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Sean Galvin
University of Portland

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Changing Teacher Hiring Practices to Improve Student Outcomes

Sean Galvin

This paper is an attempt to replicate the findings of a study done by Drs. Esther Duflo, Pascaline Dupas, and Michael Kremer published in 2007. The primary question of this study was to determine if, by hiring low-cost local contract teachers, Kenyan school districts could improve student achievement and counteract classroom overcrowding that has been an issue since the removal of school fees in the country. I am also testing an additional hypothesis, whether students assigned to the contract teacher are less likely to drop out. I find, along with the previous study, that the hiring of a local contract teacher improves student learning for students assigned to the extra teacher by a statistically significant amount. Additionally, the students assigned to the contract teacher have a 3.7% lower attrition rate.

1. Introduction

Since the establishment inclusion of universal primary education in the Millennium Development Goals in 2000, developing nations have been striving to provide education to all of their citizens by treating it as a public good and removing enrollment fees. Of course, by allowing more students into a public education system that does not necessarily have the infrastructure to handle universal enrollment, developing nations face the problem of overcrowding in school classrooms. This is a major problem faced by Kenya's public school system. After removing enrollment fees in 2003, Kenyan schools saw an increase in enrollment of 30% by 2005. The mean classroom size for first graders in 2005 was 83, with many classes having over 100 students (Duflo *et al.*, 2007).

The goal of this research is to analyze the effect on student performance when schools are given the funding to hire a local contract teacher at around one quarter the salary of the standard civil service teachers. This would be a low-cost solution to the problem of overcrowding, and the short-term nature of the local teachers' contracts could, in theory, provide a better incentive for teacher effort. The data show that when schools are given

the funding to hire one local contract teacher for first grade, student performance on standardized tests at the school improves by .16 standard deviations, with an improvement of .18 standard deviations for students assigned to the contract teacher.

2. Literature Review

This research is similar to a study done by Drs. Banerjee, Duflo, and Linden in India, which also studied the effects of hiring contract teachers. However, in Banerjee *et al.*, the focus was on remedial education in math and reading while this study deals with first grade general education. The study in India resulted in improvement for students given the remedial education, but no increase in performance for the students not assigned to the remedial teachers, despite reduction in class sizes for all students (Benarjee *et al.*, 2007).

Other studies with similar foci have provided mixed results, adding to the controversy around these kinds of programs. A different study done in rural India showed no improvement in test scores (Banerjee, Jacob, Kremer, Lanjouw, and Lanjouw, 2005). A study varying class sizes in Kenya, where treatment schools received 9 additional students, showed no change in test scores (Kremer, Moulin, and Namunyu, 2003). These varying results indicate that class sizes are not the only factor that dictates when these programs will be successful and when there will be no change. The authors of my target paper and one other study done in 2004 show evidence that the introduction of contract teachers into schools with civil service teachers has the effect of reducing the performance of the civil service teachers (Kremer *et al.*, 2004; Duflo *et al.*, 2007). Giving more oversight power to the parent associations of schools with local contract teachers can mitigate this effect (Duflo *et al.*, 2007).

3. Data summary

To test their hypothesis, the researchers conducted a randomized controlled experiment. Out of a pool of 210 schools, 140 were randomly selected to receive funding to hire a local contract teacher, leaving 70 additional schools as a control. These 140 schools were then split into two groups of 70, one receiving just the extra teacher treatment and one receiving an additional treatment. Unfortunately, the data on the website is incomplete, with only 131 schools in the data set and apparently no control schools at all. Instead of comparing average test scores by school, I will be comparing average test scores between those assigned to the civil service teachers and those assigned to local contract teachers. By comparing the test scores at the end of the year between these two groups, we can observe the effect of hiring an additional local contract teacher on student outcomes.

There are three variables in the dataset that were important for my hypothesis. These are as follows: *etpteacher_1*, which is a dummy variable representing whether the student was assigned to a contract teacher; *totalscore*, which represents the student's overall score on the standardized test given at the end of the year; and *attrition*, which is a dummy variable representing whether or not the student was present on the day of the exam or dropped out beforehand.

4. Methodology/estimation methods

To test my hypotheses, I used a single dummy variable *etpteacher_1* to represent whether or not a student was assigned to one of the additional contract teachers. To determine whether students assigned to one of the contract teachers performed the same

or better than students in the control group, I performed a two-tailed t-test on the variable *totalscore* to compare the means for this variable between the two groups. Then I performed a standard OLS regression on test scores with independent dummy variable *etpteacher_1* to determine the effect that the treatment had on average test scores.

To test my alternative hypothesis regarding attrition rates, I performed a standard OLS regression with the variable *attrition* as the dependent variable and *etpteacher_1* as the independent variable.

5. Results

My analysis shows a statistically significant difference in average test scores between the control group and the treatment group. As shown in Table 1, the null hypothesis is rejected with extreme certainty, with a difference in means of about .16 standard deviations. The regression in Table 2 reiterates this finding, with a coefficient on *etpteacher_1* that is significant at the 1% level. This is slightly different from the findings of my target paper, which found a difference of .18 standard deviations, but this distortion is likely due to the incompleteness of the dataset online.

My additional hypothesis was also confirmed. Table 3 shows the results of my regression for attrition rates, which indicate that students assigned to a contract teacher were 3.7% less likely to drop out before the test. This result is also statistically significant at the 1% level.

6. Conclusions

The results of this study indicate that at least within the context of the Kenyan public school system, the practice of hiring contract teachers from the local population is a cost

effective way to mitigate the problem of overcrowding in schools. Not only do the test scores of students assigned to these teachers improve, my research also shows that there is a greater likelihood for students to stay in school. This is possibly due to local teachers having more of a personal connection with the students, preventing them from falling through the cracks. While there clearly needs to be more research done due to the mixed results of previous studies, this study at the very least provides justification for more research in this area.

References

Banerjee, A., Cole, S., Duflo, E. and Linden, L. (2007). "Remedying Education: Evidence from Two Randomized Experiments in India." Quarterly Journal of Economics.

Banerjee, A., Jacob, S., and Kremer, M., with J. Lanjouw and P. Lanjouw, (2005) "Moving to Universal Education! Costs and Tradeoffs," MIT mimeo.

Duflo, E., Dupas, P., and Kremer, M. (2007). Peer effects, pupil-teacher ratios, and teacher incentives: Evidence from a randomized evaluation in Kenya.

Kremer, M., Miguel, E., and Thornton, R (2004). "Incentives to Learn." Manuscript, Harvard University Department of Economics.

Tables

Table 1
T-Test on Test Scores between Test Groups

Group	Obs	Mean	Std. Error	Std. Dev.	95% Conf. Interval	
Control	1368	11.54554	0.2368885	8.761673	11.08083	12.01024
ETP Teacher	1446	12.92863	0.2417206	9.191742	12.45447	13.40279

Diff	1.383
Diff/Std. Dev.	0.157846567

diff = mean(0) - mean(1)   t = -4.0812

Ho: diff = 0   degrees of freedom =   2812

Ha: diff > 0

Pr(T > t) = 1.0000

Table 2	
Test Scores by Teacher Assignments	
	Test Scores
etpteacher_1	1.3831***
	(0.339)
Constant	11.5455***
	(0.243)
Observations	2,814
R-squared	0.0059
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Table 3
Attrition Statistics

	Probability of Attrition
etpteacher_1	-0.0371***
	(0.013)
Constant	0.1929***
	(0.009)
Observations	3,409
R-squared	0.0024
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	