علّم طفلاً
EDUCATE A CHILD

RESULTS FOR DEVELOPMENT

EXCLUSION FROM EDUCATION: THE ECONOMIC COST OF OUT OF SCHOOL CHILDREN IN 20 COUNTRIES

BY MILAN THOMAS WITH NICHOLAS BURNETT

ENROLLING IS ESSENTIAL

CONTENTS PAGE

ACRONYMS

DRC: DEMOCRATIC REPUBLIC OF CONGO
EAC: EDUCATE A CHILD
EFA: EDUCATION FOR ALL
GDP: GROSS DOMESTIC PRODUCT
GMR: EDUCATION FOR ALL GLOBAL MONITORING REPORT
HDI: HUMAN DEVELOPMENT INDEX
MDG: MILLENNIUM DEVELOPMENT GOALS
OOSC: OUT OF SCHOOL CHILDREN
UIS: UNESCO INSTITUTE FOR STATISTICS
UN: UNITED NATIONS

This is the second publication from Educate A Child (EAC) that focuses on the costs of not providing universal primary education—to individuals and to nations. Like the first, it was developed by and is published jointly with Results for Development (R4D).

This study, using more recent data, covers more countries and reinforces in significant ways the findings of the first study. In addition, it further develops the estimation methodology, which we believe is an important contribution to future knowledge generation in relation to the economic and related costs of not educating children at the primary level.

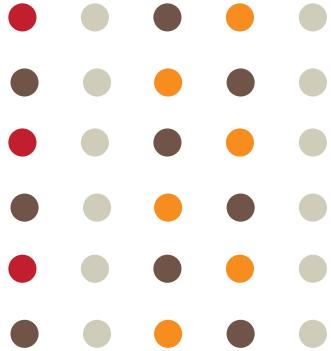
The key findings from this research are that the costs of not educating out of school children significantly outweigh the necessary investments for providing universal primary education, and that for some countries; these costs exceed the value of an average year of economic growth. Additionally, using the findings from the first study, educating out of school children will also yield impressive savings in a range of other sectors including health, agriculture, and the environment, which can have a positive effect on growth and productivity.

Investing in basic education seems an obvious solution in a global community where economic disparities are increasing and becoming more visible, leading to dissatisfaction, and sometimes social unrest, among segments of society worldwide.

Why then, are investments in primary education not on the increase across the board, and especially in those countries where the numbers of out of school children are highest? The evidence exists and it has been shown to be constant over decades. We can only surmise that it has not reached leaders and decision-makers in a form that enables them to understand the importance to nations, as well as individuals, of providing free, quality primary education to all.

We hope that this research can contribute to decisions that result in increased investment in primary education.

Mary Joy Pigozzi, PhD
Director, Educate A Child



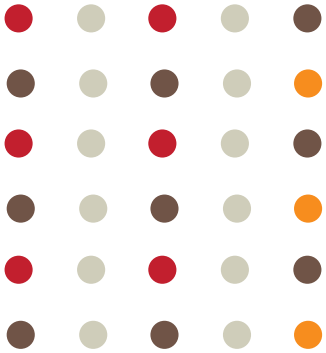
ACKNOWLEDGEMENT

The authors would like to express their gratitude to Educate a Child for providing the original idea and funding for this paper. In particular, they thank Mary Pigozzi for substantive feedback on early drafts, and Lubna al-Attiah for her contributions to the design of this report. They also thank Sheena Bell of the UNESCO Institute for Statistics for calculating and providing out of school children typology figures for this study, and Birger Fredriksen and Anne Guison-Dowdy for their valuable conceptual guidance.

DISCLAIMER

The author and publisher have made every effort to ensure that the information in this book was correct at press time, the author and publisher do not assume and hereby disclaim any liability to any party for any loss, damage, or disruption caused by errors or omissions, whether such errors or omissions result from negligence, accident, or any other cause.

EXECUTIVE SUMMARY



In April 2013, Results for Development Institute (R4D) reviewed the benefits of primary education and estimated the economic cost associated with large populations of out of school children in a background study for Educate A Child's (EAC) High Level Strategic Meeting to Accelerate Efforts to Reach out of school Children (Burnett, Guison-Dowdy and Thomas 2013). This report is an extension of that study. It updates economic cost estimates to reflect the latest data from the UNESCO Institute for Statistics (UIS), further develops the estimation methodology, and expands the estimation exercise to a set of 20 low- and middle-income countries.

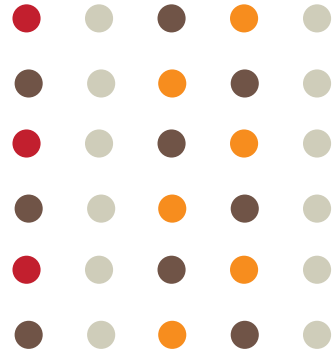
EAC's mission to support the Education for All initiative and Millennium Development Goals for education is more pressing and relevant than ever. Although significant progress toward achieving universal primary education has been made over the past decade, out of school children (OOSC) remain a pervasive global problem. According to UNESCO estimates, there are at least 57 million OOSC of primary-school age in the world (UIS 2013).

To underscore the importance of reducing the global number of out of school children, this paper uses two methods to estimate the economic loss associated with OOSC. The first estimation approach uses labor market data to estimate the total earnings that will be forfeited in the near future due to undereducated workers if primary school enrollment patterns do not change. The second approach is based on cross-country regressions that estimate the relationship between national education attainment and per capita income (Psacharopoulos and Patrinos 2011, Barro and Lee 2010).

The estimated economic costs of OOSC vary substantially with OOSC prevalence rates across the sample, from 1% of GDP in Thailand to 10% of GDP in Gambia. Because these estimates do not account for the non-income benefits of primary education (such as improved health and citizenship), they are likely lower bounds for the total cost of OOSC in each country. This report reveals that for nine countries with high OOSC prevalence, the economic benefit associated with achieving universal primary education exceeds multiple years of economic growth. In Mali and Nigeria, for example, the projected cost of OOSC is worth over two years of average GDP growth.

In fact, the economic cost of OOSC tends to be highest in countries that have experienced slow growth over the past decade, suggesting that enrolling out of school children and providing them with quality education could contribute to global economic convergence, reducing economic inequality between and within countries. Furthermore, for all countries in the sample (even those with low OOSC prevalence, like Brazil and Indonesia), the estimated economic gain from achieving universal primary education exceeds the estimated increase in public spending required to enroll those OOSC in primary school. Thus there are strong equity and efficiency arguments in favor of endowing OOSC with quality primary education.

