The Cost of Early School-leaving and School Failure *

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Summary

This report examines how low educational attainment is associated with significant economic costs for private individuals, for taxpayers, and for society. Specifically, higher education levels are associated with higher earnings, increased labor market participation, better health status (including lower prevalence of epidemic disease), and improvements in family decision-making; education is also associated with lower rates of poverty and intra-household benefits such as improved family nutrition. We describe the method for calculating these costs of school failure. We then highlight methodological challenges as well as key assumptions that underlie estimates of the overall costs of school failure. The method is illustrated with case studies from seven countries: Indonesia; Ghana; Kenya; Pakistan; Mexico; Chile; Ukraine; and Egypt. Using the best available research evidence, we calculate the gross costs of school failure for each of these countries. In each case these costs are significant. However, the magnitude of these costs depends on several key assumptions, including: the appropriate discount rate; the valuation of informal activity; and the economic value of improved health.

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1. Introduction

This report investigates the economic consequences for nations from failing to adequately educate their citizens. Hundreds of studies have established the income gains from having more education such that investment in more schooling would pass a cost-benefit test (see Psacharopoulos and Patrinos, 2004). That is, the present value of the investment in education would be exceeded by the present value of the resulting economic benefits, as expressed in money terms (McMahon, 1998). But, basing educational investment decisions solely on the earnings gains is incomplete: as documented below, there are many other effects of education that might justifiably be included in a benefit–cost analysis. Such analysis should include this full range of benefits from education, expressed in present values, to set against the costs of the investment. Yet despite the simplicity of the evaluation method, and the need for a complete accounting, it has been only infrequently applied at the national level. As such, it is not possible to determine whether national education policies and investments in schools and colleges are optimal.

Recent research has begun to investigate the costs of school failure or inadequate education.[1] It finds substantial economic benefits to individuals and countries when education levels are higher; alternatively put, nations are losing significant opportunities for improvements in economic well-being by failing to ensure that citizens have sufficient education and skills. The economic magnitudes are such that there is a strong imperative for governments to invest more in public education. However, this work has focused primarily on the U.S. and Europe, mature economies with relatively small informal labor markets and large government expenditures as a proportion of GDP. Research for other countries is very limited. Evidence on the costs of inadequate education ultimately depends on how education influences economic behaviors and who benefits, and these influences may vary from country to country.

[1] Psacharopoulos (2007); Belfield and Levin (2007); and World Bank (2003). Looking just at low levels of literacy for the United Kingdom, KPMG Foundation (2006) estimates the costs at £45,000 per person.

This report makes two contributions to the research on the costs of inadequate education. First, we develop the method for estimating the costs of inadequate education, as applied to a broader set of countries. Second, we assess the potential costs of inadequate in eight countries: Mexico; Chile; Ukraine; Ghana; Kenya; Egypt; Indoneisa; and Pakistan.[2] These eight countries were selected to include a variety of global circumstances of developing economies: central/South America; one centrally-planned Soviet economy; three African countries, one Arabic; a large Asian economy; and a large low-income nation with very low education levels. This variety allows us to compare and contrast different methodological and empirical aspects of the costs of inadequate education. These comparisons are important in highlighting the key assumptions needed to calculate costs of school failure.

The report is structured as follows. First, we review the education levels in each of the eight countries. This review allows us to assess the extent to which education levels might be suboptimal. Second, we describe in detail the assumptions behind calculations of the costs and benefits of inadequate education. We consider issues of specific relevance to developing countries, including child labor, the appropriate discount rate, and the system of governance. Third, we calculate the costs of inadequate education for each of the eight selected countries. For each country we follow a modular template approach that: (a) describes key aspects of the education system, including the extent to which families are constrained in their enrollment decisions; (b) identifies the earnings premium from education; (c) assesses other economic benefits from education (e.g. health and long-term well-being); and (d) calculates a lifetime present value cost of inadequate education. We emphasize that, for two reasons, these calculations are provisional. One is that there are a number of unresolved issues in relation to applications of the cost–benefit method at a national level; and the other is that the data available

[2] From our literature review, for none of these countries has a full economic burden been calculated. For other countries, partial costing models have been undertaken in relation to specific social burdens (such as HIV/AIDS) but generally these models have not be related to educational status.

for each country is far from ideal. Nevertheless, these figures give an indication of the costs of school failure and the extent to which public investments are optimal.

2. Educational Status

2.1 Measuring education levels

Table 1A shows basic educational and demographic data for the selected countries from the Barro-Lee dataset from 1980 to 2000 (data for the Ukraine is from UNESCO). Each country has experienced significant population growth over the last two decades. Per capita educational attainment has also increased over this period. However, as of 2000, for each country, the average years of schooling per person aged over 24 is low: less than 8 years in Chile; 7 in Mexico; 5 in Egypt and Indonesia; 4 in Ghana and Kenya; and 2.5 in Pakistan. With the exception of Chile and Mexico, the average years of schooling per person does not ensure that each individual has completed primary school. In fact, in Egypt, Ghana, Kenya, and Indonesia one-third to one-half of the population has not completed primary school. Yet, for those who complete secondary education, each country has a growing higher education system, albeit from a relatively small base.

Table 1B gives further information about each education system (World Bank data, 2005). Three countries have almost complete adult literacy (Chile, Mexico, and the Ukraine), but three have a significant proportion of adults who are not literate; and in Pakistan and Ghana, roughly half of the population is not literate. Each country spends public funds on education: spending varies from 2.3% of GNP up to 6.7%, with the higher figure above the proportion for the OECD countries (the OECD average for 2005 was 5.8%, www.oecdinfigures). However, this high spending ratio includes a significant investment in higher education. As shown in the final panel of Table 1B, both Kenya and Ghana – despite majorities of the population only at primary level – invest heavily in higher education: per student spending for higher education is more than twice as much as per capita GDP. Also, Indonesia spends an amount equivalent to GDP per capita on each student enrolled in higher education.

There are significant differences in education levels by sex. Unlike OECD countries, where the high school graduation rate for females is above that of males in all but two countries (Turkey and South Korea), educational disparities favor males in developing countries. In examining illiteracy rates, the rates in Egypt are 17% for males but 40% for females and in Indonesia 6% versus 13% (MENA, 2007, Table 1.9). For Ghana, attainment differences are stark, with males aged 20-24 having on average 8.3 years of schooling, compared to 5.5 for females. For Pakistan, 10% of boys aged 10-14 are not enrolled; for girls, the figure is 36% (Sathar et al., 2003, Table 1). However, for countries with higher incomes and higher overall attainment, girls are at parity with, or overtaking, boys: in Mexico, education levels are broadly the same by sex; and 20-29 year old Ukrainian females have almost one year more schooling than males.

There are also significant differences by urban/rural location and poverty status. For example, in Egypt, enrollment rates for 15-19 year olds are 85% for the urban non-poor, 73% for the rural non-poor, 72% for the urban poor, and only 65% for rural poor children (MENA, 2007, Table 1.11). Illiteracy rates are almost 50% in poor, rural Upper Egypt compared to 31% nationally (World Bank, 2004, Figure 1.4). For the Ukraine, children in rural areas have 0.4 years less schooling on average (Patrinos, 2008, Table 7). For Indonesia, school participation rates are 10 percent lower in rural over urban areas; and the gap in participation between the poorest and the richest quintiles is almost 30% (Filmer, 2008, Figure 1). These gaps also exist in the earliest years of schooling: approximately half of all children in Indonesia in the richest quintile participate in early childhood education; the proportion for those in the poorest quintile is one-fifth (World Bank, 2006b). Similar disparities in early education enrollments are evident in Kenya and Ghana (Kennedy and Haddad, 1994).

2.2 Defining school failure or inadequate education

From an economic perspective, the definition of 'school failure' or 'inadequate education' is clear: it occurs whenever the economic benefits of education exceed the costs of attending school, i.e. when the net present value of educational investment is positive. The specific level of education associated with a positive net present value will vary from country to country. For example, Belfield and Levin (2007) argue that, for the U.S., failure to graduate from high school represents 'inadequate education'. In the U.S., being a high school dropout results in significantly lower income, higher unemployment, inferior health status, and higher welfare receipt and involvement in criminal activity. By failing to graduate from high school, students in the U.S. are risking significantly impaired lifetime economic well-being.

Low absolute levels of education may not be synonymous with inadequate education, particularly in regions where life expectancy is relatively short. Important to the consideration of 'inadequate education' is whether individuals are constrained in the optimal amount of education they can obtain. If individuals are unconstrained and can invest freely in education and other activities, it is unlikely that they will have made sub-optimal investments from a private perspective. Internationally, there is plausible evidence of substantial income constraints on educational investments (see Filmer, 2008) such that families cannot borrow optimally. Citations regarding education policies and the likelihood of sub-optimal investments for each of the selected countries are listed in column 2 of Table 2. These citations are discussed below.

As shown in Tables 1AB, very few students complete secondary education. Given these low absolute levels of education in the selected countries, high school graduation is not a reasonable measure of school failure. Instead, it is more appropriate to consider investments that would either ensure universal completion of primary education or augment existing levels of attainment by one or two years.

The growth in average years of schooling over the last two decades (Table 1A) gives some indication of feasible changes in educational attainment. Each country (except Pakistan) has raised average educational attainment by at least one year over the period 1990-2000. However, given the low rates of completion of primary schooling, it may be more appropriate to focus on raising education levels for children at the bottom of the education distribution. For example, a more efficient policy may be to seek to reduce the numbers of persons who do not complete the first level of education by 20 percentage points (equivalent to the gain by Egypt, Ghana, Kenya, and Mexico over the prior decades, see Table 1A).[3] For countries with higher first-level completion rates, an alternative policy might be to raise the rate of completion of secondary education by 10 percentage points (as for Mexico from 1980 to 2000). These changes are considered below, as applicable for each country.

[3] Others have argued – in the context of education systems across Africa – that free and universal primary education is feasible (see Avenstrup et al., 2004).

3. Method for Calculating Costs of Inadequate Education

3.1 Taxonomy of benefits from education

There are many potential benefits from more education. These benefits are reaped by three agencies: the private individual; government/taxpayers; and the broader society. Each agency may gain because education influences a number of domains. For example, private individuals gain because they obtain higher incomes; but taxpayers also gain because higher incomes mean higher tax payments. Necessarily, it is the costs and benefits of education for each agency that help explain investment decisions.

The primary beneficiary of education is of course the individual who experiences higher incomes, wealth, and improved health status, as well as a set of intra-household benefits. For income, the effect is assumed to be a direct skill effect (and not a signaling effect). The wealth effect may arise because educated persons have higher returns on financial assets or avoid poverty and debt. The health status effect may arise in part because of higher incomes, but there is also a direct knowledge effect (e.g. on disease etiology). For fertility, education plays an important role because: where females have more labor market options they have a lower demand for children; education is associated with greater use of contraception; and staying in school reduces the number of years available for child-rearing. But education affects sexual behaviors more broadly; this in turn influences the spread of sexually-transmitted diseases (as discussed below). Also, maternal education is likely to raise child health in two ways: it raises the productivity of health inputs; and it reduces the costs of gathering information about healthy behaviors (Barrera, 1990). Compelling international evidence is summarized in Hanmer (2003): across ten studies of infant mortality, eight find a clear, statistically significant reduction in infant

mortality from mother's education.[4] Finally, individuals gain from education through intra-household productivity gains, such as more efficient household management and better care of children and their health. Offsetting these private advantages from education are the costs. These costs have two main components: the opportunity cost of not working and the direct cost of fees for education.

