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The Pattern of Returns to Education and its Implications

Christopher Colclough, Geeta Kingdon
and Harry Anthony Patrinos

The pattern of economic returns to education can help us to understand the poverty-reducing potential of different levels of education. It is commonly believed that labour market returns to education are highest for the primary level of education and lower for subsequent levels. Recent evidence suggests that the pattern is changing. The paper explores the implications of such changes for both education and labour market policy.

While education has many important non-market benefits, it is also valued for its role in helping people to become more productive, have higher earnings and avoid poverty. The extent to which education raises earnings is loosely called the economic 'return' to education. Estimates of private and social returns to different levels of education have been undertaken for a large number of developing and developed countriesⁱ.

Usually the studies are based upon information drawn from samples of workers in waged work, rather than on all employed persons (i.e. including those in self-employment and agriculture). They are also typically not adjusted for unemployment among the educated, nor adjusted for abilityⁱⁱ. Thus, the usual source of data for estimating returns to education is not a random sample of the population. 'Social' rates of return to education are somewhat lower than private returns due to the addition to the calculations of publicly financed costs of education. Estimation of returns presupposes that markets function efficiently and that earnings are a reliable measure of productivity at the margin – not necessarily a realistic assumption in places where large proportions of wage and salary-earners are employed by the public sector. Estimates also take no account of the external benefits of education, i.e. the benefits of an individual's education for other people or for society in general. These are thought likely to be substantial in the case of primary schooling which is typically associated with the acquisition of basic cognitive skills: the securing of literacy and numeracy brings sets of behavioural changes that are beneficial to families and communities. Similarly, at higher levels of education, externalities from scientific research bring benefits which extend well beyond the direct benefits for the individual with that higher education. The presence of externalities is important to the case for *public*

investment in education, because private individuals, not being the direct beneficiaries, are not influenced by them in making their schooling decisions. Although there have been important attempts to quantify their scale and impact (Haveman and Wolfe 1984; McMahon 1999), definitive results which allow for the impact of externalities remain elusive. Notwithstanding these omissions, the estimated size of the return to education compares favourably with the return to investments in many forms of physical capital. Accordingly, investment in education has been judged to have high social priority in developing countries.

The evidence on wage returns to education in developing countries continues to grow. These studies show that, internationally, one additional year of education adds approximately 10% to a person's wage, at the mean of the distribution (Psacharopoulos and Patrinos 2004). However, returns vary at each level of education, and it is of interest to know how these differ from each other.

Until recently, the evidence has suggested that the returns in developing countries are generally larger at primary level than at secondary and higher levels of education. Some have interpreted this to be consistent with a notion of diminishing returns to education. A pattern of high returns to primary and lower returns to subsequent levels of education indicates that even where most children leave the system at or before the end of primary school, poor families are still likely to value educational outcomes highly. Thus, primary schooling – even where it is terminal – has historically been interpreted to be a profitable investment of time (and money, to the extent that direct costs have to be met) for the poorⁱⁱⁱ.

The pattern of returns and implications for the poverty-reducing role of education

In Figure 1, the slope of the education-earnings relationship provides a measure of the private rate of return to education. It is clear that in the curve marked 'concave', the slope is steep at low levels of education (i.e. the return to education is high), but becomes progressively flatter (i.e. the marginal returns fall) at higher levels. If the shape of the education-earnings relationship is concave, then an extra year of education at low levels of education (S_1 to S_2 in Figure 1) brings substantially greater increases in earnings than it does at higher levels of education (S_3 to S_4). If the education-earnings relationship is concave, marginal increases in education at low levels of education (where the poor are typically concentrated) raise earnings substantially. However, if the

relationship is convex (Figure 1), the slope of the curve, and thus returns to education, *increase* rather than decrease with education level. In that case, additional education has a much stronger proportionate impact on earnings at higher than at lower educational levels.

Changes in the pattern of returns to education

Much of the empirical evidence from the 1960s to the 1990s suggested that in most countries the relationship between education and earnings was concave (Psacharopoulos, 1994; Psacharopoulos and Patrinos, 2004). However, more recent evidence suggests that the rate of return to primary education may now be lower than that to post-primary levels of education^{iv}. A number of studies using 1990s and early 2000s cross-section data find that the return to primary education in wage employment is significantly lower than that to post-primary education. Table 1 lists 18 such studies with evidence on returns from 26 countries spanning Asia, Africa and Latin America. Tables 2 and 3 illustrate the types of results obtained for various countries in two recent cross-section studies (Schultz, 2004; Kingdon et. al. 2008), showing that in general the return to an extra year of education increases with the level of education: while returns do not increase monotonically with level of education in some countries (corresponding to the 'mixed' curve shown in Figure 1), a generally convex pattern of returns is observed across most countries.

