

Copenhagen Consensus 2008 Perspective Paper

Education

Comments on Alternative Strategies to Improve Educational Outcomes in Developing Countries

A Perspective Paper prepared for the Copenhagen Consensus 2008¹

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¹ The perspective paper relates to the challenge paper “The Benefits and Costs of Alternative Strategies to Improve Educational Outcomes” by P. Orazem, P. Glewwe and H. Patrinos, August 2007.

I. Introduction

The topic of the challenge paper is education. The authors (OGP for Orazem, Glewwe and Patrinos) decided to focus their report on poorer countries of the developing world, and to address the challenge of identifying the most cost effective way to make progress on the goal of Universal Primary Education. One of the Millennium Development Goals is to attain universal primary education by 2015 and the authors claim that under current educational policies it is unlikely that this goal will be met. In the search for various mechanisms that can be used to foster progress towards this goal, the authors suggest that mechanisms that stimulate schooling demand demonstrate the strongest indication of success to date and are the most cost effective.

In this perspective paper I summarize the rationale and the solutions proposed in the challenge paper, critically review some of the paper's main underlying assumptions, and propose an alternative view with recommendations. I limit my discussion to the developing countries, as did the challenge paper authors, although issues related to education and human capital accumulation are also currently under debate in most of the developed countries.

This paper is structured as follows. Section II presents a brief summary of the challenge paper, section III presents comments on the challenge paper's approach and methodology, section IV outlines two alternative/additional components for improving educational attainment and learning outcomes in developing countries, section V offers some benefit-cost considerations and examples and section VI concludes.

II. Summary of the Challenge Paper “The Benefits and Costs of Alternative Strategies to Improve Educational Outcomes” by P. Orazem, P. Glewwe and H. Patrinos, August 2007.

The first part of the paper reviews the stylized facts regarding the levels of human capital investment and the returns to those investments in developing countries. The main reported findings and conclusions are:

1. Estimated rates of return in developing countries are comparable to the respective rates estimated in developed countries. The median return is in the range of 8-10 percent per year of schooling.
2. Estimated returns to schooling are higher for girls (mean of 9.8 percent) than for boys (mean of 7.2 percent), and are higher in urban areas (mean of 8.3 percent) than in rural (mean of 7.5 percent).
3. Rates of return are highly correlated across labor markets.
4. Given the high rate of return to schooling the *question* is why so many children in developing countries do not even complete primary schooling?

5. The authors *claim* that the high rate of individuals who never attend school or drop out in early grades is more puzzling given the presumption that schooling, or at least completion of primary education, is needed for literacy.

6. Based on their assessment of the empirical evidence the authors *conclude* that the lower than optimal investment in schooling is due to constraints on household schooling investments, particularly credit constraints, that prevent them from selecting the optimal investment.

7. Various estimates from UNESCO, UNICEF and the World Bank suggest that the cost of achieving universal primary education is between \$9-34 billion. Against these high estimates, the challenge paper authors *suggest* that a more cost-effective approach is to identify the illiterate populations that will respond more effectively to policy interventions rather than aim at achieving universal primary schooling.

8. The authors *suggest* that the interventions should concentrate on primary schooling because early childhood investment and primary schooling yield the highest returns.

9. The authors *calculate* that 20 percent of men and 26 percent of women in developing countries fail to complete 5 years of schooling (the threshold to literacy). The rates are higher in rural areas where half of all girls do not attain primary education and the gender gap is the largest. The authors *conclude* that the world-wide focus should be to maximize primary schooling attainment, although there is considerable heterogeneity across countries in schooling attainment levels and therefore different strategies should be used to raise school enrollments in different countries.

10. The authors *assume* that it is less expensive to educate school dropouts to the point of literacy than those who never attended school. This group amounts to 30 percent of children in developing countries (excluding China, Eastern Europe and Central Asian countries) and the cost effective policy should therefore focus on 55 percent of these children who started school but dropped out. Based on 2004 data, this group includes 14.4 million children per cohort. The authors *estimate* that interventions that will make these children literate will reduce the universal primary education gap in these countries from 23 to 10 percent.