A second beneficiary of education is the government (taxpayer). As education boosts incomes it increases tax payments and reduces reliance on government health, welfare, and social support programs. As education reduces criminal activity the taxpayer saves on criminal justice system expenditures. However, the government also incurs costs in public subsidies for education. An important distinction in considering the government benefits from education is between central and local government. Typically, central governments collect payroll taxes and fund anti-poverty programs. However, they do not have the primary responsibility for funding education (or supporting health systems); this is devolved to local governments.[5] Therefore, there is a mismatch between the recipient of the benefits of education (central government) and the agency responsible for funding education (primarily the local government).

Finally, it is useful to consider the social perspective on investments in education. This social perspective values all the benefits of education regardless of which agent is the beneficiary. Therefore, the social benefit includes the private benefits and the fiscal benefits (excluding transfers). It counts all the costs of education, both private fees and public subsidies. In addition, a social perspective would count the gains to all citizens when crime rates are lower; these gains

[4] The health status to education relationship is not conclusive, in part because the effects of education appear to vary by amount of education. Grignon (2007) reports on the variation in the returns to education on health status across different countries: modelling a relationship where educational effects differ after completion of primary school, the effects of education are almost zero beyond this attainment level. Moreover, both Behrman and Wolfe (1987) and Streatfield et al. (1990) find that knowledge of the benefits of health is more important than education per se even as the two are strongly positively correlated. And the education–health relationship is not always found. Wang (2002) shows that, in pair-wise correlations, education and child mortality are strongly correlated. But, the effect is mediated by the collinearity between income and education such that the correlation is not statistically significant in multivariate estimation.

[5] For example, In the Ukraine, local government spending is 30% of total government spending, but it bears a much higher fraction for education (61%) and health (77%).

include savings from being a victim of crime and reduced costs of crime avoidance. The social perspective also counts productivity externalities, i.e. improvements in economic competitiveness that arise when the workforce has more human capital. Lastly, the social perspective also counts the social value of health, i.e. the economic benefits from reductions in infectious diseases or epidemics (such as HIV/AIDS).

Indeed, one domain where educational investments may be powerful for individuals, the taxpayer, and society is in reducing HIV/AIDS prevalence. AIDS prevalence rates vary significantly, with extremely high rates in some African countries.[6] AIDS prevalence is strongly related to education levels: using UNAIDS data for 84 countries, Lakhanpal and Ram (2008) estimate that a ten percent increase in mean schooling (equivalent to one-half year) reduces HIV prevalence (% of adult population age 15-49 with HIV) by 12-17%. And the economic costs of HIV/AIDS, particularly in high-prevalence countries, are stark. HIV/AIDS infection destroys human capital formation and work productivity among young adults; it reduces savings as families pay for medicines; and it also dramatically cuts schooling investments for children in families with HIV-positive adults (as well as creating large cohorts of orphans).[7] The costs of HIV/AIDS is borne by the entire family: in Kenya, Yamano and Jayne (2005) find that parental HIV/AIDS significantly reduces school attendance for girls – caring for sick parents – and boys – assuming household and income-generating responsibilities (see also Mishra et al., 2007). The total costs of HIV/AIDS include not only the loss of life, but also the fiscal costs of prevention and treatment. In an economic evaluation in urban and rural Kenya, Forsythe et al. (2002) report significant costs of counseling and testing centers for HIV/AIDS. Costs were such that many families would not use the service if it was not publicly-supported. Also, HIV-positive patients

[6] In Kenya the rate is at least 15% of persons aged 15-49 (Robalino et al., 2002a). In contrast, for the Ukraine, it is 0.25% of persons aged 15-49 (World Bank, 2007), but it is 0.7% of those aged 20-24. According to World Health Organization data, the numbers needing anti-retroviral treatments in 2006 were: 9,000 in Chile; <1,000 in Egypt; 20,000 in the Ukraine; 12,000 in Pakistan; 25,000 in Indonesia; 46,000 in Mexico; 63,000 in Ghana; and 290,000 in Kenya (Global HIV/AIDS online database at www.who.org).
[7] However, orphanhood may not reduce attainment according to research by Ainsworth and Filmer (2006).

may have complications from other diseases, ratcheting up health care costs.[8] A series of models have examined the consequences for economic growth and although these economic models vary widely in their predictions about economic losses, they are consistent in identifying the costs of AIDS as substantial.[9] Direct evidence on the costs of HIV/AIDS for some of the selected countries is available and is incorporated below.[10]

This taxonomy (private, fiscal, and social) is distinct from other classifications of the economic benefits of education in several dimensions. First, the rate of return to education is strictly calculated from the present value costs and benefits accrued to each agent (private, fiscal, or social). By custom, the term 'rate of return to education' is often applied to the coefficient on years of schooling from a Mincerian earnings function. In this taxonomy, such a coefficient is called the earning premium because it may not approximate to the rate of return to education once costs and, importantly, other benefits are accounted for. Second, the term 'social' in this taxonomy includes all the benefits that might accrue to society. Other studies refer to the social rate of return as the private rate of return minus the public costs of providing the education. (Typically, studies report this social rate as a few percentage points below the private rate). However, this reference is overly narrow in that it does not account for the other social benefits from education. Finally, this taxonomy is more detailed than the term 'non-market' outcomes from schooling (Behrman and Stacey, 1997; Wolfe and Zuvekas, 1997). This term may include benefits that accrue to government in the former of lower expenditures or society in the form of productivity externalities; it may also include benefits that can be monetized using shadow prices.

[8] In a microeconomic study of patient case management in Sudan, El-Sony et al. (2006) report that HIV-positive patients with tuberculosis are significantly more expensive than HIV-negative patients with tuberculosis.

[9] As reviewed in Bell et al. (2006) and Robalino et al. (2002a), these studies find: if HIV prevalence rises from zero to 15-20% in sub-Saharan Africa, per capita income falls by 30-40%; if HIV prevalence rises by 1%, per capita income falls by 0.59%; and an overall estimate for countries where prevalence rates exceed 5% is 0.5% to 1.5% per year in per capita GDP.

[10] Nevertheless, there is an important caveat: the urgent imperative is to reduce HIV rates in the immediate term, whereas educational investments are a long-term strategy for reducing prevalence. Alternative policies – health interventions – may therefore be more cost-effective at reducing HIV prevalence in and of itself. Nevertheless, the above evidence suggests that the economic benefits of education in reducing HIV/AIDS prevalence may still be significant.

Finally, we note one important implicit assumption of this cost-benefit method: it assumes that each dollar of savings for each agency is valued equally. Yet, if society places a higher value on reducing poverty over raising average income levels, then simple comparisons of costs and benefits may not be appropriate.

The matrix of agencies and benefits from education are summarized in Box 1 (Belfield and Levin, 2007; Behrman and Stacey, 1997). This matrix shows how the benefits accrue to different agencies, as well as how each benefit affects multiple agencies. The matrix allows us to consider a modular approach where research evidence on each of the items (1)-(12) is collected for any country or region.

3.2 General Statement of Method

The method for calculating the costs of school failure involves three stages (Belfield and Levin, 2007). These are outlined in Box 2.

First, it is necessary to specify an appropriate threshold level of education that constitutes success or failure. As reported above in Section 2, an appropriate level for the selected countries may be either one additional year of attainment or universal completion of primary (or secondary) school.[11] Given this threshold it is necessary to count the numbers of persons who fail to reach that threshold for a given age cohort and to identify those persons who might feasibly reach the appropriate level of education. A further consideration is whether this increase in education leads to a further upgrading of education levels. For example, new high school graduates might then enroll in college.

Second, the lifetime 'causal impact' of education on each of the benefits listed in Box 1 must be identified. This identification is determined using the best available research evidence

[11] School quality should also be considered. Behrman et al. (2008) argue that because children are already enrolled in school, the opportunity cost of improving school quality is zero. However, given the very low levels of attainment in developing countries (as well as equity considerations) the primary concern is access to school; improving school quality would of course benefit those who already enroll, and these children are disproportionately from wealthier families.

for each country, appraised according to method. To estimate the impact of education on each domain, we review a wide range of literature. Reflecting differences in education systems, labor markets, and social systems, we only draw on literature specific to each country.[12] As shown in Tables 3 and 4, there are a significant number of high quality studies that relate education to each outcome. As an iterative process, the research evidence may be continuously improved. That is, the evidence would be drawn from: studies conducted most recently; studies that are specific to localities or disaggregated by population characteristics; and from studies that use high-quality research methods.[13]

As most of the research employs controlled observational empirical methods, rather than experimental methods, it is not possible to identify causality. Indeed, causality from education to any of the benefits is often difficult to establish given individuals' endogenous choices of schooling. However, at least for the education–earnings relationship, there is sufficient evidence to conclude that there is causality (Rouse, 2007). The earnings premiums for a year of additional schooling for the selected countries are reported in Tables 5A-E. For each equation the earnings premium is positive and statistically significant, although there are variations by locality and level of education. Moreover, these premiums do not typically adjust for labor market participation rates by education levels.[14]

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[12] Our search strategy for review for each country includes: review of the World Bank database ('data and statistics', 'publications and reports', and 'development topics'); search of Web of Science literature from 1995-2008; direct review of journals *Education Economics*, *Economics of Education Review*, *World Bank Economic Review*, as well as IMF working papers (2005-2008).

[13] A more detailed approach would involve estimation of these relationships directly using country-specific datasets. For the selected countries, household survey data do exist for: Kenya Demographic and Health Survey (2003); Ghana Living Standards Survey (2003); Pakistan Integrated Household Surveys (2001); National Income and Expenditure Household Survey (ENIGH, 2002); and Indonesia SUSENAS National Socioeconomic Survey (2003). Further research is necessary to examine these datasets.

[14] Earnings premiums, conditional on employment, do not significantly vary by sex. For Chile, male earnings premiums are 12.1% versus 13.2% for females; for Ghana, the respective figures are 9.3% and 10.6%; and for Mexico, 14.1% and 15% (see Tables 5AE below). However, female labor market participation rates are considerably below male rates. Typically, private earnings premiums for primary school are higher than for secondary school or higher education (as in Indonesia and Mexico). However, in some cases the return to higher education is significantly above that of other education levels because access to university is restricted. For example, earnings premiums for secondary school in Chile are 12.9%

The third stage is to calculate the monetary benefits or economic/cost consequences from each educational impact for each population cohort. In the case of income gains, these cost consequences are straightforward, but the economic consequences of other benefits may be harder to identify. For example, it is necessary to place an economic value on gains in health or reductions in crime, yet these typically do not have observable prices.[15] Often it is necessary to rely on government budgetary spending as an indicator of the economic consequences of poor health status or high crime.

