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The Benefits and Costs of Alternative Strategies to Improve Educational Outcomes

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Benefits from Schooling

Few empirical relationships have been investigated more frequently than that between years of schooling and earnings. Hundreds of studies using a wide variety of datasets from developed countries, spanning many decades, and employing alternative specifications to correct for various potential sources of bias, have consistently found positive private returns per year of schooling.¹ Returns are frequently equal to or above long-run average market returns to other investments.

Estimated returns to schooling in developing countries have been comparable in magnitude to returns found in developed countries. Table 4.1 presents ordinary least squares (OLS) estimates of returns from a standard Mincerian earnings function applied to sixty-three household datasets from forty-two developing countries. The results are presented separately for males and females and for urban and rural residents. These

* The opinions expressed are our own and not necessarily those of the World Bank. Amy Damon, Jean Fares, Deon Filmer, Sarojini Hirshberg, Manny Jimenez, Elizabeth King, Claudio Montenegro, Annette Richter, Ray Robertson, and T. Paul Schultz provided advice on topics, content and relevant literature as we prepared background materials for this paper. Shiva Sikdar provided able research assistance.

¹ Card (1999) contains an excellent review of the various estimation methods and biases associated with analysis of the returns to schooling. It appears that returns to schooling generated by OLS estimation tend to understate true returns, although the bias appears to be small.

² We are indebted to Claudio Montenegro for sharing these regressions results.

Table 4.1. Sample statistics of estimated returns per year of schooling in developing countries

	Male	Female	Urban	Rural
10	2.3	3.7	3.8	1.2
25	4.5	8.9	6.3	5.4
50	8.2	10.3	9.2	8
75	9.5	12.3	10.6	10.1
90	11.4	13.2	11.6	12.6
Average	7.2	9.8	8.3	7.5
Standard deviation	4.4	3.7	3.8	5
Skewness	1.2	1	1.3	-0.9
Correlation		0.85		0.85

Note: Authors' compilations of estimated returns to schooling using a standard Mincerian earnings functions applied to sixty-three household datasets from forty-two developing countries. These are the same data sets used for figure 4.1, except that some datasets are dropped because they did not have separate information on urban, rural, male, and female earnings. We thank Claudio Montenegro for supplying these estimates.

datasets were selected because the variable definitions could be harmonized across countries and because separate returns could be estimated for men and women and for urban and rural residents.² The same model was estimated for all countries so that the variation is not due to specification choice. Several interesting results are apparent.

First, private returns, estimated as the percentage increase in annual earnings obtained from an additional year of schooling, are almost universally positive. In only one case for women, four cases for men, three for urban residents and two for rural residents did education fail to raise earnings. The interquartile range for estimated

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real returns across countries varies from 5 to 10 percent for men and from 9 to 12 percent for women. The interquartile range for both urban and rural residents lies between 5 and 11 percent. The median return ranges from 8 to 10 percent per year of schooling, depending upon the demographic group. This is quite consistent with the average return of 10.9 percent for low-income countries found in the Psacharopoulos and Patrinos (2004) literature survey of studies published in the 1990s. While there is considerable variation in the magnitude of the return, there does appear to be a positive reward to individual time spent in school.

A second generalization is that in all but a handful of countries, estimated returns to schooling are higher for women than for men. Estimated returns average 7.2 percent for men and 9.8 percent for women across the datasets. One might suspect that the difference in returns is due to a selection problem – a lower proportion of women than men are engaged in wage work, and so one might suspect that it is the most productive women that are disproportionately drawn into the labor market. However, the direction of bias is not obvious – women who opt not to enter the labor market will have a value of time in non-market activities that exceeds their market value, and so the bias could go in the opposite direction. However evidence presented by Schultz (1999) and Duraisamy (2002) suggests that selection has similar effects for men and women.³

A third notable finding is that in about two-thirds of the countries, returns to urban residents exceed those of rural residents, although the differences are smaller than those between men and women. Estimated returns average 8.3 percent for urban workers and 7.5 percent for rural workers. Again, one might suspect that the returns to rural workers are biased upward because a disproportionate share of rural workers will work without wages on home enterprises or farms. Again, the direction of bias is unclear, as those opting to work on a farm will have a higher value of time than their market opportunities. Additionally, higher wages in cities create an incentive to migrate from rural to urban markets, and so rural residents with the

highest market skills will likely have moved to the cities.

Finally, the most telling result from the analysis of differences in returns to schooling across groups within countries is that the differences are so small. Estimated returns are very highly correlated across groups. The correlation in returns is 0.85 both between men and women and between urban and rural residents. Labor markets that reward education highly for men also reward education highly for women. Countries with high returns to education in their urban labor markets also have high returns to education in their rural labor market.

These returns suggest that across a wide array of countries at all stages of development, education consistently offers sizeable positive returns to wage earners – not only to urban male youths, but also to women and rural youths. Nevertheless, a year of schooling will be more productive in some environments than in others. All of the distributions of returns in table 4.1 are skewed downward, and so there is a tendency to have more extreme outliers at the bottom than the top. One reason that is quite plausible but is difficult to illustrate easily is that school quality differs across countries. However, if the economic environment rewards educational investments, then developing country parents have an incentive to seek private schools when the public schools are of low quality. Therefore, it is useful to examine other reasons why countries or their citizens may not capture the reward from schooling found in other countries.

Where Are Benefits from Schooling Greatest?

Schultz (1975) noted that human capital is most valuable in disequilibrium environments.

³ One exception to this generalization that women have higher returns to schooling than men appears in transition economies. On average, women's rate of return to secondary education is 0.6 percentage points lower and their return to university education is 1.3 percentage points lower than estimated returns for men (Psacharopoulos and Patrinos 2004).

Writing from the perspective of agricultural economies, Schultz argued that in the absence of technological change, production shocks, or price shocks, traditional rules of thumb on how to efficiently manage a farm would be adequate. Consistent with that presumption, Fafchamps and Quisumbing (1999) and Godoy *et al.* (2005) found that schooling has a negligible effect on productivity on traditional farms, even though schooling raises earnings in the same locations for farmers engaged in wage work off the farm.

On the other hand, human capital has been shown to play a very important role in agricultural environments experiencing technological change. Huffman and Orazem (2006) show that the process of economic development almost universally requires an agricultural transition in which dramatic increases in the efficiency of food production simultaneously frees up labor for emerging industrial sectors while lowering the price of food (and hence raising real wages) in urban areas. The most educated farmers are the first to adopt improved varieties, equipment, and production practices (Huffman 1977; Besley and Case 1993; Foster and Rosenzweig 2004a; Abdulai and Huffman 2005). In India, returns to schooling were highest in areas where Green Revolution technologies were most complementary with local agriculture (Foster and Rosenzweig 1996).

In order for human capital to attain its highest returns, labor must be able to adapt to disequilibria, whether by moving to industries or areas with the strongest labor demand, adopting

⁴ Acemoglu *et al.* (2001); Acemoglu *et al.* (2002) have examined the role of institutions that constrain or enhance mobility and the exercise of property rights in retarding or fostering economic growth.

⁵ Information on the Heritage Foundation Index is available at www.heritage.org/research/features/index/chapters/pdfs/Index2006_Chap5.pdf.

⁶ The negative estimated returns to schooling came from Azerbaijan in 1995; Moldova in 1998; Cambodia in 1997; and Vietnam in 1992 although Moock *et al.* (2003) found small but positive returns for Vietnam in 1992–3. More recent surveys available for Cambodia and Vietnam have generated positive returns to schooling as those countries have liberalized their economies and improved the climate for protection of property.

or developing new technologies, or switching occupations to fulfill market needs. Good adaptive decisions require a reward, and so human capital will be most valuable when social or governmental institutions place few restrictions on mobility or trade, when wages and prices are flexible, and when property rights are enforced.⁴ There is no stronger evidence of the role of free markets in enhancing human capital productivity than in the rapid increase in returns to schooling observed in virtually all formerly planned economies as they made their transitions toward market systems (Fleisher *et al.* 2005).

Sen (1999) further stipulates that it is not so much any one economic institution as the combination of institutions that is important in defining economic freedom and the ability to seek rewards for skills. When we divide our countries into groups based on their relative ranking in the Heritage Foundation's Economic Freedom Index,⁵ we get a picture of the importance of the overall economic environment in fostering returns to schooling (figure 4.1). Because higher index scores signify less economic freedom, countries whose index scores are in the lower half of the Economic Freedom Index have less regulated economies, fewer restrictions on trade, flexible wage and price adjustments, and government enforcement of property rights. Returns to schooling are, on average, just under 10 percent in these "economically free" countries. In contrast, countries in the more regulated half of the Index have returns to schooling averaging only 6.4 percent. The gap in average returns between more and less free countries is much larger than the gap in average returns between men and women or between urban and rural markets. More economically free countries have higher average returns at both high and low levels of average schooling, a proxy for the level of development in the country. This suggests that investments in schooling will be most valuable in countries that allow workers to find their highest returns across alternative sectors and occupations.⁶

There is considerable evidence that parents do respond to rising perceived returns to schooling. In India, Foster and Rosenzweig (1996) and

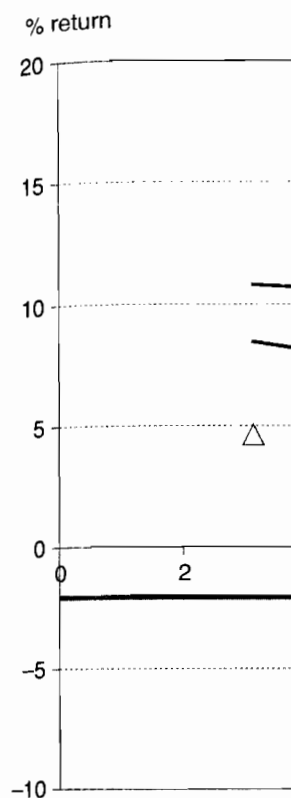


Figure 4.1 Returns to schooling for forty-six developing countries. Note: Data used for table 4.1. Source: Authors' compilation of data from forty-six countries.

Kochar (2004) found that in areas with greater perceived returns to schooling due to technological change and urban demand for labor. In Asia and Central America, rapidly growing export-oriented economies hired more educated women. This has helped increase enrollment for girls even without government intervention aimed at raising girls' enrollment (McLeod 2006). Nevertheless, returns are predicated on the ability to move to the area or sector with its highest potential value.

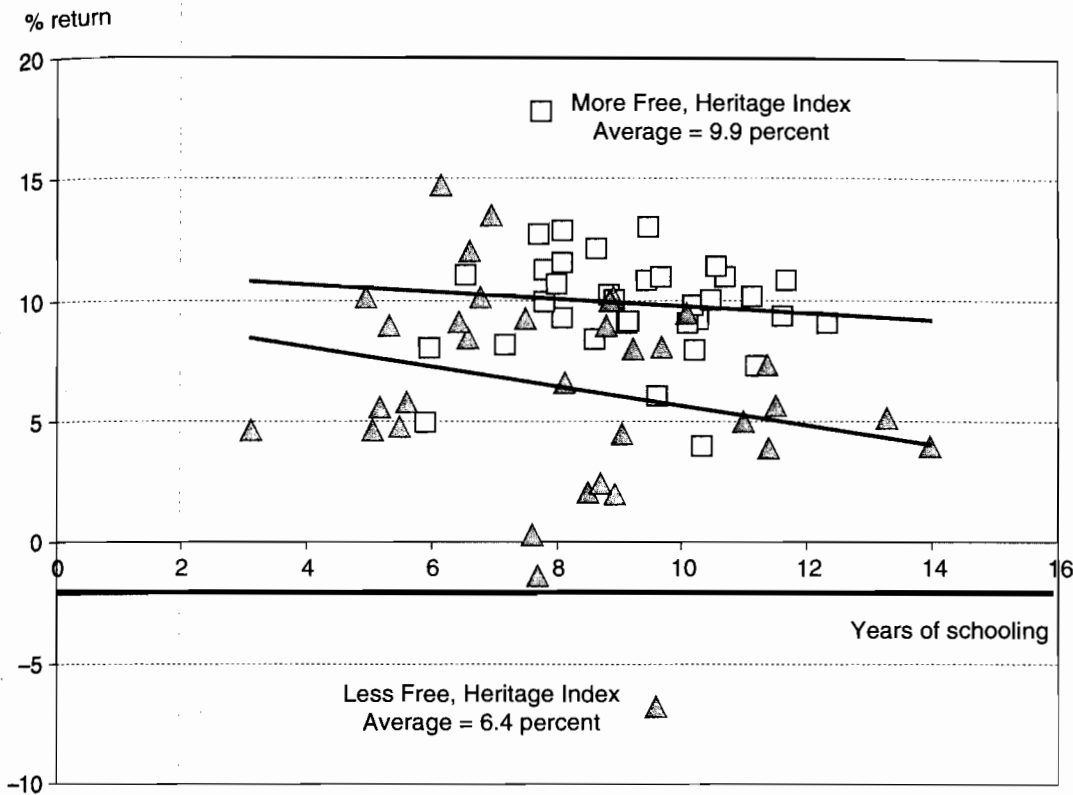


Figure 4.1 Returns to schooling, by high and low values of the Heritage Economic Freedom Index: forty-six developing countries, various years, 1990–2004

Note: Data used for table 4.1 are a sub-set of these datasets.

Source: Authors' compilation of sixty-nine earnings regressions provided by Claudio Montenegro, using household data from forty-six countries.