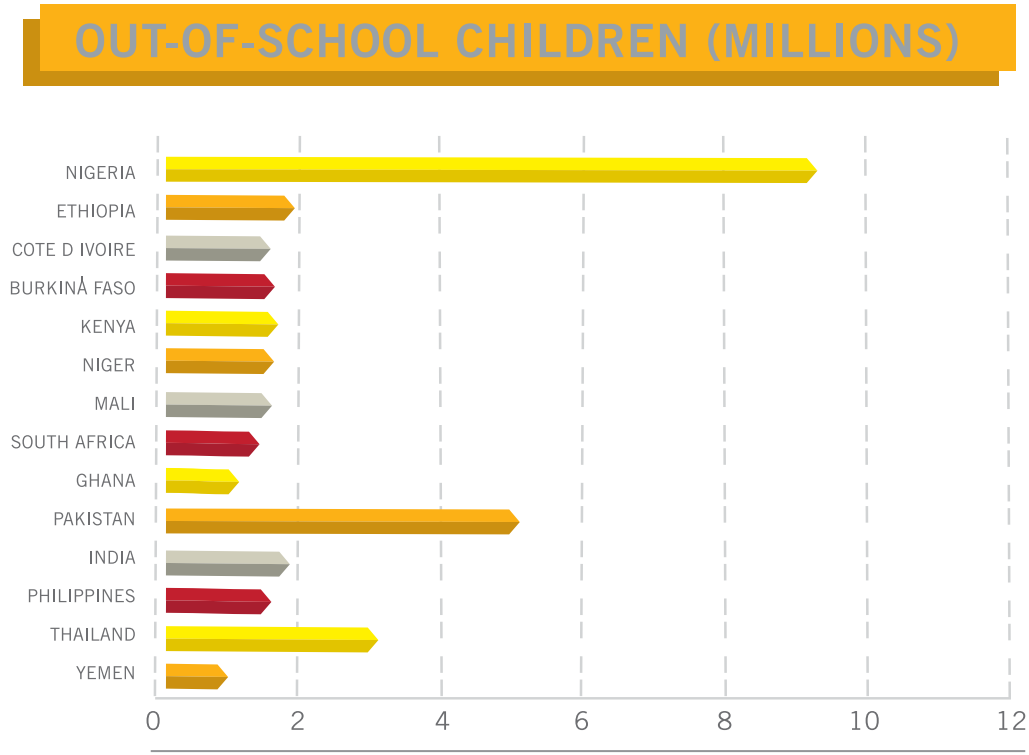
Taken together, the findings of this report should provide impetus for efforts to reach out of school children and ensure that all citizens have access to primary education and the opportunity to achieve their full economic and social potential.



BACKGROUND

Despite global initiatives dedicated to achieving universal primary education, over 57 million children of primary school age were not enrolled in school in 2011 (UIS 2013). These are the world's out of school children (OOSC). Nearly half of them were expected never to enroll in school, while the rest either had already dropped out or expected to enroll late. Significant progress in achieving universal primary education has been made over the past decade, as the global number of OOSC dropped by 44%, from 102 million in 2000 to 57 million in 2011. However, much of those gains were achieved prior to 2004, and progress in reducing OOSC has stagnated in recent years (GMR 2012).

Figure 1: Half of the world's OOSC are concentrated in 14 countries



Adapted from UIS 2013.

Considerable regional variation underlies the aggregate trend in OOSC. Although the global absolute number of OOSC has fallen since 1999, the number of OOSC has increased in many countries. Fourteen countries alone, nine of which are in Sub-Saharan Africa, account for half of the world's OOSC population (Figure 1). With significant progress being made in South and West Asia, a growing concentration of OOSC are in Sub-Saharan Africa, which is home to over half of the world's OOSC. In Sub-Saharan Africa, the number of OOSC rose from 29.0 million in 2008 to 29.8 million in 2011. Over one-sixth of all OOSC are in Nigeria (GMR 2012), where the rate of OOSC has actually increased since 2001. In some countries, the lack of progress in reducing OOSC can be attributed to disruption from armed conflict (e.g. the Democratic Republic of Congo), ethnic discrimination (e.g. the Kurds in Iran) and natural disasters (e.g. floods in Pakistan).

There is also notable concentration of out of school children within demographic groups. Data show a sizable gender gap in global enrollment (53% of OOSC were female in 2010), and that gap is even more pronounced in certain countries (61% of OOSC in Mozambique are female). The income gap in primary education attendance is on average even wider than the gender gap. Children from the poorest families are overwhelmingly overrepresented in OOSC populations across countries, because the private costs of attending school are more prohibitive to the poor. In Mali, for example, 75 out of 100 children from the richest quintile of households enter school, compared with 26 out of 100 from the poorest households (Delprato 2012). Recent household surveys from eight countries show that school fees are a common deterrent to enrollment (GMR 2012). Many countries, including Kenya, Mozambique, and Ethiopia, have taken steps to address this by abolishing school fees, and have observed an increase in enrollment (World Bank 2009). However, other financial obstacles remain. On top of school fees, books, supplies, clothing, transportation costs, and private tutoring are all expenses that richer families are better equipped to defray.

Furthermore, attending school imposes an opportunity cost that is most burdensome to the poorest families. They are faced with a decision between putting their children to work and enrolling them in school. The direct and indirect costs of schooling are more likely to induce families at the lower end of the income distribution to substitute child education for child work, whether at home or in the labor market. Even in countries where access to education is equal, children from richer families are more likely to stay in the system and complete primary education (GMR 2012). Schemes that lower barriers to enrollment, reduce dropout, and promote attendance (such as conditional cash transfers) have high social rates of return, because they allow individuals and societies to access the benefits of primary education.

In summary, OOSC are a significant and persistent phenomenon, and they are concentrated geographically (Africa and South Asia) and demographically (females and children in poverty). Due to their exclusion from school, OOSC forego the benefits of primary education. In the following sections, we show that the sheer number and high prevalence of OOSC in certain countries represents a major economic failure – an underinvestment in human capital that results in significant income gaps, especially in the poorest countries.

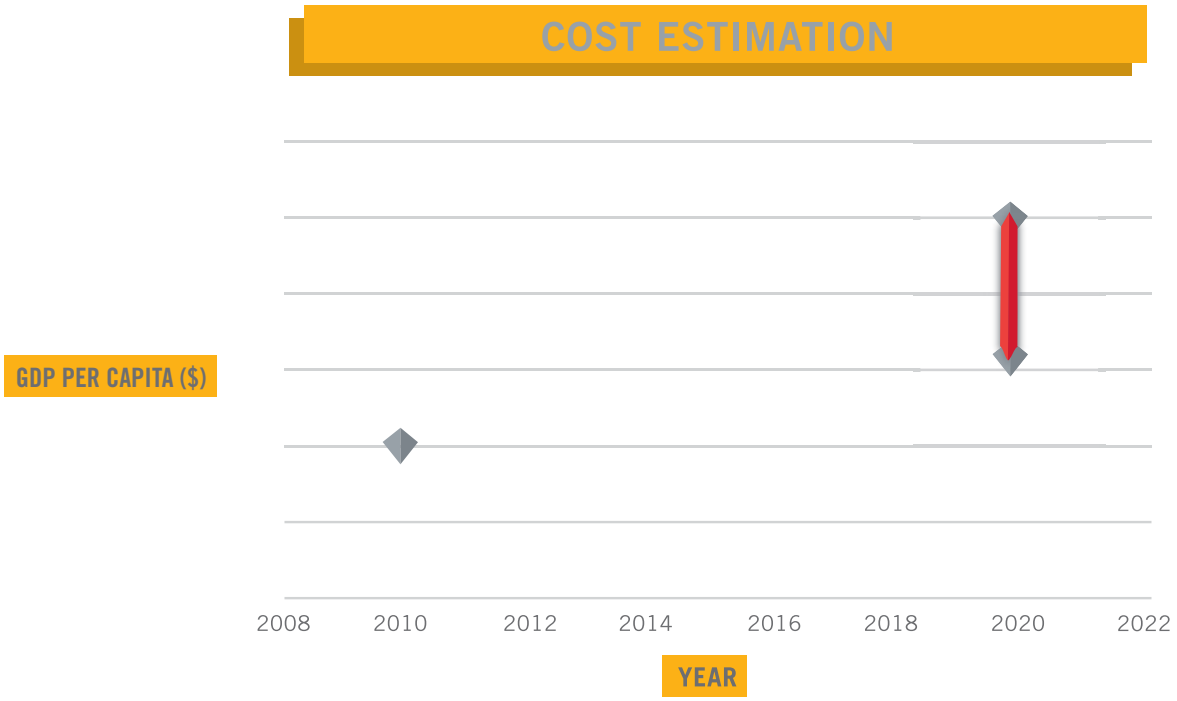
THE ECONOMIC COST OF OUT OF SCHOOL CHILDREN