Where cost data are not available we apply the method described in Wolfe and Zuvekas (1997) and first elaborated in Haveman and Wolfe (1984). In equilibrium, families should accumulate education such that the marginal utility divided by the price equals the marginal utility divided by the price of other inputs into the utility function. One of these inputs is education, the price of which is typically unknown. Often, one of the other inputs is income, the price of which serves as the numeraire. Therefore, the equilibrium condition is:

(1) $MU_{education}/Price_{education} = MU_{income}/\$1$

Equation (1) can be rearranged such that:

(2) $Price_{education} = MU_{education}/ MU_{income}$

With information on the marginal utilities (proxied by coefficients from regression equations), it is therefore possible to calculate the economic value of education. Where data are available, we apply this Haveman–Wolfe (HW) translation below to allow for a fuller accounting of the benefits of education.

Finally, the fourth stage is to aggregate these benefits to provide a full assessment of the gross costs of school failure. These benefits should be expressed in present values and so can be

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versus 20.7% for higher education; for Pakistan, the respective figures are 13.7% and 31.2% (all data from Psacharopoulos and Patrinos, 2004).

[15] One measure of costs is the amount that private individuals spend as a proportion of their budgets; but this is problematic because higher incomes allow families to consume more health or less crime. The only shadow price we could identify for family valuations of child health is from Dickie (2005). Using U.S. data, families report a willingness-to-pay to avoid one school day lost to health of $100-$150 (1997 dollars). Approximately, therefore, one lost school day equates to one lost day of work.

compared with any additional educational subsidies. This comparison will yield the net costs of school failure. Below we do not calculate the costs of educational subsidies and so the figures presented below are the gross costs of school failure.[16]

This method has a number of benefits, not least in terms of conceptual simplicity, for formulating educational policies across countries. It estimates the effects for individuals who must make decisions about educational investments. It illuminates the relative importance of education across the domains of life. It highlights which assumptions are the most sensitive for policy. Perhaps most important is the utility in comparing the economic consequences of school failure with the burden of funding for education. Clearly, determination of the burden of funding for education is a key policy issue, but this burden should in part reflect the benefits principle, i.e. agencies should fund education to the extent to which they benefit from it.[17] This analysis helps shed light on the optimal burden of funding.

3.3 Methodological Issues

Although straightforward in principle, the method of calculating the costs of school failure is challenging in practice. The key sensitivity issues are itemized in Box 2, section (4).

First, it is important to fully account for the benefits of education (particularly when calculating a social rate of return). Some influences that might be anticipated from increasing levels of education are omitted in this analysis. These are itemized in Box 3. These omissions may be justified on the grounds that the resulting 'costs of school failure' will be conservatively estimated.

We exclude any environmental benefits from additional attainment; yet, for Mexico Dasgupta et al. (2000) find levels of human capital to be positively associated with compliance

[16] The costs of educational subsidies would require identification of successful interventions that would raise attainment. Identifying such interventions is a far from straightforward task.
[17] The burden of funding raises many other important issues. Few of the selected countries run budget surpluses, such that public funding can be directly secured either from tax revenues or from borrowing at current interest rates.

with environmental protections. We do not include the influence of education on remittances to families. These are an important way for families to avoid poverty, but the effect of education is hard to identify because education is positively correlated with migration decisions which in turn induce remittances.[18]

We also do not fully consider issues related to family formation, household size, and intra-household externalities. Specifically, education is associated with smaller family size; we do not place a positive or negative value on that change (although we do count the impact on child quality from mother's education and the implications of better fertility management for government health spending). Intra-household externalities may be significant, particularly across generations: for Egypt, for example, Wahba (2006) finds that parental education is strongly negatively associated with child labor rates. The economic values of these more subtle linkages are not easy to calculate or calculate shadow prices for, however.

Another separate area where education may play an important role is in relation to civic order. Education has been found to be positively correlated with civic engagement and this may contribute to good government. However, the economic value of democracy has not been found to be strong (even as political stability appears to raise economic growth, McMahon, 1998).[19] So, this benefit is not counted here. Finally, education has a demonstrated positive effect on life expectancy, but this is only partially incorporated into the analysis below. That is, we assume education will yield additional years of life (and so additional economic activity) and will reduce child mortality rates; but we do not include a measure of the value of life *per se*.

[18] Also, even Mexico, which has by far the largest absolute value of international remittances across Latin America, generates less than 5% of GDP through such remittances (Acosta et al., 2008). Adams (2006) finds that, intranationally, families that remit money do not have higher incomes than families that do not remit. And Taylor and Yunez-Naude (2000) report only small effects of education on remittances in Mexico.

[19] Such externalities are hard to identify because they appear to be very sensitive to institutional frameworks and power structures. For cooperative economic arrangements involving NGOs in Ghana, see Botchway (2001). On peer learning in regard to micro-credit financing in Mexico, see Barboza and Baretto (2006). Olken (2006) investigates corruption in rice aid programs in Indonesia; although corruption rates are high (at least at 18% of total aid), education levels do not appear to influence corruption rates.

Second, the evidence is not always conclusive that education is beneficial. Macroeconomic studies typically find much smaller gains from education compared to microeconomic studies; the former find factor accumulation to be a more potent influence on economic growth than productivity gains (on evidence for Egypt, see Abu-Qarn and Abu-Bader, 2007; internationally, Pritchett (2006) estimates productivity externalities from education are zero). The discrepancy between these results may arise because of general equilibrium effects: education may be privately beneficial, but at the expense of other workers who do not have credentials. (It might alternatively be a result of aggregation bias). For example, Duflo (2006) finds that a large-scale expansion in education in Indonesia did cause the wage rate to fall, in part because capital did not expand. It also caused a large increase in participation in the formal labor market. A 10% increase in the primary school graduation rate caused the wages of older cohorts to fall by 4-10% but it also increased their labor market participation by 4-7%. If the expansion of education is large-scale, wages may indeed fall.

However, these general equilibrium effects may not be strong. Educational changes take a long time to permeate the labor market (as some students go to college) and even then the new entrants are a flow being added to a very large stock (of about 30 times the size). Moreover, education influences migration, such that new graduates may move to alternative labor markets to get jobs (the impact of education on migration is also not considered here: the motivations for migration are complex and educational influences are unclear, Mansuri, 2006). Finally, intensive investigation for the U.S. (and other western countries) has found that skill-biased technical change significantly offsets labor supply effects; the long run correlation between aggregate skills and wages is therefore unclear. Our approach is to use the best available microeconomic research evidence on the impacts of education but recognizing that, if substantial expansions in education are contemplated, the marginal returns may be lower than our average estimates.

A third challenge is that children's time in school has a high opportunity cost, particularly in developing countries. Specifically, many children are not in school because they must work to

support the family and ensure that household income is above subsistence; this is especially salient for countries where secondary school enrollment rates are low. For children, hours worked in the labor force do reduce attainment (perhaps by as much as two years of attainment, for Mexico, see Binder and Scrogin, 1999; for Ghana, see Ray, 2002). However, a significant proportion of child labor is either illegal, compromises child development, or is not monetarily compensated.[20] Also, the majority of child who work are also in school.[21] Moreover, free schooling or subsidies may reduce child labor (as found in studies of conditional cash transfer programs, such as Progresa in Mexico, Bando et al., 2005). If schooling includes free meals, it may reduce poverty also. Here, the assumption is that child time out of school – at least for elementary school children – has no opportunity cost.[22]

Fourth, the economic consequences of education will depend on how informal labor market activity is valued. In developing economies, with large agricultural sectors, it is harder to measure employment status and to account for the value of work done by all members of a household.[23] Increasing education may lead to greater participation in the formal labor market but not necessarily an overall improvement in family well-being (e.g. if child care is transferred to other family members). This impact of education may be particularly strong in countries where female labor force participation rates are currently low.[24] The assumption here is that education is equally beneficial in non-market settings as in the labor market. That is, education changes the opportunity cost of working versus not working so that a college-educated non-worker must have the same economic benefits as a college-educated worker. (As we show below for the case studies, consumption data indicate that educational impacts are at least 75% as strong

[20] Binder and Scrogin (1999) report wage rates for children in Mexico that are one-third of parental wages.
[21] For rural Egypt, Wahba (2006) estimates 19% of children work, but over half of them are also in school.
[22] This assumption is motivated by the following: child labor is illegal, raises only a small amount of family income, displaces in part child leisure, and is often a consequence of a lack of availability of schooling.
[23] For example, in Pakistan only 27% of adults are in wage employment, with 8% self-employed, 13% agricultural workers, and 52% out of the labor force (Kingdon and Soederbom, 2007).
[24] For the selected countries, female rates of labor market participation are: in Egypt, 31%; in Indonesia, 41%; in Chile, 35%; and in Mexico, 35% (MENA, 2007, Table 2.9).

in rural or agrarian areas as they are in urban areas). Under this assumption it is not necessary to incorporate changes in labor market participation in the overall returns. However, one advantage of education in raising labor market participation rates is that individuals do pay more in taxes; in this respect education yields fiscal gains.

Fifth, a critical parameter in calculating the benefits of education is the discount rate, i.e. the rate at which future benefits from education should be valued. In their analysis for the U.S., Moore et al. (2003) argue for a 3.5% discount rate for public investments. However, this rate is almost certainly too low for countries with lower life expectancies, greater economic volatility, and more unstable governments. Yet, it is possible to avoid the use of a discount rate if the simulation is simply described as: the current annual cost of school failure for all those persons who are not adequately educated.

Finally, data limitations may be such that it is hard to accurately identify the benefits of education. Data for some of the domains of education or for costs may not be available. Typically, information is only available on average cost even though marginal cost is the more relevant value. Regional government budgets are also not easily accessible.[25] Sample surveys in these countries may suffer from greater selection bias or educational mismeasurement (particularly in regions with low literacy rates); also school quality may vary significantly (Behrman and Birdsall, 1993). In addition, in many developing countries with poorly functioning public education systems, families may enroll their children in private tutoring schools (as well as public school). This tutoring is not typically measured in educational datasets and its omission may lead to an upward bias in the earnings premium for education.

[25] Also, information on the progressivity of the tax code is needed. If education raises incomes and makes persons liable at a higher tax rate, then the fiscal impacts of education are likely to be understated. As found by Gong and van Soest (2002) for Mexico, the fiscal impacts of education on incomes taxes are somewhat muted by the proportionality of the tax rate.

In terms of the benefits of education, data limitations are particularly evident in the domain of criminal activity.[26] As noted by Soares (2004), not only have there been few investigations into the causes and costs of crime in developing economies, perhaps in part because there is likely to be a significant bias from misreporting of crime. Indeed, from empirical investigation of 45 countries, Soares (2004) finds that the countries with higher incomes are much more likely to report crimes. However, education still has a beneficial impact on crime: if a country increases its primary school enrollment by 10%, both theft and contact crimes would fall by 30% (Soares, 2004, Table 6). In a separate study, Soares (2006) has calculated the costs of crimes of violence across 73 countries. These costs are expressed: as the marginal willingness to pay of an 18-year old individual; as the lifetime aggregate social value across the population; and as a proportion of GDP. However, country-specific results are only available for three of the selected countries: Chile, Mexico, and the Ukraine. These results are incorporated below. For the remaining five countries, even applying the lowest estimates of the costs of violence yields a significant economic magnitude.

