IOWA STATE UNIVERSITY

The Benefits and Costs of Alternative Strategies to Combat Illiteracy

Peter Orazem

August 2006

Working Paper # 06029

Department of Economics
Working Papers Series

Ames, Iowa 50011

The Benefits and Costs of Alternative Strategies to Combat Illiteracy

Report prepared for the Copenhagen Consensus 2008

Peter F. Orazem[a]
Iowa State University

August 2006

Preliminary: Comments Welcome

This paper reviews the stylized facts regarding the distribution of human capital investments and the returns to those investments in developing countries. It then examines recent evidence regarding which policies can induce increased human capital investments in the most efficient manner, using estimated benefits and costs as a guide.

[a]Department of Economics, Iowa State University, Ames, IA 50011-1070, pfo@iastate.edu
I thank Jean Fares, Deon Filmer, Sarojini Hirshberg, Manny Jimenez, Elizabeth King, Claudio Montenegro, Harry Patrinos, Annette Richter, and T. Paul Schultz for their advice on topics, content and relevant literature as I prepared background materials for this paper. Shiva Sikdar provided able research assistance. Opinions expressed are my own and not necessarily those of my colleagues or of the World Bank.

The Benefits and Costs of Alternative Strategies to Combat Illiteracy

I. Benefits

Few empirical relationships have been more frequently investigated than that between years of schooling and earnings. Literally hundreds of studies using alternative data sets from developing and developed countries, spanning many decades, and employing alternative specifications to correct for various potential sources of bias, have derived amazingly consistent estimated private returns per year of schooling.[1] Returns are almost universally positive and at or above market returns to other investments.

Figure 1 presents the estimated least squares returns from a standard Mincerian earnings function applied to 71 data sets from 48 developing countries. The results are presented as paired returns to schooling for males and females in each country. If the returns are equal between the sexes, they will align along the 45^o line. If they are higher for women, the point will lie above the line and if they are higher for men, they will lie below the line. Several interesting results are apparent. First, in only one case for women and four cases for men did education fail to raise earnings. Second, estimated returns are very highly correlated at .85 between the pairs, and so markets that reward education highly for men also reward education highly for women. Third, estimated returns average 7.3% for men and 9.8% for women across the data sets. While these estimates are subject to various sources of bias due to measurement error in schooling, missing variables such as ability or ambition that may be correlated with schooling, and selection bias due to nonrandom sorting into the labor market, the consensus from numerous attempts to correct for these problems is that the biases are small and that the true returns are larger than those based on least squares estimation.[2]

Figure 2 repeats the exercise for estimated returns for paired samples of urban and rural residents of developing countries. In this setting, points lying above the 45^o line suggest higher returns to schooling for rural residents while points below the 45^o line indicate higher returns for urban residents. Again, the correlation between the two is high at .85, and so markets that reward schooling in urban areas tend to reward schooling in rural areas as well. In only 3 of the 61 country studies did schooling fail to raise earnings for both urban and rural residents of the country, although the estimated gains from schooling to rural residents are only marginally positive in 10 percent of the cases. Again, these estimates are subject to the various biases mentioned above, plus another in that many urban residents would have been schooled in rural areas. Because evidence is strong that the more educated have the greatest incentive to migrate from rural to urban areas, the rural sample will disproportionately miss individuals from the upper tail of the talent distribution of those schooled in rural areas. Limited evidence that has investigated these estimation problems suggests that the biases are small.

These returns suggest that across a wide array of countries at all stages of development, education offers consistent, significant positive wage returns—not only to urban male youth, but to women and rural youth as well. Nevertheless, a year of schooling will be more productive in some environments than others. It has long been recognized (Schultz, 1975) that human capital is most valuable in disequilibrium environments. In the absence of technological change,

---

[1] Card(1999) contains an excellent review of the various estimation methods and biases associated with analysis of the returns to schooling.

[2] One could argue that the finding of larger returns to women than men are *prima facie* evidence of underinvestment in the schooling for girls (Schultz, 2002). However, it is plausible that the pattern of estimated returns is caused by the fact that fewer women enter wage labor, and those sorted into wage labor may be from the upper tail of the ability distribution.

production shocks, or price shocks, traditional rules of thumb may be adequate.[3] Human capital is strongly tied to the ability to adapt, whether by moving to industries or areas with the strongest labor demand, adopting or developing new technologies, or switching occupations to fulfill market needs. Foster and Rosenzweig (1996) and Kochar (2004) show that enrollments rise with increases in perceived returns to schooling.

If we divide countries into two groups based on their relative ranking in the Heritage Foundation's Economic Freedom Index,[4] we get a picture of the importance of the economic environment in fostering returns to schooling (Figure 3). The countries that rank 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 average just under 10% in these "economically free' countries. In contrast, countries in the more regulated half of the index have returns to schooling averaging only 6.4%. 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. 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.[5]

The second point is that a year of schooling does not mean the same thing in all school systems. More important than spending time in school is what is learned during the time in school. In fact, studies that include both years of schooling and measures of cognitive skills find that it is the latter and not the former that drive earnings (Glewwe, 2002). In about 60% of the country data sets, a measure of literacy adds significantly to earnings, even when years of schooling are held fixed. The implication is that in these countries, years of schooling alone are not sufficient to assure a requisite set of marketable skills. In these countries, the return to literacy is roughly equivalent to two year of attained schooling. Figure 4 demonstrates the relationship between average literacy and attained schooling across 73 data sets and 57 countries. While the probability of attaining literacy rises with years of schooling, there are countries in which many children are still illiterate after five or more years of schooling. School quality will affect human capital acquired in school and the associated return per year of schooling.

Marginal returns to schooling are not necessarily constant across all schooling levels. 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) supported that conjecture. However, that presumption may be incorrect. 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, 2004). One might suspect that similar changes are increasing the private returns to those with secondary or tertiary educations in developing countries. However, the government per pupil costs of secondary schooling in low-income countries are more than double the costs for primary schooling, and the

---

[3] Consistent with that presumption, Fafschamps and Quisumbing (1999) and Godoy, Karlan, Rabindran and Huanca (2005) find that returns to schooling are apparent in off-farm work but not on traditional farms. On the other hand, in agricultural environments with technological change, it is the most educated that adopt first (Huffman and Orazem, 2006) and in India, returns to schooling were highest in areas where Green Revolution technologies were most complementary with local agriculture (Foster and Rosenzweig, 1996).

[4] Information on the Heritage Foundation Index is available at http://www.heritage.org/research/features/index/chapters/pdfs/Index2006_Chap5.pdf

[5] Acemoglu, Robinson, and Johnson (2001), Acemoglu, Johnson, and Robinson (2002) have examined the role of institutions that constrain or enhance mobility in retarding or fostering economic growth.

per pupil tertiary costs are nearly 34 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.

Finally, there may be external benefits from schooling beyond those that go to the individual. These include improved governance due to an educated electorate, improved climate for growth due to agglomerations of skilled individuals, reduced fertility behavior, and improved household health.[6] However, there may still be a role for government provision of schooling in the absence of these externalities if the government wishes to equalize opportunities for schooling across children. Relying solely on private schooling provision may limit schooling opportunities for rural or poor children.

II. Enrollment Rates

One of the Millennium Development Goals 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 the challenges future policy interventions will need to address.

Figures 5a and 5b show the pattern of male-female enrollment differences for different age groups in urban and rural areas. The information is arranged so that points above the 45^o line indicate larger enrollment gaps favoring males in urban areas while those below the 45^o line have the larger gender gap in rural areas. Points on the vertical dashed line indicate no rural enrollment gap while points on the horizontal dashed line indicate no urban enrollment gap. Only combinations in the northeast quadrant have gaps favoring males in both urban and rural markets. In contrast, those in the southwest quadrant imply gaps favoring females in both urban and rural markets. Points inside the dotted square are combinations where neither the urban nor the rural gender enrollment rate gap is larger than 10 percentage points.

At young ages, male female enrollment gaps are quite small. For ages 7-11, in only 3 of 69 cases is the enrollment rate larger than 10% in both the urban and rural markets. While the larger enrollment gaps tend to favor males, there are many combinations where girls' enrollment rates dominate boys' in at least one market. As children age, the enrollment gaps get larger. By age 15-17, male-female enrollment gaps exceeding 10% are found in half the rural areas and in one-third the urban areas. In the remaining cases, male-female gaps are less than 10% and they actually favor women in at least one of the two areas in one-third of the countries. The implication is that there if there is underinvestment in girls' schooling compared to boys', it is at ages consistent with secondary schooling and primarily in rural areas.

The gap in enrollment between urban and rural girls is much larger than the enrollment gaps between boys and girls in either urban or rural areas. Figures 6a and 6b show the gaps between urban and rural enrollments for boys and for girls. Even at young ages, there are substantial enrollment gaps between urban and rural boys and girls. Very few gaps favor rural children of either gender. These gaps get even larger as the cohort ages so that by ages 15-17, three-quarters of the urban-rural gaps exceed 10%. The graphs highlight that if the goal of

[6] Pritchett (2004) questioned the importance of these externalities because of the unstable relationship between growth in measures of aggregate human capital and aggregate output, but there is strong microeconomic evidence that human capital improves household health, lowers fertility, lowers the crime rate, and improves labor mobility, all of which have external as well as individual benefits. Angrist et al (2002) and Schultz(2004) both found that increased schooling from randomly assigned vouchers and conditional cash transfers led to reduced fertility behavior, although the evidence was somewhat weaker in the latter case.

universal primary education is to be reached, it will disproportionately require increasing rural enrollments.