Primary education is not only an inalienable human right - it is a powerful instrument for generating benefits for individuals and their families, the societies in which they live, and future generations. In our literature review of the social, economic, environmental, and political benefits of primary education (Burnett, Guison-Dowdy and Thomas 2013), we discuss the challenge of quantifying the wide-ranging, cross-sectoral impacts of enrolling out of school children in a single measure. Indeed, while non-economic returns have potentially the largest impacts on welfare due to externalities (such as democratization, women's empowerment, and improved public health) and play a central role in justifying national and international investments in primary education, they are also the most difficult to estimate.

With an understanding that foregone income accounts for only a portion of the total cost associated with out of school children, the following sections estimate the economic cost of out of school populations in 20 countries. The purpose of these estimation exercises is to demonstrate that enrolling out of school children is not only a moral obligation, but a productive investment, and that economies suffer a far greater loss from maintaining large out of school populations than they would from increasing public spending to enroll those children in primary school.

Cost estimation in this section investigates the question: If all of today's children expected not to complete primary school actually do complete basic education, how much higher will GDP be in the 20 countries when that cohort of children enters the labor market in ten years, relative to a counterfactual in which those OOSC never completed primary education? (Figure 2).

Figure 2: Cost Estimation



The cost of OOSC can be thought of as the difference in GDP between two hypothetical, forward-looking scenarios: one in which current OOSC trends persist (point A) and one in which today's OOSC that are not currently expected to complete primary education do receive basic education before entering the labor market in the next decade (point B).

Two approaches are employed to give an indication of the magnitude of the cost (expressed as a percentage of current GDP) that countries can expect to bear if current patterns of OOSC are not improved. The first approach uses a microeconomic method, aggregating the estimated productivity deficits of individuals who are not expected to complete primary education. Based on wage premium estimates collected in Psacharopoulos and Patrinos (2004) and Colclough et al. (2009) and OOSC figures calculated by UIS, it provides an estimate of how much higher GDP will be in roughly a decade if all of today's OOSC are given primary education before they enter the workforce. This approach accounts for only the private economic gains of enrolling OOSC.

The second approach uses a macroeconomic method, based on cross-country regressions estimating the relationship between schooling and income per capita, to address the same question. Unlike the microeconomic estimation, which captures only direct income returns to primary education (the expected increase in average private income enjoyed by primary-level educated individuals), the macroeconomic cost estimation should capture some indirect economic impacts of primary education attainment on GDP, such as increases in national income due to lower crime rates, better public health, and other peer effects of schooling. Together, the two approaches show that there are significant economic incentives (equivalent to multiple years of GDP growth in some cases) to enroll OOSC populations and provide them with quality primary education.

MICROECONOMIC COST ESTIMATION

Evidence on the returns to education suggests that in recent decades, the income gains from primary school completion have fallen relative to the returns of higher education (Colclough et al. 2009). There are even some studies that show no apparent returns to primary education (Kingdon et al. 2008). Labor economists ascribe this trend to demand- and supply-side developments. These include skill-biased technological change, which has raised the demand for skilled workers at the expense of unskilled and semiskilled workers, and the rising proportion of the global working population that has completed primary education. There is also concern that progress toward universal primary education has strained educational infrastructure in less developed countries, to the detriment of quality of schooling and, as a result, the productivity gains associated with primary education.

There are three reasons why the downward trend in relative returns to primary education does not undermine the importance of investing in primary school and reducing the number of out of school children. First, basic education is recognized as a human right. Second, primary education is a prerequisite for higher levels of education, so the cost of OOSC is proportional to the returns to all levels of education. Finally, the majority of economic studies focus on the effect of primary education on the wages of workers employed in the formal sector, but this constitutes only one aspect of returns to education. Primary education has a wide range of non-market benefits (social, political, psychosocial, environmental, and health) that studies typically do not capture.

With these arguments in mind, this section presents estimates of the economic cost of a selection of OOSC populations. Given that OOSC is a phenomenon heavily concentrated in select countries (see Figure 1), returns to education vary widely by country, and data is missing for potentially key countries (e.g. China), estimating a global cost of OOSC is neither illustrative nor tractable. Instead, the country-level costs of OOSC are estimated for a sample of 20 countries, selected to provide geographic variety and on the basis of data availability.

The pure economic impact of primary education is the effect of schooling on labor productivity and wages. There is a vast literature, reviewed in Burnett, Guison-Dowdy and Thomas (2013), that measures the returns to education in terms of wage premia – the wage differential between those who complete a given level of education and those who do not (Psacharopoulos and Patrinos 2004). Wage premia estimates provide a measure for the direct private benefit of education completion. As discussed in Colclough et al. (2009), labor market returns to education vary substantially by country and level of education.

Unfortunately, countries with significant OOSC populations are the ones for which wage premia are least likely to be available for recent years. They are also the countries that tend to have large informal sectors, so wage premium estimates have limited

relevance. The majority of primary education wage premium studies have not been updated in light of recent evidence that the primary education wage premium has been falling relative to premia associated with higher levels of education. Many recent studies focus on higher education, taking primary education as a human right with benefits that no longer require empirical validation.

Thus, even estimation of the direct productivity cost of OOSC is not straightforward. Due to these data limitations and methodological issues, restrictive assumptions must be made to quantify the direct economic cost of OOSC. To overcome the lack of information on the returns to education outside of the formal labor market, it is assumed that the wage premia estimated in studies on the returns to education are representative of the economic benefits that would accrue to all population groups. For example, the 15% wage premium used for Cote d'Ivoire (Schultz 2004) was estimated using survey data of males age 25-34 employed in wage labor. The analysis underlying Table 1 assumes that the 15% wage premium for primary education applies to all members of the population in Cote d'Ivoire, even those working in the informal sector or the household. This is not an unreasonable assumption, given the sparse but growing evidence on education returns in the informal sector (De Brauw and Rozelle 2006 for rural China, Nguetse Tegoum 2009 for Cameroon, Arbex et al. 2010 for Brazil, and Yamasaki 2012 for South Africa) and on the positive effect of maternal education on child health (Chen and Li 2009).

To calculate the direct cost of OOSC (Equation 1), the per capita economic benefits (measured by wage premia) from primary education must be multiplied by the prevalence of primary school non-completion in the school-aged population. However, raw OOSC numbers alone do not reveal how many school-aged children in a cohort will eventually complete primary education under the status quo scenario. Country-level estimates produced and provided for this study by UIS (2013) break OOSC down into the three categories for the most recent year with available data (e.g. based on 2006/2007 Demographic and Health Survey for Pakistan). Those figures are used to derive the percentage of children projected to not complete primary school.

