

# **Randomized Evaluations of Educational Programs in Developing Countries: Some Lessons**

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This paper reviews recent randomized evaluations of educational programs in developing countries, including programs to increase school participation, to provide educational inputs, and to reform education. It then extracts some lessons for education policy and for the practice and political economy of randomized evaluations.

## **I. Increasing School Participation**

Education is widely considered to be critical for development. The internationally-agreed Millennium Development Goals call for universal primary school enrollment by 2015. However, until recently there were no good assessments of how best to achieve this goal or how much it would cost. Some argue that it will be difficult to attract additional children to school, since most children who are not in school are earning income their families need. Others argue that children of primary-school age are not that productive, and modest incentives or improvements in school quality would be sufficient. Some see school fees as essential for ensuring accountability in schools and as a minor barrier to participation, while others argue that eliminating fees would greatly increase school participation.

The simplest way to increase school participation is to reduce the cost of school, or even pay for attendance. Schultz (forthcoming) takes advantage of randomized order of program phase-in to examine the impact of the PROGRESA program in Mexico, which provided cash grants to families conditional on their sending their children to school. He finds an average increase in enrollment of 3.4% for all students in grades 1 through 8; the increase was largest

among girls who had completed grade 6, at 14.8%. In part because the randomized phase-in of the program allowed such clear documentation of the program's effects, the Mexican government decided to preserve and expand the program, and similar programs are being introduced elsewhere in Latin America.

One potential problem with conditional transfers is that the people administering the program may not enforce the conditionality in practice. School meals may therefore provide a stronger incentive to attend school than take-home rations ostensibly conditioned on school attendance (Sen, 2002). Christel Vermeersch and I are examining the effect of school meals on school participation in Kenya. School participation was 30% greater in 25 Kenyan pre-schools where a free breakfast was introduced than in 25 comparison schools. The provision of meals cut into instruction time, however. Overall, test scores were 0.4 standard deviations greater in the program schools, but only if the teacher was well-trained prior to the program (Vermeersch, 2002).

In many countries, parents face significant private costs of education, either for school fees or for other inputs, such as uniforms. Kremer, et al. (2002) evaluate a program in which an NGO, Internationaal Christelijk Steunfonds Africa (ICS), provided uniforms, textbooks, and classroom construction to seven schools, randomly selected from a pool of 14 poorly performing candidate schools in Kenya. Parents are normally required to purchase uniforms at about \$6— a substantial expense in a country with per capita income of \$340. Dropout rates fell considerably in treatment schools and after 5 years pupils in treatment schools had completed about 15% more schooling. In addition, many students from nearby schools transferred into program schools, raising class size by 50%. This suggests that students and parents were willing to trade off substantially bigger class sizes for the benefit of free uniforms, textbooks, and improved

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classrooms. Given that the combination of these extra inputs and a 50% increase in class size led to no measurable impact on test scores, but that the cost savings from a much smaller increase in class size would have allowed the Kenyan government to pay for the uniforms, textbooks and other inputs provided under the program, these results suggest that existing budgets could be productively reallocated to decrease parental payments and substantially increase school participation.

Poor health may also limit school participation. To take one example, intestinal helminths (such as hookworm) affect a quarter of the world's population, and are particularly prevalent among school-age children. Miguel and Kremer (2001) evaluate a program of twice-yearly school-based mass treatment with inexpensive deworming drugs. Seventy-five schools were phased into the program in random order. Health and school participation improved not only at program schools, but also at nearby schools, due to reduced disease transmission. Absenteeism in treatment schools was 25% (or 7 percentage points) lower than in comparison schools. Including this spillover effect, the program increased schooling by 0.15 years per person treated. Bobonis, et al. (2002) find similar effects in India.

Because several programs were conducted in similar environments, cost-effectiveness can be readily compared. Deworming is extraordinarily cost effective, at only \$3.50 per additional year of school participation. In contrast, even under optimistic assumptions, provision of free uniforms would cost \$99 per additional year of school participation induced. The school-feeding program, which targeted pre-schoolers rather than primary-school age children, cost \$36 per additional year of schooling induced.

Overall, these results suggest that school participation is quite elastic to cost and that school health programs may be one of the most cost-effective ways of increasing school participation.

## **II. School Inputs**

Many are skeptical about the effects of inputs on learning based on existing non-experimental studies (Hanushek, 1995). These studies may, however, be subject to omitted variable bias. This bias could be upwards, if observed inputs are correlated with unobserved parental or community support for education, or downwards, for example if compensatory programs provide assistance to poorly performing schools.