The other major gap in enrollment rates is correlated with household wealth. Filmer and Pritchett (1999) develop estimates of child grade attainment by household wealth status. Figure 7 shows the ratios of the proportion of children attaining grade 1 for the middle 40% relative to the lowest 40% and the corresponding ratios for completing the primary cycle. Pairs in the northeast quadrant imply higher rates of grade attainment for the children in wealthier households, while combinations above the 45^{o} line imply rising gaps at higher grade levels. In almost all countries, the gaps occur even at grade 1, and in all countries, the gaps are get larger at higher grade levels.

III. The Justification for Government Provision of Schooling

It is possible to derive conditions that would explain differences in human capital investment rates between the rich and poor, between boys and girls, and between urban and rural residents as the outcome of individually and socially optimal decisions, despite apparent similarities in returns. For example, the pattern of human capital investments could be explained away by latent talents between the groups that lead to sorting into and out of school based on comparative advantage. However, these arguments have been discredited, both because they are inconsistent with evidence on the distributions of genetic abilities and because they have been used as justification for the perpetuation of discriminatory preferences in favor of males or in favor of the upper classes. Moreover, there are easily observable market failures that explain the existence of persistent gaps in human capital investment across these groups and that justify government intervention in the provision of schooling.

Because human capital investments require the sacrifice of current income for future rewards, households of limited means may be unable to afford sending their children to school. Direct schooling costs such as school fees or supplies may not be affordable. In addition, child labor may be an important share of household income in the poorest households struggling to meet a threshold level of subsistence. Children who suffer from malnutrition or from related health problems may be more limited in their capacity to profit from time investments in school. Finally, the poorest households may live in areas without schools or with very poor quality schools, limiting the human capital return from child time spent in school. The same arguments that explain why poor children are less likely to receive schooling contribute to the lower schooling attainment for rural children. Rural households are atypically poor and agrarian households have more uses for child labor.

The arguments for enrollment gaps between boys and girls are more challenging in that boys and girls share the same household backgrounds. In cultures where boys and girls attend the same schools, genders share the same school access and quality. Under those conditions, differential enrollments reflect differences in expectations about future time allocations between the labor market and the home. Girls who expect not to conduct wage work may not be responding to the same wage incentives as boys. In addition, girls may not capture all the external benefits from their education that come from the improved health and nutrition of their families or from improved fertility control.[7] More plausibly, parents may favor boys' education over girls' education, especially if culture dictates that boys take care of their elderly parents but girls are tied to the families of their future husbands. In virtually all countries, girls' education

[7] This argument is frequently made, but it is difficult to argue that these are really externalities if women get utility from their household's health or welfare.

has improved relative to boys over the past 30 years, both because labor market opportunities for women have improved and because governments have invested in improving educational opportunities for girls.

In assessing where to invest new efforts in schooling, it is useful to focus on these gaps. At the primary level, boys and girls now get similar access to schools in almost all countries, but poor children and rural children face disadvantages. At the secondary level, gaps between boys and girls begin to emerge in many but not all countries, while the gaps between the rich and poor and the urban and rural children are much more widespread. This discussion also helps to explain why there is no universal best way to combat illiteracy. An intervention that may make sense for raising boys' primary enrollment in rural areas, may have no impact at all on the primary enrollment of urban girls.

IV. Market Liberalization

There is considerable evidence that schooling decisions are shaped by perceived returns in the labor market and that those perceived returns are enhanced by flexible labor markets. One way to enhance the returns of schooling investments and to induce additional investment is to insure that the labor market does not artificially constrain the returns. For example, evidence from South Asia suggests that the rapidly growing export-oriented sectors disproportionately hire more educated youth, and 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. In another setting, opening the Vietnam market to trade has caused rapid increases in household income that have improved the ability of households to invest in their children (Edmonds and Pavcnik, 2006). In shaping policies designed to increase the quality of human capital investments, it should not be ignored that the benefits of that policy depend on whether the human capital will have the opportunity to find its highest value in the economy, and whether parents can perceive those potential rewards.

V. Supply-side interventions

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.[8]

V. a: Building new schools

Enhanced school supply or quality will have the greatest impact when schooling demand is relatively price elastic (distance is a component of the cost of schools) and where the existing school supply is price inelastic. Frequently forgotten in the analysis of new school construction projects is that they may displace some students who are currently going to private schools. This is particularly true in urban areas of developing countries where private schools are more plentiful. Expansion of public school supply will displace some private sector enrollment, diminishing the benefits.[9] In rural areas where private schools are frequently nonexistent, there is no crowding out effect of government school expansion.

[8] Glewwe and Kremer (2006) and Duryea, King and Orazem (2006) provide much more detailed discussion of these and other interventions and related evaluation issues.

[9] See Jimenez and Sawada (2001).

Duflo (2001) analyzed the impact of Indonesia's massive public works project that doubled the number of primary schools in a six year period. She found that halving the average distance to school raised years of schooling by about 1.5% in the areas most densely affected by the program.[10] Similarly, Filmer's (2004) analysis of the relationship between distance and enrollments across 21 developing countries generally found very small marginal effects of lowering distance. This does not imply that school provision is unimportant—only that the existing supply tends to be located where most of the children are located. Any new schools will likely be in more remote places at relatively high expense and where there are relatively few children. Even if all the children there start going to school, the benefit cost ratio may not justify the expense. In the Duflo study, the increase in average years of schooling is statistically significant and the implied returns are on the order of 10-13% per added year of schooling, but the percentage gain in years of schooling is still very modest.

As the density of schools increases, the marginal costs of additional school expansion rise and the marginal returns fall. Foster and Rosenzweig (1996) found that new school construction in India from 1971-1982 could increase enrollment substantially in communities hat had no schools. Jalan and Glinskaya's (2003) analysis of additional school expansion in India from 1993-1999 found almost no effect on student enrollment.

V. b: School Quality

Using rigorous methods to compare the performance of students in specific grades across teachers within schools, holding constant past performance of the grade cohort, Rivkin, Hanushek, and Kain (2005) found that good teachers systematically produce better academic outcomes than 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 and are compensated similarly. In other words, teacher quality matters, but we don't know what matters for teacher quality. As teachers represent 74% 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, and so the lack of agreement about how to foster teacher quality is a serious problem.

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 a detriment 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, Kremer and Moulin (2002) 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 below average students who could not understand English.

Chaudhury et al (2006) report that in developing countries, teachers attend only about 20% of the time. Many of the absences are perfectly legal as schools offer numerous legal vacations from sick leave to annual leave.[11] One might guess that simply removing these legal

[10] Because average distance was cut in half, Duflo's estimates suggest a 3% increase in years of schooling from the doubling of schools. Pitt et al (1993) estimate that the program raised enrollments by 2.5%, very similar to Duflo's estimates of the impact on years of schooling.

[11] See Rafiq Jaffer's (1994) review of teacher leave policy in Pakistan.

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. Banerjee and Duflo(2006) 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. Unclear as yet is whether the students learn more with teachers who would otherwise be absent in the absence of cameras, and it is clear that students are more likely to attend when their teacher attends. Prorating the cost of the program across children, it cost $20 to generate an additional child-year of schooling, and so this experiment holds promise as a means of reducing shirking by teachers in a cost-effective manner.[12]

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.

V. c: School Management

The World Bank and other 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 presumption is that by moving the decision-making closer to the consumer (in this case, the local community, parents, students and teachers), resource allocations will be better targeted to those who need them. The local community consumers will also pressure local managers to use resources wisely. 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. However, decentralization could backfire if local management capacity is limited and subject to undue influence by local pressure groups. In addition, local consumers may not be able to exert pressure on local school managers if mobility is constrained. Bardhan (2003, 2005) suggests that developing countries are less likely than developed countries to have conditions in place that would make local control effective.

The available evidence, even that often used by proponents of decentralization, is really too uncertain to engender a high degree of confidence that local management can work in all settings. Studies by Jimenez and Sawada (1999) of the EDUCO schools in El Salvador and by King and Ozler (2001) of the autonomous schools in Nicaragua found that schools that exercised more local autonomy 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 do not behave autonomously does not imply that the nonautonomous schools would have better outcomes if they too behaved autonomously.[13]

---

[12] A child-year is defined as the average number of days per year a child attended before the cameras were installed.

[13] Reinnika and Svensson(2003) found that a decentralization program in Uganda dramatically increased the proportion of funds that ended up reaching the schools from 20% in 1995 to 80% in 2001. Pressure to spend more on schools may have been due to publication of the amount of the transfers, making it moiré difficult to withhold money from the schools, but it may have also come from better central monitoring of the accounts. Whether the resources were then allocated better or whether the schools improved is not clear, but it does suggest that aspects of decentralization can be mandated.

Gertler, Patrinos and Rubio-Codina (2006) compare the failure and grade repetition rates of early and late adopters of a school autonomy program in Mexico. The CONAFE program transfers modest resources and management training to targeted schools that cater to indigenous and impoverished populations. The early adopters experienced modestly faster reductions in failure rates and repetition rates than did the later adopters, although both groups were experiencing improvements even before the program was implemented. However, even if the gains can be tied to the program, they would only apply to the universe of schools whose parents would be interested in local school management. It is not clear from the paper if this is a large or small proportion of all potentially qualifying schools.[14]

Gunnarsson et al (2006) found that local parental participation in schools and of local autonomous decision-making by principals is tied to community socioeconomic status and to the principal's experience, suggesting that decentralized decision-making occurs in places best able to make those decisions.[15] While expanding local options to control schools to places with the adequate capacity to manage may indeed make schools better, it is unlikely that a universally mandated decentralization would actually make schools better in communities lacking that capacity.[16]

V. d: Conclusions Regarding Benefits and Costs of Supply-Side Interventions

There are two other points that must be raised regarding the benefits and costs of supply-side interventions. First, even if successful, changes in the school supply or quality have a relatively long gestation period. If school materials are improved, it may take some time for parents to react to the improvements. Similarly, it may take some time for teachers and students to respond to better local management. Supply-side interventions are also prone to bottlenecks—because bad behaviors or habits may be difficult to unlearn, it may take a generation for teacher reforms to improve all teachers. Even if these reforms are successful, the benefits may come sufficiently in the future that they will fail under any reasonable discounting.