Comparing Supply and Demand Side Interventions

The paper *considers* a series of supply and demand side policies that may improve the quantity and quality of schooling and conclude that demand policies are much more effective and cost-efficient as a means to achieve the goal of universal primary education in developing countries. The supply side policies include the improvement of access through school construction, decentralization of school control to local authorities, and the reduction of teacher absenteeism. The authors *discount* the possibility of

improving education outcomes because not much is known about policies to improve schooling quality. They also *claim* that returns to increased school supply are realized after a long lag while the cost is incurred upfront and that unlike demand side policies, supply side interventions cannot be targeted to the population currently not in school.

The demand side policies that the paper *recommends* are *focused* on incentive programs that influence parental decisions regarding their children's enrollment in school. Reducing or eliminating school fees, providing school vouchers, and using conditional cash transfers to induce parents to send their children to school are the most prominent policies promoted in the paper. Also *suggested* are programs that improve child nutrition and health and that were shown to be effective in reducing schooling truancy.

The authors *assume* that demand-side policies are cheaper than other policies. They present the rates of return on many demand-side projects and show that they are very high (Table 4), with benefit cost ratios ranging from 1.2 to 528. The authors suggest that these results should be read with a considerable grain of salt, and I interpret them as meaning that the estimates have very large confidence intervals.

III. Comments on the Challenge Paper's Approach and Methodology

The authors make two key decisions in terms of their preferred basic strategy to increase primary school completion rates in developing countries. The first is to focus on schooling attainment and to overlook the importance of school quality. The second is their decision to adopt demand-side policies as the only course of action and to completely overlook potentially cost-effective supply side policies. I disagree with the challenge paper about both of these decisions and I will explain why below.

Improving Schooling Quality and Education Outcomes other than Attainment

There is ample evidence from developed and developing countries that school quality is very important both at the micro level (determining individual earnings and income) and at the macro level (determining the economic growth of nations). Recent studies have even shown that the quality of schooling dominates the effect of the quantity of schooling (Hanushek and Kimko, 2000, Hanushek and Woessmann 2007). This evidence has led to major policy changes in developed and developing countries and in international organizations. For example, the World Bank, which prioritized the achievement of universal primary education over the past 15 years, recently decided to shift some of its educational

lending to encourage improvements in schooling quality.² Its past goals were to reach universal primary school enrollment and completion; equality of access for girls and other under-served groups; and improved learning outcomes. The IEG report concluded that access expansion was the most successfully met objective in Bank-supported primary education projects: 69 percent reached their expansion goals. In the 12 study countries where the Bank supported enrollment gains, gross enrollment ratios increased an average of 19 percentage points over the past 10-12 years.³

However, these improvements in school access have not been accompanied by improvements in school quality. The more fundamental question is why so many children are not gaining any human capital even though they regularly attend school. For example, in India, a nationwide survey found that 65 percent of children enrolled in grades 2 through 5 in government primary schools could not read a simple paragraph, and 50 percent could not do simple subtraction or division (Pratham, 2006). As a result in recent years there has been a shift in the World Bank lending priorities that emphasizes improvement in learning outcomes as an objective.

For these reasons, I think that the authors' decision not to include improvement in schooling quality as part of their recommended strategy is misguided. I also think that the claim that we still do not know much about how to improve school quality is not founded empirically since there is ample evidence, both from developing and developed countries, which can be used to design a cost effective strategy to improve school quality and learning outcomes in poor countries. The following interventions are just a sample of educational interventions that were shown to improve learning outcomes in poor and rich countries and also to be cost effective:

- Adding instruction time to under achievers (Banerjee, Cole, Duflo and Linden, 2007)

² The 2006 World Bank Independent Evaluation Group report assessed the development effectiveness of assistance to countries to improve basic knowledge and skills through the provision of quality primary education to all children, particularly since the EFA movement began in 1990. The World Bank has invested \$12.5 billion over the past 15 years in developing countries to improve primary education. Sub-Saharan Africa, South Asia, and Latin America launched the most projects. The lending's objectives were to expand access to primary education and to improve learning outcomes. Based on IEG's examination of loan documents, expansion goals were found to be met in every region.