A randomized evaluation of a program in India that provided a second teacher, where possible female, to one-teacher schools, suggests that it did not improve test scores, although it did attract more girls to school (Banerjee and Kremer, 2002). An ICS program that provided training and inputs to pre-school teachers who started with minimal training also had little impact on test scores.

Although retrospective studies provide at best mixed evidence on the effect of many types of school inputs, they typically suggest that provision of additional textbooks in schools with low initial stocks can improve learning. Indeed cross-sectional and difference-in-difference analysis of Kenyan data would suggest that textbooks have dramatic effects on test scores. Results from a randomized evaluation point a more subtle picture, however. Provision of textbooks increased test scores by about 0.2 standard deviations, but only among students who had scored in the top one or two quintiles on pre-tests prior to the program. Textbook provision did not affect scores for the bottom 60% of students (Glewwe, et al., 2002b).

Many students may have failed to benefit from textbooks because they had difficulty understanding them. Kenyan textbooks are in English, the official language of instruction, but English is most pupils' third language, after their mother tongue and Swahili. More generally, the Kenyan curriculum is set at a level that, while perhaps appropriate for elite families in Nairobi, is far ahead of the level typically attained by rural students, given high levels of student and teacher absence.

Given the results with textbooks, the NGO tried providing an alternative input, flip charts that presumably were more accessible to weak pupils. Retrospective data from the area suggest flip charts substantially improve test scores, but again, a randomized evaluation provides no evidence for this (Glewwe, et al., forthcoming).

These examples suggest that the OLS estimates are biased upward, rather than downward. This is plausible, since in a poor country with a substantial local role in education, inputs are likely to be correlated with favorable unobserved community characteristics.

### **III. School Reform**

Given the limited measured impact of additional inputs on learning, focus has shifted to school reform initiatives, ranging from decentralization of budget authority, to strengthening links between teacher pay and performance, to vouchers and school choice. There is reason to believe that the Kenyan school system could benefit considerably from reform. Evidence discussed above suggests budgets are misallocated and that the curriculum focuses excessively on the strongest students. Moreover, teacher incentives in Kenya, as in much of the developing world, are quite weak. Absence among teachers in our data is quite high, around 20%.

A decentralization program in Kenya that provided small grants to parent-run school committees induced them to purchase textbooks, with educational consequences similar to those of the textbook program. Providing larger grants led school committees to shift spending toward construction, and no educational impact could be observed from this, at least in the short-run.

Some parent-run school committees in the area provide gifts to teachers whose students perform well. Glewwe, et al. (2002a) evaluate a program that provided prizes to teachers in schools that performed well on exams and had low dropout rates. In theory, this type of incentive could lead teachers to either increase effort or, alternatively, teach to the test. Empirically, teachers responded to the program not by increasing attendance, but by increasing prep sessions designed to prepare students for the exams. Consistent with a model in which teachers responded to the program primarily by increasing effort devoted to manipulating test scores, rather than by increasing effort at stimulating long-term learning, test scores for pupils who had been part of the program initially increased but then fell back to levels similar to the comparison group at the end of the program.

Angrist, et al. (forthcoming) evaluate a Colombian program in which vouchers for private schools were allocated by lottery. Vouchers were renewable conditional on satisfactory academic performance. Lottery winners were 15-20% more likely to attend private school, 10% more likely to complete 8<sup>th</sup> grade, and scored 0.2 standard deviations higher on standardized tests, equivalent to a full grade level. The effects of the program were larger for girls than for boys. Winners were substantially more likely to graduate from high school and scored higher on high-school completion/college entrance exams. The benefits of this program to participants clearly exceeded the cost, which was similar to the cost of providing a public school place.

#### **IV. Conclusion**

The evaluations described above offer both substantive and methodological lessons. School participation can be increased substantially by inexpensive health programs, by reducing the cost of school to households, or by providing meals. Given the existing education system in Kenya, which like many developing countries has a curriculum focused on the strongest students, limited teacher incentives, and suboptimal budget allocation, simply providing more resources may have a limited impact on school quality. Decentralizing budgets to school committees or providing incentives based on test scores had little impact in Kenya, but a school choice program in Colombia yielded dramatic benefits for participants.

These evaluations also provide methodological lessons:

1.) As seen in the textbooks and flip chart examples, estimates from prospective randomized evaluations can often be quite different than the effects estimated in a retrospective framework, suggesting that omitted variable bias is a serious concern.

2.) Many programs fail. Publication bias may therefore be substantial if only positive results are published. This may be particularly likely for retrospective evaluations. Even with randomized evaluations, it is important to put institutions in place to ensure negative results are disseminated.