Kochar (2004) found that rural enrollments rise in areas with greater perceived returns to schooling due to technological innovations or rising urban demand for labor. Evidence from South Asia and Central America suggests that the rapidly growing export-oriented sectors disproportionately hired more educated youth, and that hiring has frequently targeted educated young women. This has helped to increase enrollment for girls even without an explicit program aimed at raising girls' enrollment (Gruben and McLeod 2006). Nevertheless, these responses are predicated on the ability of human capital to move to the area or sector where it can find its highest potential value in the economy, and

on parental ability to perceive those potential rewards.⁷

Of course, just spending time in school is not enough to generate a return. More important is what is learned during the time in school. Investments of time and money in a child's schooling that fail to produce basic cognitive skills such as literacy are almost surely wasted. In fact, studies that include both years of schooling

⁷ Datt and Ravallion (2002) argue that economic growth in India has tended to benefit most those groups with more schooling. Sources of growth were complementary with skills. This is consistent with the recommendation that efforts to fight poverty through growth must include measures to raise the human capital of the poor.

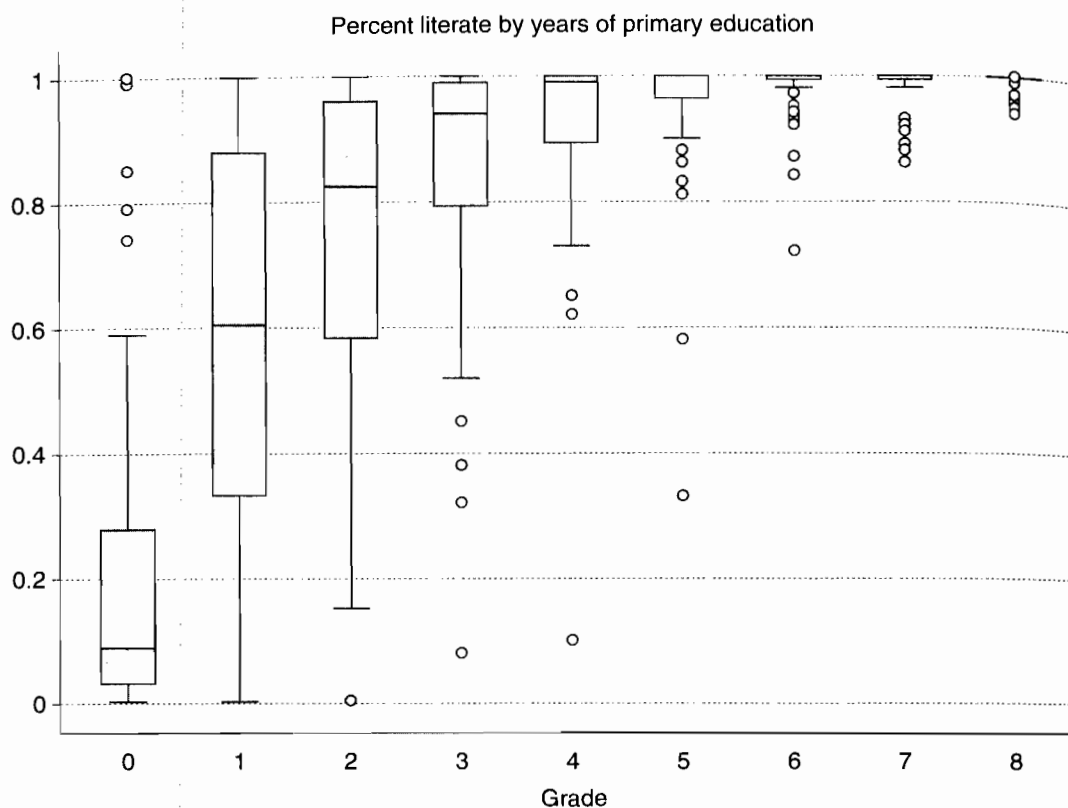


Figure 4.2 Distribution of self-reported literacy by grade attainment for youth aged 15–24, various countries

Source: authors' compilation of summary data from seventy-three household surveys spanning fifty-seven developing countries provided by Claudio Montenegro

and measures of cognitive skills find that it is the latter and not the former that drive earnings (Glewwe 2002). Similarly, Hanushek and Kimko (2000) found that it is average cognitive attainment and not average years of schooling that drives economic growth. More recently, Hanushek and Woessmann (2008) show that the cognitive skills of the population – rather than mere school attainment – are powerfully related to individual earnings, to the distribution of income, and to economic growth. Their empirical results show the importance of both minimal and high level skills, the complementarity of skills and the quality of economic institutions, and the robustness of the relationship between skills and growth.

While time in school does not guarantee the acquisition of cognitive skills, it is almost impossible to acquire those skills without formal schooling. As shown in figure 4.2, the probability of attaining self-reported literacy rises with years of schooling, although there is considerable variation in the pattern across countries. Children who complete the primary cycle, about six years of schooling, are almost certain to attain literacy in most countries. While it is theoretically possible that these children could have attained literacy without schooling, figure 4.2 shows that relatively few literate individuals never attended school. This presumption that schooling is needed for literacy underlies the Millennium Development Goal (MDG) of

attaining universal primary education by 2015.

Various estimates from UNICEF, and the annual additional cost between \$9 billion and \$15 billion. Estimates use various approaches that apply current average costs to the fraction of children who are not in school. These high costs may be reduced if the children who are not in school are disproportionately from poor households that are more expensive to reach with education services to school.⁸ Others argue that having access to local schools and more supply will not reduce costs. They argue that in order to reach the UPE goal, more investment toward the UPE goal is needed, which illiterate population will be economically.

Should Investment in Primary Level or O

Much of our discussion has been about the fraction of literate population, but for many developing countries, the fraction of the population already attained UPE is high. This is no longer relevant to the discussion. We briefly on why we should focus on schooling in identifying cost interventions in the primary level.

It has commonly been argued that the returns to primary schooling are subject to diminishing returns to primary schooling. The returns to primary schooling are higher for higher levels of schooling. The returns to schooling are higher for higher levels of schooling. Patrinos (2004) and Patrinos (2004) show that the highest returns to schooling are at the primary level. Reported *per capita* income is higher in countries with higher levels of schooling. Government spending on primary schools in low-income countries is less than double the cost of secondary schools. The per-pupil tertiary cost is about three times the primary cost. The gains in relative priv

attaining universal primary education (UPE) by 2015.

Various estimates generated by UNESCO, UNICEF, and the World Bank place the annual additional cost of attaining UPE at between \$9 billion and \$34 billion. These estimates use various applications of procedures that apply current average costs of schooling to the fraction of children not in school. Even these high costs may be under-stated because the children who are currently not in school are disproportionately located in areas that are expensive to reach with schooling services or in households that are less keen to send children to school.⁸ Others are not in school despite having access to local schools, and so adding more supply will not address the problem. We argue that in order to make efficient progress toward the UPE goal, we need to identify which illiterate populations can be served most economically.

Should Investments Concentrate on the Primary Level or Other Levels?

Much of our discussion will concentrate on raising the fraction of literate adults in the world, but for many developing countries that have already attained UPE, that level of schooling is no longer relevant. It is useful to comment briefly on why we focus on lower levels of schooling in identifying the highest benefit to cost interventions in the schooling arena.

It has commonly been presumed that schooling is subject to diminishing returns, so that the returns to primary schooling would exceed those for higher levels of schooling. Estimates of social returns to schooling reported by Psacharopoulos and Patrinos (2004) support that conjecture. Reported *per capita* schooling costs also suggest that the highest returns must be at the lowest levels: Government per pupil costs for secondary schools in low-income countries are more than double the costs for primary schools, and the per-pupil tertiary costs are nearly thirty-four times the primary costs. It is unlikely that any gains in relative private returns are large enough

to reverse the pattern of diminishing social returns to schooling.

Both theoretical arguments and empirical evidence support the view that interventions early in life have the highest returns. Carneiro and Heckman (2003) and Heckman and Masterov (2007) present a wealth of evidence that earlier investments in human capital, including those occurring before the start of formal schooling, are far more cost-effective than efforts to improve schooling later in life. It seems that because human capital development builds upon past accumulations of human capital, it is extremely important to develop a strong human capital base at an early age. Numerous pathologies including criminal activities, drug abuse, idleness, and chronic illnesses can be linked to a weak human capital foundation in the form of malnutrition, bad health, and poor schooling experienced at the youngest ages.

Nevertheless, in some settings, particularly those of more advanced developing countries, returns may be substantial at the secondary or even tertiary level. In industrialized economies, private returns to tertiary schooling rose relative to returns to secondary schooling as new technologies and investments in capital complemented the skills of college graduates (Schultz 2004b). One might suspect that similar changes are increasing the private returns to those with secondary or tertiary educations in developing countries.

This is particularly true in countries with strong growth in export trade. Xu (2000) argued that a developing country can expect to attract technology from multinational enterprises (MNEs) only if it has an adult population that meets a threshold level of education of roughly ten years of completed schooling. That assessment is consistent with findings that workers in foreign-owned enterprises in Indonesia, Vietnam, Malaysia, Guatemala, and elsewhere tend to be drawn from the upper tail of the schooling distribution in those countries (Goldberg and Pavcnik 2007), although the experience in Mexico appears to be in the opposite direction

⁸ Glewwe and Zhao (2006) present a summary of these estimates and a critique of the methodologies employed.

(Robertson 2004). It is plausible that the rising returns to skill in the export sectors occur when there is insufficient migration toward growing sectors of the economy and/or because there is an insufficient supply of the types of skills exporters demand.

The OECD (2000) has revised the definition of literacy, going well beyond basic facility with reading and mathematics to incorporate functioning efficiently in the information age. This presents another illustration of the Schultz hypothesis: The level of minimal functional literacy rises with the level and complexity of the economic environment. As a country develops, the minimal level of schooling required to function effectively will increase. However, in those economies, many of the barriers to obtaining the requisite skills will be falling as the country progresses. The countries we will focus on here have not yet attained that level of development for a large portion of their citizenry.

If Parents Respond to Returns, What is the Public Role in Schooling Investments?

As argued above (p. 182) parents increase the intensity of their investments in schooling when expected returns rise. If this is true, then why don't parents select the efficient amount of time to send their children to school, the time at which the private rate of return to an additional year of schooling is equal to the market rate of return to other investments of comparable risk? Either there must be returns to schooling that are not captured by the households or there must be constraints on household schooling investments that prevent them from selecting the optimal investment.

Several external benefits are frequently

⁹ One could argue that to the extent that these transfers of schooling and health are confined within dynastic households, they are not really externalities. Parents will get utility from their children's health or future welfare. Nevertheless, there may still be external benefits to having healthier and more educated progeny that are not fully captured by the parents and their children.

associated with women's schooling. The fertility transition, the common finding that the number of children per woman declines as economic growth occurs, has been tied to increases in women's value of time as their education increases (King and Mason 2001; Schultz 2002). Angrist *et al.* (2002) and Schultz (2004a) both found that increased schooling from randomly assigned vouchers and conditional cash transfers led to reduced fertility, although the evidence was somewhat weaker in the latter case. Increases in women's (and men's) schooling has also been associated with improvements in the health of their children and other family members, with improvements in the schooling of their children – and, as a consequence, a rising quality of life from one generation to the next (de Walque 2005; Oreopoulos *et al.* 2006; Paxson and Schady 2007). More schooling is associated with later age of marriage and lower teenage birth rates, which improves the health and schooling outcomes of the next generation (Black *et al.* 2004, 2005a; Cardoso and Verner 2006). Many of the most recent studies utilize changes in truancy laws to generate plausibly exogenous changes in years of schooling (e.g. Patrinos and Sakellariou 2005), increasing the confidence that these effects of parental schooling on children's welfare are causal. While in developed countries, some studies find only modest effects of parental schooling on their children (Black *et al.* 2005b), the effect appears to be stronger in developing countries.⁹

Markets are often credited with improving the allocation of resources in an economy, but those resource allocation decisions require agents who are able to absorb and react to information. Schooling is credited with lowering search costs and improving allocative efficiency, which has both private and social benefits. These efficiency gains will be spread broadly in the economy. For example, better-educated people are better able to migrate from rural to urban markets or from less-productive to more-productive sectors, helping those markets allocate labor efficiently. This implies that the economy will be producing more output from the same inputs, increasing the total size of the pie available. Not all of these benefits will be captured by the migrants themselves

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schooling. The former finding that the human capital declines as economic growth has been tied to increases in schooling as their education improves (Schultz 2001; Schultz 2002). Schultz (2004a) both schooling from randomly distributed additional cash transfers through the evidence was stronger case. Increases in schooling has also been found in the health of family members, with schooling of their children a rising quality of life in the next (de Walque 2006; Paxson and Schady 2006) associated with later teenage birth rates, health and schooling outcomes (Black *et al.* 2004, 2006). Many of the changes in truancy are exogenous changes in returns and Sakellariou evidence that these effects on children's welfare are in low countries, some studies of parental schooling (*et al.* 2005b), the effect in developing countries.⁹ tied with improving the economy, but those studies require agents who react to information. Lowering search costs and efficiency, which has benefits. These efficiency gains in the economy. For people are better able in urban markets or from productive sectors, help labor efficiently. This will be producing more outputs, increasing the total lot all of these benefits migrants themselves

(for example, labor that does not migrate will get higher wages as the migrants pursue their interests). Returns to capital are also enhanced by efficient allocations of labor.

Empirical studies have consistently found that it is the better educated who are the most likely to adopt new technologies. Of course these agents are acting in their own self-interest, but there will be benefits that accrue to others as well. For example, because food demand is relatively inelastic, improved productivity in the agricultural sector from newly adopted technologies or enhanced farming ability will lower food prices, which raises consumer surplus. Lower food prices will tend to raise the purchasing power of urban wages and will hasten the shift of labor out of agriculture and into the industrialized sector of the economy.