What do time-series data say? Several studies examine the temporal change in returns to different levels of education for individual countries. Blom and Verner (2001) find that between 1982 and 1998 in Brazil, returns to tertiary education increased sharply while returns to primary and lower secondary education dropped. Riboud, Savchenko and Tan (2006) find that between early 1990s and early 2000s, rates of return to higher secondary and tertiary education increased in all three countries for which they had time-series data, namely India, Pakistan and Sri Lanka. Mehta et. al. (2007) find that the education earnings relationship became more convex in Thailand, Philippines and India over the 1990s. Fiszbein et. al. (2007) show that in Argentina over the period 1992 to 2002, returns to primary education decreased, returns to secondary remained stable and returns to higher education increased substantially, with university education exhibiting the highest returns among all levels by 2002. Lachler (1998) finds that in Mexico between 1984 and 1994, the marginal return to primary education (i.e. the return to each extra year of primary education) fell by 3.1 points (from 16.9 to 13.8%) and marginal returns to both secondary and higher education rose, with the latter nearly doubling (from 10.3 to 19.9%). This pattern of decrease in primary returns in Mexico is also confirmed in Psacharopoulos et al (1996). Finally, a study of 16 Latin American countries (CEPAL, 2002), and another of 18 Latin American countries (Behrman et. al., 2003), concludes that returns to tertiary education have greatly increased in the 1990s whilst those to primary and secondary education have fallen (see Figure 2 below).

Reasons for the changed pattern of returns to education

The fall in returns to primary education over time among waged workers documented in the literature could be due to both supply-

side and demand-side reasons. The supply of primary completers has greatly increased over the past 3 or 4 decades in most developing countries and the wage rewards to primary education are likely to have correspondingly fallen. On the demand side, demand for employees with low skills may have fallen due to changes in the skill composition of goods that are demanded and produced in the economy. There is evidence for such skill-biased technological change in both developed and developing countries in the 1980s and 1990s (Berman et. al. 1998; 2003). Wood (1995) shows that in developing countries, the share of skilled workers increased over time and was accompanied by the rapid growth of employment in manufacturing. Declining private and social returns to primary education, measured in the above ways, would be entirely predictable outcomes of such trends^v.

Another potential explanation for the fall in returns to lower levels of education is that cognitive skills learnt from a given number of years of schooling are weaker now than before. Though there is no firm evidence on *changes* in schooling quality, it is plausible to think that there may have been a fall in the quality of education over time, e.g. due to reduced per student resources as primary school enrolments have greatly risen. For example, in some African cases, the expansion of the primary system appears to have been accompanied by sharp declines in school quality, such that literacy and numeracy are no longer so readily delivered by the primary system. Recent evidence from India suggests that completion of 5 years of education does not guarantee the acquisition of basic literacy and numeracy skills for a high proportion of students^{vi}. It could also be due to the newer cohorts of students increasingly coming from homes where parents are uneducated, where informal home-based learning is therefore more constrained.

Implications of the changes in the pattern of returns

Reduced returns imply reduced private profitability. So long as returns remained positive, primary education would continue to provide a means of individuals and families fighting poverty, but falling returns to primary education reduce the poverty-mitigating scope of primary education since the wage increment associated with each extra year of education is lower now than before. Moreover, if returns to primary education are low and increase at higher levels of education, they would reduce the incentives for poor households to send their children to school if they believed that the prospects for their progressing upwards through secondary schooling and beyond (where the higher returns accrue) were small. In such circumstances, pressures to expand the system at secondary and higher levels could be expected to increase and the average duration of schooling would be likely to rise.

If the reduced private primary returns derive partly (or wholly) from a decline in school quality (rather than from changes in employment patterns) and thus a reduction in the cognitive skills of the average primary graduate, then we would expect demand for primary education, as a terminal stage of schooling, to be concomitantly reduced.

The findings on the changed pattern of wage returns to education have potentially important policy implications for both labour market policy and education policy in the context of poverty reduction^{viii}. Firstly, they have implications for the pattern of public funding of education. In particular, given its very high returns, large universal subsidies may not be needed to motivate students to enrol in tertiary education although if credit market failures deny poor people access to profitable tertiary education, there may still be a need for state intervention for equity reasons^{viii}. Secondly, in those cases where returns to primary education have been falling, its direct poverty-reducing potential is thereby reduced, so that less reliance can now be placed on primary school completion as a strategy for poverty reduction than in the past.