In terms of the cost consequences, the largest data uncertainty relates to government financing and fiscal implications of education. Specifically, although there is information on total government expenditures as a proportion of GDP, there is limited information on who bears the tax burden and on whether marginal and average tax rates differ significantly. Also unavailable is information on tax avoidance and on the deadweight loss of collecting taxes. Absent more detailed information on these parameters, the working assumption below is that taxes are paid proportionately with income. (For developing economies relying on excise taxes, this assumption may be reasonable).

These data limitations mean that our analysis is very preliminary. One possible response to a lack of data availability and methodological challenges is to draw on evidence from other countries. Indeed, given the sizeable costs of school failure in the U.S. (Belfield and Levin,

[26] Hence, there are no entries for crime in Tables 3 and 4 of the literature review.

2007), it might be anticipated that the costs would be even greater for countries with low education levels. For example, low-income countries tend to have higher earnings premiums from schooling than rich countries (because the gains from basic literacy are greater than the gains from college, see Psacharopoulos and Patrinos, 2004).

However, there are significant economic, social, and organizational differences across countries; the presumption of high returns may not be valid.[27] Education may have less influence on economic well-being in countries with more informal labor markets or those with high agricultural employment. As well, labor markets in developing countries may not be sufficiently flexible in rewarding skills. This is especially likely in former Soviet states and economies with large public administrations. In Egypt, for example, government employment as a percentage of total employment is high at 16%; but government wages as a percentage of GDP are not proportionate at only 4% (MENA, 2007, Figure 2.1). It may be the case that educated workers accept stable government jobs which pay relatively little. If so, cross-sectional estimates of the return to education will fail to account for the benefit of job stability. In contrast, the returns might be greater in developing economies where larger families living in single dwellings may generate greater intra-household externalities.

Even if the overall costs of school failure might be comparable across countries, the returns may vary across agents. Specifically, the fiscal returns may be lower in developing countries if government spending as a fraction of GDP is lower. For example, without comprehensive healthcare coverage, private families bear the burden of ill health. So, Baeza and Packard (2006, Table 2.1) tabulate total health expenditures as a percent of GDP at 7.7% for high-income countries, 5.8% for mid-income countries, and 4.7% for low-income countries. However, differences in private spending expenditures on health as a fraction of total health expenditures are compressed (relative to income differences): they are 30% for high-income

[27] Nevertheless, international evidence may be useful for estimating key relationships. For example, in their multi-country study, Boyle et al. (2006) estimate that maternal education has a very strong effect on child health.

countries, 38% for mid-income countries, and 48% for low-income countries.[28] So, although high-income countries spend more on health and more of that spending is mediated through public provision, these patterns are not significantly discrepant from those in low-income countries. Yet, studies have found that the returns to health from education vary significantly depending on the absolute levels of education in the country (Grignon, 2007). Moreover, in less-developed economies ill health is more likely to include infections that lead to epidemics (such as HIV); in this case health improvements are likely to yield significant social benefits.

Overall, there are many factors in relation to a country's labor market, health status, family characteristics, and role of government, that will affect the costs of school failure. Hence, a country-by-country analysis of the costs of school failure appears to be necessary.

4. Indonesia

4.1 Education levels

Across Indonesia, six of ten adults are literate and over one-third have not completed primary schooling; average attainment of the adult population is under five years (Tables 1AB). According to World Bank (2006b) data, 16% of the population (35 million people) live below the national poverty line; many of these persons lack basic literacy skills. However, education levels have risen signficantly over the last two decades and Indonesia has undertaken an expansion of education through construction of new schools.[29] Ito (2006, Table 1) reports that the expansion of schooling and increase in the number of teachers in Indonesia (SD INPRES) raised educational

[28] Moreover, private spending on health care is quite small as a proportion of total annual consumption (less than 5%), and it is not substantially higher in developing Latin American countries (Baeza and Packard, 2006, ES2). Chile and Mexico, for example, fund health provision using payroll and general taxes, with private spending about one-quarter of the total in Chile and one-half the total in Mexico (Baeza and Packard, 2006, Table 1.1). Total government spending in the Ukraine is 44% of GDP (2005 data), with health spending 4% and social protection and assistance 20% of GDP (World Bank, 2006).

[29] Per-child annual spending on primary education is approximately $230 (2004 dollars, World Bank, 2004b).

attainment by 0.12 years (see also Duflo, 2001). This significant increase in attainment for younger cohorts indicates the possibility of increasing education levels in Indonesia. Moreover, public schools appear to out-perform private schools in Indonesia (Newhouse and Beegle, 2006), suggestive of the importance of constraints on families in their abilities to afford more education.

4.2 The benefits from education

As shown in Table 5, years of attainment are positively correlated with attainment in Indonesia. The most precisely calibrated estimate of earnings gains is from Duflo (2001): based on a comparison of wages before and after an expansion of school construction, earnings premiums are approximately 7%-11%. Earlier studies found positive earnings premiums from additional education of even larger magnitude. McMahon and Boediono (1992) found high social rates of return from greater investments in junior secondary general education, as well as senior secondary general and vocational education (see also Cann, 1982). Skoufias and Suryahadi (2002) survey earnings premiums over the period 1986-98 and find that younger workers are benefiting the most from education with greater participation in the labor market. This suggests that earnings premiums for education are likely trending upwards even as the economy develops with greater formalization of the labor market.

Education also raises labor market participation. Gertler and Gruber (2002) report a very strong correlation between completing primary school and secondary school and hours worked by the head of the household. There is also evidence that increasing education levels will generate externalities in terms of economic growth. In Indonesia, Todo and Miyamoto (2006) find that the effect of research and development from foreign firms on domestic Total Factor Productivity is "positive, statistically significant, and large" for enterprises with high skill levels.

Health benefits from education are also evident and potentially these gains in improved health status may outweigh those from increased earnings. In Indonesia, one-quarter of children under five are considered undernourished; infant mortality in poor districts is high, at 82 per

1,000 births; across the country, the rate is 41 per 1,000 (World Bank, 2006b). Poor health and poverty are of course strongly correlated. For adults, ill health has a strong impact on consumption, reducing it by 20% when activities of daily living are constrained (Gertler and Gruber, 2002).

For rural Indonesia, Block (2007) finds that education has a strongly positive impact on nutritional status.[30] Applying the HW translation, the value of one year of schooling is worth just under 5% of annual income. Much larger effects are reported by Skoufias (1999): applying the HW translation, having a mother who is educated to junior high has an equivalent effect on rural infant boys' weight-for-height as a 50% increase in per capita household expenditures (with similar impacts for girls and older children). In a model of intra-household bargaining, Park (2007) estimates that maternal education has a stronger effect on child nutritional status than on child education (primarily because the mother has greater responsibility for nutrition relative to education).

The effect of education on child mortality is very large: Mellington and Cameron (1999) report that one additional year of primary schooling by the mother is associated with a reduction in child mortality of 2.2 percentage points. However, the relationship between education and fertility is complex: Angeles et al. (2005) find that its effects depend on whether an individual is married or not. This impact is therefore excluded in the economic analysis below.

4.3 The costs of inadequate education

Several economic analyses of inadequate education have been conducted for Indonesia. Arze del Granado et al. (2007) calculate a social rate of return (in the narrow sense), finding significant earnings premia net of costs. However, the returns appear lowest for primary school (4%), compared to junior secondary (25%), and secondary (28%) school. A similar social rate is

[30] Miller et al. (2006) do not find strong impacts of human capital on health when social capital is controlled for.

calculated by Duflo (2001) based on investments in school construction. Although these investment take a long time to be recouped, Duflo (2001) estimates an internal rate of return of 8.8%-12%, depending on the growth rate of GDP. Finally, World Bank (2006b) conducted a cost-benefit analysis of early childhood education, focusing on both the educational benefits (higher enrollments and lower grade repetition) and on the increase in earnings. Across children, the predicted benefit-cost ratio of investing in early education is 6.01, rising to 6.93 for children from the poorest expenditure quintile. This calculation – as do the other two – excluded benefits such as nutrition and health, as well as intra-family externalities; it was also specific to a particular intervention.

Given the high rate of failure to complete primary school, this is adopted as the measure of school failure. Assuming that two additional years of school are required to complete primary school for the one-third who currently do not, this would mean an increase in the stock of human capital of 0.66 years across the entire population.

The gross annual fiscal costs of school failure are calculated as follows. The earnings gain is 14% of per capita income; and the taxes paid are 19% of this amount (calcuated as Gross Government Expenditure divided by Gross Domestic Product, see Table 6). The government health savings are five percent of 2.3% of per capita income (spending patterns calculated from Baeza and Packard, 2006). The government criminal justice system costs are estimated at 0.5% of per capita income (the developing economy average from Soares, 2006).[31] Thus, for each person who fails to complete primary school, the gross fiscal cost is 3.3% of per capita income; note that this is an annual measure of what is being lost by the taxpayer from low education levels. Given that one-third of persons do not complete primary school, the annual gross fiscal cost from school failure is 1.1% of gross domestic product (27.3 millions rupiah). Note that this value does not count the economic benefits in terms of externalities from improved health and

[31] Even for the sample of Western European economies, with homicide rates of 4 per 100,000, the welfare costs of violence are: 0.1 expected years of life lost; with a marginal willingness to pay of 12% of per capita GDP; and a social present value of 7% of GDP (Soares, 2006, Table 1).

family nutrition; nor does it factor in the enormous private (and social) losses from high child mortality rates.

5. Ghana

5.1 Education levels

As shown in Tables 1AB, education levels in Ghana are relatively low: approximately half of the adult (aged 25+) population has not completed primary school; over 40% of adults are not fully literate; and adults have on average only four years of education. However, education levels have risen considerably since 1980, when average attainment was less than 2.5 years.

There is strong evidence that individual families in Ghana face severe constraints when deciding on educational investments. Using micro-survey data, Tansel (1997) finds parental education strongly influences child educational attainment, as do Glick and Sahn (2000). In addition, Tansel's (1997) analysis of how income declines in Ghana in the 1990s had a strongly negative impact on child attainment is indicative of wealth constraints. Lavy (1996) has found that families do consider the costs of schooling across childhood when making decisions about enrollment. As for other developing economies, these constraints appear to operate more strongly for girls than for boys.

5.2 The benefits from education

There is evidence on basic earnings premiums from education in Ghana: workers with one additional year of attainment earn 7-9% more (see Tables 3 and 5). This premium is also found by Teal (2000) and Jones (2001) in the manufacturing sector, although Teal (2000) reports that Ghanaian wage rates have been very volatile in recent decades. Jolliffe (1998, 2004) finds that these premiums are strongest for off-farm income, i.e. informal or agricultural workers gain less from education although the returns are still positive. This difference may in part arise because of

how education serves as a signal of productivity in the formal labor market in Ghana (Strobl, 2004). It may also arise because more educated workers take greater advantage of on-the-job training, raising earnings further (as developed in Frazer's (2006) apprenticeship model for Ghana).

As well, education also raises labor market participation rates, with this effect also stronger in non-farm settings. Given this disparity, education induces workers to shift toward working in the formal labor market: as found by Abdulai and Delgado (1999), "human capital… is essential in increasing nonfarm earnings and time allocation of rural families and to diversify the rural economy out of agriculture… a 10% increase in years of schooling increased women's labor supply to nonfarm activities by 6.6%, compared to 3.2% for men." Greater participation in the formal labor market is associated with increased tax payments reinforcing the economic benefits to the government.