From Foster and Rosenzweig's (2004b) analysis of the distribution of benefits from India's Green Revolution, it is apparent that the technologies were first adopted by relatively skilled farmers in areas with complementary land and irrigation. The social or private returns to the technology would have been negligible without a group of farmers able to successfully implement the technologies. Falling food prices did displace some farmers, but the displaced agriculture labor fueled a rural industrialization. There was an expansion of manufacturing employment and increased wages and incomes in rural areas that were less suited to the Green Revolution; those areas benefited from the increased productivity of the farmers in the Green Revolution districts.¹⁰

Improved schooling opportunities can raise the quality of public servants and hence of public good provision. Indeed, improved human capital is believed to improve the quality of governance in democracies.¹¹

Another reason why private schooling decisions may deviate from social optima is that parents may face borrowing costs that exceed the market interest rate. Becker and Tomes (1986) showed that if households are credit constrained, they will under-invest in their children's schooling, but all intergenerational transfers will be in the form of human capital and not wealth.

Households that are not credit constrained will invest optimally in their children's schooling and then make any additional transfers in physical wealth. This may be why there is a stronger apparent tie between parental and children's schooling in developing countries. In developed countries, credit constraints may not be important and so variation in children's schooling is not as strongly tied to parents' education or wealth (Carneiro and Heckman 2003; Cameron and Taber 2004). However, substantial segments of poorer countries are more likely to face credit constraints that will limit children's schooling opportunities.

The best evidence regarding these credit constraints is that child schooling appears to be atypically sensitive to unforeseen fluctuations in household income, positive or negative. Edmonds *et al.* (2006) found that unexpected pension income raised schooling of grandchildren in South Africa. In another setting, opening the Vietnam market to trade caused rapid increases in household income that increased child schooling in Vietnam (Edmonds and Pavcnik 2006). Negative income shocks from weather or national recessions cause poor households to reduce child time in school (Jacoby and Skoufias 1997, 1998; Funkhouser 1999; Glewwe and Jacoby 2004; Thomas *et al.* 2004). There is evidence that better educated parents can absorb these shocks more effectively (Glewwe and Hall 1998).

The existence of liquidity constraints creates a second role for government provision of schooling, even in the absence of external benefits. Under-investment in schooling by poor households means that the level of national skills will be lower than optimal. Furthermore, the under-investment will be concentrated among poor children who will then be consigned to poverty

¹⁰ The need for educated farmers to adopt improved technologies that would raise food yields has become increasingly apparent with the run-up of food prices and their impact on poverty rates worldwide. This is one of the topics covered in the *World Development Report 2008: Agriculture for Development*.

¹¹ Haveman and Wolfe (1984) have a detailed review of the sources of private and social returns to schooling.

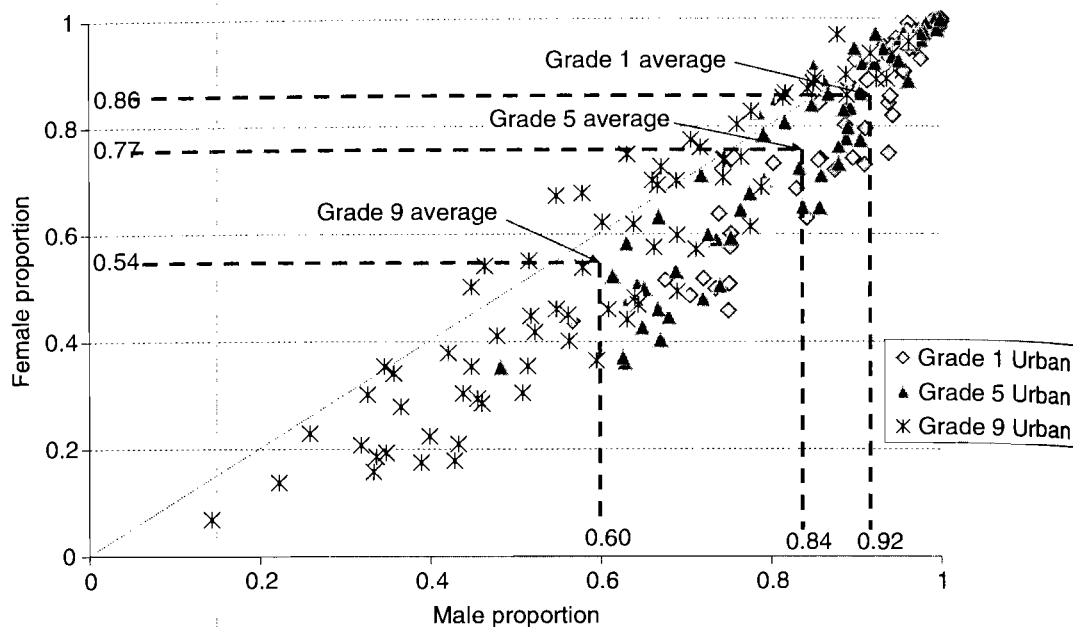


Figure 4.3A Proportion of male and female urban population completing grades 1, 5, and 9 in seventy-two developing countries

in the future due to their poor human capital endowments. Government provision of schooling can therefore also be justified as a means of equalizing the opportunity to escape poverty across households of varying economic status.

Where are the Most Serious Gaps in Enrollment Rates?

One of the MDGs is to attain universal primary education by 2015. Despite the consistency in estimated returns to schooling across countries, genders, and regions within countries, it is unlikely that this goal will be met. This section highlights which groups lag the furthest behind in attaining the goal, and which lagging groups can be aided in the most cost-effective manner.

To illustrate the magnitude of the problem, we make use of seventy-two household datasets on schooling attainment compiled by Deon Filmer of the World Bank. All the datasets were collected between 2000 and 2006. We computed the fraction of 20–29-year-olds who completed

grades 1, 5, and 9 in order to show how rapidly educational attainment drops off in these developing countries. The grade 5 information is of particular interest, in that completion of five years of schooling represents near assurance of lifetime literacy and numeracy. Separate estimates were generated for males and females and for urban and rural residents.

Figures 4.3a and 4.3b show the first illustration. Each point represents paired male and female proportions of the 20–29-year-old population that completed a given grade level in a country. Figure 4.3a shows the relationship for urban areas and figure 4.3b for rural areas. The dotted 45° line indicates combinations where males and females are equally likely to attain the grade level. Values on the axes range from 0 to 1, with 1 representing universal attainment. Larger deviations from the upper right-hand point (1,1) mean a greater gap from universal attainment of a given grade level.

The average schooling attainment combinations are also indicated for each grade level using dashed lines. Note that, by construction, the

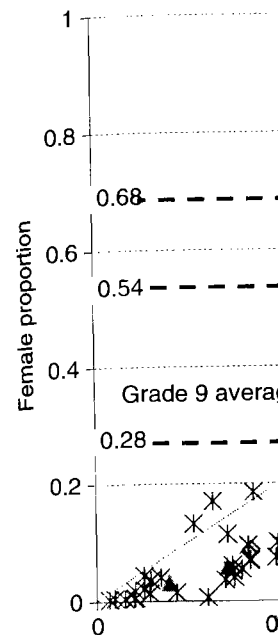


Figure 4.3B Proportion of male and female rural population completing grades 1, 5, and 9 in seventy-two developing countries

pattern of dots will move toward the level of schooling indicated by completion of grade 9 or higher than the fraction completing grade 1, which will, in turn, be similar to completing grade 1.

Several facts emerge. For grade 5 points lie well below (0.63, 0.54) indicating that developing countries have a 63 percent UPE. This is particularly true in rural areas. In urban areas, the non-attainment of grade 5 by women and 84 percent of men. In rural areas, the non-attainment of grade 5 by women and 63 percent, respectively. For grade 9, the non-attainment of grade 9 by women and 28 percent of men in seventy-two developing countries. For grade 1, the non-attainment of grade 1 by women and 28 percent of rural residents. For grade 5, the non-attainment of grade 5 by women and 63 percent of rural residents. For grade 9, the non-attainment of grade 9 by women and 28 percent of rural residents. For grade 1, the non-attainment of grade 1 by women and 28 percent of rural residents. For grade 5, the non-attainment of grade 5 by women and 63 percent of rural residents. For grade 9, the non-attainment of grade 9 by women and 28 percent of rural residents.

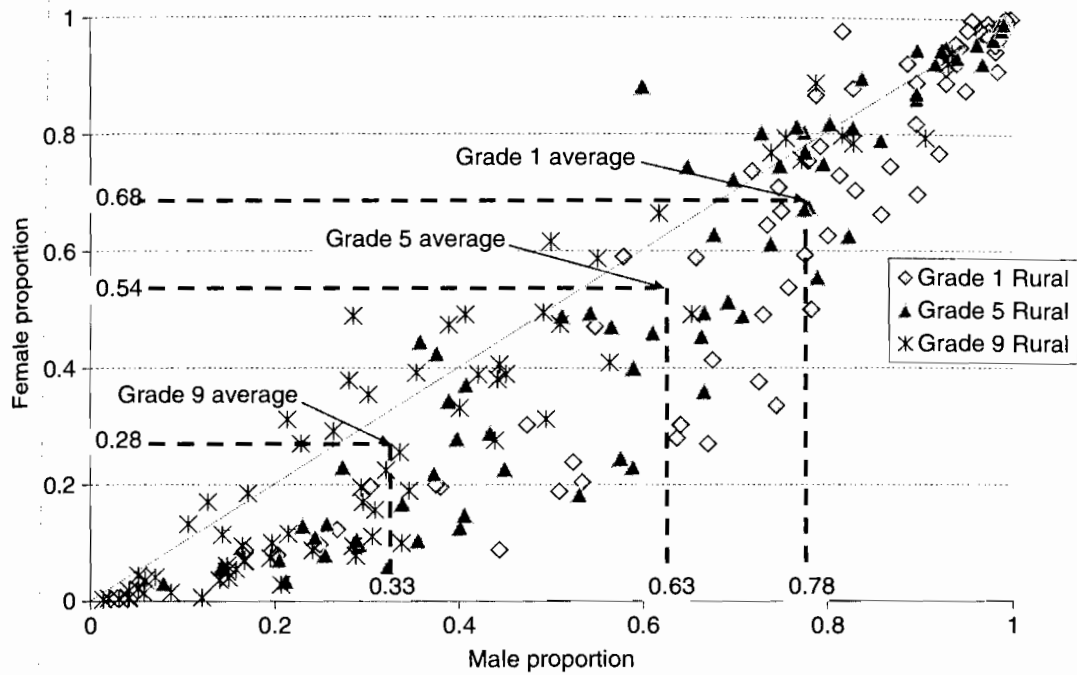


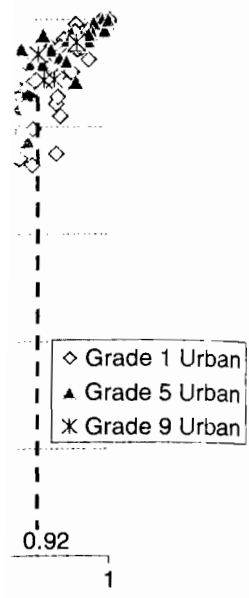
Figure 4.3B Proportion of male and female rural population completing grades 1, 5, and 9 in seventy-two developing countries

pattern of dots will move toward the origin as the level of schooling increases because the fraction completing grade 9 or more must be smaller than the fraction completing at least grade 5 which will, in turn, be smaller than the fraction completing grade 1.

Several facts emerge. First, most of the grade 5 points lie well below (1,1), and so most developing countries have yet to meet the goal of UPE. This is particularly true in rural areas. In urban areas, the norm is for 77 percent of women and 84 percent of men to complete grade 5. In rural areas, the norms are 54 percent and 63 percent, respectively. Aggregating across the seventy-two developing countries using population weights, 13 percent of urban residents and 28 percent of rural residents fail to complete five years of schooling. Second, in both urban and rural markets most combinations lie below the 45° line, indicating that, on average, males are more likely to reach each grade level than females. Women are farther away from UPE

than men. The population-weighted aggregates are that 20 percent of men and 26 percent of women fail to complete five years of schooling. Nevertheless, in some countries, girls do receive more schooling than boys. Third, rural points tend to be farther from the 45° line, and so male-female schooling gaps tend to be largest in rural areas. Fourth, there is a very high correlation in educational outcomes across demographic groups. Countries with high boys' enrollment rates also tend to have high girls' enrollment rates. Countries with high urban education rates have high rural rates as well. Finally, there is considerable heterogeneity across countries in schooling attainment levels, and so it is unlikely that the same strategy to raise enrollments would work in all countries. Some have yet to get a majority of children to complete grade 1 while others are approaching universal completion of grade 9, at least in their urban areas.