However, the fact that primary education has lower earnings increments associated with it than in the past – reducing its poverty-mitigating potential – should not be taken to suggest that the overall rationale for investments in primary education is weakened. There are several reasons for this. Firstly, primary education is a necessary input into further levels of education which may have higher economic returns. If the benefit that primary education confers by permitting access to more lucrative levels of education is taken into account, its ‘true’ return will increase. Secondly, whatever its economic return, primary education continues to be important for its intrinsic value in a rights-based perspective. Thirdly, returns to education have been estimated mainly using wages; yet waged workers constitute typically a small fraction of the total workforce in many developing countries and the pattern of returns to education in self-employment and agricultural employment could be different. Similarly, the size of the positive *economic* externalities of basic education could be greater than those of other levels of education, though there is little testing of this issue. Finally, basic education is valued not only for its economic benefits but also for its non-market benefits (reductions in fertility and mortality, empowerment, better environment, lower crime, democratic participation, etc). There is persuasive evidence

that basic education has substantial beneficial non-market externalities, although it is not straightforward to assign monetary values to these or to integrate them into a single measure of the overall return to education (McMahon, 2001). Each of these factors continues to underpin the case for the public financing of education throughout the basic cycle.

Figure 1. Different Education-Earnings Relationships

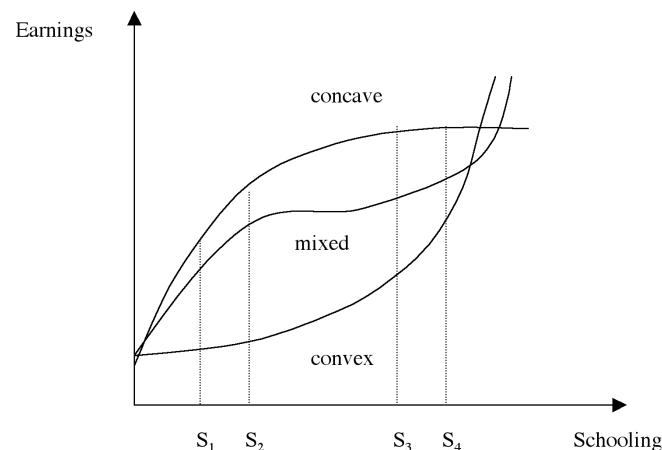
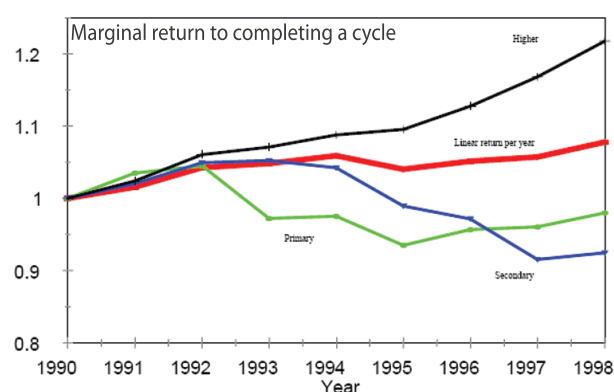


Figure 2. Changes in Marginal Return to Education in Latin America in the 1990s



Source: Behrman, Birdsall, and Szekely (2003)

Note: Linear return refers to yearly change in returns.

Table 1
New Evidence on Returns to Primary vs. Higher Levels of Education

Country	Study
Cote d'Ivoire, Ethiopia, Uganda	Appleton, Hoddinott and Krishnan (1999)
Cote d'Ivoire, Burkina Faso, Ghana, Kenya, Nigeria, South Africa	Schultz (2004)
Rwanda	Lassibille and Tan (2005)
Tanzania, Kenya	Söderbom, Teal, Wambugu and Kahyarara (2006)
South Africa	Moll (1996); Fryer and Vencetachellum (2005)
India	Kingdon (1998); Kingdon and Unni (2001); Duraisamy (2002); Vasudeva-Dutta (2004)
Pakistan	Aslam (2006)
Bangladesh, Sri Lanka, India, Pakistan	Riboud, Savchenko and Tan (2006)
Taiwan	Wu (1999)
China	Li (2003)
Argentina, Brazil, Chile, Guatemala, Indonesia, Mexico, Mongolia, Philippines, Singapore, Thailand, Venezuela, Vietnam	Patrinos, Ridao-Cano and Sakellariou (2006)
Philippines	Maluccio (2003)
Brazil	Blom and Verner (2001)
Mexico	Lachler (1998)

Table 2

Estimates of Mincerian returns to different levels of education for males aged 25-34 in Africa, using recent data

	Primary	Middle	Secondary	Higher
Ghana (1998)	11.0*	3.9	12.0	44.0
Cote d'Ivoire (1987)	15.0	14.0	22.0	16.0
Kenya (1994)	---	11.0	7.4	21.0
South Africa ¹ (1993)	---	7.3	22.0	32.0
South Africa ² (1993)	---	1.4	20.0	20.0
Nigeria (1999)	1.6	---	4.0	12.7
Burkina Faso (1998)	7.9	---	10.9	12.9
Africa	8.9	7.5	14.0	22.7

Source: Schultz (2004).