On the other hand, some of these interventions may be justified on equity grounds, even though they could not be justified under strict application 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% enrollment. Similarly, some reforms may be needed to shift the incentives for teachers or the aspirations of students, even if the reforms will only take hold over a long time.

VI. Demand-side interventions

Efforts to shift the demand for schooling have some distinct advantages over efforts to influence supply with regard to benefit-cost comparisons. 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 already in school to the new schools. Demand-

[14] Galiani, Gertler and Schargrodsky (2005) also found that in Argentina, it was the early adopters that had the biggest gains in test scores following the initiation of a decentralization program. Additionally, it was the wealthiest schools that adopted most readily.

[15] Gunnarsson et al (2006) also report that most of the variation in the practice of local autonomy or parental participation occurs within and not between countries. This finding calls into question whether changes in national policies regarding the locus of control over schools can be effectively enforced.

[16] See King, Orazem and Wohlgemuth (1999) for an example of how local governments opted whether or not to participate in the Colombia voucher program (PACES). There, the municipalities that participated were the ones with better financial capacity and in a better position to benefit from the program.

side interventions can also be made contingent on the child being in school, meaning that payment only occurs if the program is working. Supply-side interventions generally require the allocation of funds upfront with the hoped for child or parental response only becoming apparent later. Finally, demand-side interventions can immediately influence behavior and so they have an advantage relative to the more heavily discounted benefits of supply-side interventions.

There are three types of interventions that I will review, 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 the household's ability to pay for schooling; and income transfers to the households made conditional on the child's enrollment that enhance the household's ability to afford schooling while lowering the opportunity cost of child time in school.

Demand side interventions will be most effective in settings with high elasticities of demand and in cases where supply is also very elastic with respect to household willingness to pay. Stimulating demand in settings where additional school space cannot accommodate more students will have no impact. Consequently, demand-side strategies work best where there is existing excess capacity of available schools so that more children can be added at low marginal costs.

VI. a: Health and schooling

Numerous mechanisms to influence child health have been introduced through schools including the administration of nutrition supplements, school lunch plans, immunization programs, and health instructions. These programs have been installed from preschool through the schooling cycle, although the most rigorously evaluated have been the ones targeted at younger children.

There is substantial evidence that malnutrition early in life affects both cognitive and physical development that may be only partially reversible by better nutrition later in life. For example, Glewwe, Jacoby and King (2000) found that controlling for other household background measures, children who were malnourished early in life start school later and complete fewer years of schooling. Alderman, Hoddinott and Kinsey (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 preschool children have shown permanent improvements in physical stature and cognitive development, both of which can raise life-time earnings.

Behrman, Cheng, and Todd (2004) conducted an experimental evaluation of the *Proyecto Integral de Desarrollo Infantil* (PIDI) program in Bolivia. This program provides support for daycare, nutritional inputs, and preschool 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 that they translate to projected life time earnings growth with benefit cost ratios ranging between 1.7-3.7. Grantham-McGregor et al. (1991) report comparable findings for a similar program aimed at stunted infants in Jamaica, as do Armecin et al. (2005) for low-income rural households in the Philippines. . Vermeersch and Kremer found that providing free breakfast to preschoolers raised attendance by 30% in Kenya but did not raise average measured skills. An analysis of a program that combined deworming medication with an iron supplement for preschoolers in India also raised attendance and physical stature.

Nutritional programs can also have benefits at older ages. McGuire (1996) reported that giving iron supplements to secondary children aged (13-15) in a low icnome country can raise

cognitive abilities by 5-25% or the equivalent of .05 years of schooling. Knowles and Behrman (2005) estimate that because the cost of the supplement is so small and administration inexpensive, it costs about $11 per added child-year of schooling and even these modest gains in schooling have substantial returns of 32 times the costs.

In a widely publicized study, Miguel and Kremer (2004) examined the impact of a program which administered deworming medicine to school children in Kenya. The treated children increased their attendance by 0.15 years per pupil, or an implied cost of $3.50 per child-year of schooling.

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 the programs is to improve child health which has a value in itself, raising the benefits side of the equation. On the cost side, expenses are only incurred 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 deworming on school attendance could be very large if expanded world-wide, in that 25% 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, there settiong had an infection rate of 92% and so the magnitude of the impact is likely related to fact that they selected sites artypically needing the intervention—areas with more modest infection rates would have smaller impacts. Finally, 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 1). Health is cited more often in Africa and in urban areas of Latin America, but is less often cited elsewhere. Nevertheless, in areas where malnutrition or worm infestations are more common, these interventions offer an inexpensive way to raise attendance, physical and mental capacity, and perhaps school enrollment.

VI. b: Lowering schooling costs

In many countries, parents face significant expenses from sending their children to school, ranging from uniforms and school supplies to tuition fees and after school tutorials. These expenses can represent a significant share of household income for poor families. Several countries have cut or eliminated the school fees charged by government schools, including Ghana, Kenya, Tanzania, and Uganda. Results in Uganda were dramatic with a reported doubling of school enrollments. In Tanzania, enrollments rose by 1.2 million children. An evaluation by Deininger (2001) of the Uganda case found that elimination of primary fees lowered costs by 60% on average or by about $16 per child. As a result, enrollments by 60%. Consistent with the presumption of larger price elasticities in rural area, rura enrollments more than doubled while urban enrollments rose on 16% as a result of the policy. The expansion came at the cost of some considerable crowding as school supplies did not keep up. Pupil teacher ratios rose from 48 to 70 in rural areas and from 38 to 65 in overall. These findings of large enrollment responses have been confirmed elsewhere, although none as dramatic. A program that cut household costs of uniforms and school materials in Kenya, a cost of about $15 per child, increased years of schooling completed by 15% (Kremer, Moulin and Namunyu, 2003) .

In many developing countries, students are expected to get 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, 2003). At a cost of $5 per child, the program raised the likelihood of a child performing at first grade math level by 11.9 percentage points and at second grade language levels by 9.9 percentage points. By the end of the two year program, children were performing on average .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 they hired less qualified tutors at the market rate rather than mandating teaching certifications and paying the government rate for teachers. This is a very important element to using private rather than public sector solutions—it allows for much lower teacher costs. These tutors (called *balsakhis* or children's friends) were paid only $10-$15 per month, roughly one-eighth of the government school teaching scale.

The availability of less expensive teaching and infrastructure inputs is a major reason to consider private rather than government school options to serve expanding school demand. A program in Balochistan province in Pakistan attempted to spur both school demand for 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 was offered on a declining basis so the subsidy went to zero after four years. In urban areas, even this modest subsidy was sufficient to get schools to open (Kim, Alderman and Orazem, 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, Kim and Orazem, 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 schools that opened 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 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.

James(1993) demonstrates that in many developing countries, private schools are an important component of school supply. In many countries, private schools have excess capacity as measured by relative numbers of students per teacher. Of course, some fraction of the difference in pupil teacher ratios may be a deliberate effort to offer greater quality in private than in public schools, but if excess capacity exists, vouchers are an excellent mechanism by which governments can expand access less expensively than 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, Orazem and Wohlgemuth, 1999). Vouchers were only offered to children in the lowest socioeconomic strata in municipalities where private schools had committed to participate.

Angrist et al (2002, 2006) demonstrated that children who were randomly sorted into the program were 10% more likely to complete the 8th grade and also scored .2 standard deviations higher on standardized tests, equivalent to adding an additional year of school. For those in

doubt of 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. The voucher cost $228 per recipient including the opportunity cost of the children (Knowles and Behrman , 2005), which is swamped by the lifetime value of the induced additional years of schooling and cognitive attainment.

Programs to reduce the costs of schooling to parents can have dramatic and quick impacts on children's achievement and years of schooling completed. Additionally, they can take advantage of existing underutilized capacity on the form of potential teachers and spaces in private schools at costs that are a fraction of the cost of building and staffing new schools, and they have the additional advantage of only using resources if the children use the services.

VI. c: 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 the household sending their children to school. Many of these programs include other components, typically adding nutritional supplements and mandating health clinic visits for children and health training for mothers, so the programs are not just aimed at education. Programs have been implemented and evaluated in Argentina, Bangladesh, Brazil, Colombia, Costa Rica, Honduras, Jamaica, Mexico, Nicaragua and Turkey and other programs have been or are being established in Chile, Ecuador, Peru and other countries.

These programs will be most effective in environments in which schooling demand is highly income and child wage elastic and where large numbers of children are not in school. These circumstances naturally fit poor households, neighborhoods and communities and these programs have in fact been aimed at the lowest income strata of society. While they have been tried in urban areas, most notably the *bolsa escola* programs in Brazil, there are significant advantages to using geographic targeting which is easier in less densely populated areas. In urban areas, it can be costly for authorities to try to establish which households qualify on the basis of income and which don't, 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.