³ In countries such as Mali and Uganda increases were explosive. Enrollment expansion has generally come through supply-side interventions. Only recently did the Bank start to support demand-side policies, such as eliminating school fees (as in Uganda and Malawi), and providing girls' scholarships (Pakistan) or conditional cash transfers (Mexico). The IEG report also notes that the objectives of increasing the enrollment of girls and children from poor families were also generally reached; however, equity gaps did not always close. However, improving completion rates through reducing dropout and repetition was often underemphasized, even in countries with very poor school completion records. Where it was an explicit objective, countries succeeded in only about a quarter of Bank-supported projects.

- Using computer aided instruction (Banerjee, Cole, Duflo and Linden, 2007)
- Combining class size reduction with improved incentives to hire local teachers on short term contracts or increasing parental oversight (Duflo, Dupas and Kremer, 2007)
- Combining class size reduction with tracking by initial achievement (Duflo, Dupas and Kremer, 2007)
- Reducing class size (Urquiola, 2005, Angrist and Lavy, 1999, Krueger 1999)
- Reducing Pupil-teacher ratios (Case and Deaton 1999)
- School choice through vouchers (Chang-Tai Hsieh and Urquiola, 2006)
- School competition (Hoxby 2000, Lavy 2006)
- On the job teacher training (Angrist and Lavy, 2002)
- Targeted remedial education (Lavy and Schlosser, 2005)
- Incentives to reduce teacher absenteeism (Duflo, Hanna and Ryan (2007)
- Conditional merit pay for teachers (Muralidharan and Sundararaman 2006, Lavy 2002, Lavy 2004, Kremer and Glewwe, 2003)
- Awards conditional on student performance (Lavy and Angrist 2004, Kremer, Miguel and Thornton 2007).

IV. Additional Relevant Strategies

Demand versus Supply-side Policies

Demand-side policies that are based on incentives to households such as conditional cash transfers, or reduction or elimination of school fees might be effective at increasing primary school enrollment. The challenge paper nicely summarizes the current evidence but my understanding of this literature is that the evidence on the effect of user fee reduction is more robust and reliable than the evidence on conditional cash transfers. For example, a recent study (not cited by OPG) by Barrera-Osorio, Linden and Urquiola (2007) evaluates the impact of a fee reduction program launched by the city of Bogotá in 2004 and shows significant effects on enrollment both in primary and high school.⁴ However, basing the strategy on demand-side policies only overlooks supply-side policies that have been proven to be very effective and perhaps even more crucially it overlooks what may be one of the most important problems in education systems in poor countries, namely teacher absenteeism.

⁴ This program is targeted using a proxy-mean index, which allows the authors to implement a regression discontinuity design which yields rigorous and credible estimates of this program's effect. The results suggest that the program had a significant impact on enrollment in primary and high school grades (3 and 6 percent respectively). Importantly, these positive effects seem to be larger for at-risk students, and to not vary by gender.

Supply-Side Policies based on Adding Teachers

In this section I review two similar educational programs that were implemented in India. Both programs were based on adding para-teachers and both were very effective in achieving their objects, the first being to raise test scores of underachievers in an urban setting and the second to increase school attendance, mainly of girls in rural areas. These programs demonstrate the potential of cost effective supply-side policies to increase attainment and learning of children from poor families.

Banerjee, Cole, Duflo and Linden (2007) studied a remedial education program in two cities that hired young women from the community to teach students lagging behind in basic literacy and numeracy skills. These children were taken out of the regular classroom to work with these young women for 2 hours per day (the school day is about 4 hours). This increased average test scores of all children in treatment schools by 0.28 standard deviations, mostly due to large gains experienced by children at the bottom of the test-score distribution. How can teachers who have less training than formal teachers be so effective? The authors provide two plausible explanations. Firstly, teachers teach to the prescribed curriculum, and may not take the time to help those students who are behind, and thus are completely ineffective as teachers for these students. Secondly, students share a common background with the young female teachers, but not with the formal teachers. If social attitudes and community prejudices limit teachers' effectiveness, this common background can explain the higher productivity of the para-teachers in this context. This program was remarkably cheap as the salary of the young teacher was only a fraction of a teacher's salary. This study suggests that it may be possible to dramatically increase the quality of education in urban India, an encouraging result because a large fraction of Indian children cannot read when they leave school. The program is inexpensive and can easily be brought to scale: the remedial education program has already reached tens of thousands of children across India. An important unanswered question, however, given the evidence of decay in the gains a year after the program's end, is whether this effect is only experienced in the short term, or can be sustained several years after the program ends, to make a long-lasting difference in the lives of these children.

