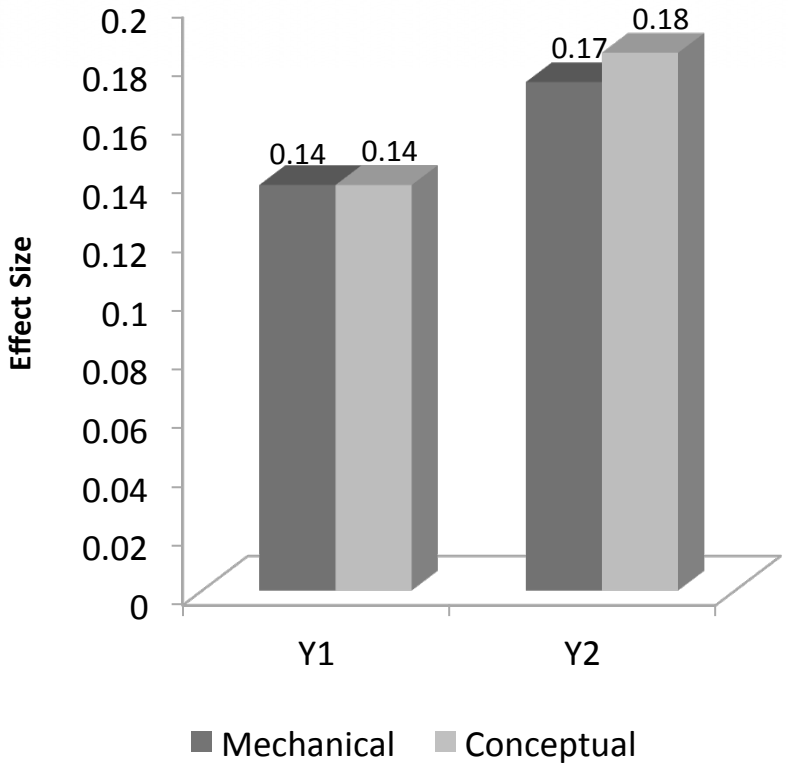


- Students in ***bonus schools do better for all major subgroups***, including: all five grades (1-5); both subjects; all five project districts; and levels of question difficulty
- ***No significant difference by most student demographic variables***, including household literacy, caste , gender, and 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

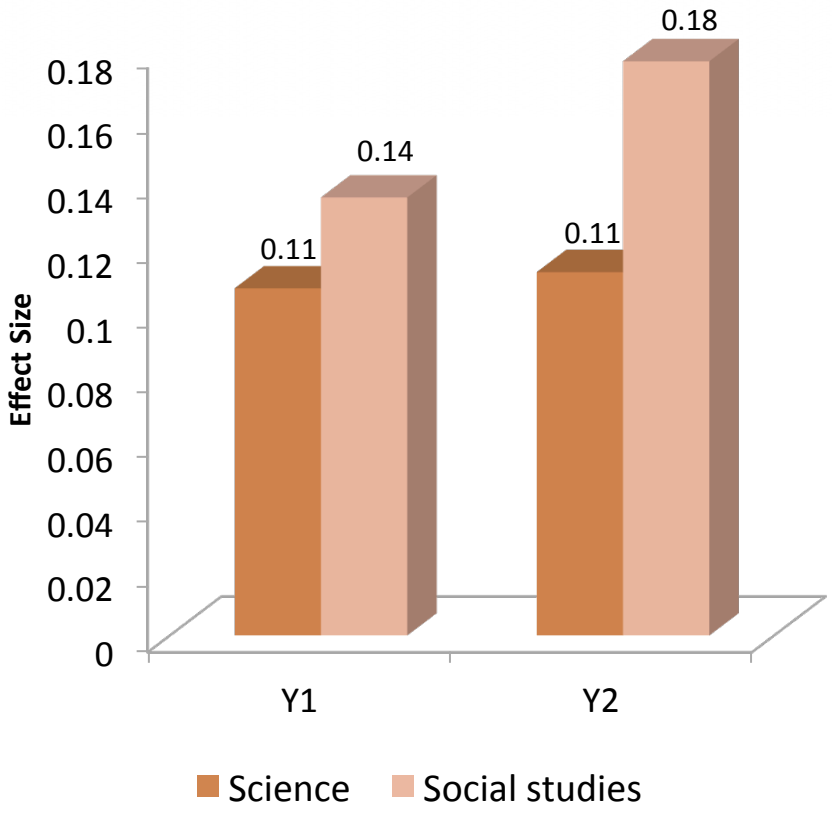
Incentives have broad-based impact

True learning: *Bonus students perform better on conceptual, not just mechanical questions*