Additionally, these 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 more recently under the federal *bolsa familias*, some programs targeted children who were sufficiently young that the vast majority were already in school. Allowing self-selection into the program allowed families whose children would have been in school anyway to opt into the program and receive the transfer. This means that in less developed countries, the program could target primary aged children while in more advanced countries, it would be more appropriate to target secondary aged children. As an example, in Mexico, conditional transfers had almost no impact on primary enrollments (Schultz, 2004) while in Nicaragua, there were substantial gains to primary enrolments (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. On the other hand, enrollment rose by 23 percentage points in Nicaragua during the initial pilot phase with most of the gains in children spending time in school exclusively rather than combining school and work. As a rule, the

largest effects from conditional transfers have been in rural areas, consistent with the presumption of higher income and opportunity cost elasticities in those areas.

Benefit-Cost Summary

My task in this exercise is to identify the low-lying fruit of educational expansion—what programs will raise returns most per dollar expended. These estimates must be taken with a considerable grain of salt—the returns will depend on the degree of economic freedom and growth in the economy and will depend on whether the program can be successfully targeted to those populations that will respond most elastically to the intervention. As a general rule, these populations will be drawn disproportionately from the poor and rural areas at the primary level. At the secondary level, urban populations may be targeted as well. In designing these programs, efforts to supplement existing supply by working outside the government school system is 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. The enrollments of poor and rural children, populations that have higher income and child wage elasticities, will also be particularly sensitive to conditional cash transfers.

My 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 I report, I will assume that the return to schooling is an increase of 8% per year of schooling completed over an estimated average earning for labor in the country. Modest variation in the returns to schooling will not be sufficient to reverse the conclusions regarding whether the interventions are expected to pay for themselves.

I assume a 45 year work career in my estimates. In my projection of lifetime earnings, I am implicitly assuming 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, I do not make any adjustments for possible external benefits of women's education which would create a bias in the other direction, and I should further note that the literature has not demonstrated that returns to girls' schooling are substantially lower than are returns to boys' schooling.

I provide summary information on benefit-costs ratios for many of the programs mentioned above. Some of these are compiled personally while others take ratios developed by the authors of those studies. It is important to emphasize that some programs may have very high ratios and yet be only applicable to certain areas and not others. For example, the voucher program that appears to have been successful in urban areas of Colombia could not be implemented in rural areas without preexisting private schools.

Finally, these estimates concentrate on the narrow returns to a year of schooling. This can be misleading in either direction. The reported benefit cost ratios will be biased downward if increased years of schooling reduced fertility behavior of young women, as was found in Colombia and (less definitively) in Mexico. Incorporating the benefits of delayed fertility increases the benefit cost ratios substantially, from 3.3 to 25.6 in the case of the Colombia PACES program (Knowles and Behrman, 2005). On the other hand, it is possible that increased time in school will not have the same impact on lifetime earnings if the schools are of atypically poor quality. For example, the results of cognitive tests of the Kenya experiments found that even though students spent more time in school, their performance on cognitive exams did not

improve significantly. The increased enrollments in Uganda apparently were only modestly accommodated by increased school materials and so school quality suffered for all children. That raises concerns that these programs did not permanently increase the children's lifetime human capital stock. My view is that the 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 show immediately. It should be emphasized that in most of the cases summarized in Table 2, improved cognitive ability did accompany the increased time in school when both were measured.

Estimated benefit-cost ratios for discount rates 3% and 5% are reported in Table 2. I use the 5% discount rate because it was the rate most commonly used in the cited literature. I report the estimates of other authors when I assess that they are more carefully done than anything I could do from reading the paper.

It is immediately clear that these benefit cost ratios are large and some extremely large. Those tend to be very low cost interventions in areas with a very clearly defined need such as 92% worm infestation in Kenya or a lack of tutors for poor and lagging students in India. The very high benefit-cost ratios are attributable both to the selection of very low cost interventions and to the siting of these interventions in settings where they would be disproportionately successful. In contrast, more broadly distributed interventions such as the conditional cash transfer programs are less selective in terms of the places where the intervention is tried and the benefits are more modest as a result. It is also the case that the benefits are largest where children are initially out of school. For the Mexican Progressa 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 was roughly six times the cost of inducing an additional year of schooling at the secondary level.

The largest benefit-cost ratios are interventions early in the child's life because the interventions are less costly and the opportunity costs are less. However, relatively modest costs resulted in sizable returns in the Colombia PACES program and in the iron supplement aimed at secondary students. Both did not involve building more schools or adding capacity, a key to keeping cost low relative to benefits.

The same intervention installed in twop different settings will result in different benefit-cost ratios depending on the strength of the market for educated labor in the country. Countries with relatively rapid economic growth and with relatively flexible labor markets will have higher returns to schooling on average. Of course, these economies will also find it less difficult to convince parents to send their children to school, even without new programs.

References

Acemoglu, Daron, James A. Robinson and Simon Johnson. (2001) "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91: 1369-1401.

Acemoglu, Daron, Simon Johnson and James A. Robinson (2002) "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution." *Quarterly Journal of Economics* 117:1231-1294.

Alderman, Harold, John Hoddinott and Bill Kinsey (2003) "Long-Term Consequences of Early Childhood Malnutrition." IFPRI Discussion Paper #168. Washington D.C.

Alderman, H., P.F. Orazem and E.M. Paterno (2003) "School quality, school cost and the public/private school choices of low-income households in Pakistan." *Journal of Human Resources* 36: 304-326.

Alderman, H., J. Kim and P.F. Orazem (2003) "Design, evaluation, and sustainability of private schools for the poor: the Pakistan urban and rural fellowship school experiments." *Economics of Education Review* 22:265-274.

Angrist, J. D., E. Bettinger, E. Bloom, E. M. King and M. Kremer. (2002) "Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment," *American Economic Review* 92 (5, December): 1535-59

Angrist, Joshua D., Eric Bettinger, and Michael Kremer. (2006) "Long-Term Educational Consequences of Secondary School Vouchers: Evidence from Administrative Records in Colombia." *American Economic Review* 96:847-862.

Armecin, Graeme, Jere R. Behrman, Paulita Duazo, Sharon Ghuman, Socorro Gultiano, Elizabeth M. King, and Nanette Lee. (2005) "Early Childhood Development Programs and Children's Development: Evidence from the Philippines." Mimeo, University of Pennsylvania.

Banerjee, Abhijit, Shawn Cole, Esther Duflo and Leigh Linden (2003), "Remedying Education: Evidence from Two Randomized Experiments in India," Mimeo, Massachusetts Institute of Technology.

Bardhan, Pranab. (2002) "Decentralization of Governance and Development." *The Journal of Economic Perspectives* 16 (Fall):185-206.

Bardhan, Pranab. (2005) *Scarcity, Conflicts and Coooperation: Essays in the Political and Institutional Economics of Development* Cambridge, MA: The MIT Press.

Behrman, J.R., Y. Cheng, and P. Todd. (2004) "Evaluating Pre-school Programs when Length of Exposure to the Program Varies: A Nonparametric Approach," *Review of Economics and Statistics* 86(1): 108-32

Bobonis, Gustavo, Edward Miguel and Charu Sharma (2004), "Iron Deficiency Anemia and School Participation," Poverty Action Lab Working Paper No. 7.

Bruns, Barbara, Alain Mingat, and Ramahatra Rakotomalala (2003), "Achieving Universal Priomary Education by 2015: A Chance for Every Child." World Bank.

Card, D. (1999), "The causal effect of education on earnings," in O. Ashenfelter and D. Card, eds. *Handbook of Labor Economics* Vol 3A Amsterdam: Elsevier Science B.V.

Chaudhury, Nazmul, Jeffrey Hammer, Kremer, Michael, Karthik Muralidharan, F. Halsey Rogers. (2005) "Missing in Action: Teacher and Health Worker Absence in Developing Countries," *Journal of Economic Perspectives* 19(4, Fall), forthcoming.

Deininger, Klaus. 2003. "Does cost of schooling affect enrollment by the poor? Universal primary education in Uganda." *Economics of Education Review* 22(3): 291-305.

Duflo, E. (2001), "Schooling and labor market consequences of school construction in Indonesia: evidence from an unusual policy experiment," *American Economic Review* 91: 795-813.

Duryea, Suzanne, Elizabeth M. King and Peter F. Orazem. (2006) "Schooling in Developing Countries: The Roles of Supply, Demand and Government Policy." in T.P. Schultz ed. *Handbook of Development Economics*, forthcoming.

Edmonds, Eric V. and Nina Pavcnik. (2006) "Trade Liberalization and the Allocation of Labor between Households and Markets in a Poor Country." *Journal of International Economics*, forthcoming.

Fafchamps, Marcel and Agnus Quisumbing (1999) "Human Capital, Productivity, and Labor Allocation in Rural Pakistan." *Journal of Human Resources* 34 (2): 369-406.

Filmer, Deon. (2004) "If You Build It, Will They Come? School Availability and School Enrollment in 21 Poor Countries," World Bank Policy Research Working Paper 3340, June 2004

Filmer, Deon, and Lant Pritchett. 1999. The Effect of Household Wealth on Educational Attainment: Evidence from 35 Countries. *Population and Development Review*, 25(1).

Foster, A.D. and M.R. Rosenzweig (1996) "Technical change and human-capital returns and investments: evidence from the Green Revolution." *American Economic Review*

Galiani, Sebastián, Paul Gertler, and Ernesto Schargrodsky (2005) "School Decentralization: Helping the Good Get Better, but Leaving the Poor Behind." Working Paper, Universidad de San Andres. http://www.utdt.edu/congresos/pdf-sri/eee-691.pdf

Glewwe, Paul (2002), "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes." *Journal of Economic Literature* 40:436-483.