Banerjee, Jacob, Kremer, Lanjouw and Lanjouw (2005) examine the cost of increasing attendance at non-formal schools in a tribal area of Rajasthan with low school attendance, particularly among girls. The study evaluates a program which provided a supplementary teacher, where possible female, in non-formal schools operated by an NGO. This program increased the average daily attendance of girls by 50 percent from a base of about four female students, but had no significant effect on the attendance of boys. The program cost per additional student attending school was 125 percent greater

than the average cost of schooling. The study did not find compelling evidence of any change in test scores as a result of the intervention eighteen months after the program started. The study concludes that building new non-formal schools in un-serviced areas would be a cheaper way of expanding enrollment than adding teachers, as long as average daily attendance in newly opened schools was at least two students. These results suggest that it is possible to raise primary school participation in India substantially above current levels, without a significant loss in the quality of teaching. However the cost of doing so will be substantially more than the current unit cost.

Teacher Absenteeism in Developing Countries

The poor learning outcomes of children in developing countries despite the significant improvement in access and attainment may be due, in part, to high non-attendance rates among teachers. Chaudhury et. al (2006) report results from surveys in which enumerators made unannounced visits to primary schools in Bangladesh, Ecuador, India, Indonesia, Peru and Uganda and recorded whether they found teachers in schools. Averaging across the countries, about 19 percent of teachers were absent from school at this visit. These absence rates among teachers are high relative to those of both their counterparts in developed countries and other workers in developing countries.⁵ The study found that absence rates are generally higher in poorer regions and absence is typically fairly widespread, even among school headmasters. Male teachers are absent more often than female. Teachers from the local area are absent less often.⁶ In India's rural private schools and in locally managed non-formal education centers absence rates are high among these teachers as well, although private school teachers have lower absenteeism rates than public teachers in the same village. While official rules provide for the possibility of punitive action in the case of repeated absence, disciplinary actions for absences are rare. Teachers are almost never fired. Despite India's 25 percent teacher-absence rate, only one head teacher in the Chaudhury et. al (2006) sample of nearly 3,000 Indian government-run schools reported a case in which a teacher was fired for repeated absence.

This state of affairs implies that developing countries are wasting considerable resources and missing opportunities to educate their children because the vast bulk of education budgets go to pay

⁵ For example, in India, one-quarter of government primary school teachers were absent from school, but only about one-half of the teachers were actually teaching at enumerator visits.

⁶ The study found some evidence that pay does not strongly affect absence but that the quality of school facilities and working conditions does have an effect on the decision of teachers to come to work.

salaries.⁷ Even these figures may understate the problem, since many teachers who come to work are not teaching. Improving teacher attendance rates may be the first step needed to make “universal primary education” a meaningful term.

Solving the absentee problem poses a significant challenge (see Banerjee and Duflo 2005 for a review). One solution suggested is to involve the community in teacher supervision, including the decisions to hire and fire teachers. However, in many developing countries, teachers are a powerful political force, and may resist attempts to curb their influence. As such, many governments have begun to shift from hiring government teachers to instead hiring “para-teachers.” Para teachers are hired on short, flexible contracts to work in primary schools and in non-formal education centers run by NGOs and local governments.⁸ These flexible conditions represent an environment that may allow for policies that take into account high absenteeism rates, and aim to reduce its incidence and cost. Unlike government teachers, with para-teachers it may be feasible to implement incentive programs where salaries depend on actual days at work combined with effective monitoring. This may be effective as para-teachers do not form an entrenched constituency, and are already subject to yearly renewal of their contracts, and there is a long queue of qualified job applicants. Thus, providing para-teachers with strong incentives may be an effective way to improve the quality of education, provided that para-teachers can teach effectively. Duflo, Hana and Ryan (2007) present results that prove that such incentives effectively induce teachers to come to work more regularly and to teach while at school. Technical approaches allowing objective monitoring of teacher attendance such as the camera monitoring system explored by this study are very effective in this regard.⁹ The program reduced teacher absenteeism by half and led to significant