Figures 4.4a and 4.4b repeat the exercise, except that the points are combinations of urban



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r to show how rapidly drops off in these levels. The information is of at completion of five years near assurance of parity. Separate estimates for males and females and for urban and rural areas.

show the first illustration of the relationship between male and female attainment for each grade level in a population-weighted aggregate. Figure 4.3b for rural areas. The relationship between male and female attainment is generally likely to attain the goal of universal attainment. Larger gaps in attainment are more likely to be found in rural areas.

g attainment combinations for each grade level using population weights, by construction, the

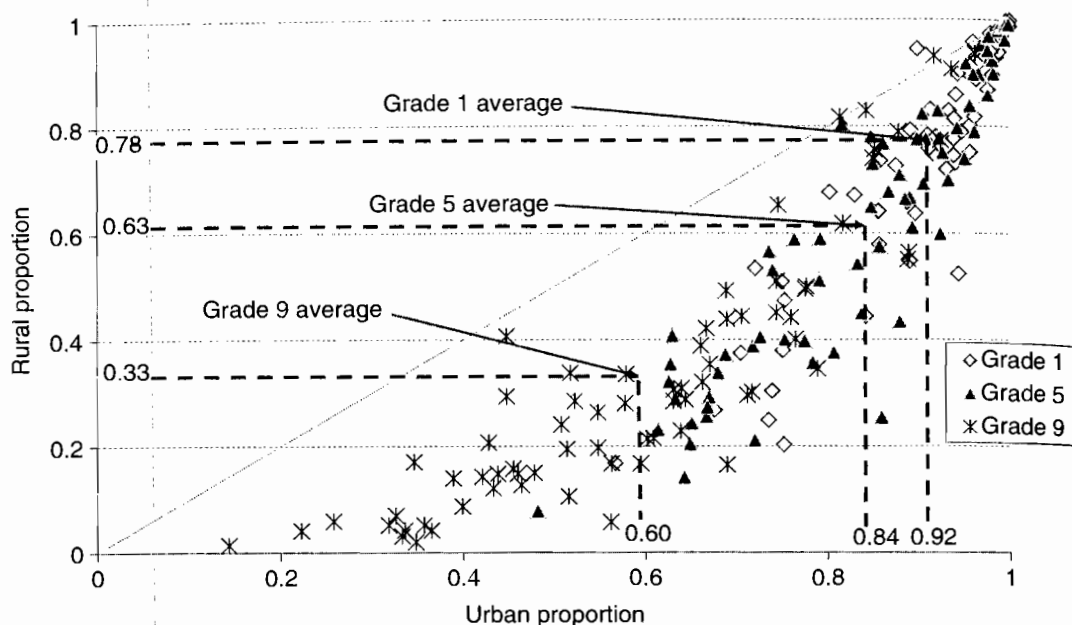


Figure 4.4A Proportion of male urban and rural population completing grades 1, 5, and 9 in seventy-two developing countries

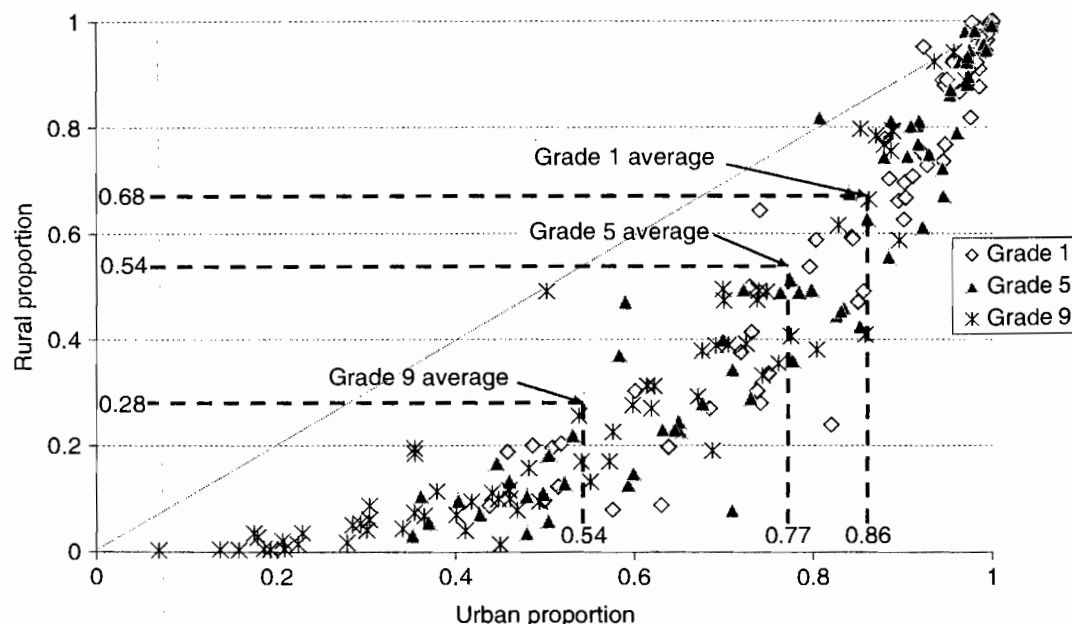


Figure 4.4B Proportion of female urban and rural population completing grades 1, 5, and 9 in seventy-two developing countries

Source: Authors' compilation of educational attainment data provided by Deon Filmer from seventy-two original household surveys collected from 2000 to 2006, www.worldbank.org/research/projects/ledattain/.

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and rural schooling attainment levels for males and females separately. Almost all combinations lie below the 45° line, indicating that urban residents get more schooling than rural residents. The degree of schooling inequality between urban and rural children, as indicated by the distance from the 45° line, increases with schooling level. Only 8 percent of urban males failed to complete grade 1, compared to 22 percent of rural male; 16 percent of urban males and 37 percent of rural males failed to complete grade 5, the gaps that must be filled to attain UPE. For both urban and rural males, there is a sharp drop off in attainment after grade 5. In only 60 percent of countries do a majority of male children complete grade 9, and only rarely do rural males reach that level.

Schooling levels are even lower for females. As shown in figure 4.4b, almost all combinations lie below the 45° line, indicating that urban females almost always get more schooling than their rural counterparts. A large advantage for urban females opens up immediately upon school entry. Just over two-thirds of rural females complete one year of schooling, but only 54 percent manage to complete grade 5. Of urban females, 86 percent complete at least one year of schooling and 77 percent complete grade 5. The UPE goal has not yet been satisfied for about one-quarter of urban girls and one-half of rural girls in developing countries. Consequently, while problems are not the same across countries, a significant proportion of developing countries have yet to attain the UPE goal.

Where and How can Schooling be Increased most Efficiently?

Given the substantial gap from UPE, our task is to identify where schooling attainment can be expanded most efficiently. In table 4.2, we present the stylized facts regarding the population of youth aged 15–19 that failed to complete grade 5 by region of the world. All youth in this age range should have been able to complete grade 5. We decompose the population failing

to complete grade 5 into two groups, those who never went to school and those who dropped out before completing grade 5. Our estimate of those who never went to school is given by the fraction of 14-year-olds who never attended. We present the data by population-weighted averages of geographic regions.

Our contention is that it is less expensive to get the children who have dropped out to complete the primary cycle than it is to get children who never attended school to attain literacy. We know that for children who at least started school, there exists school capacity that induced parents to send the child to school. In addition, these parents at least cared enough about their children's schooling to make an initial investment of child time. It is more difficult to induce parents who have not sent their children to school to enroll the child for the first time and to take the child through the primary cycle. The reason we focus on completing at least five grades is the result from figure 4.2 that five grades are sufficient to attain literacy. Investments that do not successfully carry the child through grade 5 are likely to be wasted.

The fraction of children not completing grade 5 varies from very small proportions in China and in Eastern Europe and Central Asia to over 40 percent of children in Africa. Worldwide, excluding China and the Eastern Europe and Central Asian countries, 30 percent of children in developing countries fail to complete grade 5. Of these, 55 percent started school but dropped out. To put these proportions into perspective, about 112 million children were born in developing countries in 2004. Assuming that current patterns do not change between 2004 and 2015, we estimate that 26 million of these children will fail to complete grade 5. Of these, 14.4 million will start school and drop out before attaining literacy and numeracy.¹² Those 14.4 million represent the most cost-effective target for raising literacy rates in the world. If these 14.4 million children were able to complete

¹² Our fraction of children not completing grade 5 is reasonably close to the UNESCO estimate of the fraction of children who are illiterate.

Table 4.2. Percentage of youth 15–19 years old not completing grade 5 and of 14 years old never starting school, by world region

Sample	Africa		Asia			Eastern Europe	Latin America		Middle East
	East-South	West-Middle	East-Pacific	South	China	Central Asia	Central	South	North Africa
	[15]	[20]	[11]	[6]	[1]	[11]	[10]	[9]	[3]
All children									
Not completing ^b	40.9%	46.5%	12.6%	32.2%	1.3%	4.8%	17.5%	14.3%	19.1%
Never starting ^c	14.4%	24.6%	2.6%	17.1%	0.0%	3.5%	6.9%	0.8%	7.4%
Dropout ^d	26.5%	21.9%	10.0%	15.1%	1.3%	1.3%	10.6%	13.5%	11.7%
Males									
Not completing ^b	39.9%	40.9%	13.1%	25.0%	1.0%	3.3%	18.1%	16.5%	15.2%
Never starting ^c	12.5%	20.7%	2.4%	11.1%	0.0%	1.6%	7.8%	0.9%	4.2%
Dropout ^d	27.4%	20.2%	10.7%	13.9%	1.0%	1.7%	10.3%	15.6%	11.0%
Females									
Not completing ^b	41.9%	51.9%	11.9%	39.9%	1.8%	6.3%	16.8%	12.2%	22.9%
Never starting ^c	16.7%	28.5%	2.8%	23.5%	0.0%	5.0%	6.1%	0.7%	10.6%
Dropout ^d	25.2%	23.3%	9.2%	16.3%	1.8%	1.3%	10.7%	11.5%	12.3%
Urban									
Not completing ^b	20.4%	29.0%	7.3%	18.5%	1.2%	4.0%	11.4%	10.6%	10.6%
Never starting ^c	5.0%	13.2%	1.6%	8.1%	0.0%	2.2%	4.4%	0.6%	3.2%
Dropout ^d	15.4%	15.7%	5.7%	10.4%	1.2%	1.9%	7.0%	10.0%	7.4%
Rural									
Not completing ^b	46.6%	56.8%	15.1%	37.6%	1.4%	6.2%	23.9%	29.0%	27.9%
Never starting ^c	16.3%	30.6%	2.9%	20.6%	0.0%	5.4%	8.9%	1.7%	11.4%
Dropout ^d	30.3%	26.2%	12.1%	17.0%	1.4%	0.8%	15.0%	27.3%	16.5%
Bottom two household income quintiles									
Not completing ^b	55.0%	64.7%	24.0%	54.0%	1.8%	6.8%	44.6%	15.3%	35.2%
Never starting ^c	22.2%	36.8%	5.5%	27.8%	0.0%	5.7%	8.9%	1.7%	15.2%
Dropout ^d	32.9%	28.0%	18.5%	26.2%	1.8%	1.1%	35.8%	13.6%	20.0%

Source: Authors' compilation of data compiled by Deon Filmer from the most recently available household surveys conducted in each of the eighty-six developing countries between 1994 and 2005. www.worldbank.org/research/projects/ledatrain/.

^a Population-share weighted averages of countries in the region. Number of countries included in the regional average is in brackets.

^b The share of 15–19-year-olds who did not complete grade 5.

^c The share of 14-year-olds who never attended school.

^d The share of 14-year-olds who never attended school.

^e Estimated share of 15–19-year-olds who started school but dropped out before completing grade 5.

^f Excluding China.

the primary cycle, the gap from UPE in these countries would decrease from 23 percent to 10 percent.

The other statistics in table 4.2 demonstrate that for almost all demographic groups, substantial progress toward UPE can be made

by reducing dropouts. Aggregating across countries, 61 percent of males and 49 percent of females who failed to complete grade 5 did so because they dropped out. The corresponding ratios for urban and rural residents are 62 percent and 55 percent, respectively. We also show

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Supply-Side Interventions

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information on children in the lowest two quintiles of the income distribution.

We can also show the importance of household income as a factor influencing child schooling attainment. The bottom of table 4.2 includes the school entry, completion, and dropout rates for children living in households in the poorest two income quintiles. Children in the poorest households fail to complete grade 5 in higher proportions in every part of the world: 37 percent of the poorest children fail to complete grade 5, compared to 23 percent overall. Of these, 54 percent dropped out after starting school. For all these groups, therefore, reducing the incentives to drop out would generate substantial progress toward UPE for all demographic groups in all regions of the developing world.

Supply-Side Interventions

There are two avenues through which governments can influence parental schooling choices. Supply-side policies aim to improve the quantity or quality of schooling offered. These policies include direct provision of newly constructed schools or of school supplies by the central government, but they can also involve the decentralization of school control to local authorities who are believed to be able to allocate resources more efficiently to meet school needs. Demand-side policies attempt to directly influence parental incentives to allocate more of their children's time to school. We will argue that demand-side policies show more promise for cost-effective means of enhancing schooling outcomes, but we will first explain why we view supply-side mechanisms as less promising.

If you Build it, they May not Come

The biggest concern with new school construction is that most of the costs of new building and staffing are incurred before we find out if parents will send their children to the school. Duflo's (2001) analysis of Indonesia's massive public works project that doubled the

number of primary schools in a six-year period resulted in a statistically significant but small 3 percent increase in average years of schooling. Similarly, Filmer's (2004) analysis of the relationship between distance and enrollments across twenty-one developing countries generally found very small marginal effects of lowering distance. Enrollment does not appear to be highly sensitive to the distance to the nearest school. This does not imply that school provision is unimportant – only that the existing supply is already located in the most dense child populations. New schools will be disproportionately located in relatively remote places where there are relatively few children to add to the rolls and relatively high costs of adding capacity.

Frequently forgotten in the analysis of new school construction projects is that they may cause some students currently going to private schools to switch to the new public schools. This is particularly true in urban areas of developing countries where private schools are more plentiful. As public school supply is expanded, some private school students are likely to switch to public schools and some private schools will close, diminishing the benefits of the supply expansion.¹³ In rural areas, where private schools are frequently non-existent, there is no such crowding out effect of government school expansion.

Quality Matters, but we don't know how to Foster Quality

It is undoubtedly true that higher-quality schools enhance human capital production and raise the demand for education. However, research has failed to identify how to foster improved quality. For example, Rivkin *et al.* (2005) found that good teachers systematically produce better academic outcomes than do bad teachers. Unfortunately, good teachers and bad teachers look very much alike statistically – they have the same education levels, similar demographics, receive the same in-service training

¹³ See Jimenez and Sawada (2001).

er starting

	Middle East
	North Africa

[3]

3%	19.1%
3%	7.4%
3%	11.7%
5%	15.2%
7%	4.2%
1%	11.0%
1%	22.9%
1%	10.6%
1%	12.3%
1%	10.6%
1%	3.2%
1%	7.4%
1%	27.9%
1%	11.4%
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and are compensated similarly. In other words, teacher quality matters, but we don't know what matters for teacher quality. As teachers represent 74 percent of recurring school expenditures in developing countries (Bruns *et al.* 2003), it would seem that any policy aimed at improving school quality would have to confront teacher quality. The lack of agreement about how to foster teacher quality thwarts any general prescription regarding likely cost-effective avenues for improvement.

