

Abstract Title Page  
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Title:

Long-Term Effects of Teacher Performance Pay: Experimental Evidence from India

Authors and Affiliations:

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

Abstract Body  
*Limit 4 pages single-spaced.*

Background / Context:

*Description of prior research and its intellectual context.*

While the idea of teacher performance-pay is increasingly making its way into policy, the evidence on the effectiveness of such programs is both limited and mixed. The central questions in the literature on teacher performance pay to date have been whether teacher performance pay based on test scores can improve student achievement, and whether there are negative consequences of teacher incentives based on student test scores?

On the first question, two recent sets of experimental studies in the US have found no impact of teacher incentive programs on student achievement (see Fryer 2011, and Goodman and Turner 2010 for evidence based on an experiment in New York City, and Springer et al 2010 for evidence based on an experiment in Tennessee). However, other well-identified studies in developing countries have found positive effects of teacher incentives on student test scores (see Lavy 2002 and 2009 in Israel; Glewwe et al. 2010 in Kenya; and Muralidharan and Sundararaman 2011 in India). Also, Rau and Contreras (2011) conduct a non-experimental evaluation of a nationally scaled up teacher incentive program in Chile (called SNED) and find positive effects on student learning.

On the second question, there is a large literature showing strategic behavior on the part of teachers in response to features of incentive programs, which may have led to unintended (and sometimes negative) consequences. Examples include 'teaching to the test' and neglecting higher-order skills (Koretz 2002, 2008), manipulating performance by short-term strategies like boosting the caloric content of meals on the day of the test (Figlio and Winicki, 2005), excluding weak students from testing (Jacob, 2005), re-classifying more students as special needs to alter the test-taking population (Cullen and Reback 2006), focusing only on some students in response to "threshold effects" embodied in the structure of the incentives (Neal and Schanzenbach, 2010) or even outright cheating (Jacob and Levitt, 2003).

The literature on both of these questions highlight the importance of not just evaluating teacher incentive programs that are designed by administrators, but of using economic theory to design systems of teacher performance pay that are likely to induce higher effort from teachers towards improving human capital and less likely to be susceptible to gaming (see Neal 2011). Also, while there is a growing body of high-quality empirical studies on the impact of teacher performance pay on education quality, most of these evaluations stop after two or three years, and so there is no good evidence on longer-term impacts (both positive and negative) of teacher performance pay on students who have completed most of their education under such a system.

Purpose / Objective / Research Question / Focus of Study:

*Description of the focus of the research.*

In this paper, we contribute towards filling this gap with results from a five-year long randomized evaluation of group and individual teacher performance pay programs implemented across a large representative sample of government-run rural primary schools in the Indian state of Andhra Pradesh (AP). The main questions addressed in this paper are:

- 1) What is the impact of teacher performance pay (implemented for five years) on student test scores at various points of program exposure?
- 2) Are there any negative consequences of the teacher performance pay program?
- 3) What is the relative effect of group and individual teacher incentive programs?

**Setting:**

*Description of the research location.*

The study is conducted across a representative sample of 300 government-run rural primary schools in the state of Andhra Pradesh, India

**Population / Participants / Subjects:**

*Description of the participants in the study: who, how many, key features, or characteristics.*

Primary school students (~25,000) and teachers (~1000)

**Intervention / Program / Practice:**

*Description of the intervention, program, or practice, including details of administration and duration.*

Teachers in program schools were eligible to receive bonuses on the basis of the average improvement (relative to a target) of students in the school (for the group incentive program) or in the classes taught by the concerned teacher (for the individual incentive program).

**Research Design:**

*Description of the research design.*

Randomized experiment

**Data Collection and Analysis:**

*Description of the methods for collecting and analyzing data.*

Independent assessment of learning outcomes and school surveys for process outcomes

**Findings / Results:**

*Description of the main findings with specific details.*

There are three main results in this paper. First, the individual teacher performance pay program had a large and significant impact on student learning outcomes over all durations of student exposure to the program. Students who had completed their entire five years of primary school education under the program scored 0.54 and 0.35 standard deviations (SD) higher than those in control schools in math and language tests respectively. These are large effects corresponding to approximately 20 and 14 percentile point improvements at the median of a normal distribution, and are larger than the effects found in most other education interventions in developing countries (see Dhaliwal et al. 2011).

Second, the results suggest that these test score gains represent genuine additions to human capital as opposed to reflecting only ‘teaching to the test’. Students in individual teacher incentive schools score significantly better on both non-repeat as well as repeat questions; on both multiple-choice and free-response questions; and on questions designed to test conceptual understanding as well as questions that could be answered through rote learning. Most importantly, these students also perform significantly better on subjects for which there were *no incentives* – scoring 0.52 SD and 0.30 SD higher than students in control schools on tests in science and social studies (though the bonuses were paid only for gains in math and language). There was also no differential attrition of students across treatment and control groups and no evidence to suggest any adverse consequences of the programs.

Third, we find that individual teacher incentives significantly outperform group teacher incentives over the longer time horizon though they were equally effective in the first year of the experiment. Students in group incentive schools score better than those in control schools over most durations of exposure, but these are not always significant and students who complete five years of primary school under the program do not score significantly higher than those in control schools. However, the variance of student outcomes is lower in the group incentive schools than in the individual incentive schools.

We measure changes in teacher behavior and the results suggest that the main mechanism for the improved outcomes in incentive schools is not reduced teacher absence, but increased teaching activity conditional on presence. Finally, we also measure household responses to the program – for the cohort that was exposed to five years of the program, at the end of five years – and find that there is no significant difference across treatment and control groups in either household spending on education or on time spent studying at home, suggesting that the estimated effects are unlikely to be confounded by differential household responses across treatment and control groups over time.

## Conclusions:

### *Description of conclusions, recommendations, and limitations based on findings.*

While our specific findings (and point estimates of program impact) are likely to be context-specific, many features of the Indian education system (like low average levels of learning, low norms for teacher effort in government-run schools, and an academic and pedagogic culture that highly values performance on high-stakes tests), are found in other developing countries as well. Our results therefore suggest that performance pay for teachers could be an effective policy tool in India and perhaps in other similar contexts as well.

The main challenge to scaling up teacher performance pay programs of the type studied in this paper is likely to be administrative capacity to maintain the integrity of the testing procedures. However, the results reported in this paper over five years, suggest that it may be worth investing in the administrative capacity (perhaps using technology for testing) to implement such a program at a local scale (such as a district or comparably sized jurisdiction in India) and learn if such implementation is feasible. Combining scale ups with credible evaluation strategies will help answer whether teacher performance pay programs can continue to deliver benefits when administered at scale.

Appendices  
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Appendix A. References

*References are to be in APA version 6 format.*

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