7 Therefore many teachers receive substantial rents in the form of wages that are higher than their outside options. Teachers in low-income countries earn about four times GDP per capita, while those in rich countries earn only about twice per capita GDP (Bruns, Mingat and Rakotomalala, 2005).

8 In some countries, informal teachers account for most of the growth in teaching staff over the last few years. In India alone, 21 million children attend NFEs. It is not clear that para-teachers are more motivated than other teachers. In India, Chaudhury et al. (2005b) found that locally hired para-teachers had significantly higher absence rates. In contrast, Duflo, Dupas and Kremer (2007) found lower rates for para-teachers in Kenya.

9 Duflo, Hanna and Ryan (2007) test whether direct monitoring of attendance, coupled with high-powered attendance based incentives, improves school quality, in single-teacher NFEs in rural villages in Rajasthan, India. The NGO Seva Mandir implemented an innovative monitoring and incentive program in September 2003, which was tamper proof. Each teacher was paid according to a non-linear function of the number of valid school days for which they were actually present. In comparison schools, teachers were paid a fixed monthly rate. The program resulted in an immediate and long lasting improvement in teacher attendance rates in treatment schools. Over the evaluation phase, program school teachers had an absence rate of 21 percent, much lower than the 44 percent baseline and the 42 percent rate in comparison schools. Absence rates stayed low after the proper evaluation phase, suggesting teachers did not only change their behavior during evaluation. The study also shows that the teachers' response was almost entirely due to the financial incentives and not due to monitoring. When the school was open, teachers were as likely to be teaching in treatment as in comparison schools. Teachers at treatment schools taught a

improvement in students' learning outcomes. The study shows that the benefits of this type of program, relative to its costs, are high, and are comparable to other successful education programs in developing countries that have been evaluated with randomized evaluations. Its estimated benefit-cost ratio was 1.83. The authors also show that the program's cost per year is very favorable in comparison to the PROGRESA program in primary schools in Mexico which is primarily a transfer program to families. The authors acknowledge the difficulty of implementing such an incentive program in regular public schools. Based on their findings that para-teachers can be effective teachers, they conclude that if implementing strict monitoring within the government system turns out to be impossible, increasing teaching staff through the hiring of para-teachers is the preferred policy for many developing countries.

Supply-Side Policies based on Teacher Incentives

The evidence on ways to deal with teacher absence from work and the following evidence on incentive based pay for teachers originate largely on experiments performed in India.¹⁰ The external validity of these findings may of course be a concern, but it should be noted that perhaps a fourth of the children that the Challenge report identified as the target for policies to achieve primary schooling, are actually Indian. I therefore think that these and other related findings based on experiments performed in India should be carefully scrutinized.

Muralidharan and Sundararaman (2006) report the results from a recent randomized experiment in Andhra Pradesh, India, that tried two alternative approaches to improving primary education. The first was to provide schools with additional para-teachers or with a cash grant and the second was to provide performance-based bonuses to teachers on the basis of the average improvement in their students' test scores. Both group incentives based on school performance and individual incentives based on teacher performance were considered. The additional spending in each of the four programs was calibrated to be slightly over 3 percent of a typical school's annual budget. The experiment randomly allocated the programs across a representative sample of 500 government-run schools in rural AP with 100 schools in each of the four treatment groups and 100 control schools serving as the comparison group. The results of

third more per month. A year in, test scores in the treatment schools were 0.17 standard deviations higher than in the comparison schools. Two and a half years into the program, treatment school students were also 10 percentage points (or 62 percent) more likely to transfer to formal primary schools, which required passing a competency test. The program's impact and cost are similar to other successful education programs.