The analysis assumes that all late-starters eventually complete primary school, and that no drop-outs or those unlikely to start will ever complete primary school. Thus the final column of Table 1, percentage of non-completing OOSC, is the overall percentage of OOSC minus the percentage that is likely to start late. These simplifying assumptions belie the complex behavior of OOSC (many of whom enter and leave school multiple times due to idiosyncratic factors like family illness), but they make the analysis possible in the absence of more detailed data on OOSC.

Equation 1: Direct GDP Loss from foregone primary education =
[% non-completing OOSC] x
[wage premium to primary education

Table 1: Primary School Aged OOSC in 20 Countries

Country	OOSC*	% Left School*	% Likely to Enter*	% Unlikely to Enter*	% Non-Completing OOSC
Bangladesh	14%	18%	80%	3%	2.9%
Brazil	2%	24%	76%	0%	0.5%
Burkina Faso	37%	5%	19%	76%	30.0%
Cambodia	2%	23%	68%	9%	0.6%
Cote d'Ivoire	37%	11%	32%	57%	25.4%
DRC	22%	24%	54%	22%	10.1%
Ethiopia	13%	12%	79%	9%	2.7%
Gambia	30%	3%	19%	78%	24.4%
Ghana	16%	12%	76%	12%	3.9%
India	1%	14%	38%	48%	0.6%
Indonesia	1%	53%	45%	2%	0.6%
Lesotho	25%	46%	44%	10%	13.9%
Liberia	59%	1%	90%	9%	6.1%
Mali	33%	3%	4%	93%	31.7%
Nigeria	30%	5%	21%	74%	23.7%
Pakistan	28%	6%	61%	32%	10.6%
Senegal	21%	8%	9%	83%	19.0%
Thailand**	10%	43%	46%	11%	5.6%
Vietnam	1%	23%	67%	10%	0.3%
Yemen	24%	19%	48%	33%	12.5%

*Source: UIS calculations based on Multiple Indicator Cluster Surveys and Demographic and Health Surveys, 2013.

**Due to irreconcilable inconsistencies in Thailand's survey data, regional typology data for East Asia is used.

The percentage of school-aged children that is predicted to not complete primary education (the last column of Table 1) is then multiplied by the wage premium to primary education (the second column of Table 2) to produce estimates in the third column of Table 2.

The next step of the analysis is designed to account for the value of primary education as a gateway to higher education (Equation 2). Table 3 estimates the additional increase in aggregate income that primary-enrolled OOSC would be expected to generate due to the access they gain to secondary education. This is calculated by multiplying the wage premium to secondary education by the rate of continuation from primary to secondary school (GMR 2012) and the rate of secondary school completion. Because data are unavailable for secondary school completion rates, it is conservatively assumed that 50% of students that transition from primary to secondary education complete secondary school. That assumption is based on the lowest rates of primary school completion observed in developing countries. The probability-weighted loss from foregone secondary education is then added to the GDP loss from foregone primary education to generate Table 4.

Table 2: GDP Loss from foregone primary education

Country	% Non-Completing OOSC	Wage Premium to Primary Education*	GDP Loss from Foregone Primary Education
Bangladesh	2.9%	23.6%	0.69%
Brazil	0.5%	36.6%	0.18%
Burkina Faso	30.0%	7.9%	2.37%
Cambodia	0.6%	5.3%	0.03%
Cote d'Ivoire	25.4%	25.7%	6.52%
DRC	10.1%	8.9%	0.90%
Ethiopia	2.7%	24.7%	0.67%
Gambia	24.4%	37.1%	9.06%
Ghana	3.9%	8.9%	0.35%
India	0.6%	2.6%	0.02%
Indonesia	0.5%	5.0%	0.03%
Lesotho	13.9%	15.5%	2.15%
Liberia	6.1%	99.0%	6.07%
Mali	31.7%	8.9%	2.82%
Nigeria	23.7%	30.0%	7.12%
Pakistan	10.6%	6.0%	0.64%
Senegal	19.0%	33.7%	6.41%
Thailand	5.6%	3.5%	0.20%
Vietnam	0.3%	10.8%	0.04%
Yemen	12.5%	10.0%	1.25%

Equation 2: Probability-weighted GDP loss from foregone secondary education =
[% non-completing OOSC] x
[wage premium to secondary education] x
[rate of continuation from primary to secondary school] x
[rate of secondary school completion]

*Source: Psacharopoulos and Patrinos 2011, Colclough et al. 2004. Wage premium estimates for Mali and DRC are unavailable, so the regional estimate from Colcough et al. 2009 is used.

Table 3: Probability-weighted Loss from foregone secondary education

Country	Rate of Continuation to Secondary School*	Wage Premium to Secondary Education*	Probabilty Weighted Loss from Foregone Secondary Education
Bangladesh	81%	44.3%	0.53%
Brazil	96%	5.1%	0.01%
Burkina Faso	52%	22.6%	1.76%
Cambodia	80%	13.7%	0.04%
Cote d'Ivoire	46%	30.7%	1.79%
DRC	80%	22.6%	0.91%
Ethiopia	89%	24.2%	0.29%
Gambia	81%	12.7%	1.26%
Ghana	91%	18.0%	0.32%
India	81%	17.6%	0.04%
Indonesia	92%	23.3%	0.06%
Lesotho	74%	26.7%	1.37%
Liberia	62%	30.5%	0.58%
Mali	73%	22.6%	2.61%
Nigeria	43%	14.0%	0.71%
Pakistan	74%	20.1%	0.79%
Senegal	69%	21.3%	1.40%
Thailand	50%	25.4%	0.36%
Vietnam	92%	3.8%	0.01%
Yemen	66%	41.0%	1.69%

*Source: GMR 2012. Data was unavailable for Bangladesh, Brazil, Nigeria, Thailand, Vietnam and Yemen. For these countries, transition rates from countries with similar gross secondary enrollment rates were used.

Table 4, which adds the last columns of Tables 2 and 3, can be interpreted as the direct economic cost (lost productivity as measured by wages) incurred by today's OOSC that will not complete primary education in each of the countries when those OOSC reach working age. It can also be visualized as the vertical red gap between points A and B in Figure 2.

Table 4: Economic Cost of OOSC by microeconomic estimation

Country	Economic Cost of OOSC as % of GDP	Country	Economic Cost of OOSC as % of GDP
Bangladesh	1.22%	Indonesia	0.09%
Brazil	0.19%	Lesotho	3.53%
Burkina Faso	4.12%	Liberia	6.65%
Cambodia	0.07%	Mali	5.43%
Cote d'Ivoire	8.32%	Nigeria	7.83%
DRC	1.81%	Pakistan	1.43%
Ethiopia	0.97%	Senegal	7.81%
Gambia	10.32%	Thailand	0.55%
Ghana	0.66%	Vietnam	0.04%
India	0.06%	Yemen	2.94%

To generate an estimate of the total cost (economic and non-economic costs combined) of OOSC requires calculation of the foregone non-market benefits of primary education. There are also significant behavioral impacts of education that might take years or decades to manifest. For example, education has been shown to accelerate demographic transition in developing countries. By lowering dependency rates, increasing investment and raising female labor force participation rates, educating OOSC can have large economic impacts aside from direct productivity gains. Since OOSC forego all of these benefits, the economic cost estimated in Table 4 likely provides a lower bound for the total cost of OOSC. Moreover, there are additional significant benefits associated with female primary education. Since females are overrepresented in OOSC populations, the calculations above further understate the total costs of OOSC populations.