Glewwe, Paul, Hanan Jacoby and Elizabeth M. King (2001) "Early Childhood Nutrition and Academic Achievement: A Longitudinal Analysis."*Journal of Public Economics* 81:345-368.
Glewwe, Paul, and Michael Kremer. (2006) "Schools, Teachers and Educational Outcomes in Developing Countries." in E. Hanushek and F. Welch eds. *Handbook of Economics of Education* Amsterdam: Elsevier Science B.V., forthcoming.

Glewwe, Paul, Michael Kremer and Sylvie Moulin (2003) "Textbooks and Test Scores: Evidence from a Randomized Evaluation in Kenya." Development Research Group, World Bank. Washington D.C.

Godoy, Ricardo, Dean S. Karlan, Shanti Rabindran and Tomás Huanca. 2005. "Do modern forms of human capital matter in primitive economies? Comparative evidence from Bolivia." *Economics of Education Review* 24 (1): 45-53.

Grantham-McGregor, S.M., C.A. Powell, S.P. Walker and J.H. Himes. (1991) "Nutritional Supplementation, Psychosocial Stimulation, and Mental Development of Stunted Children: The Jamaican Study," *Lancet* 338:1-5.

Gunnarsson, Victoria, Peter F. Orazem, Mario A. Sánchez, and Aimee Verdisco. (2006) "Does School Decentralization Raise Student Outcomes?: Theory and Evidence on the Roles of School Autonomy and Community Participation." Iowa State Unioversity Working Paper.

Hanushek, Eric A., and Dennis D. Kimko (2000). "Schooling, Labor Force Quality, and the Growth of Nations," *American Economic Review*, 90: 1184-1208.

Huffman, W.E. and P.F. Orazem . (2006) "Agriculture and Human Capital in Economic Growth: Farmers, Schooling and Health." in R. E. Evenson, T. P. Schultz and P. Pingali eds. *Handbook of Agricultural Economics* Vol. 3. Amsterdam: North Holland

Jaffer, Rafiq (1994) "Incidence and Causes of Student Absenteeism and Dropout in NWFP Primary Schools." Institute of Social Studies, Lahore. Mimeo.

Jalan, Jyotsna and Elena Glinskaya. 2003. "Improving Primary School Education in India: An Impact Assessment of DPEP-Phase I." Indian Statistical Institute (New Delhi) and The World Bank. Processed.

James, Estelle. 1993. "Why Do Different Countries Choose a Different Public-Private Mix of Educational Services?" *Journal of Human Resources* 28(3):571-592.

Jimenez, Emmanuel and Yasuyuki Sawada. 1999. "Do Community-Managed Schools Work? An Evaluation of El Salvador's EDUCO Program." World Bank Economic Review 13(3, September).

Jimenez, E. And Y. Sawada (2001). "Public for Private: The Relationship between Public and Private School Enrollment in the Philippines," *Economics of Education Review* 20: 389-99

Kim, J., H. Alderman and P.F. Orazem. (1999) "Can private school subsidies increase enrollment for the poor? The Quetta Urban Fellowship Program," *World Bank Economic Review* 13:443-465.

King, E. M., P. F. Orazem, and D. Wohlgemuth (1999) "Central mandates and local incentives: the Colombia education voucher program," *World Bank Economic Review* 13: 467-491.

King, Elizabeth M. and Berk Ozler. 2001. "What's Decentralization Got To Do With Learning? The Case of Nicaragua's School Autonomy Reform," Working Paper Series "Impact Evaluation of Education Reforms," No. 9, Development Research Group, Poverty and Human Resources, The World Bank.

Knowles, James C. and Jere R. Behrman. (2005). "Assessing the Economic Returns to Investing in Youth in Developing Countries." In C.B. Lloyd, J.R. Behrman, N.P. Stromquist and B. Cohen eds. *The Changing Transitions to Adulthood in Developing Countries: Selected Studies.* Washington, D.C.: National Academies Press.

Kochar, Anjini. (2004) "Urban influences on rural schooling in India." *Journal of Development Economics*, Volume 74, Issue 1, June 2004, Pages 113-136

Kremer, Michael, Sylvie Moulin and Robert Namunyu (2003), "Decentralization: A Cautionary Tale," Mimeo, Harvard University, April 2003.

Maluccio, John (2006) "Education and Child Labor: Experimental Evidence from a Nicaraguan Conditional Cash Transfer Program." in P. F. Orazem, G. Sedlacek, and P. Z. Tzannatos eds., *Child Labor and Education in Latin America*. Washington DC: InterAmerican Development Bank, Forthcoming.

McGuire, Judith S. (1996) *The Payoff from improving Nutrition* Unpublished manuscript. The World Bank.

M.I.T. Abdul Latif Jameel Poverty Action Lab. 2005. "Fighting Poverty: What Works?" http://www.povertyactionlab.com/research/Education%20MDGs.pdf

Miguel, Edward and Michael Kremer (2004), "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities," *Econometrica* 72 (1), 159-217.

Pitt, Mark M., Mark R. Rosenzweig, and Donna Gibbons. (1993) "Determinants and Consequences of the Placement of Government Programs in Indonesia," *World Bank Economic Review* 7(3):319-48.

Pritchett, Lant. (2004) "Toward a New Consensus for Addressing the Global Challenge of the Lack of Education." In in B. Lomborg ed. *Global Crises, Global Solutions* Cambridge: Cambridge University Press.

Psacharopoulos, George and Harry A. Patrinos (2004) "Returns to Investment in Education A Further Update." *Education Economics* 12: 111-134.

Reinikka, Ritva and Jakob Svensson. (2004) “Local Capture: Evidence from a Central Government Transfer Program in Uganda.” Quarterly Journal of Economics, 119 (2): 679-705.

Rivkin, Steven G., Eric A. Hanushek, and John F. Kain (2005) "Teachers, Schools, and Academic Achievement," *Econometrica* 73: 417-.

Schultz, T.W. (1975), “The value of the ability to deal with disequilibria.” *J. of Econ. Lit*. 13, 827-46.

Schultz, T. Paul (2002), "Why governments should invest more to educate girls," *World Development* 30: 207-25.

Schultz, T. Paul (2004), “School Subsidies for the Poor: Evaluating the Mexican Progresa Poverty Program,” *Journal of Development Economics* 74 (1), 199-250.

T. Paul Schultz. (2004) “Alternative Perspective on Access to Education,” in B. Lomborg ed. *Global Crises, Global Solutions* Cambridge: Cambridge University Press.

Vermeersch, Christel and Michael Kremer (2005), “School Meals, Educational Achievement and School Competition: Evidence from a Randomized Evaluation,” Mimeo, Harvard University.

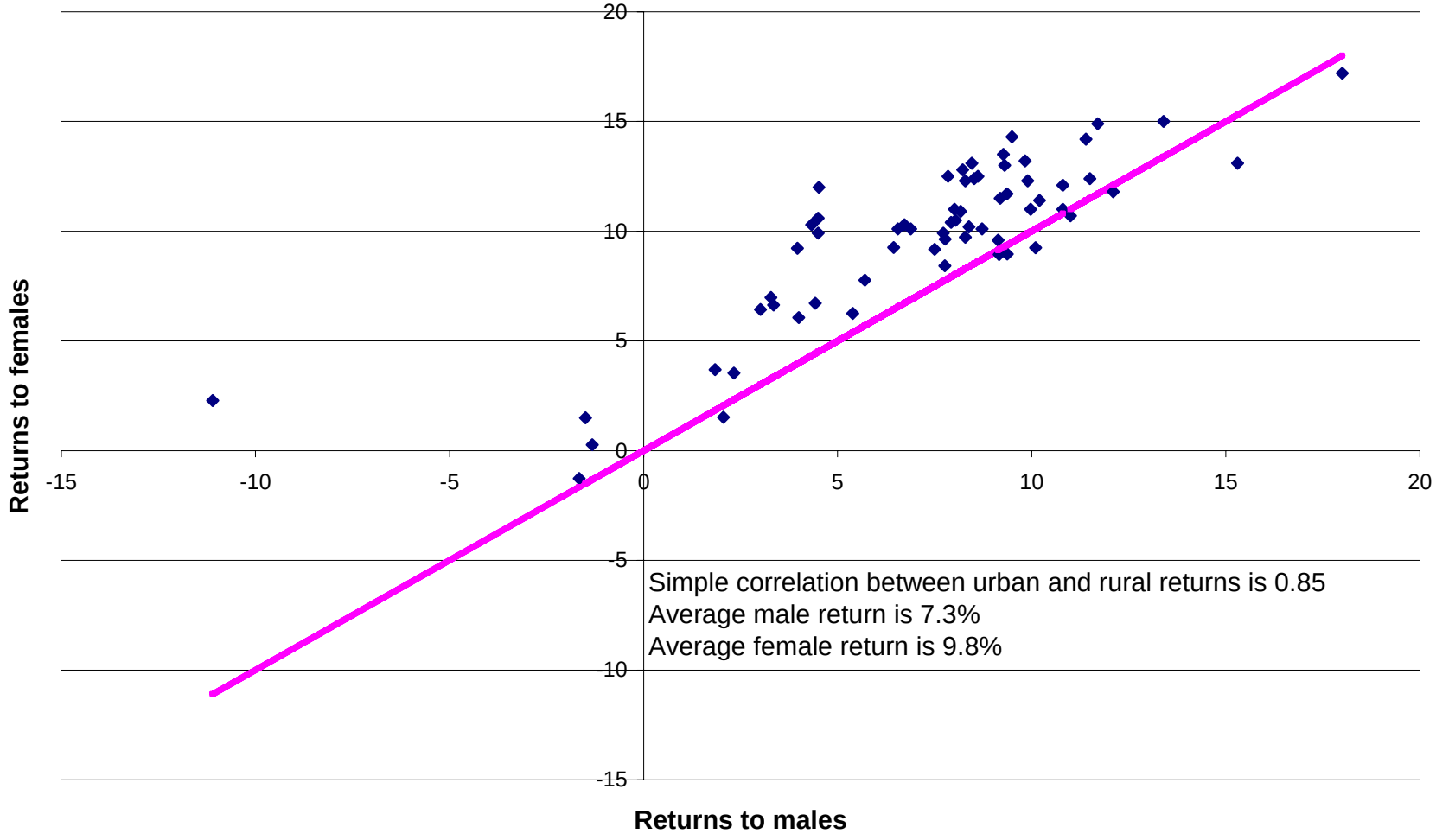
Table 1: Reasons for Not Attending School in Urban and Rural Populations, by World Region