¹⁰ The focus of primary education policy in India has typically been on access, enrollment, and retention; however, much less attention has been paid to low learning quality in schools. The Annual Status of Education Report found that 52% of children aged 7 to 14 in an all-India sample of nearly 200,000 rural households could not read a simple paragraph of second-grade difficulty, though over 93% of them were enrolled in school (Pratham, 2005).

this study suggest that performance-based bonuses to teachers had a significant positive impact on test scores, with students in incentive schools scoring 0.19 and 0.12 standard deviations higher than students in control schools in math and language tests respectively. The mean treatment effect of 0.15 standard deviations is equal to 6 percentile points at the median of a normal distribution. Incentive schools score higher in each of the 5 grades (1-5), across all quintiles of question difficulty, and in all the 5 districts where the project was conducted, with most of these differences being statistically significant.¹¹ Importantly, the study did not find any significant difference between the effectiveness of school-level group incentives and teacher-level individual incentives.¹²

The two input programs (an extra para-teacher; and cash block grants) also had a positive and significant impact on test scores. Student test scores in input schools were 0.09 standard deviations higher than those in control schools. The input programs were around five times more cost effective than the status quo but the incentive programs cost the same amount in bonuses paid, and students in incentive schools scored 0.06 standard deviations higher than students in input schools, with differences significant at the 10 percent level. Thus, performance-based bonus payments were more cost effective even when compared with effective inputs, and substantially more so when compared with the status quo.¹³

The structure of these experiments follows closely the experiments studied by Lavy (2002) and Lavy (2004) and the findings are also very similar. In these studies regression discontinuity and matching methods are used to show that both group and individual incentives for high school teachers in Israel led to improvements in student outcomes.

Another analysis of a school-based teachers' incentive program, this time in Kenya, examined effects on both teacher behavior and test scores. The program randomly assigned fifty Kenyan primary schools to a treatment group eligible for monetary incentives (21–43 percent of monthly salary). The winning schools were determined by their average test score performance relative to other treatment schools in district-wide examinations; all teachers in the winning schools received awards. The program

¹¹ The authors report that no adverse consequences were noticed as a result of the incentive programs. Incentive schools did significantly better on both the mechanical and conceptual test components, suggesting that the gains in test scores represent an actual increase in learning outcomes. Students in incentive schools also did significantly better in non-incentive subjects, suggesting positive spillover effects.

¹² However, since the average government-run school in rural AP is quite small with only 3 teachers, the authors admit that these results probably reflect a context of relatively easy peer monitoring.

¹³ The evidence shows that there was broad-based support from teachers for the program. The study also revealed that the extent of teachers' ex-ante support for performance pay was positively correlated with their ex-post performance. The authors suggest that teachers are aware of their own effectiveness and that performance pay might not only increase existing teacher effort, but systematically draw more effective teachers into the profession over time.

penalized schools for dropouts by assigning low scores to students who did not take the examination. Data were collected on many types of teacher effort—teacher attendance, homework assignments, pedagogical techniques, and holding extra test preparation sessions—and on student scores obtained after the program’s conclusion.

During the two years the program was in place, student scores increased significantly in treatment schools (0.14 standard deviations above the control group). But the gain in scores was not attributable to the expected incentive-induced changes in teacher behavior. In fact, teacher attendance did not improve, and no changes were found in either homework assignment or pedagogy. Instead, teachers were more likely to conduct test preparation sessions outside regular class hours. Data collected the year after the program ended showed no lasting test score gains, suggesting that the teachers focused on improving short-term rather than long-term learning. Consistent with this hypothesis, the program had no effect on dropout rates even though examination participation rose. The test score effect was also strongest in geography, history, and Christian religion, arguably subjects involving the most memorization.