Normalized by mechanical / conceptual distribution in control schools
All figures statistically significant

Spillovers: *And they also perform better on non-incentive subjects*



Normalized endline scores grades 3-5 only
All figures statistically significant

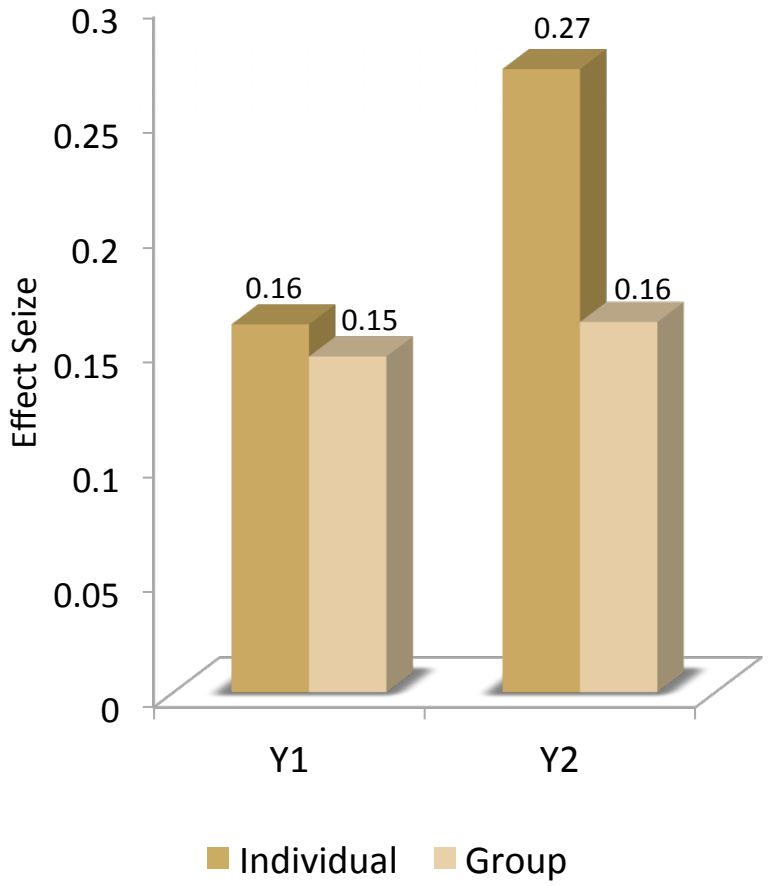
Individual incentives versus group incentives

In theory…

- The theory on group- versus individual-level incentives is ambiguous
  - On the one hand, group incentives may induce less effort due to free-riding
  - On the other, if there are gains to cooperation, then it is possible that group incentives might yield better results