	All World Regions		Sub-Saharan Africa		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 the author by Elizabeth King based on data from Demographic and Health Surveys, various year

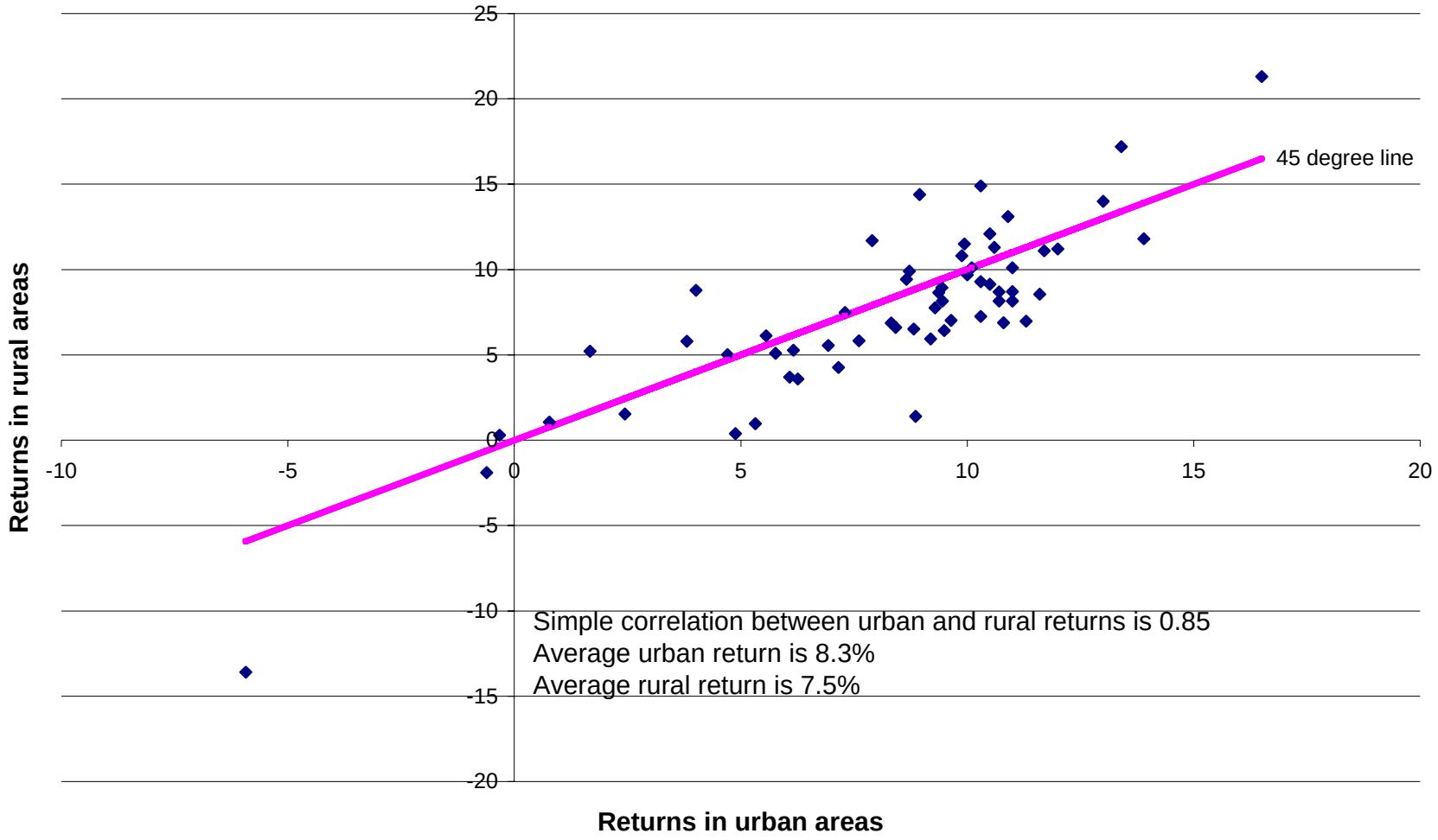
Table 2: Overview Table of Benefit-Cost ratios from various efforts to reduce illiteracy							
	Low Discount (3%)				High Discount (5%)		
	Benefit	Cost	BCR		Benefit	Cost	BCR
Health and Nutrition Programs							
Bolivia PIDI: preschool and nutrition[a]	$5,107	$1,394	3.66		$3,230	$1,301	2.48
Kenya: deworming[b]	2977!	3.5!	850		2188!	3.5!	625
Kenya: preschool and nutrition[c]	2977!	$29.13	102		2188!	$28.6!	76.5
Iron supplements to secondary schoolersd	$474!	$10.49!	45.2		$330	$10.29!	32.1
Scholarship/Voucher Programs							
Colombia: PACES secondary school urban voucher[d]	$4,287	$971	4.41		$3,152	$953	3.31
Pakistan urban girls' scholarship[e]	$7,011!	225!	31		$4,866!	$223!	21.8
	$7,011!	$452!	15.5		$4,866!	$448!	10.9
Pakistan rural girls' scholarship[e]	$5842!	253!	23		$4055!	$250!	16
	$5842!	$758!	7.7		$4055!	$751!	5.4
India *balsakhis* tutorial program[f]	$8173!	$9.85!	830		$6,008	$9.76!	616
Uganda tuition waiver[g]	$3678!	$140!	26.3		$2,703!	$140!	19.3
Conditional Cash Transfers							
Mexico Progressa[h]	$16086!	$2585!	6.2		$11,163!	$2535!	4.4
Nicaragua: RED[i]	$6,003	$509!	11.8		$4,412	$509!	8.67
	$6,003	$1574!	3.80		$4,412	$1574!	2.80
[a]Behrman, Cheng and Todd(2004)#							
[b]Miguel and Kremer (2004)*							
[c]Vermeersch and Kremer (2005)*							
[d]Knowles and Behrman(2005)#							
[e]Alderman, Kim and Orazem (2003)							
[f]Banerjee, Cole, Duflo and Linden (2003)							
[g] Deininger (2003)**							
[h] Schultz(2004)							
[i]Maluccio (2006)							
#Benefit cost ratio computed in the cited paper.							
*Cost per year of schooling reported in M.I.T. Abdul Latif Jameel Poverty Action Lab. (2005)							
!Per year of schooling induced							
**Assumes that the government expands school space to accommodate additional students at the average cost per primary student							

Figure 1: Paired estimated returns to schooling for males and females
71 pairs from 48 developing countries



Source: Authors compilation of estimates provided by Claudio Montenegro of the World Bank in preparation for the 2007 *World Development Report*

Figure 2: Paired estimated returns to schooling for urban and rural residents, 71 pairs from 48 developing countries