There is also evidence for Ghana that human capital generates productivity externalities. Using micro-data, Barr (2000) finds that more human capital is associated with higher productivity of capital and greater productivity through business networks. (However, because of multicollinearity, this externality cannot be calculated precisely). Where families work together informally, intra-household externalities may equate to intra-workplace externalities. For family enterprises in Ghana Vijverberg (1995) found that the entrepreneur's educational attainment raises income by an amount close to that of employed workers and that the educational attainment of the entrepreneur's family members significantly increased income for the enterprise.

The personal benefits of education include improvements in health status, reductions in the rate of HIV/AIDS prevalence, fertility, intra-household transfers, as well as long-term economic well-being (see Table 4). As noted above, research on the link between education and crime is sparse, limited to work by Soares (2006). Also, research on the fertility effects of

education for Ghana does not show strong impacts, except on abortion rates (Ahiadeke, 2001).[32] Therefore, our focus is on health effects, measured using calorie counts, and HIV/AIDS.

There is evidence for Ghana that education reduces long-term poverty and improves health status. Using the Ghana Household Budget Survey, Kyereme and Thorbecke (1991, 1987) find that education independently influences household calorie gaps, as do other correlates such as income and fertility patterns. Using the Haveman–Wolfe translation on Kyereme and Thorbecke's (1991) results, completing primary school has an impact on health (calorie gaps) of equivalent size as a 40% increase in income. Schultz (1999) also reports a very strong positive association between attainment, income, and body-mass index for Ghana. Similarly, Higgins and Alderman (1997) find a strong positive impact of primary, secondary and higher education on nutrition (BMI) in Ghana. Applying the Haveman–Wolfe translation, completing primary school raises Body-Mass Index by an amount equivalent to an increase in income of approximately 40%.[33] Finally, Kennedy and Haddad (1994) calculate the probability that a Ghanaian child is malnourished. Applying the Haveman–Wolfe translation, any schooling by the mother reduces the probability of malnutrition to an extent equivalent to a 29% increase in per capita income.

5.3 The costs of inadequate education

Given existing education levels, school failure in Ghana is considered as failure to graduate from primary school. This failure means lower incomes and labor market participation and worse health status (including HIV/AIDS incidence).

Income gains from completion of primary school are approximately 14% (assuming two years to complete primary school). There is also an induced switch toward employment in the formal labor market; offsetting this is the lower return to work in the non-farm sector. There is

[32] As found for other countries, education does influence fertility, but the relationship is subtle. For Ghana, Benefo and Schultz (1996) found that child mortality was an exogenous shock to families, but that fertility rates were sensitive to this shock. More educated females were found to be more sensitive, but the effect for Ghana was not substantively strong.

[33] Again, we do not compare educational effects with direct health interventions (as the latter have been found to be very effective in Ghana, see Lavy et al., 1996).

also a productivity externality of almost equivalent size to the earnings premium. With an average tax rate of 31% on incomes (Table 6), per capita fiscal gains are likely to be 8.7%. In addition, the substantial gains in health status are worth 1.1% in per capita incomes and the fiscal savings in crime are 0.5%. Thus, the gross annual fiscal cost of failing to ensure primary school completion is 9.3% of per capita income. Given that 46% of the population has not completed primary school, the per capita fiscal effect is 4.3% or per capita income of US$21. Note that this is almost certainly an underestimate because it does not include the costs of HIV/AIDS (Lakhanpal and Ram, 2008).

6. Kenya

6.1 Education levels

Education levels in Kenya are shown in Table 1AB: one-third of children have not completed primary school and the average adult has four years of schooling. Moreover, Kenya's education system has suffered shocks to enrollment in recent decades. As described by Bedi et al. (2004), investment was high in the 25 years after independence in 1963, but that enrollments in primary school actually fell in the late 1980s. A number of factors are involved, including: rising school fees; a lack of school supply; and the spread of HIV/AIDS. School failure rates may therefore be extremely high.

Research evidence suggests that families are constrained in their educational investments. Kabubo-Mariara and Mwabu (2007) report high sensitivity of enrollment to incomes and to family characteristics. Evidence on price sensitivity to participation is evident from a study of child care for primary school children by Lokshin et al. (2004) in which high costs of child care are found to discourage mothers from participating in market work. Educational subsidies may therefore play an important role in allowing mothers to work. Families also appear to be sensitive

to small subsidies: for example, Ito (2006, Table 1) reports that free school meals in Kenya raised the probability of schooling by 30 percentage points. Thus, public funding may encourage families to invest in schooling.

6.2 The benefits from education

Even as school quality and access are constrained, there are positive returns to investments in education in Kenya (see Table 5). These returns – at 16% – appear to be higher than for most other countries. The returns may include better access to high-skilled jobs: more educated workers in Kenya get more training, and this has a positive impact on earnings (de Beyer, 1990). However, from data on manufacturing employees in Kenya over the period 1993-2001, Soderman et al. (2005) find that the rate of return to education in Kenya has been falling. (No evidence on the effects of labor market participation were found).

Long-term indicators of well-being are positively associated with education, which in turn reduces the likelihood of poverty. Christiaensen and Subbarao (2005) estimate that raising the household literacy rate from 50% to 100% would raise household expenditures by 23% (although this effect is only statistically significant in non-arid zones). Eloundou-Enyegue and Calves (2006) examine vulnerability to poverty in rural Kenya. They find that poverty – which afflicts two out of five households – is affected by climate and disease although adult literacy was also a strong predictor.

The link between education and health is particularly salient for Kenya. Goodman et al. (2006) investigate how education programs improve health diagnoses and treatments in rural Kenya. Targeted to general shopkeepers and communities, the program found major improvements in the use of over-the-counter anti-malarial drugs for childhood fevers. The proportion of shop-treated childhood fevers treated according to medical guidelines rose from 2% to 15%, at an economic cost of $4.00 per additional appropriately treated case (2000 US$). For family health, Kennedy and Haddad (1994) calculate the probability that a Kenyan child is

malnourished. Applying the HW translation, any schooling by the mother reduces the probability of malnutrition to an extent equivalent to a 1% increase in per capita income. However, the most important health gain from education is related to HIV/AIDS prevalence (education has significant effects, see Maticka-Tyndale et al., 2007). Direct economic analysis of this is included below.

6.3 The costs of inadequate education

For Kenya, inadequate education is identied as a failure to complete primary school; this applies to one-third of the population. Per new completer, the gains in earnings are likely to be 32%. (This overstates the impacts in that it assumes all persons will be participating in the formal labor market but understates in that it does not take account of induced labor market participation or productivity externalities). Applying the average tax rate on income of 21%, the per capita fiscal cost of school failure in lost taxes is 6.7% of income. Adding in the fiscal costs of crime, at 0.5%, and the government health savings (at 0.6%, or 23% of 2.66%), the per capita annual gross fiscal cost of school failure is 7.8%, or 23,200KES.

But given the high rate of HIV/AIDS in Kenya, the health effects of education are probably more salient. For Kenya, Bell et al. (2006) report that investments to raise school attendance would yield benefit-cost ratios of 1.7-2.9 in per capita GDP simply from reducing AIDS prevalence. Robalino et al. (2002b) estimate that, conservatively, present value GDP losses for the period 2000-2020 are 20-30% without a 20-50% reduction in the current incidence rate. Similarly, Bruhns (2006) estimates long run GDP in Kenya to be significantly below that under a zero prevalence rate. Microeconomic evidence also shows strong impacts. As reviewed by Robalino et al. (2002a), Kenyan households with AIDS experience income reductions of approximately 50%; after the AIDS-related death of a family member, household expenditure per capita is reduced by 32%. There are also intergenerational impacts that are not counted here: in their analysis of orphaned and fostered children of HIV-infected parents using the Kenya

Demographic and Health Survey, Mishra et al. (2007) identify significantly lower rates of school attendance, higher rates of malnutrition, and inferior medical care. Hence, the fiscal and social cost of school failure is likely to be dominated by any reductions in HIV/AIDS incidence in Kenya.

7. Pakistan

7.1 Education levels

Average attainment among the adult population of Pakistan is very low, at less than three years per person. Seven out of ten adults have not completed primary school and only half of the population is literate (see Table 3).

Many households are constrained in providing education for their children, particularly girls. Income levels strongly influence enrollment (Hazarika and Bedi, 2003; Rosati and Rossi, 2003). The costs of primary school influence enrollment, as does distance to the nearest primary or secondary school (as found by Holmes, 2003, using the Pakistan Integrated Household Survey (1991)). The private schooling market has partially responded to the scarcity of public schooling (Lloyd et al., 2005). Nevertheless, there is still a need for public funding for the large proportion of families who cannot afford to send their children to primary school.

7.2 The benefits from education

The income benefits from education in Pakistan in the years 1998 and 2001 are reported in Table 5C (Kingdon and Soederbom, 2007). Estimated separately by gender and sector of employment, the coefficients on schooling are strong positive, except for females who are either self-employed or work in the agricultural sector. An average of the reported estimates is 7%. Earnings premiums are higher for older workers (aged over 30), perhaps reflecting the continuing human capital acquisition of the younger workers. In a study that adjusts for school quality, Behrman et

al. (2008) report very high private rates of return (at 20%) from high quality primary school competion (with social rates of return at 18%).

Yet, the income gains from education are not consistently evident even for low absolute skill levels.[34] Despite low levels of literacy in Pakistan, Kingdon and Soederbom (2007) find only weak impacts of literacy (and numeracy) on earnings and labor market participation. However, only about half of the labor force has wage employment. In early study for Rawalpindi, Guisinger et al. (1984) found low rates of return to schooling, but attributed that to government policies that compress the skill-wage structure. In their study that compares farm and non-farm work, Kurosaki and Khan (2006) find that the earnings gains rise across all education levels for non-farm work, but that there are only positive gains from completing primary school for farm workers. Satriawana and Swinton (2007) find that the benefits of education in the farming sector are very low.

However, the effects of education on participation in the formal labor market are very strong (Fafchamps and Quisumbing, 2007), both in terms of literacy and primary schooling (Kochar, 2000). As found for other countries with large rural and agrarian populations, education induces individuals to substitute farm work for off-farm work (Fafchamps and Quisumbing, 1999).

Gains in economic well-being and health status are also identifiable. Sathar et al. (2003) find that increases in schooling induce large welfare improvements. An extra year of schooling raises average consumption by 5% and reduces the percentage of poor by 10%; the effects across urban and rural areas are very similar. In fact, these effects are understatements because they fail to account for parental influences: Sathar et al. (2003) find that an increase in parental education to attain primary schooling reduces the incidence of poverty by 23%. Importantly, mean consumption increases by 19% but mean consumption by the head of the household only

[34] Evidence on remittances indicates that these transfers do not substantially increase income (Adams, 1998).

increases by 12%; thus, the household head is sharing the educational benefits with the rest of the family. Directly, Hazarika (2000) finds that the schooling of the household head strongly influences the household's purchases of quality foods (meat, milk, and fish). The effects are also evident for child nutritional status, although the relationship is not substantively large. Using the HW translation, one year of mother's schooling raises child height equivalent to less than a 2% increase in household expenditure.