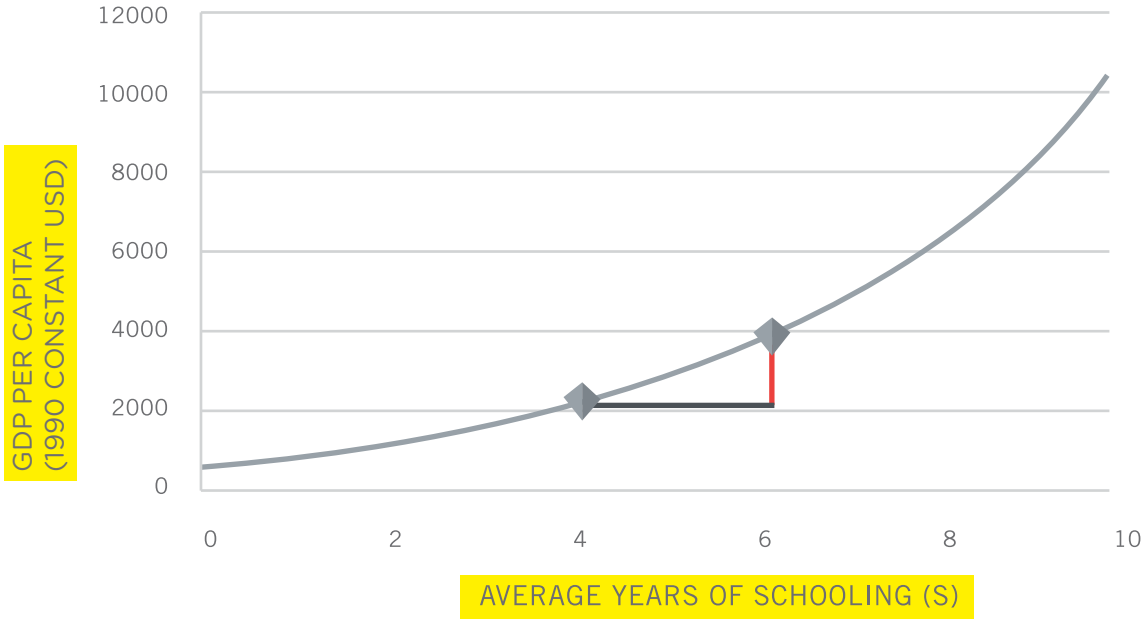
This section has provided an indication of the magnitude of the economic cost of today's OOSC in 20 countries. In the next section, macroeconomic analysis is employed to provide an alternate set of estimates.

MACROECONOMIC COST ESTIMATION

The microeconomic approach to cost estimation requires precise quantification of the various individual-level effects of education, many of which are difficult to express in terms of income. For that reason, the previous estimation exercise focused on labor productivity gains. While a macroeconomic cost estimation approach is less specific on where income gains are derived from, it has the potential to provide a more comprehensive estimate of the cost of OOSC and provides a second set of estimates against which the estimates from the previous section can be compared.

The technique for macroeconomic modeling of the relationship between education levels and income levels is derived from labor economics literature, in which an individual worker's wage is dependent on his or her education attainment and other individual characteristics (Mincer 1974). Extending Mincerian equations to the aggregate level, macroeconomic modeling uses cross-country or time-series data (regional, national, or international) to estimate the income gains associated with the accumulation of human capital. Those gains can alternatively be considered the cost of underinvesting in human capital (i.e. having a large OOSC population). Psacharopoulos and Patrinos' (2011) estimation of a global Mincerian equation is presented graphically in Figure 3. For more details on this type of regression, refer to Annex 2.

Figure 3: The income-education relationship, as estimated by Psacharopoulos and Patrinos (2011)



Using data from over 100 countries from 1950-2010, Psacharopoulos and Patrinos fit the curve displayed above. In the graph above, the red line segment represents the increase in per capita GDP associated with an increase in the population's average years of schooling from 4 to 6 years.

Using the type of Mincerian equation graphed in Figure 3, the cost of OOSC can be estimated as the difference between two hypothetical, forward-looking scenarios. In the first scenario, education policy follows the status quo so that the expected number of years of schooling in each country (estimated in UNDP 2013) is unchanged. In the second scenario, a stronger push is made to achieve universal primary education, so that the expected lifetime schooling of the population (S in Figure 3) rises in proportion to the current percentage of children expected not to complete primary education.

While Psacharopoulos and Patrinos' specification provides a useful starting point for conceptualizing the cost of OOSC in the macroeconomic context, their estimation technique has shortcomings (discussed in full detail in Annex 2). A more rigorous estimation of the education-output relationship is provided by Barro and Lee (2010). Barro and Lee specify a more sophisticated model of the education-output relationship, using multivariable regression, panel effects, and instrumental variable estimation in order to resolve issues of omitted variable bias and endogeneity. By controlling for other possible influences on GDP, all of these additional econometric techniques bring the estimation closer to isolating a causal effect of education attainment on national income. Table 5 shows the macro-estimated costs of OOSC (based on Barro and Lee's estimation of the education-output relationship) for the same 20 countries analyzed in the microeconomic estimation exercise. The equation used to generate these estimates can be found in Annex 2.

Table 5: Economic cost of OOSC by macroeconomic estimation

Country	Expected Years of Schooling (status quo)	% Non-completing OOSC	Expected Years of Schooling (No OOSC scenario)	Economic cost of OOSC as a % of GDP
Bangladesh	8.1	2.9%	8.2	1.45%
Brazil	14.2	0.5%	14.2	0.23%
Burkina Faso	6.9	30.0%	8.1	17.02%
Cambodia	10.5	0.6%	10.5	0.31%
Cote d'Ivoire	6.5	25.4%	7.5	14.06%
DRC	8.5	10.1%	8.9	5.17%
Ethiopia	8.7	2.7%	8.8	1.34%
Gambia	8.7	24.4%	9.7	13.46%
Ghana	11.4	3.9%	11.6	1.92%
India	10.7	0.6%	10.7	0.30%
Indonesia	12.9	0.5%	12.9	0.27%
Lesotho	9.6	13.9%	10.2	7.24%
Liberia	10.5	6.1%	10.7	3.07%
Mali	7.5	31.7%	8.8	18.16%
Nigeria	9.0	23.7%	9.9	13.03%
Pakistan	7.3	10.6%	7.7	5.45%
Senegal	8.2	19.0%	9.0	10.19%
Thailand	12.3	5.6%	12.5	2.80%
Vietnam	11.9	0.3%	11.9	0.16%
Yemen	8.7	12.5%	9.2	6.45%

Income gaps estimated using Barro and Lee (2010) specification of the income-education relationship.

Bearing in mind that cost calculations are based on the cross-country average relationship between income and education, Table 5 suggests that countries with the large populations of OOSC face very high costs in terms of foregone GDP. These estimates are generally higher than the microeconomic estimates, likely because this second method captures some of the positive externalities associated with primary education, rather than solely direct private income gains.