There have been many studies of the educational production process, with very inconsistent findings. Teacher or school attributes that appear critically important for student performance in one study prove unimportant or even detrimental in another. Experimental designs don't really resolve the problem because the value of one type of input (textbooks, say) may depend on what other assets the school has available (trained teachers, English-medium instruction). A particular experimental infusion of inputs may succeed in some settings and not others, complicating the applicability of the lessons to other schools and settings. As an example, Glewwe *et al.* (2009) found that making textbooks more available in Kenya benefited students in the upper tail of the ability distribution, who were prepared for the English-medium texts, but the texts had no impact on average and below-average students, most of whom could not read those textbooks.

Chaudhury *et al.* (2006) report that, in developing countries, teachers are absent about 20 percent of the time. Such absenteeism rates have a tremendous impact on the education sector. In terms of direct loss of financing, it is estimated that between 10 and 24 percent of recurrent primary education expenditures are currently lost to teacher absenteeism. Losses from teacher absenteeism range from \$16 million per year in Ecuador to \$2 billion per year in India (Patrinos and Kagia 2007). Many of the absences are perfectly legal as schools offer numerous ben-

efits for teachers, including many days of sick leave and annual leave. One might guess that simply removing these legal absences would help resolve the problem, except that comparisons of spot-check attendances with official attendance registries indicates that off-contract absences are rarely reported. Duflo and Hanna (2005) report on the effect of placing cameras with time indicators into remotely sited schools in India. Compared to schools without cameras, teacher attendance rises substantially. When teachers attend more regularly, their students attend more regularly as well, and the students appear to perform better on standardized tests. This experiment holds promise as a means of reducing shirking by teachers in a cost-effective manner, but we do not yet have enough information in other settings to know if these results generalize.

It is undoubtedly true that higher-quality schools enhance human capital production and raise school demand. However, our lack of clear rules of thumb regarding how to improve school quality suggest that we are not yet prepared to make general propositions regarding likely cost-effective avenues for improvement.

Are Better Managed Schools Better, or are Better Schools Better Managed?

International agencies have made decentralization of school management a central theme of new efforts to improve the efficiency of public service delivery in developing countries (Bardhan 2005). The clear attraction of the strategy is that it offers the potential of improving school outcomes without spending more on the schools – we simply “spend smarter and not harder,” to modify the common aphorism. The available evidence, even that often used by proponents of decentralization, is really too uncertain to provide a high degree of confidence that local management can work in all settings, without complementary investments. Studies by Jimenez and Sawada (1999) of the EDUCO¹⁴ schools in El Salvador and by King and Ozler (2001) of the autonomous schools in Nicaragua found that schools that exercised more local autonomy

¹⁴ EDUCO comes from the Spanish acronym “Educación con Participación de la Comunidad,” or “Community Managed Schools.”

experienced gains in student scores compared to non-participating schools and – local authorities had programs and would not fulfill their obligations schools opting to accept differ in ways that could compared to communities participate in the program finding that autonomous schools that are not autonomous that the non-autonomous had better outcomes in autonomous.

More recent papers on autonomous schools compared from those that do not. Gertler *et al.* (2009) rural school-based management resulted in a small but reduction in repetition schools in poor areas found that early adoption program in Argentina largest improvements. Again, the sorting of schools and non-autonomous. In Mexico, schools chosen program. In Argentina the wealthiest schools.

Even if decentralization schooling outcomes is not clear how government decentralization. Gunther that most of the variation school autonomy occurs countries, suggesting foster decentralized do little effect on actual scores.

We may eventually have to foster local school management generate the skills needed areas that do not already the current level of knowledge to make a general recommendation school management works comes.

experienced gains in student attendance or test scores compared to other schools. However, participating schools are not randomly drawn – local authorities had to self-select into the programs and would be dropped if they did not fulfill their obligations. It is likely that the schools opting to accept local responsibility differ in ways that could vary school outcomes compared to communities that did not elect to participate in the program. In other words, a finding that autonomous schools outperform schools that are not autonomous does not imply that the non-autonomous schools would have had better outcomes if they, too, had become autonomous.

More recent papers continue to find that autonomous schools differ in important ways from those that do not exercise such authority. Gertler *et al.* (2006) find that Mexico's rural school-based management intervention resulted in a small but statistically significant reduction in repetition and failure rates for schools in poor areas. Galiani *et al.* (2005) found that early adopters of a school management program in Argentina experienced the largest improvements in schooling outcomes. Again, the sorting of schools into autonomous and non-autonomous groups is not random. In Mexico, schools choose to participate in the program. In Argentina, the early adopters were the wealthiest schools.

Even if decentralization were known to raise schooling outcomes using the same inputs, it is not clear how governments can best foster decentralization. Gunnarsson *et al.* (2007) found that most of the variation in the practice of local school autonomy occurs within and not between countries, suggesting that national policies to foster decentralized decision-making may have little effect on actual school autonomy.

We may eventually have a better grasp of how to foster local school management and how to generate the skills needed to manage schools in areas that do not already have those skills. At the current level of knowledge, it is premature to make a general recommendation that local school management will improve schooling outcomes.

Returns to Increased School Supply Come after a Long Lag

Supply-side interventions generally require the allocation of funds upfront with the hoped-for child or parental response becoming apparent only later. Once built, there is no economic return to a new school unless children enroll, but it may be five years before children attain permanent literacy. It may take some time for parents to perceive school quality improvements. Similarly, it may take some time for teachers and students to respond to better local school management. Perhaps even more important is that the returns to the parents will come in the form of increased child earnings that are far into the future and heavily discounted relative to the immediate direct and opportunity costs parents face in sending their children to school. The combination of upfront costs, uncertain response, and delayed benefits place supply-side interventions at a cost-benefit disadvantage compared to the demand-side alternatives discussed in the next section.

When conducting benefit-cost comparisons, efforts to shift the demand for schooling have some distinct advantages over efforts to influence supply. A demand-side stimulus can be targeted to the particular population currently not in school, whereas supply-side interventions will generally involve some redistribution of children who are already in school to new schools. Demand-side interventions can be made contingent on the child being in school, meaning that payment occurs only if the program is working. In contrast, as we have just seen, supply-side interventions generally require the allocation of funds upfront with the hoped-for child or parental response becoming apparent only later. Demand-side interventions have benefits to the household that are discounted less heavily because they can put money in the parents' pockets immediately, either by lowering schooling costs or providing transfer payments in exchange for the child being in school. The parents also see the benefits immediately rather than the less apparent return in the form of future income the child will earn as an adult.

Finally, from the societal perspective, demand-side interventions can influence behavior immediately and so have an advantage relative to the more heavily discounted benefits of supply-side interventions, at least in terms of increasing enrollment. Even so, some supply-side interventions may be justified by their impact on learning outcomes and by equity considerations, even though they could not yet be justified under strict comparisons of benefits against costs. Adding schools to rural areas is expensive, and there may be insufficient numbers of students to take advantage of the returns to scale needed to make the school cost-effective, even with 100 percent enrollment. Similarly, some reforms may be needed to shift the incentives for teachers or the aspirations of students, even if the reforms take hold only over a long time horizon.

Demand-Side Interventions

This section reviews three types of interventions: Interventions in child health or nutrition that attempt to improve the child's physical or mental ability to learn; efforts to lower the cost of public or private schooling that enhance households' ability to pay for schooling; and income transfers to households that are made conditional on the child's enrollment, which will make schooling more affordable and lower the opportunity cost of children's time in school.

Demand-side interventions will be most effective in settings with high income and price elasticities of demand for schooling and where the supply of schooling is also very elastic with respect to household willingness-to-pay (WTP) for schooling. Since stimulating demand in settings where

¹⁵ There have been several reviews of early childhood interventions that combine schooling and nutrition in developed countries. Reviews by Currie (2001), Carneiro and Heckman (2003), and Heckman and Masterove (2007) conclude that the benefits of these programs frequently exceed their costs and that the programs dominate interventions that occur later in life. Recipients of early childhood training are less likely to drop out of school or engage in criminal activities. Recipients of school breakfast programs have healthier diets (Bhattacharya *et al.* 2006) that can raise their cognitive development.

additional school space cannot accommodate more students will have little impact, demand-side strategies work best where there is excess capacity in existing schools, which allows more children to be added at a low marginal cost.

Health and Schooling

There is a high incidence of malnutrition in developing countries. UNICEF compilations indicate that 28 percent of children in developing countries are moderately or severely under-nourished. In areas where malnutrition is common, nutritional supplements and/or treatments for intestinal diseases or parasites offer an inexpensive way to raise school attendance and physical and mental capacity.

Numerous policies aimed at improving child health have been administered to children currently in school, including the distribution of nutrition supplements, provision of school lunches, school-based immunization programs, and delivery of health education for students. Programs have also been implemented to improve the health of infants and pre-school-age children, and these programs are the ones that have been most rigorously evaluated.

There is substantial evidence that malnutrition early in life compromises both cognitive and physical development in a way that may be difficult to reverse through better nutrition later in life. For example, Glewwe *et al.* (2001) found that controlling for other household background measures, children who were malnourished early in life start school later, complete fewer years of schooling, and learn less per year of schooling. Alderman *et al.* (2003) report similar findings for children who were malnourished because of exposure to civil war and drought in Zimbabwe. Evaluations of efforts to provide nutritional supplements to at-risk pre-school children in developed countries have shown permanent improvements in physical stature and cognitive development, both of which can raise lifetime earnings.¹⁵

Behrman *et al.* (2004) conducted an experimental evaluation of the Proyecto Integral de Desarrollo Infantil (PIDI) program in Bolivia.

This program provided additional inputs, and pre-school children aged 6–72 months were enrolled in the program for periods of 12 months. The authors report positive impacts on child development and financial returns. McGregor *et al.* (1999) reported findings for a similar program in rural areas of Jamaica, as did Vermeersch and Krenn (2000) for a program providing free breakfasts in rural areas, raising average school attendance by 30 percent. A program that combined school attendance with an iron supplement in India also raised attendance (Bobonis *et al.* 2004).

Health programs in school settings are also a schooling investment in children as well. A program that provided a school lunch program raised the attendance of girls but also reduced the incidence of malnutrition in girls. This program comes from a widely cited study, which examined the impact of administered de-worming in Kenya. The treatment raised attendance by 0.15 years at a cost of only \$3.50 per child.

Nutritional programs can raise cognitive benefits at older ages. McGreggor *et al.* (1999) found that giving iron supplements to children (13–15 years old) can raise cognitive ability the equivalent of 0.5 years of schooling. McGreggor *et al.* (2006) found that nutritional supplements and treatments for intestinal parasites to adult populations improved productivity of older recipients, in an inexpensive and cost-effective way, in excess of costs.

One reason these programs are viewed as particularly good schooling investment collateral benefit. The

This program provides day care, nutritional inputs, and pre-school activities for low-income children aged 6–72 months. For children exposed to the program for periods exceeding one year, the authors report permanent gains in cognitive development and fine motor skills. Grantham-McGregor *et al.* (1991) report comparable findings for a similar program aimed at stunted infants in Jamaica, as do Armezin *et al.* (2005) for low-income rural households in the Philippines. Vermeersch and Kremer (2005) found that providing free breakfast to pre-schoolers raised attendance by 30 percent in Kenya, but did not raise average measured skills. An analysis of a program that combined de-worming medication with an iron supplement for pre-schoolers in India also raised attendance and physical stature (Bobonis *et al.* 2004).

Health programs have been shown to raise schooling investments for young school-aged children as well. Afridi (2007a, 2007b) found that a school lunch program in India increased attendance of girls but not of boys, but did lower the incidence of malnutrition for both boys and girls. This program costs just pennies per day. In a widely cited study, Miguel and Kremer (2004) examined the impact of a program that administered de-worming medicine to school children in Kenya. The treated children increased their attendance by 0.15 years per pupil, at an implicit cost of only \$3.50 per child per year of schooling.

Nutritional programs can even have benefits at older ages. McGuire (1996) reports that giving iron supplements to secondary school-age children (13–15 years) in a low-income country can raise cognitive abilities by 5–25 percent or the equivalent of 0.5 years of schooling. Brown *et al.* (2006) found that the provision of iron supplements and treatments for intestinal parasites to adult apparel factory workers in India improved productivity. Even for these teenage or older recipients, nutritional supplements are inexpensive and can generate benefits well in excess of costs.

One reason these health interventions can be viewed as particularly cost-effective in raising schooling investments is that the schooling is a collateral benefit. The main aim for most of these

programs is to improve child health, which is valuable in itself, and so raises the benefits side of the equation. On the cost side, expenses are incurred only if the children participate and so there is much less potential for wasted investments than is the case for supply-side interventions.

How generalizable are these studies to other developing country settings? Miguel and Kremer (2004) argue that the potential impact of de-worming on school attendance could be very large if expanded worldwide, in that 25 percent of children in developing countries are infected. However, it is useful to keep in mind that the impact is in raising the attendance of children already in school and not necessarily inducing children not in school to enroll. Secondly, their population of students had an infection rate of 92 percent and so the magnitude of the impact is likely related to fact that they selected sites most in need of the intervention – areas with more modest infection rates would have smaller program impacts. Demographic and health survey data suggest that health reasons are less often cited as a reason for children not being in school than are child work inside or outside the home, poverty, or lack of interest on the part of the child (table 4.3). Health is cited more often in Africa and in urban areas of Latin America, but is less often cited elsewhere.

Nevertheless, nutrition and health programs for pre-school age as well as school-age children will have particular relevance for the poorest households, who have a disproportionate share of the children who drop out before completing five grades. Many of these programs are relatively inexpensive to deliver. Most importantly, the benefits they offer from improved health alone may be much larger than the expense, even if they have little impact on schooling.