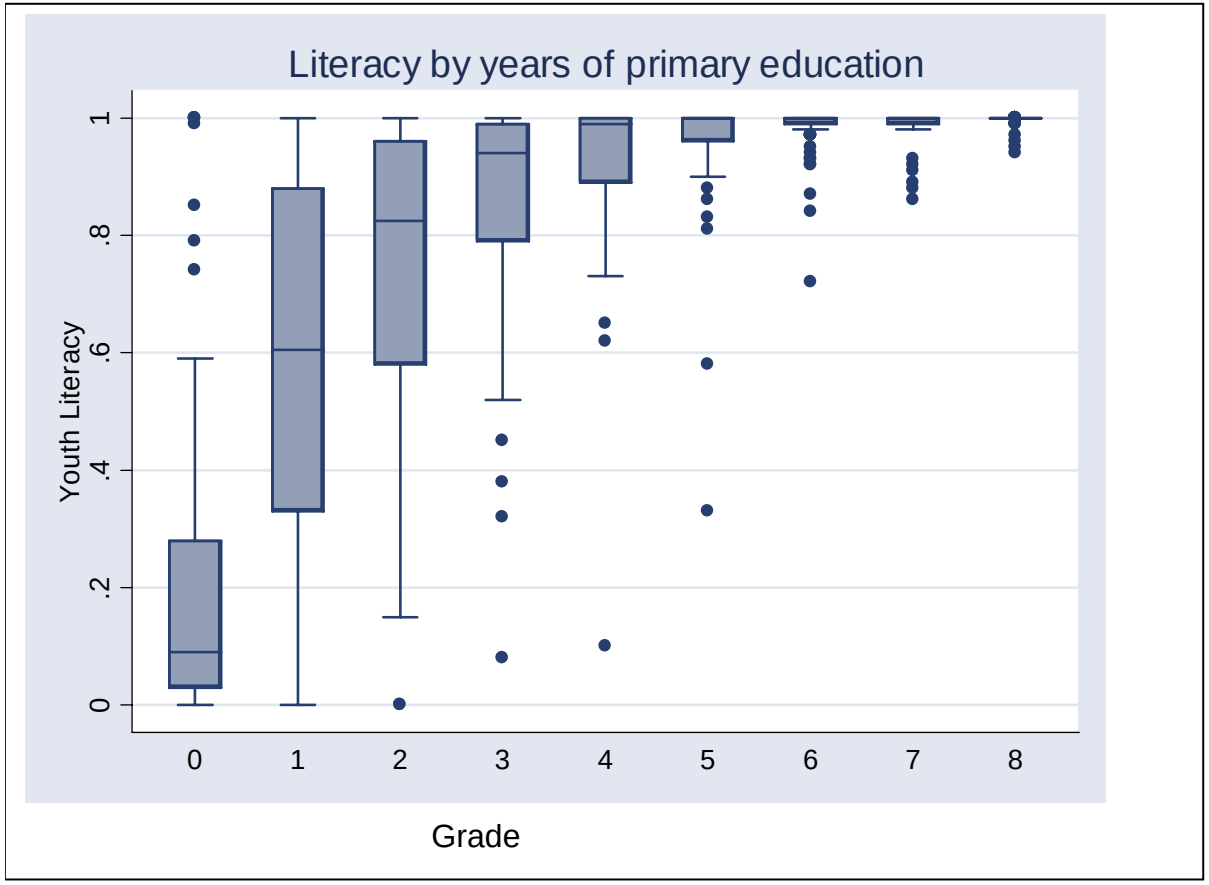


Source: Authors compilation of estimates provided by Claudio Montenegro of the World Bank in preparation for the 2007 *World Development Report*

Figure 3: Returns to schooling by years of schooling and Heritage Economic Freedom Index
48 developing countries, various years between 1990-2004

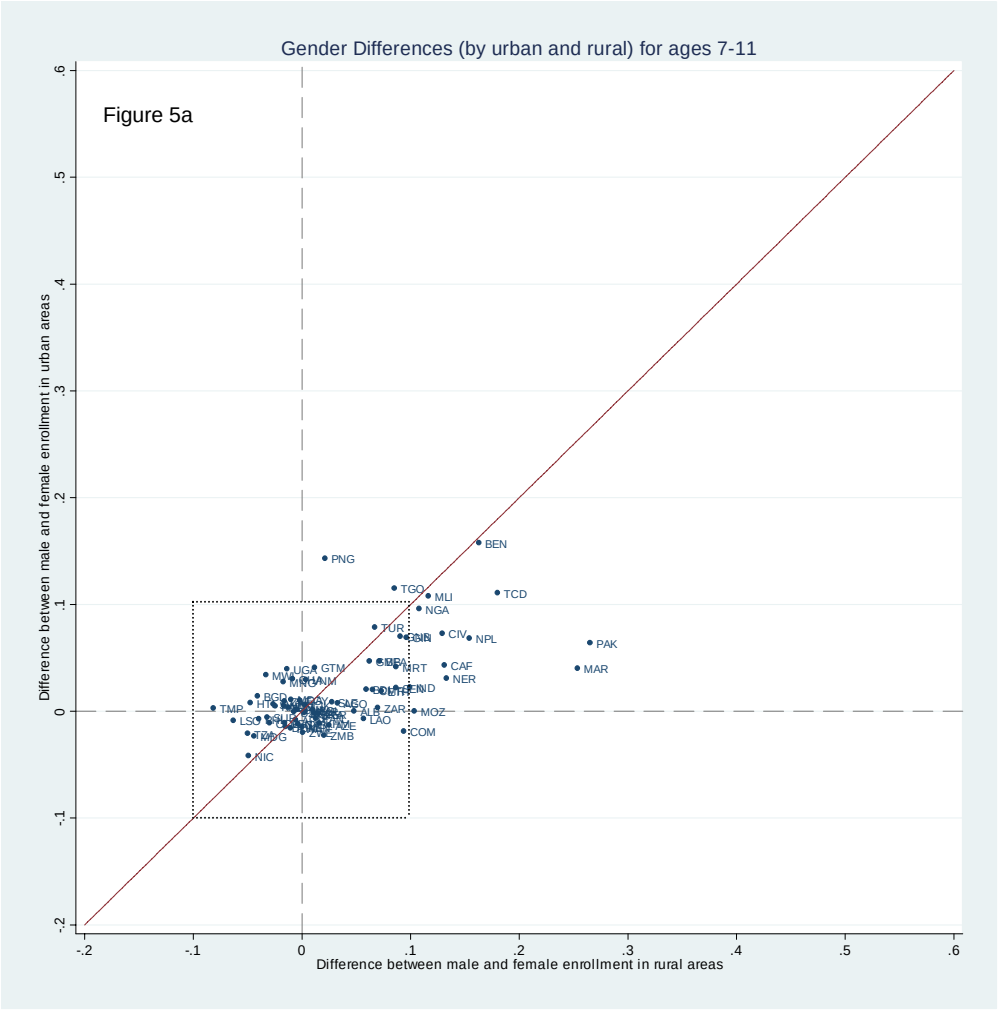
Source: Authors compilation of estimates provided by Claudio Montenegro of the World Bank in preparation for the 2007 *World Development Report*

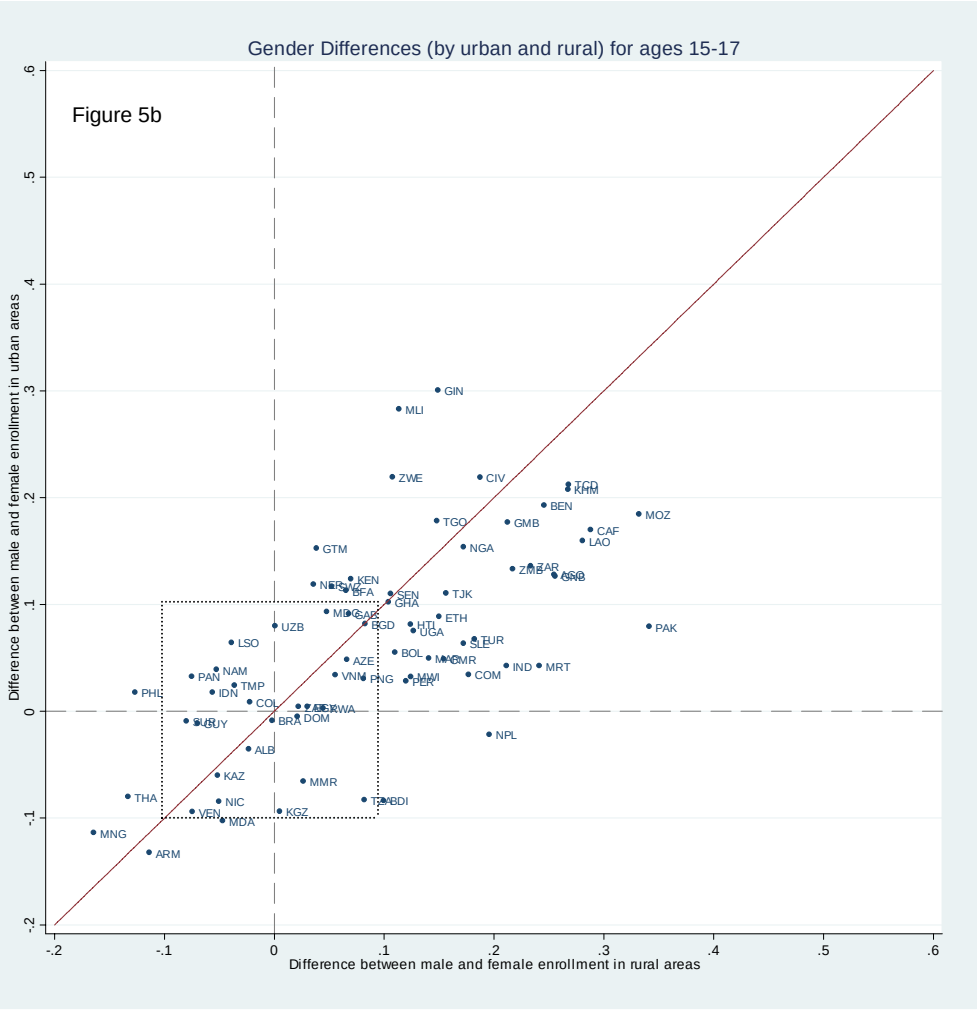
Figure 4: Distribution of self-reported literacy bu grade attainment for youth aged 15-24, various countries



Source: Authors compilation of summary data from 73 household surveys spanning 57 developing countries provided by Claudio Montenegro of the World Bank