DISCUSSION: THE URGENCY OF ENROLLING OUT OF SCHOOL CHILDREN

Table 6: Benchmarking the Economic Costs of Out of school Children

Country	Economic Cost of OOSC as % of GDP (Micro method)	Economic Cost of OOSC as a % of GDP (Macro method)	Average Economic Growth, 2008-2012*	Required incremental spending on primary education as a % of GDP**
Bangladesh	0.38%	1.45%	6.21%	0.15%
Brazil	0.19%	0.23%	3.20%	0.03%
Burkina Faso	4.12%	17.02%	6.19%	1.35%
Cambodia	0.07%	0.31%	5.41%	No data
Cote d'Ivoire	6.09%	14.06%	2.65%	No data
DRC	1.81%	5.17%	6.04%	0.25%
Ethiopia	0.97%	1.34%	9.07%	0.49%
Gambia	10.32%	13.46%	4.09%	1.19%
Ghana	0.72%	1.92%	8.67%	0.35%
India	0.05%	0.30%	6.50%	No data
Indonesia	0.09%	0.27%	5.92%	0.01%
Lesotho	3.53%	7.24%	4.98%	1.31%
Liberia	6.65%	3.07%	11.10%	No data
Mali	5.43%	18.16%	3.36%	0.89%
Nigeria	1.12%	19.20%	6.97%	No data
Pakistan	1.43%	5.45%	3.18%	No data
Senegal	7.81%	10.19%	3.25%	0.64%
Thailand	0.55%	2.80%	2.90%	0.19%
Vietnam	0.04%	0.16%	5.88%	No data
Yemen	3.39%	6.45%	0.97%	No data

We have constructed two sets of estimates of the cost of out of school children, but what do these figures mean? Although the two methods diverge considerably in their results for a few countries, they are in agreement across the sample that the economic cost of OOSC is significantly large for many countries. The costs appear even more striking when compared to the estimated incremental public spending (as a percentage of GDP) required to achieve universal primary education in the countries, and compared to average annual economic growth in those countries in recent years (Table 6).

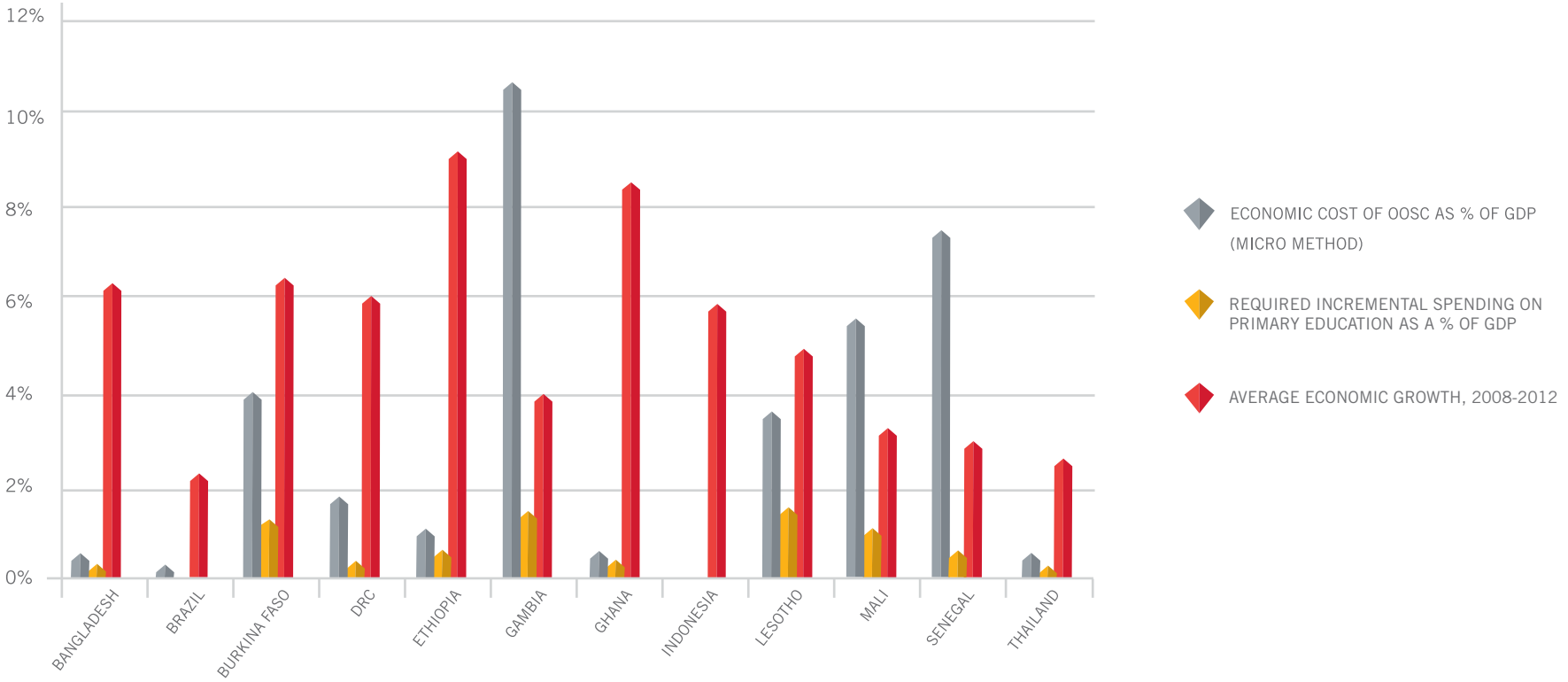
*Average GDP growth from World Bank data.

**GMR 2012 data on public spending on primary education as a percentage of GNP was converted to GDP using GDP to GNP ratios based on World Bank data. Incremental required spending is calculated based on the assumption of constant average costs of enrolling students in primary education to (e.g. if current public spending on primary education is 1% of GDP and 50% of primary-aged children are in school, spending 2% of GDP on primary education will cover 100% of primary-aged children).

Just taking purely economic gains into account, countries with high rates of OOSC will forego significant benefits when today's OOSC enter the labor market in ten years. Indeed, for nine countries (Burkina Faso, Cote d'Ivoire, Gambia, Lesotho, Liberia, Mali, Nigeria, Senegal and Yemen), the economic cost due to OOSC is greater than the value of an entire year of GDP growth (Table 6). In the case of Mali, for example, the projected cost of OOSC is worth over two years of average GDP growth. Countries with high economic costs of OOSC tend to be those that experienced slow economic growth over the past decade (notably Gambia, Cote d'Ivoire and Senegal), suggesting that enrolling OOSC in primary education is an equity-enhancing investment that could contribute to global economic convergence. Furthermore, the last column of Table 6 suggests that enrolling OOSC is cost-effective. For all countries, the estimated cost of OOSC outweighs the additional public spending required to enroll OOSC (see Figure 4). Even for large middle-income countries with very low rates of OOSC (e.g. Brazil and Indonesia), enrolling OOSC appears to be a highly cost-effective investment.