Many other developing countries have developed and implemented system-wide teacher incentive programs. Since 1993, Mexican public school teachers have been eligible for large financial awards based on student test scores, among other factors. Under the *Carrera Magisterial* program, teachers participate in a yearlong assessment process that awards 100 points for education, experience and student test scores, among other factors. In recent years, teachers scoring above a nationally specified cutoff score (70) have enjoyed a sharply higher probability of receiving an award. The awards are substantial—more than 20 percent of the teacher’s *annual* wage—and they persist for the teacher’s entire career. Since 1993, over 600,000 teachers have been awarded the lowest level of award. Because it is so far-reaching, the *Carrera Magisterial* reform resembles an across-the-board wage increase for “good” teachers and may be expected to have led to an increase in the quality of new cohorts of teachers in the past decade. McEwan and Santibañez (2005) examined whether the incentives provided by *Carrera Magisterial* induced teachers to improve their students’ test scores. A nonlinear award structure introduced a discontinuity in the relationship between a teachers’ initial point score and their classroom’s test score and authors looked for the existence of such a discontinuity, which could be plausibly attributed to program-induced test-score improvements. The results suggested an effect on mean test scores of about 0.15-0.20 points in the vicinity of the discontinuity, equivalent to less than 10 percent of a standard deviation.

The National System for Assessing School Performance (*Sistema Nacional de Evaluación del Desempeño de los Establecimientos Educativos Subvencionados, SNED*) has been implemented in Chile since 1996. This policy is oriented toward all schools receiving government funding, whether

administered by local government (municipal schools) or by the private sector (subsidized private schools). The schools that perform at high levels of excellence are chosen every two years and receive an incentive in the form of an excellence subsidy. Schools representing up to 25 percent of each region's enrollment receive awards. Program terms stipulate that 90 percent of the amounts assigned must go directly to the school's teachers, proportional to their hours of employment, with each school deciding the distribution of the remaining 10 percent. The SNED has been applied four times. In 2002, a parallel teaching excellence bonus (*Asignación de Excelencia Pedagógica*) for those teaching grades 1-4 was added. This bonus consists of a monetary award (US\$714 for 10 years) linked to a voluntary, individual evaluation. To receive this award, teachers must successfully pass knowledge-based examinations, present their curricula, and a recording of a class in action. Of the 1,932 teachers who met the requirements, only 313 were considered excellent teachers.

Another known teachers' merit pay program in Latin America is Bolivia's comprehensive "merit wages" (*salario al mérito*) program which was implemented from 1998. Its aim was to provide incentives and to improve teachers' performance, although no evidence is available of its efficiency. El Salvador has also implemented a school awards program (*Plan de Estímulos a la Labor Educativa Institucional*) to encourage public school teachers to work together to solve the problems affecting their schools and to improve the quality of education services offered to the community. The award consists of a monetary incentive for each teacher working at schools that meet objectives previously established by the Education Ministry (MINED). To assign this reward, all public schools at the pre-school, primary and secondary level were evaluated.

In most cases the performance based payment schemes are marginal additions which do not involve a complete revamping of the educational system. The evidence presented above and elsewhere¹⁴ suggests that the respective performance and effectiveness gains can be considerable. It appears that teachers and schools are motivated by monetary incentives and respond to them by exerting more effort, applying more creativity and modifying their pedagogical practices. Therefore, the measurement and reward of performance are potentially important elements in modernizing public school systems in developing countries. Such mechanisms also induce selection and sorting processes that discourage poor performers and attract better performers in the medium and longer term. Yet, notwithstanding their positive contribution, these incentives can also lead to unintended and undesired consequences growing out of their many inherent structural problems, such as measurement problems, or the possibility of

¹⁴ See Lavy (2007).

teachers induced to direct their efforts exclusively to rewarded activities. Although there are unfortunately no magical cures for these problems, there are many lessons already drawn from the experience and evaluation of teachers' incentives programs.