Lowering Schooling Costs

In many developing countries, parents face user fees for access to basic social services such as health care, sanitation, potable water, or schooling. These fees may discourage service utilization by the most vulnerable children: Girls, the poor, the rural, the disabled, and minority

Table 4.3. Reasons for not attending school in urban and rural populations, by world region

	Africa		S.E. Asia		North Africa & Middle East		Central Asia & Europe		South & East Asia		Latin America & Caribbean	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Work outside the home	7.4	4.2	3.3	1.8	0.7	0.7	9.3	7.8	8.7	4.4	18.3	10.0
Housework	7.3	11.5	5.3	7.9	5.6	9.9	6.3	9.3	10.7	19.7	11.7	17.9
Inadequate school supply	1.9	4.9	1.8	3.2	2.0	6.2	1.3	3.0	1.7	2.7	2.6	10.8
Poverty	18.2	18.1	24.1	23.9	4.6	3.4	1.3	0.8	24.2	26.3	11.9	11.3
Lack of interest	47.3	44.0	45.2	42.7	76.6	69.4	65.0	58.2	49.3	41.7	34.0	33.5
Health reasons	6.3	5.0	7.9	7.6	1.2	0.5	0.7	0.4	1.5	0.9	9.4	4.2
Others	11.5	12.3	12.4	12.9	9.3	9.9	16.0	20.5	4.0	4.3	12.1	12.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Computations provided to the author by Elizabeth King based on data from Demographic 00.

Table 4.4. Percentage of developing countries charging primary school fees, by world region, 2005

	Africa	East Asia	South Asia	Eurasia	Latin America	Middle East & North Africa	Total
Tuition fees	26%	25%	0%	20%	31%	40%	25%
Textbooks	17%	41%	0%	20%	31%	10%	25%
Uniforms	32%	41%	25%	10%	63%	20%	35%
Parent Teacher Associations and Community Fees	67%	91%	50%	90%	73%	60%	69%
Other	35%	58%	37%	40%	36%	30%	36%
Official fees	65%	75%	50%	90%	63%	80%	63%
Unofficial fees	32%	58%	38%	30%	42%	40%	35%
Any fee	82%	92%	63%	100%	79%	90%	84%

Source: Author's compilation of data reported in Kattan (2006), annex 3. Original data taken from World Bank surveys conducted in 2005 in ninety-three developing countries.

ethnic or racial groups. If widespread, such user fees could be a significant barrier to the achievement of universal basic education and health care.

Primary School Fees are Commonly Charged in Developing Countries

In 2005, the World Bank commissioned a survey of primary school fees in developing ninety-three countries (Kattan 2006). The findings show a strong trend toward reducing the price of attending primary school in developing countries. Whereas only three countries offered free primary schools before 2000, sixteen had eliminated all school fees by 2005. The reduction or

elimination of universal fees for primary schooling has been particularly noticeable in Africa, where countries such as Cameroon, Ghana, Kenya, Lesotho, Tanzania, and Uganda have all reduced or eliminated fees since 2000. In fact, one could conclude that primary school fees do not represent a problem in that only 18 percent of the ninety-three developing countries officially charge tuition for primary schools.

Nevertheless, the vast majority of parents in developing countries still face private costs of sending their children to primary school, and these costs are often large relative to measures of household ability to pay. Even when government policy prohibits tuition, fees may be

charged informally in 7 percent of the countries charging primary school fees. Even more so, 44 percent of the countries charging primary school fees with primary school uniforms, school payments for access to the country's primary schools offer free access to the country's primary schools uniforms, school payments for access to the country's primary schools

The most common reason for not attending primary school by a Parent-Teacher Association (PTA) or community association. While these fees are charged to households, failure to pay these fees can result in other penalties, such as exclusion from school or reduced access to school services. They are charged in 35 percent of the developing countries despite the fact that such fees should be eliminated.

In at least one country, primary school fees are charged for the use of school facilities. In the countries charging primary school fees, 82 percent of the developing countries charge primary school fees, 63 percent of the developing countries charge primary school fees, 40 percent of the developing countries charge primary school fees, 30 percent of the developing countries charge primary school fees, 20 percent of the developing countries charge primary school fees, 10 percent of the developing countries charge primary school fees, 0 percent of the developing countries charge primary school fees, 25 percent of the developing countries charge primary school fees, 25 percent of the developing countries charge primary school fees, 35 percent of the developing countries charge primary school fees, 69 percent of the developing countries charge primary school fees, 36 percent of the developing countries charge primary school fees, 63 percent of the developing countries charge primary school fees, 35 percent of the developing countries charge primary school fees, 84 percent of the developing countries charge primary school fees.

These fees can be charged to parents, particularly in rural areas. Across the world, the fee information is often not available, and fees represented

charged informally. Informal tuition is charged in 7 percent of the countries, raising the percentage charging primary school tuition to 25 percent. Even more important, as shown in table 4.4, countries charge a variety of fees associated with primary schooling, even when there is no tuition. Of the sixty-nine countries that have free primary school tuition, only sixteen actually offer free access to primary schools. The rest of the countries charge alternate fees for textbooks, uniforms, school support, or other mandated payments for accessing the school.

The most common of these is a fee charged by a Parent-Teacher Association or other community association that supports the school. While these fees may be voluntarily paid by households, failure to pay can lead to expulsion in other places. In addition, these fees tend to increase as tuition or other explicit fees are reduced. They are charged in 30 percent of the countries despite official policies stipulating that such fees should not be charged.

In at least one-quarter of the countries, parents are charged for textbooks. Over one-third of the countries charge for uniforms and for other fees associated with school activities. Overall, 63 percent of the developing countries have official policies to charge at least one of the five types of primary school fees considered. Fees are charged informally for at least one of the five fees in 35 percent of the countries. In total, parents in 84 percent of the developing countries have to pay either formal or informal fees to send their children to primary school. These fees are required in virtually all parts of the world including the two most populous, India and China. They are commonly charged in the poorest countries in the world: 82 percent of the countries in Africa, 63 percent of the South Asian countries, 79 percent of the Latin American countries, and 92 percent of the countries in East Asia. If these fees retard investments in primary education, then their impact is truly worldwide.

These fees can represent a significant burden to parents, particularly for the poorest households. Across thirty-four countries for which fee information was available, primary school fees represented over 10 percent of average

household expenditures in six and between 5–10 percent in another six. The burden is greatest on the poor: A study by Oxfam (2001) found that the poorest two household income quintiles in developing countries average over 10 percent of their incomes on primary schooling. A study of household expenditure patterns in Bangladesh, Nepal, Uganda, and Zambia found that only food (and, in one case, clothing) takes a greater share of household expenditures in those poor countries (Boyle *et al.* 2002).

School Fees Adversely Affect Enrollments of Disadvantaged Groups

School fees will have an atypically large impact on enrollments of children that are particularly price-sensitive. Orazem and King (2008) argued that the most price-sensitive groups are likely to be rural residents, girls, and the poor. If true, programs that uniformly reduce the price of primary schooling for all children will disproportionately increase enrollments of girls, rural children, and the poor, the very groups that have been shown to lag in our education measure in table 4.2 and in figures 4.3 and 4.4. Kattan's (2006) review of the empirical record found large increases in enrollment in the countries that eliminated primary school fees. In the sub-set of countries where more detailed analysis was available, the most rapid increases in enrollments have been for poor, female, and rural children. Additionally, general fee reductions in Kenya, Lesotho, and Tanzania led to rising enrollments for orphans and children of parents with HIV/AIDS.

These findings of large enrollment responses to school fee reductions hold up in more careful evaluations that control for competing explanations. A rigorous evaluation is available of a program in Bogota, Colombia which was launched in 2004. The user fee reduction program, known as *Gratuidad*, was well targeted, using a proxy-mean index, such that the probability that households benefit from the fee reduction is a discontinuous function of their score. This fact allowed Barrera-Osorio *et al.* (2007) to implement a regression discontinuity design to estimate the program's effect. The

Latin America & Caribbean

	Urban	Rural
4	18.3	10.0
7	11.7	17.9
7	2.6	10.8
3	11.9	11.3
7	34.0	33.5
7	9.4	4.2
3	12.1	12.3
7	100.0	100.0

2005

East Africa	Total
	25%
	25%
	35%
	69%
	36%
	63%
	35%
	84%

Surveys conducted in

primary school-able in Africa, roon, Ghana, Uganda have e 2000. In fact, school fees do only 18 percent countries offi-schools.

y of parents in rivate costs of y school, and ve to measures en when gov- t, fees may be

results suggest that the program had a significant impact: The fee reductions offered to students from the poorest families had a positive effect on enrollment in primary and secondary schooling. The estimates suggest that the program raises the probability of enrollment for primary-aged students by about 3 percent and for secondary school-aged students by about 6 percent. These positive effects seem to be larger for at-risk students, and not to vary by gender.

Fafchamps and Minten (2007) took advantage of a unique political crisis to observe how parents respond to schooling costs. In Madagascar, supporters of a defeated presidential candidate imposed a blockade of the central highlands of Madagascar that disrupted the delivery of all public services, including education. Enrollment in rural primary schools was found to withstand the effect of the crisis. After the blockade was broken, the government suspended user fees for public services including school fees to help the communities recover from the economic consequences of the blockade. The fee suspensions were not applied immediately in all rural communes, and so the authors could compare enrollment changes in areas with and without user fees. They found that suspension of user fees resulted in significant increases in school enrollment.

Evaluations have found substantial increases in enrollment even from modest reductions in the costs parents face from sending their children to school. A program that cut household costs of uniforms and school materials in Kenya, at a cost of about \$15 per child, increased years of schooling completed by 15 percent (Kremer *et al.* 2003). This is an important result in that it may not be necessary to eliminate all types of fees to get the desired behavioral response in terms of child time in school. Even places that eliminated fees officially often still have informal fees to help support school functions.

A case in point is the best-known and most-studied case of school user fee removal: That of Uganda, which removed user fees in 1997 as part of the effort to achieve UPE. Note that in Uganda, fees are still charged legally for textbooks, uniforms, and other school func-

tions. Nevertheless, Deininger (2003) found that elimination of primary school tuition lowered costs by 60 percent on average, or by about \$16 per child. As a result, enrollments increased by 60 percent. Consistent with the presumption of larger price elasticities in rural areas, rural enrollments more than doubled while urban enrollments rose by only 16 percent. Using regression discontinuity and difference-in-difference estimation techniques, Grogan (2006) and Nishimura *et al.* (2008) found that the reduction in fees led to a reduction in delayed enrollments. The Nishimura *et al.* analysis concluded that grade completion rates up to grade 5 rose, with especially large effects among girls from poor households.

These very large responses to school price reductions are the best argument for demand-side efforts to improve literacy. The contrast with the very small increase in schooling that resulted from the doubling of the number of schools in Indonesia reported by Duflo (2001) is striking. For cost-benefit comparisons, we find that relatively low-cost fee reductions result in much larger behavioral responses than has been obtained from supply-side interventions. Nevertheless, there is a significant concern that these large enrollment increases can over-tax the ability of the country to provide a productive school environment.

Reduction in User Fees Threatens School Quality

The Uganda case also points out a potential problem with reliance on user-fee reduction or elimination to attain UPE. The resulting enrollment expansion in Uganda came at the cost of considerable over-crowding, as school supplies did not keep up. Pupil-teacher ratios rose from 48:1 to 70:1 in rural areas and from 38:1 to 65:1 overall. Similarly, in the India school meal program, Afridi (2007a) reports that pupil teacher ratios were higher in participating classrooms because supply did not keep up with demand. This trade off between increased schooling demand and reductions in the quality of schooling appears to be a general characteristic of programs aimed at reducing

user fees. Tiongson's studies across ten countries, enrollments rose in areas that considered the quality fell in every case.

The loss in quality paid by parents can total financial support account for over half of primary schools in Cambodia and Zambia before the after the elimination of formal fees still account for expenditures in Malawi where the taxing authority fee for services rendered for public agencies to surprising that the elimination of those fees creates a loss and quality.

It is not clear how crowding is to student children who were a negatively affected with the number of students the Uganda case provides address this issue. Ti found that, following was a 10 percent fall in publicly schooled children economic characteristics a simple reading test Demographic and Health Supplement. The Nishimura also found evidence An increased likelihood school will drop out b

We should emphasize increases enrollments disadvantaged groups result in a reduction in academic success. That is children in school will toward groups who will more difficulty in school the net gain vs. loss from the cognitive gains from

user fees. Tiongson's (2005) review of twenty studies across ten countries found that, in all cases, enrollments rose. But, in the fifteen studies that considered the issue, measures of school quality fell in every case but one.

The loss in quality is not surprising – fees paid by parents can be a high fraction of the total financial support for a school. Private fees account for over half the resources available to primary schools in Cambodia, and for over half the revenues available to the schools in Uganda and Zambia before the elimination of fees; even after the elimination of legal school fees, informal fees still account for 80 percent of school expenditures in Malawi. In developing countries where the taxing authority is weak, charging fee for services rendered may be the only way for public agencies to recover costs. It is not surprising that the elimination or reduction of those fees creates a strain on service delivery and quality.

It is not clear how damaging this overcrowding is to student learning, but presumably children who were already in school may be negatively affected when these programs raise the number of students per teacher. Again, the Uganda case provides careful studies that address this issue. The Grogan (2006) study found that, following the fee reduction, there was a 10 percent fall in the probability that a publicly schooled child of a given age and socioeconomic characteristics was able to complete a simple reading test contained in the 2001 Demographic and Health Survey Education Supplement. The Nishimura *et al.* (2008) study also found evidence of increased inefficiency: An increased likelihood that children who start school will drop out before completion.