The comparisons drawn in Table 6 are illustrative but simplified. Calculations underlying the last column assume constant average costs for enrolling OOSC – i.e., the average cost of enrolling an out of school child is identical to the average public spending per primary school student. This probably overestimates the cost of enrolling OOSC, since fixed costs, such as school buildings, need not necessarily be replicated to provide for OOSC. On the other hand, scaling-up primary education to reach OOSC in rural areas or from marginalized groups likely requires spending on education infrastructure, involving some new fixed costs in addition to higher variable costs. We have also not addressed the possibility of quality of education suffering as enrollment increases, reducing the benefits of primary education, lowering the economic cost of OOSC, and qualifying these benchmarking exercises. This is a critical concern, given Hanushek and Woessman's (2007) finding that the quality of education is more important for economic growth than years spent in school. The possible quality-coverage tradeoff in primary education and its implications for optimal OOSC strategy is an important area of future study.

Figure 4: Benchmarking the Economic Cost of Out of school Children



CONCLUSION

This study analyzes the economic cost of out of school children using two approaches. The first approach aggregates the forecasted foregone private income of OOSC populations in 20 countries, predicting how much will be lost as a percentage of GDP in the future due to their lack of primary education. The second method computes the income gap due to out of school children based on a cross-country model of the relationship between education attainment and aggregate income. We benchmarked those estimates against public spending required to enroll OOSC average economic growth to highlight the magnitude of the cost of OOSC, which is highest in the smallest, least developed countries.

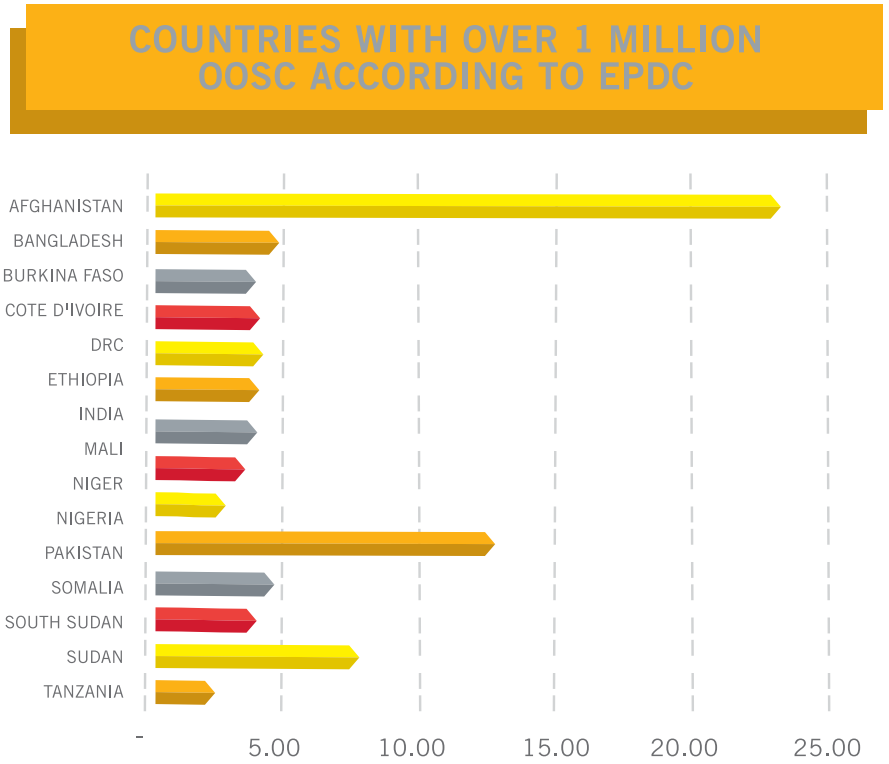
Together, the two approaches show that there are significant economic incentives to educate OOSC in all countries. On top of the economic benefits, there are a range of non-market benefits that are not accounted for in the quantitative analysis. Given the large and numerous benefits associated with primary education, programs that increase access to education for OOSC are critical interventions to promote economic and social development. Until universal primary education is achieved in countries where progress has stalled, out of school children will continue to represent an unconscionable underinvestment in human capital and a costly barrier that prevents nations from reaching their full economic and social potential.

ANNEX 1: EPDC DATA

There are a number of methodological challenges in estimating the global population of out of school children, which are discussed in Omoeva et al. (2013). Estimates of OOSC rates produced by FHI 360's Education Policy Data Centre (EPDC) are based on household surveys and population censuses, whereas UIS estimates are based on household surveys, school administrative surveys and population censuses. This leads to very different OOSC estimates for some countries, and also different availability. EPDC collects data for a number of countries with large OOSC populations that are currently not published by UIS due to data issues or lack of reported data. The graph below shows all South Asian and Sub-Saharan African countries with over one million OOSC according to EPDC data (year of survey varies by country).

Although this study relies on UIS data, it is important to note the availability of the EPDC's alternative OOSC data, which diverge from UIS estimates for a number of countries. Since they draw from different sources, EPDC and UIS data can be taken together to provide a more complete picture of the global OOSC problem.

Figure 5: OOSC in Millions According to Household Surveys Analyzed by EPDC



EPDC data is for the 2006 school year for Cote d'Ivoire, India, Mali, Niger, Pakistan, Somalia; 2008 for Nigeria, Sudan, South Sudan; 2010 for Burkina Faso, DRC, Tanzania; 2011 for Afghanistan, Bangladesh, Ethiopia, Uganda.

ANNEX 2: ECONOMETRICS

This annex goes into greater detail about the econometric specifications underlying the macroeconomic estimation method.

A generic Mincerian equation is shown below (Equation 3):

EQUATION 3: A MINCERIAN EQUATION

$$\ln (Yi) = f (Si, Zi)$$

The natural logarithm of income of country i (in macroeconomic studies) or individual i (in microeconomic studies) is a function f of average years of schooling (Si) and a vector of other explanatory variables, Zi. In a microeconomic study, this could include the individual's experience or gender. In a macroeconomic study, Z could include policy or demographic variables.

Using average years of schooling data for the working age population (age fifteen and older) from the Barro-Lee dataset, Psacharopoulos and Patrinos estimate the following Mincerian equation to describe the relationship between income and education from 1950-2010:

EQUATION 4: PSACHAROPOULOS AND PATRINOS' MODEL

$$\ln Yi = 6.645 + 0.258Si,$$

Si is mean years of schooling in country i and ln Yi is the natural logarithm of per capita income (GDP) in country i.

Psacharopoulos and Patrinos use a single variable regression – they do not condition their results on other characteristics of the countries in their sample. This is equivalent to excluding the vector Z in Equation 1. According to their estimates, each additional year of schooling is associated with a 26% increase in per capita income. This is consistent with a number of studies, such as Kruger and Lindahl (2001), who estimate a rate of return to schooling between 18% and 30%, and Heckman and Klenow (1997), who find that an additional year of schooling in a country is associated with a 30% higher per capita GDP.

Due to the exclusion of the vast number of non-educational factors that could potentially impact GDP, Equation 4 should not be interpreted as a causal relationship between education attainment and income. In addition to omitted variable bias, Equation 4 has other methodological issues. As shown in the microeconomic analysis section, the empirical evidence is that the returns to education differ substantially among countries and time periods. In estimating an average relationship across countries and over time, Equation 4 masks considerable variation in the economic cost of OOSC. Unfortunately, the Barro-Lee dataset only provides education attainment figures at five-year intervals, so there is not enough data to generate meaningful country-level Mincerian equations (only thirteen observations are available per country). There is also the possibility that Equation 4 is a product of spurious regression: except in Africa (where income and education attainment stagnated between 1980 and 2000), both income and mean years of schooling have been trending strongly upward worldwide since 1950, and regressing income on schooling could thus estimate an artificially strong relationship.