Maternal education also raises child education, both directly and indirectly through improvements in child health (Alderman et al., 2001). Research has also found positive effects on contraceptive use. In their analysis, Fikree et al. (2001) find that literacy increases usage by 100%, an effect equal to having double the average number of household assets. Similarly, Sathar et al. (2003) find that contraceptive use is one-third higher if the mother has completed primary school. These changes in behavior are of economic value, although a precise cost consequence cannot be calculated.

7.3 The costs of inadequate education

Given the low levels of attainment, school failure for Pakistan might be regarded as failure to complete primary school. As given in Table 1A, this applies to 70% of the adult population and so would represent a significant change in human capital stocks. However, only a small proportion work in the formal labor market (even as some switching toward that market is induced by education). Also, as noted above, there are substantial externalities within families such that extra years of schooling raise consumption across the household.

Accounting for the per person earnings gain of 14% across the 70% of the population, as well as the induced switch to working in the formal labor market, universal primary school education would raise GDP per capita by 7.2% each year. With current GDP per capita at Rs.41,500 (Table 6), the new level of GDP would be Rs.44,500. This boost is an annual one and it excludes the nutritional impact of maternal education on family health as well as the other intra-

family benefits. The fiscal benefits – simply from the increase in earnings in the labor market – are approximated as a proportion of the increase in GDP spent as general government expenditure: universal primary school education would increase government revenues annually by 1.6% of GDP. Again, these fiscal benefits are understatements because they do not include any impacts on health. Based on studies for other countries and the results from Sathar et al. (2003), these health gains are likely to be significant, but less than 0.5% of GDP. Similarly, the addition of intrahousehold externalities would add to the economic consequences of low education.

8. Mexico

8.1 Education levels

In Mexico, the average adult (aged over 25) has approximately 7 years of education and the literacy rate is over 90%. However, economic volatility has meant that families have been significantly constrained in investments in education (Binder, 1999b). Although Skoufias and Parker (2006) find only weak effects of household head employment status on boy's schooling, they do find adverse consequences for girls in low-income families. In contrast, Binder (1998) finds that boy's schooling is more sensitive to family income, with girls' schooling more sensitive to family structure. Further evidence on the extent to which investments in education may be sub-optimal is the existence of child labor even before children have accumulated even basic human capital skills. In Mexico, approximately 7% of children work (Bando et al., 2005). However, small-scale programs have established that it is possible to raise educational attainment: Ito (2006, Table 1) reports that Progresa conditional cash-transfers raised schooling by 0.7 years. Also, nationally attainment has increased by over three years per person since 1980.

8.2 Income benefits from education

Table 5B reports earnings premiums for Mexico over the period 1998-2002 (Patrinos and Metzger, 2005). Split by gender and level of education, these earnings premiums are consistently positive and substantively significant. Premiums are slightly higher for females but the pattern across education levels is not consistent or linear: on average, the highest premiums for males accrue to university graduates whereas for females the premiums are quite similar across education level. (Levison et al. (2001) emphasize differences in school-to-work transitions for boys and girls, suggesting that the pathways of human capital accumulation may vary.) Overall, these earnings premiums can be used to calculate a lifetime economic benefit from additional attainment.

For earnings premiums for Mexico over the period 1984-1992, see Psacharopoulos et al. (1996). Despite significant economic fluctuations over this period, the earnings premiums remained strongly positive (15%). Also, Psacharopoulos et al. (1996) use the full discounting method to calculate social rates of return (with social defined as 'net of the costs of education', not as 'including all social benefits'). These rates of return assume two years of foregone earnings during childhood, to reflect child labor. The highest social rates are at the secondary education level, reflecting almost-full primary school completion rates (and the social cost of higher education). Importantly, data for 1992 show social returns range between 11% and 15% (Psacharopoulos et al. 1996, Table 7). However, more recently Rojas (2006) analyses both supply and demand factors determining skill premiums and finds that, even as the earnings premiums are still positive, NAFTA has reduced the returns to high skill in Mexico.

Simple earnings differences do not address induced changes in labor market participation.[35] Taylor and Yunez-Naude (2000) argue that earnings premiums are typically

[35] The adult population in Mexico is divided approximately equally into those working in formal employment; those working in the household; and those not formally classed as employed (Binder and Scrogin, 1999). Hence, there is a potential for a very strong impact from education on labor market participation.

under-estimated because they do not adjust for endogenous swiches toward participation in the formal labor market and away from agricultural production.[36] Controlling for education-related sectoral choices, each extra year of education adds 15% to cash-crop income. Gong and van Soest (2002) find that education significantly raises labor market activity by females: for females with less than six years of education, the labor market participation rate is 19% and the post-tax wage per worker is 4.43 pesos (1992); for females with more than six years of education, the figures respectively are 32% and 8.63. Finally, Pagan and Sanchez (2000) report similarly strong impacts for rural Mexico where more educated males are considerably more likely to be formally employed. But they also find sharp differences by sex: for males, the big jump in employment occurs after the completion of primary school; for females completing secondary school doubles the rate of employment (whereas completing primary school only raises it by 11%).

There is also evidence of positive economic externalities. Samstad and Pipkin (2005) describe how important human capital stocks are to the development of the *maquiladoras*. Taylor and Yunez-Naude (2000) find intra-family externalities on crop incomes: an increase in mean family schooling of one year is associated with a 16% increase in income from staples and a 13% increase in income from cash crops. López-Acevedo et al. (2005) find that workers with upper secondary education are 84% more productive than the base case worker, but they earned only 44% more; for workers with higher education the percentages were 282% and 137%, respectively. These differences may reflect productivity differences that were not fully appropriated by educated workers. Alternatively specified, the private returns to education appear to be approximately 47% of the overall productivity gain.

[36] Quinn and Rubb (2006) also emphasize how occupational matching influences the returns to education in Mexico. Also, Hammitt and Ibarraran (2006) find significantly lower compensating wage differentials for persons with more education, i.e. these workers not only receive higher pay but also have jobs that are less dangerous. Inclusion of compensating wage differentials would widen the full earnings gap according to education levels. Finally, some researchers have argued that educational investments generate more greater inequality (in part because education is more available in urban areas than rural and the former are already more wealthy, see Bouillon et al., 2003).

As for other countries, there is strong evidence of personal benefits from education in Mexico, in terms of planned fertility (Miranda, 2006) and improvements in child health (Dexter, 1998). Contreras (2003) also finds that poverty is reduced, even as overall inequality may grow. However, Cutler et al. (2002) find only modest impacts of literacy on health outcomes and some indication that increases in female labor market participation may worsen health for the young and elderly. Studies on long-term well-being are equivocal: whereas Fuentes and Villagomez (2001) report some benefits in household assets for the more educated, Mayer (2002) finds that education is not a strong influence on savings rates.

8.3 The costs of inadequate education

Determining school failure in terms of years of attainment, it is possible to calculate the economic consequences. With GDP per capita of 79,500 pesos (Table 6), the wage and externality effects would add 18% to the wages of each worker. This translates into an increased per capita income of 6%, or 392,860 million pesos. With government expenditure at 23.4% of total income, the fiscal impact would be equivalent to 1.4% of national income.

Again, these amounts are almost certainly understatements of the social benefits of education. They do not include health benefits, which are likely but for which no evidence is found. Soares (2006, Table 2) estimates that the welfare costs of violence in Mexico are: 0.6 years of life lost; a marginal willingness to pay equal to 45% of GDP; and a social value of 67% of GDP (accounting for the costs on future generations). Applying Soares (2006) relationships between education and crime – a one year increase in attainment would reduce crime by as much as 30% – the savings for citizens and taxpayers in Mexico would be very large. If crime could be reduced by 30%, this would be valued at 14% of GDP (much of which would be fiscal savings) or even 20% of GDP (applying a social valuation).

9. Chile

9.1 Education levels

Chile's education system is distinct in that it operates as a voucher system (see McEwan, 2001) with considerable freedom of choice for families. Educational attainment for adults in Chile is on average 8 years and the literacy rate is close to full. However, almost half of the population has not progressed beyond primary school (see Tables 1AB).

9.2 Benefits from education

As shown in Table 5, there is evidence of a positive earnings premium from education. In fact, across the period 1974-1989 the return to education has been broadly consistent at approximately 9% (see also Hanushek and Zhang, 2006). Evidence on changes on labor market participation with education levels is not available.

In addition to the private returns, there is also evidence of productivity externalities through rates of innovation. In their study of plant-level data, Marotta et al. (2007) find that levels of human capital are strongly positively associated with innovation. Unfortunately, this association cannot easily be translated into an economic value.[37]

Limited evidence is available for Chile on other benefits from education, such as health and well-bring. Hoefter (2006) does find that education has a strongly positive effect on the use of private health insurance in Chile: having completed secondary education has the same effect as increasing own income by almost 40%.

[37] Similary, Ramirez (2000) models inflows of foreign direct investment related to overall levels of economic activity.

9.3 The costs of inadequate education

For Chile, school failure is interpreted attainment across the population at less than 9 years. Given the earnings gains of 9% per worker for each additional year of education, the aggregate annual economic gain from each additional year of attainment is 3% of GDP or 1,936,500 Chilean pesos.[38] With government expenditure of 20.6% of total GDP, the fiscal gain would be 398,900 Chilean pesos.

These amounts are understatements, because they do not account for the other social benefits of education, such as health gains, reduced HIV/AIDS prevalence or lower violence. For example, Soares (2006, Table 2) estimates that the welfare costs of violence in Chile are: 0.9 years of life lost; a marginal willingness to pay equal to 54% of GDP; and a social value of 86% of GDP (accounting for the costs on future generations). As with the case study for Mexico, even small impacts of education on criminal activity are likely to boost GDP significantly, at least rivalling the economic consequences for earnings.

10. Ukraine

10.1 Education levels

In the Ukraine, education levels are high: the average attainment across adults is 11 years, or almost the equivalent of high school; 80% of students enroll through secondary school; and the literacy rate is almost universal (Tables 1AB). However, high attainment is common in former Communist countries where labor markets do not fully reflect skills and wages are artificially compressed (Barro and Lee, 2000). Education often serves as a consumption good and is not directed at obtaining business-related skills. Thus, it is possible that educational investments fail to generate economic benefits.

[38] Accounting for labor market participation rates of 65% of the adult population.

10.2 Benefits from education

Information on the Ukrainian labor market is very limited, but the returns to education in the Ukraine have recently been calculated by Patrinos (2008). As reported in Table 5D, these are only significant for high levels of education, i.e. persons with a university degree or those with a graduate degree. This reflects the very high and compressed overall education levels of the population. Nevertheless, it is indicative of high returns beyond completion of high school. It is also likely that younger cohorts of workers will reap higher returns from education as wage determination becomes more flexible as the economy becomes more market-based. Kupets (2005) applies a survival model to unemployment durations in the Ukraine and finds that more educated workers are less likely to remain unemployed.