We should emphasize that any program that increases enrollments atypically for the most disadvantaged groups would almost certainly result in a reduction in average measures of academic success. That is because the population of children in school will be weighted more heavily toward groups who would be expected to have more difficulty in school. The better measure of the net gain vs. loss from the program is whether the cognitive gains from increased enrollments

outweigh the losses attributable to over-crowding and reduced school quality. In the case of Uganda, it seems that the gains clearly outweigh the losses. A back-of-the-envelope computation suggests that even with a 10 percent increase in academic failure conditional on having entered school, the 60 percent increase in enrollments suggests that the fraction of children attaining literacy increased by 44 percent.

Ways to Reduce User Fees without Sacrificing School Quality

It is too simplistic to argue that cost reductions would be imposed only where there is excess school capacity and so we can avoid the added costs of hiring more teachers and building more schools. While we have demonstrated that the fraction of dropouts is large relative to the total number of children failing to complete the primary cycle and so potential capacity exists to meet their needs, in practice we know that some children will enter school that previously would not have enrolled at all. These first-time entrants will increase the number of children relative to teachers and will eventually necessitate additional resources in order to maintain quality.

Some have argued that the only way to reduce user fees in schooling is to have a coincident commitment to increase public support of the schools to replace lost revenues. The strongest advocacy for this view comes from the literature on user fees in health care. Removal of user fees increases usage, especially by the poor. A review of twenty-seven studies suggests that this policy has been most successful when supported by supply-side measures that remove other barriers to access (James *et al.* 2006). However, there are mechanisms by which demand-side measures can still increase utilization without sacrificing school resources.

The most obvious of these is to target the fee reduction to the most disadvantaged groups: The poor, female, rural, disabled, or minority children who are under-served by the for-fee service. These targeted scholarships maintain payments from those best able to pay who are already accessing schools while increasing enrollments of the most vulnerable. There is

considerable experience with local targeting to identify those most deserving of public transfers at relatively low cost (Alderman 2001; Faguet 2004; Galasso and Ravallion 2005). Such efforts would lower the adverse impact of the demand response on school quality for those already in school.

The Private Sector may be Induced to Provide Some of the Necessary Supply

The most promising mechanisms to reduce schooling costs without sacrificing quality is to provide the targeted poor with the resources needed to pay for the costs of schooling. These vouchers could be used for support of public or quasi-public schools through the use of capitation grants, per-pupil payments that are made directly to the school. These could be used to induce new private suppliers of the service when local supply was insufficient. Finally, they could be directed to utilize existing excess capacity in private schools if the existing public schools are over-subscribed. There have been successful examples of each of these mechanisms in developing countries.

The availability of less expensive teaching and infrastructure inputs is a major reason to consider private rather than government school options to serve the expanding demand for schooling. James (1993) demonstrated that, in many developing countries, private schools are an important component of school supply: Private schools have excess capacity as measured by their relatively low numbers of students per teacher. In addition, private schools may have a lower marginal cost of adding additional capacity than government schools. In these circumstances, modest public subsidies that induce private school suppliers to contribute additional resources may increase enrollments at a fraction of the cost of pure public provision of schooling.

One way to accomplish this objective is through capitation grants to school operators. A program in Balochistan province in Pakistan attempted to spur both the demand for schooling among girls and to provide an incentive for private school entry by providing scholarships

to girls. Randomly selected neighborhoods were given the option of packaging up to 100 girls' scholarships of 100 rupees per month (equivalent to \$3) to try to induce a school operator to open a school in the area. The scholarship offered declined over time, falling to zero after four years. In urban areas, even this modest subsidy was sufficient to induce new schools to open (Kim *et al.* 1999), and enrollments for both girls and boys rose relative to enrollments in control neighborhoods. A similar program in rural areas enabled schools to open, but the communities were too poor and the number of girls too few to allow the schools to become self-sustaining (Alderman *et al.* 2001). This raises an important lesson for the likely success of private school options to raise enrollments – invariably they will be most successful in areas that would have been able to support private schools in the absence of a subsidy: In other words, places with the greatest elasticity of supply for private schools.

In the Balochistan case, the privately managed scholarship schools were opened at one-quarter of the cost of a public school, in part because the schools were able to access property at a much lower cost than building a school and because the schools were able to hire teachers at well below the government pay scale. Despite that fact, school quality was sufficiently high that students in the newly formed scholarship schools outperformed students from similar backgrounds in government schools.

In areas where existing private schools are under-subscribed, vouchers may be an excellent mechanism by which governments can expand access less expensively than by building additional government schools. One example of this strategy was the Colombia PACES program that provided subsidies to municipalities to provide secondary school vouchers to poor children. There was ample evidence that the existing government school supply was insufficient to meet demand and that private schools could add additional students without requiring additional teachers or classrooms (King *et al.* 1999). Vouchers were offered only to children in the lowest socioeconomic strata in municipalities where private schools had committed to

participate. The program and Behrman 2005) cost of the primary above. Because the secondary students, children's time is much case if they were of p

Angrist *et al.* (2000) children who were program were 10 p complete grade 8 and also tions higher on stand adding an additional in doubt about the cation, it is interest also were less likely and were less likely follow-up analysis o gains were permanent

A program in India nism to enable poor children in school. tries, students often school, with the tuto same teacher they h cannot afford these s their peers. A prog women with high-s remedial tutoring to had fallen behind in s At a cost of \$5 per ch likelihood of a child a by 11.9 percentage p levels by 9.9 percen the two-year progra ing on average 0.28 on the test scores, ro attained one addition

The reason the pr that it hired less-qua rate rather than requ and paying the gove (called *balsakhis*, or c only \$10–\$15 per mo the government scho

Programs to redu to parents can have impacts on children'

participate. The program cost of \$193 (Knowles and Behrman 2005) is much higher than the cost of the primary school programs discussed above. Because the Colombia voucher aimed at secondary students, the opportunity cost of the children's time is much higher than would be the case if they were of primary school age.

Angrist *et al.* (2002, 2006) demonstrated that children who were randomly sorted into the program were 10 percent more likely to complete grade 8 and also scored 0.2 standard deviations higher on standardized tests, equivalent to adding an additional year of school. For those in doubt about the external benefits from education, it is interesting that voucher recipients also were less likely to marry young or cohabit, and were less likely to engage in child labor. A follow-up analysis confirmed that educational gains were permanent and not transitory.

A program in India provides a third mechanism to enable poor households to enroll their children in school. In many developing countries, students often participate in tutoring after school, with the tutoring often provided by the same teacher they have in class. Poor children cannot afford these services and may fall behind their peers. A program in India hired local women with high-school degrees to provide remedial tutoring to grade 3 and 4 children who had fallen behind in school (Banerjee *et al.* 2007). At a cost of \$5 per child, the program raised the likelihood of a child achieving grade 1 math level by 11.9 percentage points and grade 2 language levels by 9.9 percentage points. By the end of the two-year program, children were performing on average 0.28 standard deviations higher on the test scores, roughly equivalent to having attained one additional year of schooling.

The reason the program is so inexpensive is that it hired less-qualified tutors at the market rate rather than requiring teaching certifications and paying the government rate. These tutors (called *balsakhis*, or children's friends) were paid only \$10–\$15 per month, roughly one-eighth of the government school teaching rate.¹⁶

Programs to reduce the costs of schooling to parents can have dramatic and immediate impacts on children's achievement and years of

schooling completed. Moreover, they can take advantage of existing under-utilized capacity in the form of potential teachers and spaces in private schools at a fraction of the cost of building and staffing new schools. Finally, they have the additional advantage that they use resources only if the children use the services.

Conditional Cash Transfers

Latin American countries have moved rapidly to the use of conditional cash transfers to induce parents to send their children to school. These programs transfer income to a household in exchange for it sending their children to school, and many include other components, typically adding nutritional supplements and mandating health clinic visits for pre-school children and health training for mothers, so that they are not aimed solely at education outcomes. Programs have been or are being implemented in Argentina, Bangladesh, Brazil, Chile, Colombia, Costa Rica, Ecuador, Honduras, Jamaica, Mexico, Nicaragua, Peru, and Turkey.

As with other demand-side interventions, these programs will be most effective in environments in which schooling demand is highly income- and price-elastic and where large numbers of children are not in school. These circumstances typically prevail in poor communities. Indeed, these programs are usually aimed at the lowest income strata of society, and considerable attention has been paid to identifying which households truly deserve the program. Some of this effort seems misguided in that the poor often face transitory income streams that may make them appear poorer in some months and better off in others: A transitory nature that suggests that current income is a poor targeting mechanism. In urban areas, it can be costly for authorities to try to establish which households qualify on the basis of income and which do not,

¹⁶ This should probably have been discussed as a supply-side intervention, except that it is virtually indistinguishable from the capitation and voucher systems discussed elsewhere. This system could have been designed as a voucher that would give households the resources to hire a tutor.

and such efforts lead to moral hazard problems in which households may take on activities that lower their earned income but increase their chance of getting the government transfer. There are significant advantages to using geographic targeting in populations where poverty is nearly universal, such as poor rural villages. In urban areas, targeting on parental education may be less expensive and is likely to be a better proxy for permanent income than is current income. In addition, parents cannot alter or conceal schooling as easily as they can alter or conceal their income, so the moral hazard problem and classification problems are less severe.

Conditional transfer programs will be most successful when they are aimed at populations not currently in school. In Brazil, where individual municipalities established their own programs until they were centralized under the federal Bolsa Familia program, some programs targeted children who were so young that the vast majority was already in school. Allowing self-selection into the program permitted families whose children would have been in school anyway to opt into the program and receive the transfer. Perhaps that is why the most careful evaluation of the Brazil program (Cardoso and Souza 2006) failed to show large benefits.

The Bangladesh Food for Education program transfers a grain ration instead of cash to poor households whose children regularly attend school. In other respects, this is similar to the Latin American programs discussed below. Meng and Ryan (2007) found that beneficiaries stay in school around one year longer than comparable eligible children who did not receive the transfer, with a larger effect for girls.

The most efficient targeting mechanism would be to focus on the ages at which school dropout occurs. In the least developed countries, the target would be children of primary school age. In middle-income developing countries, it would be more appropriate to target secondary school-aged children. Illustrating this point is the finding that in more-developed Mexico, conditional transfers had almost no impact on primary school enrollment (Schultz 2004a) while in less-developed Nicaragua, there were

substantial increases in primary school enrollment (Maluccio 2006). While most programs report positive impacts on enrollment, the gains are slight in some countries and substantial in others. For example, there was little impact in Honduras, where most of the targeted children were already in school and the transfer was considered too small to effectively move children away from child labor to schooling (Glewwe and Olinto 2004). On the other hand, enrollment rose by 23 percentage points in Nicaragua during the initial pilot phase, with most of the gains in the form of children exclusively spending time in school, rather than combining school and work.

Summarizing across programs, it appears that the largest effects from conditional transfers have been in rural areas and in areas that were particularly poor. The most efficient programs target transfers to groups that are not already in school so that households do not receive incentive payments for actions they would have undertaken even without the program.

Benefit-Cost Summary

Our primary task in this chapter has been to identify the low-hanging fruit for raising educational attainment in developing countries: What programs will raise education outcomes most per dollar spent? We argue that demand-side policies dominate supply-side policies because it is much less expensive to stimulate schooling demand and because the costs are incurred only when households fulfill the program's objectives. If households do not send their children to school, the government does not expend resources.

Estimated benefit-cost ratios for discount rates of 3 percent and 6 percent are reported in table 4.5. We report the estimates of other authors when we assess that they are more carefully done than anything we could do from reading the paper, although we make adjustments when the authors used other discount rates.

These estimates must be taken with a considerable grain of salt. First, while there are reliable

Table 4.5. Overview table of

Health and nutrition program
Bolivia PID: pre-school and nutrition ^d
Kenya: deworming ^b
Kenya: pre-school and nutrition
Iron supplements to secondary schoolers ^d
Scholarship/Voucher program
Pakistan urban girls' scholarship
Pakistan rural girls' scholarship
India <i>balsakhis</i> tutorial program
Uganda free primary school program ^e
Colombia: PACES secondary school urban voucher ^b
Conditional cash transfers
Mexico Progressa ⁱ
Nicaragua: RED ^j

Sources: ^a Behrman *et al.* (2004), #
^b Miguel and Kremer (2004). *
^c Vermeersch and Kremer (2005). *
^d Knowles and Behrman (2005).
^e Alderman *et al.* (2003). ***
^f Banerjee *et al.* (2007).
^g Deininger (2003). **
^h Angrist *et al.* (2006). ****
ⁱ Schultz (2004a).
^j Maluccio (2006).
 Notes: # Benefit-cost ratio computed
 * Cost per year of schooling reported
 ! Per year of schooling induced.
 ** Assumes that the government cost
 cost per primary student
 *** Cost does not include value of
 **** Estimate does not include the

data on the costs of most benefits are based on the imputed time earnings from the expenditure of schooling. Our review is based on the consistency across urban and rural markets in the response to schooling. In the estimates we assume that the return to schooling is 8 percent per year of schooling over an estimated average

Table 4.5. Overview table of B/C ratios from various efforts to reduce illiteracy

	Low discount (3%)			High discount (6%)		
	Benefit	Cost	BCR	Benefit	Cost	BCR
Health and nutrition programs						
Bolivia PIDI: pre-school and nutrition ^a	\$5,107	\$1,394	3.7	\$2,832	\$1,253	2.3
Kenya: deworming ^b	2246!	3.5!	642	1448!	3.5!	414
Kenya: pre-school and nutrition ^c	2246!	\$29.13!	77	1448!	\$28.6!	50.6
Iron supplements to secondary schoolers ^d	\$474!	\$10.49!	45.2	\$289!	\$10.29!	28.1
Scholarship/Voucher programs						
Pakistan urban girls' scholarship ^e	\$3,924!	108!	36.3	\$2,530!	\$118!	21.4
Pakistan rural girls' scholarship ^e	\$3,139!	\$311!	10.1	\$2,024!	\$326!	6.2
India <i>balsakhis</i> tutorial program ^f	\$7,002!	\$9.85!	711	\$4,515!	\$9.76!	463
Uganda free primary school program ^g	3675!	\$140!	26.3	2370!	\$140!	16.9
Colombia: PACES secondary school urban voucher ^h	\$476	\$193	2.5	\$205	\$190	1.1
Conditional cash transfers						
Mexico Progressa ⁱ	\$17,565!	\$2585!	6.8	\$12,923!	\$2535!	5.1
Nicaragua: RED ^j	\$5,920!	\$1574!	3.8	\$3,818!	\$1574!	2.4

Sources: ^a Behrman *et al.* (2004).#

^b Miguel and Kremer (2004).*

^c Vermeersch and Kremer (2005).*

^d Knowles and Behrman (2005).