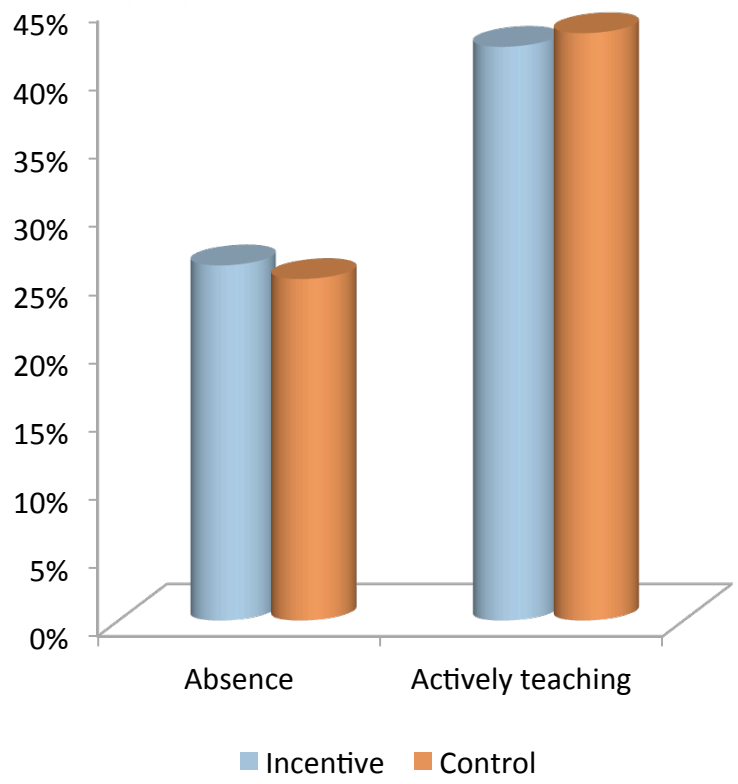
Our findings…

- Both group and individual incentive programs had significantly positive impacts on test scores in both years
- In the first year, they were equally effective, but in the second year, the individual incentives do significantly better
- Both were equally cost-effective