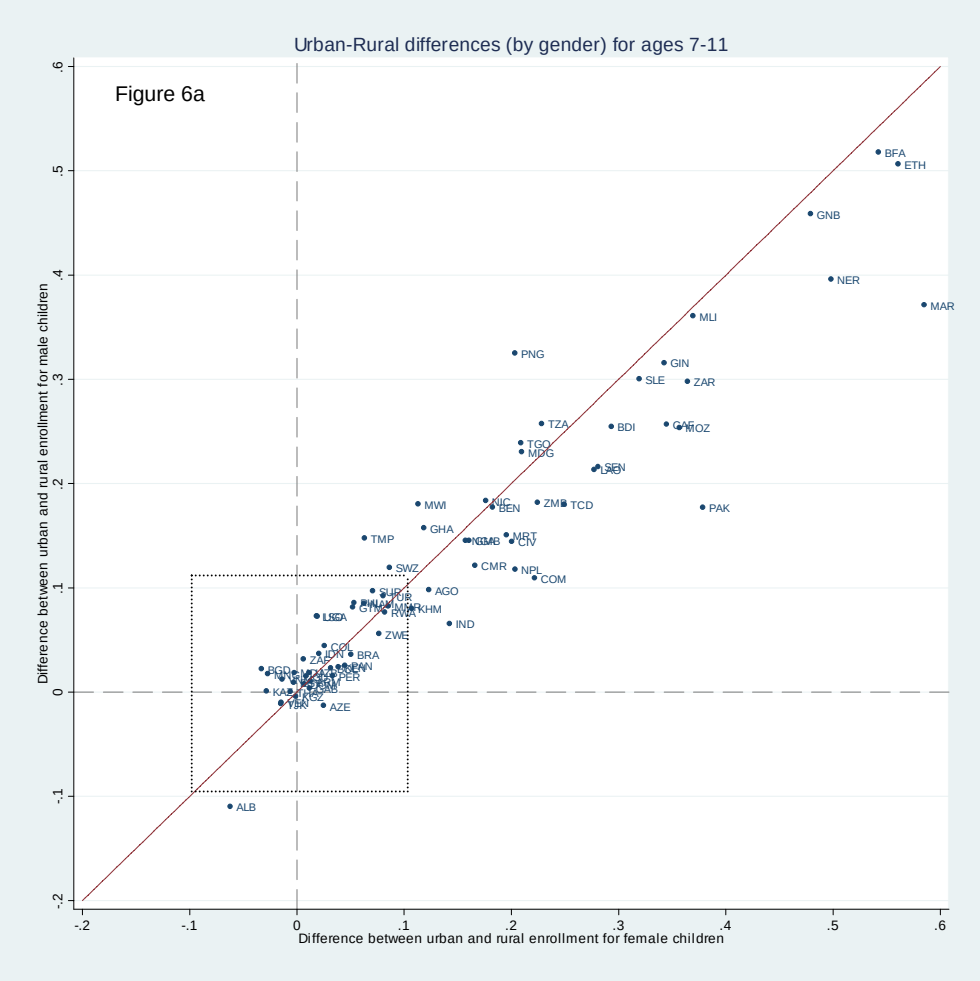
Figure 5: Combinations of male-female differences in enrollment rates, by urban and rural residence, age and country

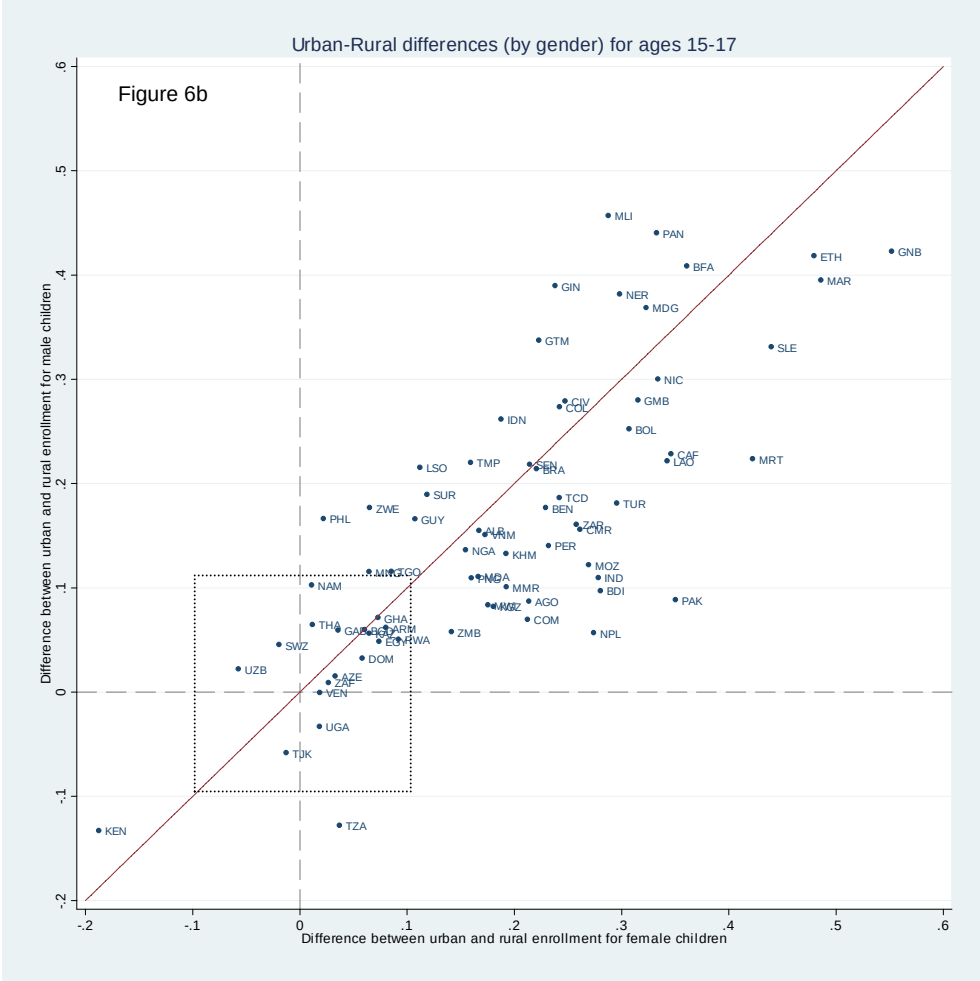




Source: Duryea, King and Orazem (2006)

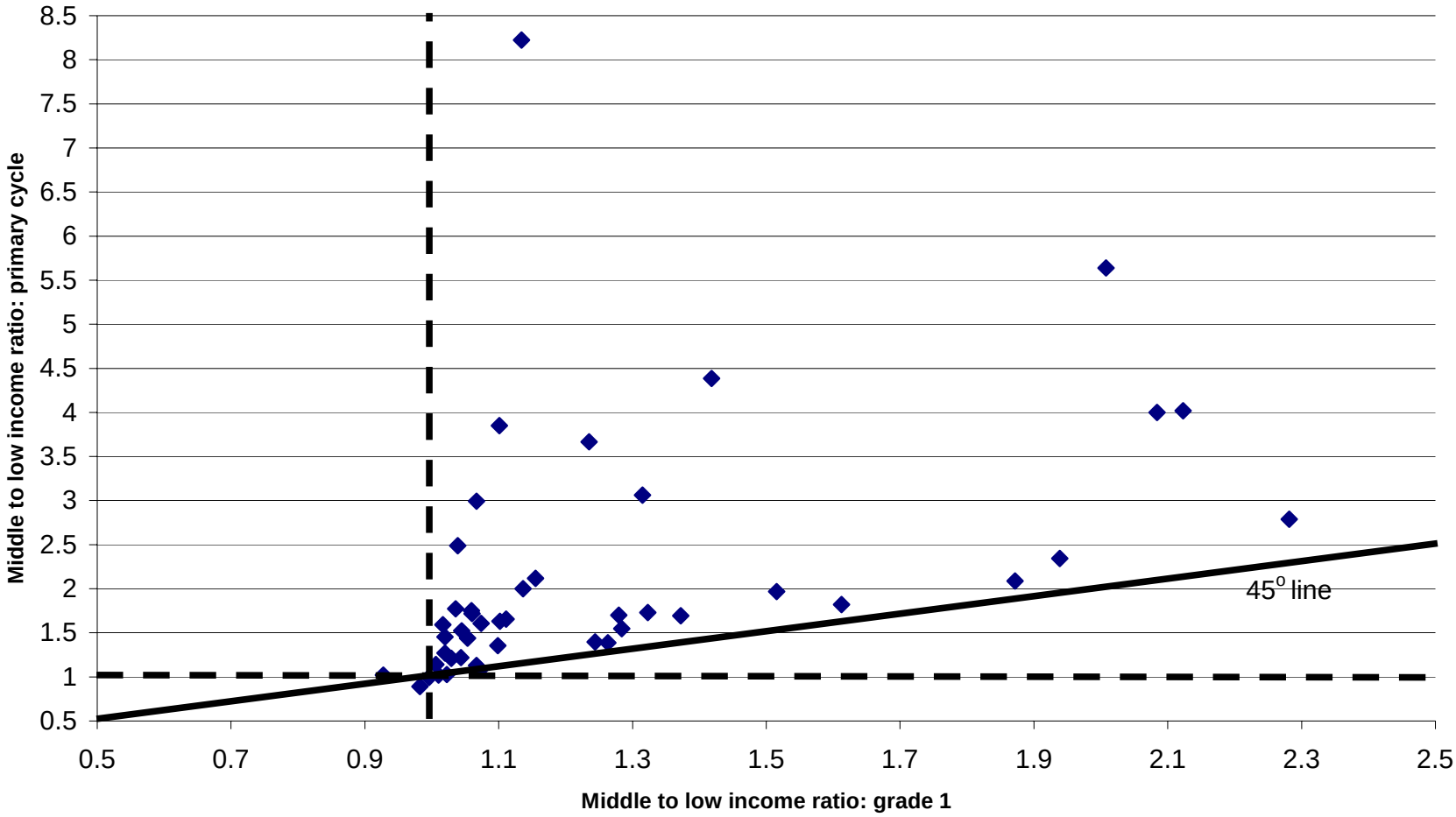
Figure 6: Combinations of urban-rural differences in enrollment rates, by gender, age and country





Source: Duryea, King and Orazem (2006)

Figure 7: Ratio of the percent of children in middle income households attaining a given grade relative to the percent of children in lower income households for grade 1 and for primary school completion



Source: Authors compilation of results reported in Fimer and Pritchett (1999).