10.3 The costs of inadequate education

Given the high levels of education in the Ukraine, school failure is interpreted as failure to graduate from high school. As a simplification, this is assumed to require one more year of education on average across the population. Based on Patrinos' (2008) calculations of the earnings benefits of one more year of education, the total wage amounts paid to labor would rise by 7% for each worker. Average GDP per capita in the Ukraine is 9,000UAH (see Table 6). Accounting for an adult labor force participation rate of 62%, an employment rate of 90%, the total annual increase in national income would be 2.6%.

These income gains will have signficant fiscal consequences because the Ukraine has a large government sector. Given government spending of 44.6% of national income, an additional year of attainment would approximate to 1.18% extra government revenues annually. However, this is just the additional tax revenues. There are likely to be other savings from reductions in HIV/AIDS and crime (as well as other potential benefits in health and intrahousehold externalities).

World Bank (2007) evidence on the costs of HIV/AIDS is also available. For the Ukraine, predicted additional costs by 2014 are estimated at 263-418 million UAH in direct budget revenue losses and an additional 139-155 million UAH in extra spending on health and welfare supports. Compared with a zero prevalence rate, the economic costs of HIV/AIDS for the Ukraine range between 1-6% of GDP (World Bank, 2007). Given the impact of education from Lakhanpal and Ram (2008), an additional year of education would generate substantial savings of at least the lower bound estimate of 1% of GDP.

Finally, the costs of crime can be considered. Soares (2006, Table 2) estimates that the welfare costs of violence in Ukraine are: 0.6 years of life lost; a marginal willingness to pay equal to 38% of GDP; and a social value of 29% of GDP (accounting for the costs on future generations). Based on Soares's relationship between education and crime, the annual economic savings from reduced crime – both fiscal and social – are likely to be very large.

11. Egypt

11.1 Education levels

Educational attainment in Egypt is on average five years of schooling per adult; but almost half of the adult population has not completed primary school and almost one-third are not fully literate (Tables 1AB).

Economic conditions are such that educational investments are probably sub-optimal (MENA, 2007). As noted in World Bank (2004c), the costs of schooling are prohibitive for some families: the income foregone from attending secondary school was approximately half of the poverty line for a family with two adults and three children; and school availability in rural areas is limited. A non-trivial number of children are active in the labor market (Wahba, 2006), and this is partly driven by family income and education levels. However, Hanushek et al. (2006)

conclude that family decisions largely reflect the low quality of schooling available in the public system and that many families must as a consequence pay for private tutoring. Thus, it is hard to establish the extent of suboptimality although the low literacy rate is an important indicator.

11.2 Benefits from education

As shown in Tables 5AE, earnings premiums vary considerably across education levels in Eqypt, with some earnings premiums quite low or negative for females (see also Dobrogonov and Iqbal, 2005). For males, at least, the returns are at least 8% and possibly 29% for vocational secondary education; but these may be overstated (Hanushek et al., 2006). However, Enders (2007) anticipates that, in the near future, as supply constraints start to bind, the rate of return to education should increase. Nevertheless, the income gains from additional years of education are still positive on average and these gains do not account for the greater job security associated with higher education (as found by Assaad and Tunali, 2002). Participation in the formal labor market is also enhanced with higher levels of education, in part induced by significant migration into cities by educated workers (as found by McCormick and Wahba, 2005).

The benefits of education are lower for those living in rural areas (see Table 5A), perhaps in part because literacy skills are less utilized. However, rural residents still earn a significant fraction of their overall incomes from non-farm income: according to Adams (2002), non-farm income accounts for 60% of total per capita income for the rural poor. Thus, educational benefits are still likely to be substantial.

Alternative measures of economic well-being also support the need for investments in education. World Bank (2004b) finds poverty rates and education are strongly negatively correlated: whereas almost 25% of illiterate persons are poor; the rate is 10% for persons with some secondary education; and almost zero for persons with some college education. Similarly, Datt and Joliffe's (2005) estimation of consumption rates show that each year of schooling adds 5% to per capita consumption in urban areas and 4% in rural areas. Finally, fertility rates in

Egypt are lower as education increases (Cochrane et al., 1990), although the effect is not substantively large.

Reductions in the poverty rate might lower government spending. Yet, because of data limitations, it is not possible to model for progressivity of the tax system and the extent to which welfare payments might be reduced. According to the World Bank (2004c) Egypt's safety net for poverty has expanded over the last few decades. Public cash transfers amount to 5% of the income of low-income families (who also receive private supports of an equivalent amount). However, social assistance programs are "modest and not necessarily targeted to the poor"; in 2002, these programs allocated on average 560LE to 900,000 families (World Bank, 2004c, xiii). Any savings in these transfers are unlikely to be significant.

11.3 The costs of inadequate education

Given the low absolute levels of education in Egypt, we consider a scenario in which completion of primary school was universal.

Earnings gains are derived from changes in average incomes in Egypt. In 2005, GDP per capita in Egypt is EGP7,300 (equivalent to $1270, see Table 6). Assuming a labor force participation rate of 66% of the total population, the average wage per worker is EGP11,100. If all the workers who have not completed primary school were assumed to have completed primary school, there would be several effects: these workers would have higher wages; and more of these workers would switch to participation in the formal labor market. Based on the wage premium of 8% and two years needed to complete primary school, the overall effect is to increase the average wage to EGP11,300 and so the aggregate national income would rise by 2.2% annually. Based on government expenditure of 32.54% of GDP, there would be an increase in government revenues of 0.72% or EGP1,253 million. (This figure would be lower if agricultural workers pay limited amounts in tax because they experience consumption rather than income gains).

As well as these labor market effects there are also savings if the rate of HIV/AIDS can be reduced. These costs may be significant. The simulation by Robalino et al. (2002a, Table 5) calculates that for Egypt a five-year delay in implementing policies to reduce HIV prevalence would mean an extra 100,000 infections and a cost equivalent to 8% of present value of country GDP. Using the evidence from Lakhanpal and Ram (2008), universal completion of primary school would reduce the HIV/AIDS prevalence by at least 34%. This would reduce the infection rate significantly and so reduce the present value cost to GDP. As with other countries, any reductions in criminal activity should also be included in the gross costs of school failure.

12. Conclusions

This report examines how low educational attainment is associated with significant gross economic costs for private individuals, for taxpayers, and for society. A copious amount of research literature has shown that higher education levels are associated with higher earnings, increased labor market participation, better health status (including lower prevalence of epidemic disease), and improvements in family decision-making. In addition, education is also associated with lower rates of poverty and intra-household benefits such as improved family nutrition. These effects are generally found for males and females, for urban and rural residents, and for developing and developed economies. Even as they do not count the costs of making educational investments, these school failure costs are suggestive of significant economic burdens as populations fail to make optimal investments in education.

However, the exact size of the gross costs of school failure remains to be determined; the estimates reported here are illustrative rather than definitive. Above we described the method for calculating these costs of school failure. This method is simple in principle, but far from simple or simple in practice. There are significant methodological challenges and a number of key assumptions may influence the overall results. These challenges include: assessing the value of

child labor and modelling how children participate in the formal economy; assessing the value of household activities and intra-household externalities; understanding how economic fluctuations mediate educational gains; fully valuing gains in health status; and calculating the burden of taxation. In addition, different calculations are relevant for urban versus rural groups, for age cohorts in school versus adult workers already in the labor market, and for fiscal returns versus social returns. Our calculations have focussed on the fiscal returns, not only because these returns should determine the level of public funding but also because if these are substantial, the social returns are likely to be extremely large.

Case studies for eight selected countries illustrate these points. First, there do appear to be constraints on investments in education such that many families are making inadequate investments and so forgoing private income and health advantages. Second, calculating the overall economic magnitude of school failure is complex and varies from country to country. The results of these calculations are given in Table 7, along with the key influences for each country. For some of the case studies, the role of education in raising health status in general may be the most important relationship (e.g., Indonesia, Pakistan, and Egypt); and for others it is the specific link between education and HIV/AIDS prevalence that matters (e.g., Kenya and Ghana). For other countries, the link between education and criminal activity merits further attention (e.g. Mexico). For a third set of countries, the traditional link between education and the labor market is perhaps the most salient (Ukraine, Chile). Although other impacts – such as reducing reliance on government health and anti-poverty programs – are not trivial but are orders of magnitude smaller than these other factors.

Overall, given the sizeable and diverse microeconomic benefits of education – and the extremely low levels of education in some of the countries analyzed here – it seems likely that the gross costs of school failure are significant. Critically, these costs are a measure of the extent to which public funding of education is inadequate and so whether further investigation into educational interventions and programs is warranted.

Box 1

Benefits from Education across Different Perspectives

Perspective	Benefits from education
P *Private individual*	(1) Gain in net earnings and wealth + (2) Improved health status / life expectancy + (3) Household productivity gains - (4) Fees for education
F *Fiscal or government (state/local and federal/central)*	(5) Increased tax payments + (6) Lower reliance on government health programs + (7) Reduced expenditures on criminal justice + (8) Lower reliance on welfare - (9) Subsidy for education
S *Social*	Private individual benefits + Fiscal benefits + (10) Productivity externalities + (11) Gains from reduced crime + (12) Social value of health

Box 2
Method for Calculation of the Costs of School Failure

Stages	
(1) Educational Investments	(1A) Describe public and private investments in education (1B) Consider extent to which total educational investments are sub-optimal (1C) Predict a feasible increase in education investments funded by public funds (1D) Account for path-dependence of schooling and school quality
(2) Impacts of education	(2A) Catalog of private, fiscal, and social impacts of education [see Box 1] (2B) Identify 'causal' impacts of education using best available evidence (2C) Adjust cross-sectional impacts of education by alpha factor [to account for differences in student characteristics]
(3) Monetary benefits of education	(3A) Cost out the individual causal impacts of education [based on budgets, expenditures or HW translation] (3B) Sum the individual monetary benefits expressed as present values (3C) Subtract any government subsidies for education to calculate the net costs of school failure.
(4) Sensitivity issues	(4A) Omitted impacts (4B) General equilibrium effects (4C) Value of child labor (4D) Value of informal work time (4E) Discount rate (4F) Data quality (4G) Differences by race/ethnicity, sex, and locality

Box 3
Additional Benefits of Education

Benefit typically omitted from benefit–cost analysis	Illustrations of the influence of education
1. Environmental impacts	Dasgupta (2000) finds greater compliance with environmental protection laws in Mexico where human capital levels are higher.
2. Income from remittances	Taylor and Yunez-Naude (2000) report positive – but small – effects of education on remittances in Mexico.
3. Migration	Education encourages migration from areas of high poverty.
4. Family formation / household size	Education is associated with family size and improved planning of fertility.
5. Reduced need for children to enter labor market	Wahba (2006) finds that parental education is strongly negatively associated with child labor rates in Egypt.
6. Civic order / good government / political stability	Beard (2007) examines the role between human capital and community development in Indonesia. Binder (1999a) investigated how community values influence the decision to invest in education.
7. Life expectancy / child mortality	Education raises life expectancy and reduces child mortality through better health knowledge.