In Barro and Lee (2010) the relationship between years of schooling and output is estimated using the natural log of GDP per worker (individuals age 15-

64) as the independent variable (Equation 5). This is manipulated algebraically below so that the independent variable is the natural log of GDP per capita instead.

EQUATION 5: FIXED-EFFECTS ESTIMATION WITH INSTRUMENTAL VARIABLE FOR SCHOOLING (PARENTAL EDUCATION).

$$\ln (Yi/wi) = 0.121Si + 0.544\ln(Ki/wi),$$
$$\ln(Yi/ni) = \ln(wi/ni) + 0.121Si + 0.544\ln(Ki/wi)$$

ln represents the natural logarithm operator.
Yi is the output in country i.
Si is instrumented average years of schooling in country i.
Ki is the per capita physical capital stock in country i.
wi is the working age population (15-64) in country i.
ni is the total population in country i.

Barro and Lee's specification has a number of advantages over that of Psacharopoulos and Patrinos. Barro and Lee add physical capital stock (a function of national investment and depreciation) as an explanatory variable. They also use the instrument variable estimation technique to resolve the potentially biasing effects of the endogeneity of human capital accumulation (causality between income and schooling is likely to go in both directions). They use parental income (proxied by national average years of schooling lagged by ten years) as an instrument for S, and use fixed-effects estimation, which allows for country-specific tendencies in income trajectories. They also estimate region-specific effects, but these are found to be insignificant for regions with large out of school populations. By controlling for other possible influences on GDP, all of these additional econometric techniques bring the estimation closer to isolating a causal effect of education attainment on national income.

The coefficient on mean years of schooling (Si) is 47% of Psacharopoulos and Patrinos' estimate of 0.26. This suggests that, by not controlling for the effect of physical capital on output, Psacharopoulos and Patrinos overestimate the effect of education on output by a factor of over 2. Table 9 compares cost estimation based on the two models of the education-output relationship (Equations 4 and 5). Due to the advantages of Barro and Lee's specification, estimates in the body of this paper are based on their model.

REFERENCES

REFERENCES

Arbex, M., Galvao, A.F., and F. Gomes (2010). "Heterogeneity in the Returns to Education and Informal Activities." Insper Working Paper.

Aromolaran, A. B. (2006). "Estimates of Mincerian returns to schooling in Nigeria." Oxford Development Studies, 34 (2), 265–292.

Barro, R. J., and J. Lee (2010). "A new data set of educational attainment in the world, 1950-2010." NBER Working Paper 15902
.

Belfield, C. (2008). "The Cost of Early School-leaving and School Failure." Mimeo, World Bank.

Belfield, C.R., and H.M. Levin (2007). The Price We Pay: The Costs to the Nation of Inadequate Education. Brookings Institution Press: Washington, DC.

Burnett, N., Guison-Dowdy, A., and M. Thomas (2013). "A Moral Obligation, An Economic Priority: The Urgency of Enrolling Out of school Children." Educate A Child.

Chen, Y. and H. Li (2009). "Mother's Education and Child Health: Is There a Nurturing Effect?" Journal of Health Economics. Volume 28(2).

Colclough, C., Kingdon, G. and H. Patrinos (2009). "The Pattern of Returns to Education and its Implications." Research Consortium on Educational Outcomes & Poverty, Policy Brief 4.

De Brauw, A., and S. Rozelle (2006). "Reconciling the Returns to Education in Off-Farm Wage Employment in Rural China."

Deininger, K. (2003). "Does cost of schooling affect enrollment by the poor? Universal primary education in Uganda." Economics of Education Review. 22 (3). 291–306.

Delprato, M. (2012). "Schooling profiles: between and within country differences. Educational dataset prepared for the GMR 2012 based on DHS household surveys." Background paper for EFA Global Monitoring Report 2012.

Kingdon, G., H. Patrinos, C. Sakellariou, and M. Soderbom (2008). "International Pattern of Returns to Education." Mimeo, World Bank.

Hanushek, E. A. and Woesmann, L. (2007). "The role of education quality in economic growth." World Bank Policy Research Working Paper 4122. Washington, DC: The World Bank.

Heckman, J. and P. Klenow (1997). Human Capital Policy. Mimeo, University of Chicago.

Knight, J., R. Sabot, and D. Hovey (1992). "Is the rate of Return on Primary Schooling Really 26 Per Cent?" Journal of African Economics, 1(2), 192-205.

Krueger, A. and M. Lindahl (2001). «Education for Growth: Why and for Whom?,» Journal of Economic Literature, vol. 39(4).

Loening, J. (2005). "Effects of primary, secondary and tertiary education on economic growth. Evidence from Guatemala." World Bank Policy Research Working Paper 3610. Washington, DC: The World Bank.

REFERENCES

Mertaugh, M. T., Jimenez, E. Y., and Patrinos, H. A. (2009). The global challenge in basic education: Why continued investment in basic education is important. Washington, DC: The World Bank.

Michaelowa, K. (2000). "Returns to education in low income countries: evidence for Africa."

Mincer, J. (1974). Schooling, Experience and Earnings. National Bureau of Economic Research.

Nguetse Tegoum, P. (2009). "Estimating the returns to education in Cameroon informal sector."

Omoeva C., Sylla, B., Hatch, R. and C. Gale (2013). "Out of school Children: Data Challenges in Measuring Access to Education." Education Policy and Data Center.

Psacharopoulos, G. and H.A. Patrinos (2004). "Returns to Investment in Education: A Further Update." Education Economics 12(2): 111-134.

Psacharopoulos, G. and H.A. Patrinos (2011). "Education: Past, Present and Future Global Challenges." World Bank Policy Research Working Paper 5616.

Riboud, M., Savchenko, Y. and H. Tan (2007) The Knowledge Economy and Education and Training in South Asia. The World Bank.

Schultz, T.P. (2004). "Evidence of Returns to School in Africa from Household Surveys: Monitoring and Restructuring the Market for Education." Journal of African Economies, 13(2), 95-148.

United Nations Development Programme (2013). Human Development Report.

UNESCO (2012). EFA Global Monitoring Report 2012. Youth and skills: Putting education to work. Paris, France: UNESCO.

UNESCO Institute for Statistics (2013). "Schooling for Millions of Children Jeopardized by Reductions in Aid." UIS Factsheet June 2013.

UNESCO Institute for Statistics (2012). "Opportunities lost: The impact of grade repetition and early school leaving."

UNICEF (2012). The state of the world's children 2012: Children in an urban world. New York: New York: United Nations Children's Fund.

World Bank (2009). Abolishing School Fees in Africa: Lessons from Ethiopia, Ghana, Kenya, Malawi, and Mozambique. World Bank.

Yamasaki, I (2012). «The effect of education on earnings in the informal sector in South Africa.» Paper presented at the annual meeting of the 56th Annual Conference of the Comparative and International Education Society.

ENROLLING IS ESSENTIAL

WWW.EDUCATEACHILD.ORG.QA

علّم طفلاً
EDUCATE A CHILD

RESULTS FOR
DEVELOPMENT