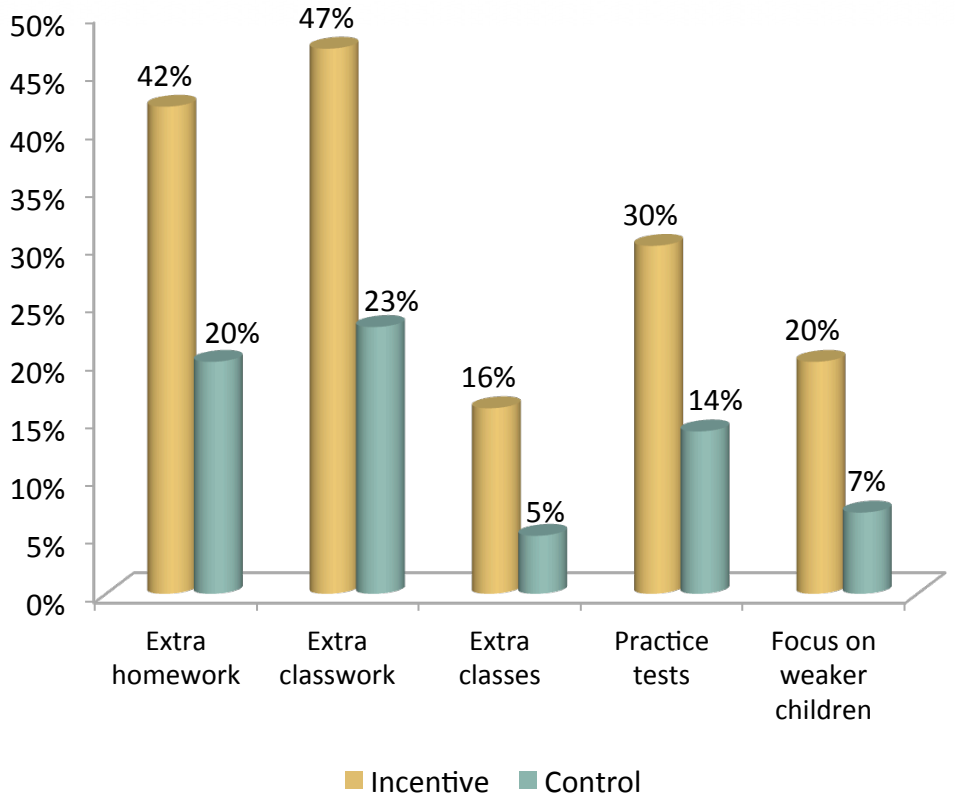


Teacher absence did not change, but effort intensity went up

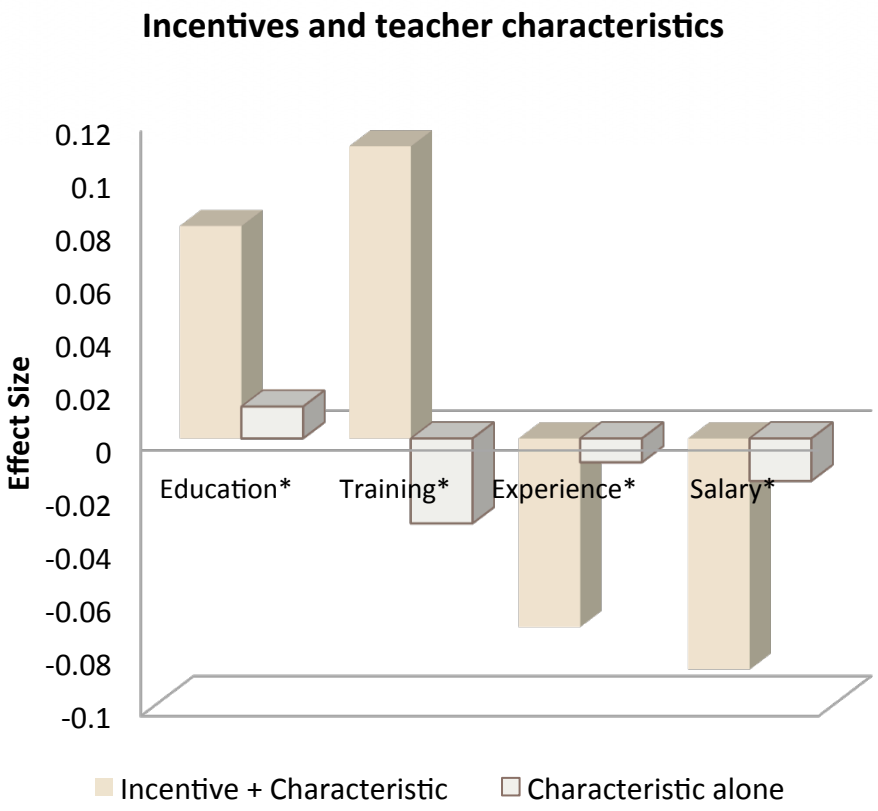
Incentive teachers did no better under observation…



… But report undertaking various forms of special preparation



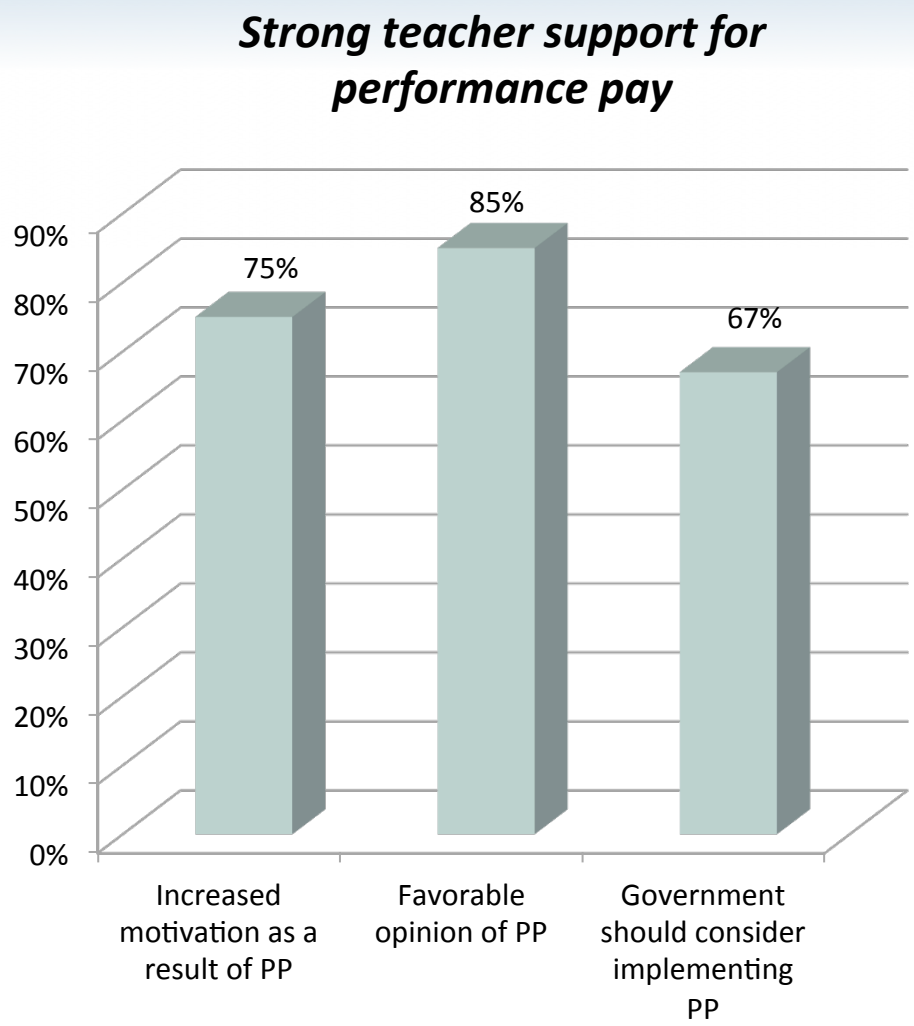
Incentives act as a force-multiplier to magnify the impact of inputs