^e Alderman *et al.* (2003).***

^f Banerjee *et al.* (2007).

^g Deininger (2003).**

^h Angrist *et al.* (2006).****

ⁱ Schultz (2004a).

^j Maluccio (2006).

Notes: #Benefit-cost ratio computed in the paper with slight adjustments for differences in discount rate.

*Cost per year of schooling reported in Abdul Latif Jameel, Poverty Action Lab, MIT, Cambridge, MA (2005).

**Per year of schooling induced.

***Assumes that the government expands school space to accommodate additional students at the average cost per primary student

**** Cost does not include value of in kind donation of building.

***** Estimate does not include the value of reduced fertility behavior.

data on the costs of most of these programs, the benefits are based on the increase in projected lifetime earnings from the expected impact on years of schooling. Our review of returns to literacy and to years of schooling demonstrated considerable consistency across countries, genders, and urban and rural markets in the estimated returns to schooling. In the estimates we report, we assume that the return to schooling is an increase of 8 percent per year of schooling completed over an estimated average earning for labor in

the country. A modest variation in the returns to schooling will not be sufficient to reverse the conclusions regarding whether the benefits of the interventions outweigh the costs. On the other hand, we apply these expected returns to interventions that target young children who are not yet working, and so we do not have direct evidence of the impact of these interventions on their wages when they become adults.

Another reason why our calculations may be imprecise is that the returns to increased

schooling will depend on labor market and schooling factors that will differ across countries. Returns will depend on the degree of economic freedom in the country – that is, on the ease with which human capital can move to its highest reward. The magnitude of the schooling increase will depend on how successfully the program can be targeted to those populations that will respond most elastically to the intervention. To maximize effectiveness, programs should focus on the grade level where dropouts are most prevalent: At the primary level in rural areas and in urban areas of the least developed countries, and at the secondary level for urban populations in middle-income countries. However, there is consistent evidence that the most productive interventions will be early in life because: (i) the costs of interventions increase with the age of the child; (ii) very early health and schooling interventions have been shown to be more productive than interventions later in life; and (iii) the earliest interventions have a longer lifetime left in which to recoup the benefits of the program. Generalizing across interventions, the most responsive populations to these interventions have been poor, rural, and female: The very groups that are currently furthest removed from universal primary education.

Skeptics may argue that the children who increase their schooling through these demand-side initiatives will receive below-average returns to that schooling, which will bias our benefits upwards. The rationale for these arguments is that adding more educated workers will crowd the market and lower wages for all educated workers, and that these children will over-crowd existing schools and lower quality for all students.

Yet the first of these arguments seems unlikely to hold. First, even if every dropout is induced to stay in school until grade 5, they will be a relatively small fraction of the literate workforce. The outward shift in the supply of literate workers will be modest. Second, in developing countries, returns to schooling have tended to be

larger at the primary than at secondary levels of schooling, and so any adverse impact on returns will be starting from a higher base. Third, dropouts are disproportionately from households facing liquidity constraints, which means the returns to schooling are being equated to a higher than market rate of interest. Therefore, their current level of schooling is inefficiently low and the return to schooling artificially higher than the market rate. Fourth, returns to schooling in both developed and developing countries have remained remarkably stable over time despite very large increases in the supply of educated labor, potentially because there are external productive benefits from increasing fractions of educated workers that raise the efficiency of production.¹⁷ Finally, even if the argument that raising the literacy rate would lower the return to literacy, a policy prescription that we keep some predominantly poor children illiterate so that we can raise the returns to schooling for literate children fails on almost any ethical dimension.

The second argument, that the children who are devoting more time to school will be spending that time in bad schools or else will be raising pupil-teacher ratios, is a more credible concern. If true, then perhaps increased time in school will not result in greater literacy. For example, the results of cognitive tests for the Kenya deworming experiment found that even though students spent more time in school, their performance on cognitive exams did not improve significantly, although follow-up surveys may yet find an impact. The increased enrollments in Uganda and India were apparently only modestly accommodated by increased school materials and so school quality may have suffered for all children. Nevertheless, there is no consistent finding that students perform more poorly in larger classrooms, especially in the range of pupil-teacher ratios observed in developing countries. Furthermore, our strategy begins with the group of students who started school, and so any increase in pupil-teacher ratios would occur because more students are staying in school and not because formerly absent students are now attending. Our view is that the

¹⁷ See Kremer (1993) for an example of such a model and Acemoglu (2002) for a review of others.

tie between years of schooling is sufficiently strong, yet become apparent as if they do not appear emphasized that, in most cases, improvements in health and education accompany the increase in both were measured.

In designing these programs to complement existing supply-side government school systems, which are expensive and subject to various constraints. Such private sector programs will be most effective if the elasticity of educational demand is high. Health programs offer other general educational benefits to welfare.

We should emphasize that binding space constraints on demand will not be effective if there is a significant increase in supply. Health programs require an increase in supply that is more expensive than program costs, especially in excess school capacity. Schools can make better use of existing capacity as those that reduce teacher-student ratios enhance parental commitment. Some programs show promise but are still in need of more work. More work is needed to show that these programs can be generalizable. Teacher and school quality are not known how to foster improvements. We cannot make a proposal for enhancements.

In our estimates of the impact of these side policy prescriptions, we assume a 10-year work career. In our estimates of earnings, we implicitly assume that time outside the market is valued at the same rate as the value of time spent in school. This assumption is particularly problematic in cases where women are not in the labor market, as in the case of the other hand, we do not account for possible externalities from education such as health and fertility which would create

tie between years of schooling and lifetime earnings is sufficiently strong that the benefits will yet become apparent as these children age, even if they do not appear immediately. It should be emphasized that, in most of the cases summarized in table 4.5, improved cognitive ability did accompany the increased time in school when both were measured.

In designing these programs, efforts to supplement existing supply by working outside the government school system are generally less expensive and subject to fewer regulatory constraints. Such private sector educational programs will be most effective in urban areas where the elasticity of educational supply is greatest. Health programs offer opportunities for collateral educational benefits while improving child welfare.

We should emphasize that where there are binding space constraints in school, stimulating demand will not be effective without a concomitant increase in supply. However, programs that require an increase in supply are much more expensive than programs that exploit existing excess school capacity. Secondly, programs that can make better use of existing resources such as those that reduce teacher absenteeism or enhance parental commitment to the school show promise but are still in preliminary testing. More work is needed to see how these programs can be generalized. Finally, we know teacher and school quality matter, but we do not know how to foster quality. Until we do, we cannot make a proposal focusing on quality enhancements.

In our estimates of the benefits of demand-side policy prescriptions, we assume a forty-five-year work career. In our projection of lifetime earnings, we implicitly assume that the value of time outside the market rises in value at the same rate as the value of time in the labor market. This assumption is particularly suspect in the cases where women are not commonly found in the labor market, as in the Pakistan example. On the other hand, we do not make any adjustments for possible external benefits of women's education such as healthier children and reduced fertility which would create a bias in the other

direction, and note further that the literature has not demonstrated that returns to girls' schooling are substantially lower than are returns to boys' schooling. We also make no adjustments for any possible additional external benefits from better-functioning labor markets, more efficient use of capital and technology, or better-functioning government institutions. Finally, we assume that the benefits of the intervention are confined to the individual child who was the target of the intervention. It is plausible that benefits may cross generations, in that more-educated parents can better provide for their children, but such projections are even more speculative than the labor market earnings projections that underlie our current projections, and those benefits are occurring sufficiently far into the future that they will be heavily discounted. We expect that our more limited measure of the likely returns to schooling will counteract any upward bias in returns attributable to our ignoring any lower quality in the schools available to these children.

We provide summary information on benefit-cost ratios for many of the programs mentioned above. Our estimates concentrate narrowly on the returns from additional years schooling induced by the program. This can be misleading in either direction. The reported benefit-cost ratios will be biased downward in that they ignore external benefits and benefits from health improvements. These biases can be large. Adding the impact that increased years of schooling reduces the fertility rates of young women, as was found in the Colombia PACES case, raised benefit-cost ratios substantially, to 25.6, instead of 3.3 when only the earnings benefits of schooling are included (Knowles and Behrman 2005).

On the other hand, past returns to schooling may over-state the future earnings of previously marginalized children whose schooling is disproportionately rising as a result of these programs. Such groups may well face more difficulty finding employment and entry into higher-paying occupations than have groups who would finish schooling without public financial support.

Why Benefit-Cost Ratios Vary

It is immediately clear that many of these benefit-cost ratios are large, and some are extremely so. The largest tend to be very low-cost health interventions in areas with a very clearly defined need, such as 92 percent worm infestation in Kenya. Others are low-cost provision of private teachers or tutors for under-served poor children in urban Pakistan and in India. The very high benefit-cost ratios are attributable both to the selection of very low-cost interventions and to the placement of these interventions in settings where they would be disproportionately successful. The expansion of these programs more broadly would occur in less fruitful areas and at higher costs, implying that the benefit-cost ratios would fall. The key point is that even very substantial corrections for selection would still suggest that these programs were worthwhile.

The more broadly distributed interventions such as the conditional cash transfer programs or the voucher plans are less selective in terms of the places where the interventions are implemented, and as a result the benefits are more modest. In those cases, the largest benefits are found when they target populations that are initially out of school. For the Mexican Progresia intervention, cash transfers to younger children were almost certainly not cost-effective because most of the children were already in school. The cost per increased year of schooling at the primary level was roughly six times the cost of inducing an additional year of schooling at the secondary level.

Another generalization that is apparent in table 4.5 is that the largest benefit-cost ratios are interventions early in the child's life because the interventions cost less and the child's opportunity costs are small. Nevertheless, some programs targeted at older children can still be cost-effective if the costs are modest. The iron supplement aimed at secondary students had substantial benefits because the costs were so low. The benefits were more modest from the Colombia PACES program because the voucher was more costly, although recall that the benefits are more substantial when the collateral benefit

of reduced fertility was included. Importantly, neither the iron supplement program nor the voucher program required building more schools or adding capacity, a key to keeping their costs low relative to their benefits.

Conclusions

In examining the pattern of results in table 4.5, it seems clear that the most cost-effective interventions occur when children are dropping out for reasons of malnutrition or treatable illness. Often very low-cost interventions offered at the school site correct the health problems, improve the cognitive capacity of the child, and increase attendance. While this represents perhaps only 10 percent of the illiteracy problem according to the estimates in table 4.5, it is by far the most cost-effective solution. School dropout attributable to poverty or child labor is a more prevalent problem and requires more expensive interventions to correct. Nevertheless, the use of conditional cash transfers, capitation grants, or school vouchers can sufficiently increase literacy rates so that the benefits outweigh the costs.

Where possible, education and health interventions should be married, as each will enforce the other. It is cheaper to distribute health and nutrition services at the school site and, in so doing, parents are more likely to send their children to school. When the mechanism used to increase school demand involves transfers that improve a child's health and nutrition, we also improve the child's cognitive capabilities and school performance, raising the returns to the program. Any additional external benefits from individual schooling just add to the plus side of the ledger. These collateral benefits come at no added cost, lowering the risk and raising the expected return to the intervention.

To put our strategy in perspective, we estimate that every year approximately 14.4 million children could be induced to attain literacy in a cost-effective manner because they start schooling but drop out before completing grade 5. We take the fact that they start school as

evidence that there is a supply in close proximity, it is the demand side that completion of five years of modest-cost mechanism stimulate schooling demand, lowering the cost of attending the receipt of health services, or income to children. Although some programs would pay for all but the interventions summarized means that for \$3.6 billion less, we could significantly attain of these 14.4 million. To raise their attainment on average needed to cycle, the cost would cor

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evidence that there is some source of school supply in close proximity to the home, and so it is the demand side that is constraining their completion of five years of schooling. Several modest-cost mechanisms have been tried to stimulate schooling demand for such children by lowering the cost of attending school or by tying the receipt of health services, nutritional supplements, or income to child attendance at school. Although some programs had higher costs, \$250 would pay for all but the most expensive of the interventions summarized in table 4.5. That means that for \$3.6 billion, and perhaps much less, we could significantly raise the schooling attainment of these 14.4 million children by one year. To raise their attainment by the 2.5 years on average needed to complete the primary cycle, the cost would come to \$9 billion.

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Introduction

The topic of the Challenge... The authors (Orazem, G... hereafter, OGP) decided... sion on poorer countries... world, and to address the... ing the most cost-effective... on the goal of Universa... (UPE). One of the Mille... Goals (MDGs) is to atta... OGP claim that under cur... cies it is unlikely that this g... search for various mechan... to foster progress towards... gest that mechanisms tha... demand demonstrate the s... success to date, and are th...

In this Perspective pap... rationale and the solutio... Challenge paper, critica... the chapter's main underly... propose an alternative vie... tions. I limit my discussi... countries, as did OGP, al... to education and human... are also currently under c... developed countries.

This paper is structured... section presents a brief sum... paper, the third present... Challenge paper's approa... the fourth outlines two