V. Remarks on Cost and Benefit Considerations

Many of the supply side policies discussed above are extremely efficient in terms of cost and benefit comparisons. For example, Duflo et al (2007) demonstrate that the Balsakhi Program in India is remarkably cheap, since the salary of the balsakhi (the main cost of the Balsakhi Program) is only a fraction of a teacher's salary (balsakhis were paid Rs 500–750 per month, or a little over \$10–\$15). Overall, the Balsakhi Program cost is approximately Rs. 107 (\$2.25) per student per year, while the computer assisted learning program that was studied as well had a much higher cost, approximately Rs 722 (\$15.18) per student per year, including the cost of computers and assuming a five-year depreciation cycle. The authors note that in terms of cost for a given improvement in test scores, scaling up the Balsakhi Program would be much more cost effective than hiring new teachers and it would also be five to seven times more cost effective than expanding computer-assisted learning. These authors also compared the cost effectiveness of the Balsakhi program to a range of programs that are analyzed in Kremer, Miguel and Rebecca Thornton (2004). The cost of the most cost-effective program they consider (an incentive programs for children) was between \$1.77 and \$3.53 per 0.1 standard deviations (depending on the region). Using the same assumptions, the remedial education program cost between \$0.67 and \$1.77 per 0.1 standard deviations. The Balsakhi program thus stands out as the most cost-effective program for learning improvement. The challenge paper computes a BCR for this supply side policy of 711 at 3% discount rate and of 528 at 4% discount rate.

Other examples of a very cost effective supply side programs are the teachers' incentive programs studied in Muralidharan and Sundararaman (2006). Both the input and incentive interventions were highly cost effective relative to the status quo. The study show that the variable cost of running a typical government school in India is around Rs. 300,000/year. The input treatments added the equivalent of 16% of a normal year's learning for an additional cost of Rs. 10,000/year, and so 6.25 years of the programs would add an equivalent of a full year's learning at a cost of Rs. 62,500 (or around 21% of the current variable cost of a year's schooling). Since a year of the incentive program added the equivalent of 26% of a normal year's learning, four years of such a program would add the equivalent of a full year's learning at a cost of Rs. 36,000 (assuming the same program effects continue). The authors conclude that a teacher incentive program could therefore add the equivalent of a full year of schooling at 12% of the current cost

of a year's schooling, which would make it a very cost effective program relative to the status quo with very high BCR.

As a third example, Duflo, Hanna and Ryan (2007) discussed above show that a straightforward monitoring and incentive program can effectively reduce teacher truancy and that the benefits of this type of program, relative to its costs, are high, and comparable to other successful education programs in developing countries that have been evaluated with randomized evaluations. For example, expressed in terms of cost per outcome, this program cost approximately 11 cents for each additional instruction day per child, \$60 per additional school year, and \$3.58 per 0.10 standard deviations of increased test scores. The authors show that the cost per standard deviation increase in test scores in this program compares favorably to most education programs evaluated through randomized evaluation but it is more expensive than a Balsakhi remedial education program discussed above. The cost per additional year of schooling of the camera program is much higher than that of the de-worming program in Africa (\$3.53 per additional year of schooling), but lower than that of any other programs evaluated in Africa, such as a child incentive program (\$90 per extra year) or a child sponsorship program that delivered uniforms to children (\$99 per extra year). Overall, the camera program is shown to be relatively cost-effective, both in terms of increasing instruction time and in terms of increasing learning we find a benefit-cost ratio of 1.83.

However, none of these programs and the other supply side interventions discussed above allow for a full cost benefit analysis since their long-term effects on learning and on labor market outcomes are not known. This demand side interventions discussed in the challenge paper and their BCR do not escape this limitation either.

VI. Concluding Remarks

The discussion presented in this paper suggests adding two major components to the education sector strategy in developing countries. The first is an effort to improve school quality by relying on interventions that have been shown to be effective in this regard, and the second is to use supply-side programs along demand-side programs in an attempt to increase primary school attainment and school quality. The supply side policies share some of the benefits and shortcomings of the demand-side policies. For example, many of the quality interventions and the supply-side programs are also conditional, as are some of the demand-side policies that the challenge paper recommended. If teachers do not reduce their absence from work or do not improve education outcomes the government will not expand resources, as seen from the India camera and teacher incentive experiments. But there is much symmetry on the negative side of both kinds of policies. For example, the external validity of some of the programs,

namely the possibility of implementing the experimental interventions in different settings and countries, is equally questionable for the demand and the supply-side policies. The uncertainty of applying large scale programs that were found to be effective in a small scale experiment is a concern both for demand and supply-side policies. Another concern for both types of policies is the unknown general equilibrium effects, and the longer term effects of both demand and supply policies.

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