No characteristic is significant on its own
'Experience' and 'salary' have been normalized
** Statistically significant in combination with incentive*

- Education and training are alone not impactful, but when combined with incentives are so
  - Suggests that ***qualifications combined with incentives can impact learning*** outcomes
- Teachers with higher base pay respond less well to incentives
  - Suggests that ***magnitude of incentives matters***
- More experienced teachers respond less well to incentives
  - Suggests that ***young teachers respond better*** new policy initiatives

Teacher opinion on performance pay is overwhelmingly positive



- 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

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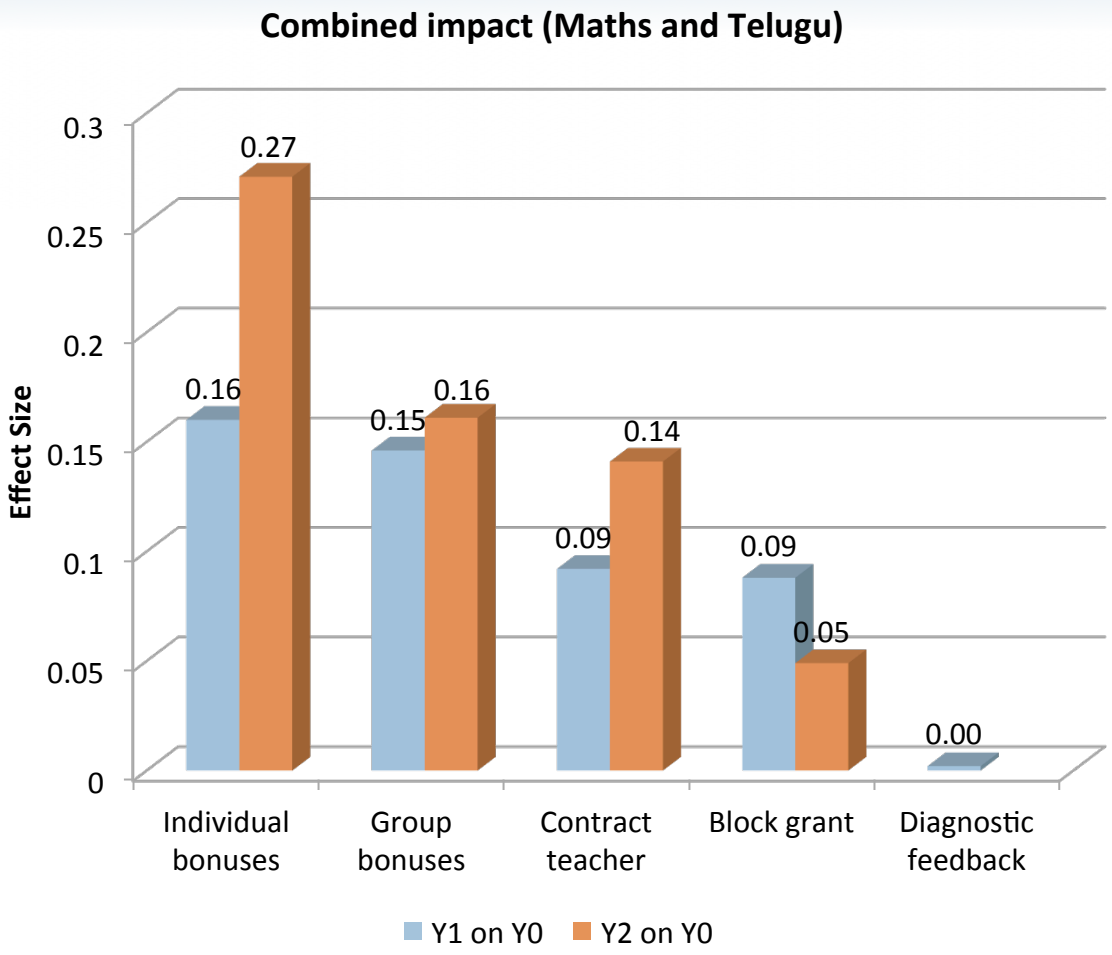
Results - Summary
Policy implications

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

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