Note: Data used are on wage employed males aged 25-34 and are for the years stated in parentheses. South Africa¹ refers to Black males and South Africa² to White males. Schultz's paper does not report standard errors or t-values.

* An estimate of the earnings function for Ghana using the same 1998 data as that used by Schultz (see Table 3 below) shows that the coefficient on the primary completion dummy variable was not statistically significantly different from zero. Thus, the apparent returns to primary education for some of the countries here may also be no different from zero.

Table 3

Estimates of Mincerian returns to different levels of education, using recent data

	Primary	Middle or Lower secondary	Secondary or Higher secondary	Higher
Ghana (1998)	8.9	8.5	8.8**	16.9**
Kenya (2000)	11.6*	---	16.4**	25.5**
Tanzania (2001)	10.2**	---	12.0**	27.3**
South Africa (2003)	12.0**	21.6**	24.4**	34.1**
India (2004)	0.0	7.2**	12.6**	15.6**
Pakistan (2001)	6.0**	6.1**	13.2**	15.3**
Indonesia (2000)	5.0**	8.4**	13.7**	17.2**
China (2004)	0.0	7.8**	7.5**	10.1**
Philippines (1999)	8.4**	7.8**	8.4**	21.6**
Thailand (2002)	3.5**	13.4**	10.6**	23.1**
Cambodia (2004)	5.3**	5.6**	7.7**	11.1*
Average	7.4	9.6	12.3	19.8

Source: Kingdon, Patrinos, Sakellariou and Soderbom (2008).

Note: * and ** represent statistical significance at the 10% and 5% levels respectively. Returns estimates reported for male waged workers (of all working ages, not just 25-34 year olds, as in Table 2 above).

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Private rates of return to education can be estimated by computing the difference in average post-tax earnings between those who have a given level of education and those at the next lower level. The rate of interest which equates the discounted value of this net earnings stream with the cumulated discounted private costs of attending the level of education concerned is the private rate of return. Social rates of return can be similarly estimated, but using gross rather than post-tax earnings. In practice, however, most studies do not take account of the costs of education and measure instead the wage increments to education.

¹⁴An important challenge in estimating the return to education is 'ability bias'. If innate ability and years of education are highly correlated then returns may be accruing to ability, rather than to education per se. If true, this 'screening' hypothesis challenges the human capital interpretation of education, and it weakens the economic efficiency rationale for public investments in education. However, there is little empirical support for ability bias affecting the results.

¹⁵The idea that returns to primary education were high was, however, challenged by a number of authors during the 1990s (Knight, Sabot and Hovey 1992; Bennell 1996).

¹⁶An issue that arises in estimating the return to each extra year of education at the primary level is what number of years to assign for 'years of forgone earnings', given that in the first few grades, primary age children are too young to work. Different studies appear to follow different rules. However, some studies apply the same rule across a range of countries (as in Table 3 here which assigns 3 years of forgone earnings for primary education).

¹⁷Azam (2008) finds that in India over the 21 year period 1983 to 2004, the increase in college wage premium came mostly from demand shifts in favour of workers with a tertiary education. While the demand shifts occurred in both the 1980s and 1990s, the 1980s demand shift was negated by the increase in the relative supply of tertiary workers so that the college wage premium did not increase much. But during 1993-2004, supply of tertiary educated persons either stagnant or decelerated and this period saw an increase in the college wage premium since the increase in demand for college graduates was not matched by a concomitant increase in the supply of such graduates.

¹⁸The Annual Status of Education Report 2007 (Pratham, 2008) showed that only 58.7% of children in grade 5 could read a piece of text at the grade 2 level of difficulty and only 42.4% could do a sum dividing three digits by 1 digit.

¹⁹This would be more powerful if the results could be generalised to all employment, not just the wage-employed. However, there are very few studies that estimate returns to education in both wage- and self-employment using the same dataset. In two companion papers by Kingdon and Söderbom (2007) for Ghana and Pakistan, the authors find that returns to education are convex not only in wage employment, but also for some worker groups in agricultural and non-agricultural self-employment, though the convexity is less pronounced than in wage employment.

²⁰The high return to tertiary education is leading to the rapid development of credit markets for higher education in some developing countries in the past decade or so. India is a good example of this.