Table 1A
Educational status (Populations aged 25+)

			Highest level attained				
		Population over 25 (millions)	Below first	First level	Second Level	Post-Secondary	Ave. years in school
Egypt							
	1980	16.4	74	13	8	6	2.21
	1990	23.6	58	18	17	7	3.57
	2000	31.0	46	18	25	11	5.05
Ghana							
	1980	3.8	66	19	15	1	2.35
	1990	5.3	54	23	22	1	3.34
	2000	7.3	46	25	28	1	4.01
Kenya							
	1980	5.2	59	32	9	1	2.46
	1990	7.4	45	46	8	1	2.98
	2000	10.5	33	52	14	1	3.99
Chile							
	1980	5.1	9	57	27	7	5.96
	1990	6.7	6	48	34	12	7.14
	2000	8.4	5	43	36	16	7.89
Mexico							
	1980	25.0	34	49	12	5	4.01
	1990	33.6	19	49	23	9	5.87
	2000	48.0	12	47	29	11	6.73
Indonesia							
	1980	59.3	41	48	10	1	3.09
	1990	79.3	55	26	17	2	3.30
	2000	105.1	36	37	22	5	4.71
Pakistan							
	1980	29.9	79	9	11	3	1.74
	1990	44.4	74	10	14	3	2.29
	2000	61.5	70	13	14	3	2.45
Ukraine[a]							
	2000						11.0

Source: Barro and Lee (2000). [a] Data for the Ukraine from UNESCO and applies to the population aged 15+.

Table 1B
Economic Data on the Education System

	Adult literacy rate	Net enrollment ratio (secondary)	Public education spending (% of GDP)	Current spending per student as a % of GDP per capita		
				Primary	Secondary	Higher
Ukraine	99%	80%	6.4%	15	24	34
Pakistan	50%	21%	2.3%	n.a.	n.a.	n.a.
Mexico	92%	65%	5.4%	15	16	41
Chile	96%	55%	3.5%	12	14	12
Egypt	71%	82%	4.7%	n.a.	n.a.	n.a.
Indonesia	61%	n.a.	3.8%	10	17	95
Kenya	74%	42%	6.7%	24	24	277
Ghana	58%	37%	5.4%	13	35	210

Source: World Bank, 2005 data (or nearest year available).

Table 2
Evaluation of educational policy

Country	Level of education	Evidence of suboptimal investments in education
Ukraine	Barro and Lee (2000)	
Mexico	Binder (1998; 1999a)	Binder (1999b)
Chile	McEwan (2001)	
Indonesia	McMahon and Boediono (1992); Cann (1982); Newhouse and Beegle (2006)	Ito (2006); Filmer (2008)
Ghana	Tansel (1997)	Lavy (1996); Glick and Sahn (2000); Ray (2002)
Kenya	Bedi et al. (2004)	Kabubo-Mariara and Mwabu (2007)
Pakistan	Holmes (2003)	Rosati and Rossi (2003); Hazarika and Bedi (2003)
Egypt	MENA (2007)	Wahba (2006); World Bank (2004c)

Table 3
Evidence on the impacts of education in the labor market

Country	Impact of education on:			
	Wages	**Labor market participation**	**Earnings in informal sectors**	**Workplace productivity**
Mexico	Patrinos and Metzger (2005); Quinn and Rubb (2006); Rojas (2006)	Skoufias and Parker (2006)	Levison et al. (2001); Binder and Scrogin (1999)	Taylor and Yunez-Naude (2000); Barboza and Barreto (2006); Samstad and Pipkin (2005); Lopez-Acevedo et al. (2005)
Chile	Ramirez (2000); Hanushek and Zhang (2006)			Marotta et al. (2007)
Indonesia	Duflo (2001); Skoufias and Suryahadi (2002)			Todo and Miyamoto (2006)
Ghana	Jones (2001); Teal (2000); Jolliffe (1998)	Abdulai and Delgado (1999)	Strobl (2004); Jolliffe (1998,2004)	Frazer (2006); Barr (2000); Vijverberg (1995)
Kenya	Soderman et al. (2006)	Lokshin et al. (2004)		De Beyer (1990)
Pakistan	Kingdon and Soederbom (2007); Behrman et al. (2008); Guisinger et al. (1984)		Kurosaki and Khan (2006); Fafchamps and Quisumbing (1999)	Satriawana and Swinton (2007)
Egypt	El-Hamidi (2006); Hanushek et al. (2006); Dobrogonov and Iqbal, 2005; Enders (2007)	Wahba (2006); Assaad and Tunali (2002)	Adams (2002)	
Ukraine	Patrinos (2008)	Patrinos (2008)		

Table 4
Evidence on the impacts of education on personal well-being

Country	Impact of education on:			
	Health status	**Fertility**	**Intrahousehold transfers**	**Long term economic well-being**
Mexico	Cutler et al. (2002); Mayer (2002); Hammitt and Ibarraran (2006)	Miranda (2006); Todd and Wolpin (2006)	Gong and van Soest (2002); Pagan and Sanchez (2000); Dexter et al. (1998)	Fuentes and Villagomez (2001); Contreras (2003)
Chile	Hoefter (2006)			
Indonesia	Miller et al. (2006); Gertler and Gruber (2002)	Angeles et al. (2005); Mellington and Cameron (1999)	Park (2007); Beard (2007)	
Ghana	Lavy et al. (1996); Schultz (1999)	Benefo and Schultz (1996); Ahiadeke (2001)	Kennedy and Haddad (1994)	Kyereme and Thorbecke (1987, 1991)
Kenya	Goodman et al. (2006); Yamano and Jayne (2005)	Maticka-Tyndale et al. (2007)	Mishra et al. (2007); Kennedy and Haddad (1994)	Eloundou-Enyeque and Calves (2006); Christiaensen and Subbarao (2005)
Pakistan	Alderman et al. (2001); Higgins and Alderman (1997)	Sathar et al. (2003); Fikree et al. (2001)	Hazarika (2000); Fafchamps and Quisumbing (2007); Kochar (2000)	Adams (1998)
Egypt			Cochrane et al. (1990)	McCormick and Wahba (2005); Datt and Jolliffe (2005)
Ukraine				

Table 5A
Earnings premium from education: Survey evidence

Country	Earnings premiums per year of attainment		
Ukraine	See Table 5D		
Mexico	See Table 5B		
Chile	8.3% (1974)	9.6% (1980)	9.2% (1989)
Indonesia	17% (1981)	7% (1995)	6.8-10.6% (1995)
Ghana	8.5% (1989)	7.1% (1995)	
Kenya	16.4% (1970)	16% (1986)	
Pakistan	4.6% (1989)	15.4% (1991)	See Table 5C
Egypt	12% (urban -2006)	5% (rural – 2006)	See Table 5E

Sources: Psacharopoulos and Patrinos (2004); for Egypt, Hanushek et al (2006); third estimate for Indonesia from Duflo (2001). *Notes:* Dates of estimate given in parentheses.

Table 5B
Earnings premium from education: Mexico

	1998		2000		2002	
	Male	Female	Male	Female	Male	Female
Primary	15.4	18.2	12.9	15.9	14.0	16.3
Lower secondary	13.6	17.9	10.2	16.0	11.4	15.0
Upper secondary	18.9	24.0	15.2	19.2	16.3	19.8
University	18.7	15.0	19.1	16.0	17.1	14.8

Source: Patrinos and Metzger (2005, Table 8). *Notes:* Percentages, controlling for experience (squared) and hours worked.

Table 5C
Earnings premium from education: Pakistan

	Wage employed		Self-employed		Agriculture	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
1998-99 data:						
Ages 16-30	0.033**	0.117**	0.045**	0.072	0.066	-0.157
Age 31-70	0.038**	0.145**	0.071	0.180**	0.067**	0.257*
2001-02 data:						
Ages 16-30	0.040**	0.117**	0.043**	0.067**	0.086**	-0.247
Age 31-70	0.056**	0.165**	0.056**	0.037	0.123**	-0.087

Source: Kindgon and Soederbom (2007, Tables 5A and 5B). *Notes:* Coefficients on years of schooling. Sample selection correction applied. Statistical significance at 5% *, 1% **.

Table 5D
Earnings premium from education: Ukraine

	All	**Males**	**Females**
Basic education (vs none)	0.6%	2.1%	-3.3%
Upper secondary (vs basic)	0.7%	-0.4%	4.2%
Vocational and technical (vs basic)	3.5%	4.2%	6.4%
University (vs upper secondary)	7.7%**	7.5%**	9.5%**
Graduate program (vs university)	8.6%**	14.8%**	4.1%**

Source: Patrinos (2008). Statistical significance at 1% **.

Table 5E
Earnings premium from education: Eqypt

	Male	**Female**
Voc. sec. educ over gen. sec. educ.	0.29	-0.02
Higher educ. over voc. sec.	0.11	0.03
Univ. over higher inst.	0.08	0.06
Univ. over voc. sec.	0.10	0.05
Univ. over gen. sec.	0.17	0.06

Source: El-Hamidi (2006).

Table 6
Economic data

	GDP NCU (millions)	General Govt Exp NCU (millions)	GDP per capita NCU	ER into dollars	GDP per capita ($US)
Ukraine	418,529	186,522	9,004	5.12	$1,760
Pakistan	6,547,590	1,433,580	41,457	59.5	$700
Mexico	8,369,246	1,958,012	79,480	10.9	$7,290
Chile	64,549,137	13,283,392	3,961,285	561	$7,060
Egypt	536,600	174,657	7,248	5.7	$1,270
Indonesia	2,729,708,200	509,419,000	12,252,877	9,705	$1,260
Kenya	1,415,150	296,350	41,311	75.6	$550
Ghana	97,035,100	29,895,000	4,388,147	9,073	$480

Source: IMF Country statistics, www.imf.org (2005). *Notes:* NCU, National Currency Units; ER, exchange rate; GNI, gross national income.

Table 7
Gross Costs of School Failure

	Assessment of School Failure	Key Influences on Gross Costs	Gross Fiscal Cost Annual Amount
Ukraine	1 year of attainment	Labor market returns in market economy	Increase of 1.2% in government revenues Social value of HIV/AIDS reduction ~1% of GDP
Pakistan	Full primary school completion (extra 70% of age cohort)	Benefits to rural populations: farm and non-farm work; intrahousehold externalities	Increase GDP per capita by 7.2% Fiscal gain of 1.6% of GDP
Mexico	1 year of attainment	Labor market returns; societal violence	Increased in per capita income of 6% Fiscal gain of 1.4% of GDP
Chile	1 year of attainment	Labor market returns	Total economic gain of 3% of GDP Fiscal gain of 0.6% of GDP
Egypt	Full primary school completion (extra 46% of age cohort)	Benefits to rural populations: farm and non-farm work; intrahousehold externalities	Increase in aggregate national income of 2.2% Increase in government revenues of 0.7% of GDP
Indonesia	Full primary school completion (extra 36% of age cohort)	Benefits to rural populations: farm and non-farm work; intrahousehold externalities	Per completer, 3.3% of per capita income Total per cohort: 1.1% of GDP
Kenya	Full primary school completion (extra 33% of age cohort)	HIV/AIDS incidence	Per completer, 7.8% of per capita income
Ghana	Full primary school completion (extra 46% of age cohort)	HIV/AIDS incidence	Per completer, 9.3% of per capita income. Total per cohort: 4.3% of per capita income

Notes: Gross costs do not include the educational investments required to rectify school failure. Costs are not discounted.

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