3.) Randomized evaluations can shed light not only on the impact of specific programs, but also on behavioral parameters and questions of more general theoretical interest. For example, evaluations suggested that the Kenyan educational system is heavily geared toward top students and that reallocating budgets within primary education could lead to considerably better outcomes, pointing to perverse incentives created by Kenya's mix of local and national school finance.

4.) While randomized evaluations have their limitations, many of these either also apply to other methods or could be overcome with appropriate evaluation design. For example, provision of inputs might temporarily increase morale among students and teachers and this could improve performance. While this would bias randomized evaluations, it would also bias fixed-effect or difference-in-difference estimates.

Another issue is that programs may create spillover effects on people who have not themselves been treated. These spillovers may be physical, as when deworming interferes with disease transmission, but they may also operate through prices, for example when provision of school meals leads competing local schools to reduce school fees (Vermeersch, 2002). If these spillovers are global, for example, due to changes in world prices, identification of total program impact will be problematic with any methodology. If spillovers are local, however, randomization at the level of groups can allow estimation of the total program effect within groups and can generate sufficient variation in local treatment density to measure spillovers across groups (Miguel and Kremer, 2001).

5.) Randomized evaluations are feasible. They are labor-intensive and costly, but no more so than other data collection activities. In the past randomized evaluations have been rare events conducted by governments with multi-million dollar budgets. The evidence here suggests another model is possible, with much cheaper evaluations of NGO projects. Unlike governments, NGOs are not expected to serve entire populations. Financial and administrative constraints often lead NGOs to phase in programs over time, and randomization will often be the fairest way of determining the order of phase-in.. Even small NGOs can substantially affect budgets in developing countries. Given that many NGOs work in the developing world, and that they frequently seek out new projects, my experience has been that it is relatively straightforward to



find NGOs willing to conduct randomized evaluations. Hitches are more often logistical than philosophical.

However, while NGOs are well-placed to conduct randomized evaluations, it is less reasonable to expect them to finance these evaluations. Given that accurate estimates of program effects are a public good, and in fact, largely an international public good, randomized evaluations should be financed internationally.

Conducting a series of evaluations in the same area allows substantial cost savings. Once staff are trained, they can work on multiple projects. Since data collection is the most costly element of these evaluations, cross-cutting the sample reduces costs dramatically. For example, the teacher incentives and textbook programs were evaluated in the same 100 schools: one group had textbooks only, one had textbooks and incentives, one had incentives only, and one had neither. The effect of the incentive program should thus be interpreted as the effect of an incentive program conditional on half the schools having extra textbooks. This tactic can be problematic, however, if there are significant interactions between programs, especially if one program makes the schools atypical.

I have argued that the problems of omitted variable bias which randomized evaluations are designed to address are real and that randomized evaluations are feasible. They are no more costly than other types of surveys, and are far cheaper than pursuing ineffective policies. So why then are they so rare? Lant Pritchett (forthcoming) argues that program advocates systematically mislead swing voters into believing exaggerated estimates of program impacts. Advocates block randomized evaluations since they would reveal programs' true impact to voters.

I would like to advance a complementary explanation, in which swing voters (or policy makers) are not systematically fooled, but simply have difficulty gauging the quality of evidence.

Suppose retrospective regressions yield estimated program effects equal to the true effect, plus measurement error, plus a bias term, possibly with mean zero. Program advocates then select the highest estimates to present to policy makers, while any opponents select the most negative estimates. Knowing this, policy makers rationally discount these estimates. For example, if advocates present a study showing a 100% rate of return, the policy maker might assume the true return is 10%. In this environment there is little incentive to conduct randomized evaluations. Since the resulting estimates include no bias term, they are unlikely to be high enough or low enough that advocates will present them to policy makers. Even if results are presented to policy makers, policy makers unable to gauge the quality of particular studies will discount them. Why fund a project that a randomized evaluation suggests has a 25% rate of return when advocates of competing projects claim a 100% rate of return?

Of course, if policy makers could distinguish the quality of studies, this problem would not arise. This suggests a potential role for a certification organization that would help policy makers identify credible studies.

Ideally, the World Bank and other development funders would require pilot programs and randomized evaluations before launching large-scale funding of new policies which are prone to evaluation, just as regulators require randomized trials before approving new drugs. In that case, randomized evaluations might play the same transformative role in social policy during the 21<sup>st</sup> Century that they played in medicine during the 20<sup>th</sup>.

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## Footnotes

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