HEART
HEALTH & EDUCATION ADVICE & RESOURCE TEAM

Helpdesk Report: Is investment in early childhood development or secondary education more beneficial?

Date: 21 February 2013

> **Query:** If DFID had an extra £ should it be spent on early childhood interventions or secondary education?

Content

1. Overview
2. Early childhood development
3. Secondary education data
4. Further resources on returns to secondary education
5. Additional information

1. Overview

Different estimates of returns were identified which may be useful in looking at the value of early childhood interventions and secondary education but are not directly comparable. In some reports there are different data for social and private returns. There may also be differences in the interpretation of cost-effectiveness data and rates of return.

Key data for comparison focusing on:

Early childhood interventions in developing countries
- A study on returns to early childhood stimulation in Jamaica found average earnings of an intervention group to 28-60% higher than those of a control group (Gertler et al., 2012).
- Engle et al. (2011) estimate a benefit-to-cost ratio ranging from 6.4 to 17.6 from increasing pre-school enrolment in low- and middle-income countries.
- A preschool health programme in Delhi is estimated to increase the net present value of lifetime wages by US$29 per child while costing US$1.70 (CGECCD, 2007).
- Grantham et al. (2007) estimate more than 200 million children under 5 in developing countries are not developing to their full potential associated with a 20% deficit in adult income.

Early childhood interventions from developed countries
- High-quality ECD programmes targeting vulnerable groups in the US could yield a potential return of 7 – 16% annually (Naudeau et al., 2011)
- Cost benefit ratios for seven early childhood development programmes in developed countries range from 1.8 to 17.0 (Engle, 2007)
- The High/Scope Perry Preschool programme in the US found that for every dollar invested over US$8 were returned to the participants and society as a whole

Schweinhart et al, 2005). Rolnick et al (2003) estimate the rate of return (increment on earnings and other relevant outcomes) for the Perry programme at 15 to 17%.

A selection of the data found on returns to secondary school:
- Psacharopoulos and Patrinos (2004) present some regional averages. Asia returns, social: 11.1%, private: 15.8%. Sub-Saharan Africa returns, social: 18.4%, private: 24.6%. For low-income countries overall they estimate private returns of 15.7% and social returns of 19.9%.
- Shultz (2003) report wage returns disaggregated by gender and age. Ghana, males: 9.8%, females: 15.0%. Kenya, age 25-34, males: 7.4, females: 20.0; age 34-54, males: 12.0, females: 19.0. Côte d'Ivoire, age 25-34, males: 22.0, females: 12.0; age 34-54, males: 26.0, females: 28.0. Data also on Nigeria and Burkina Faso.
- Riboud et al. (2007) report data for south Asia. Bangladesh, secondary: 4.1%, higher secondary: 7.1%. India, secondary: 16.8%, higher secondary: 16.3%. Also data for Pakistan and Sri Lanka.
- Palmer et al (2007) note a difference in private returns between the formal and informal sector in Rwanda, 10.8% and 25.3% respectively. They report social rates of return in African countries ranging from 1.5% (Tanzania) to 17.7% (South Africa). And private returns from 6.9% (Tanzania) to 21.3% (Rwanda).

It is difficult to draw conclusions from the different data reported due to difference in methodologies, timelines and countries. There are limitations to deriving and interpreting data of this kind, some noted by Winkler & Sondergaard (2008).

Research in the US suggests that human capital investment decreases as a child grows older (Caneiro & Heckman, 2003). However, looking at the data on schooling the returns from primary, secondary and tertiary in developing countries do not often diminish but in many cases increase (Shultz, 2003).

2. Early childhood development

Labor Market Returns to Early Childhood Stimulation: A 20-Year Follow-up to the Jamaica Study.
Gertler P, Zanolini A, Pinto R, Heckman J, Walker S, Vermeersch C, Chang S, Grantham-McGregor S. 2012 (Preliminary: do not cite or circulate)
http://economics.mit.edu/files/7682

A 20-year follow up study to an intervention trial conducted in Jamaica, found that the average current earnings of the intervention group were approximately 28 to 60% higher than the control group. The intervention was a one-hour weekly visit over a 2-year period from a community health worker who showed mothers how to interact and play with their children to develop their child's cognitive and socio-emotional skills.

Strategies for reducing inequalities and improving developmental outcomes for young children in low-income and middle-income countries
Engle PL, Fernald LCH, Alderman H, et al. and the Global Child Development Steering Group. 2011. Lancet 378: 1339-1353
http://www.sciencedirect.com/science/article/pii/S0140673611608891

The authors systematically review evidence on the effectiveness of early child development programmes, including parental support and education, pre-primary centres, conditional cash transfers, educational media for children and interventions for children at high risk.

Although preschool is only one element of early childhood development, it is used by the authors in a simulation model as a proxy to analyse the potential economic benefit of increasing investments. The authors estimate a benefit of $10.6 billion to the economy when preschool enrolment in every low-income and middle-income country is increased to 25% and $33.7 billion when increased to 50%, with a benefit-to-cost ratio ranging from 6.4 to 17.6.

Coordinators' Notebook: An international resource for early childhood.
The Consultative Group on early childhood care and development (CGECCD). 2007. Coordinators notebook 29
http://jnne.org/img/ECD-CoNo-lo-resFINAL.pdf

This notebook refers to a preschool health programme in Delhi, which would increase the net present value of lifetime wages by US$29 per child while costing US$1.70 when average school participation increased by 7.7%f or girls and 3.2% for boys. In Bolivia, a home-based programme had benefit-cost ratios between 2.4:1 and 3.1:1, with higher ratios for at-risk children. Similar analyses in Columbia and Egypt found comparable benefit-cost ratios. All three of these studies demonstrate that ECD is more beneficial for children from poor families than for more advantaged children.

Human capital policy: Inequality in America: What role for human capital policy?
Carneiro, P. and Heckman, J. in: Heckman, J., Krueger, A. (Eds.), 2003. MIT Press, pp. 77-240
http://www.ucl.ac.uk/~uctppca/HCP.pdf

The authors present data indicating that the rate of return to human capital investment decreases, as a child grows older at a given ability (see Figure 2.6). The research is based on data from the US.

Investing in Young Children: An Early Childhood Development Guide for Policy Dialogue and Project Preparation. Naudeau S, Kataoka N, Valerio A, Neuman MJ, Elder LK. 2011. International Bank for Reconstruction and Development/World Bank
https://openknowledge.worldbank.org/bitstream/handle/10986/2525/578760PUB0Inve11public10BOX0353783B.pdf?sequence=1

In 2011, the World Bank created a document to guide investment and country policy on ECD. This guide summarises existing evidence into short notes, provides practical advice and assesses the quality of the latest evidence including identifying areas for additional research and evaluation.

Specifically on the economic case, the guide identifies that investing in ECD has been shown to have significant and long-lasting benefits in three interrelated categories:
1) Enhancing school readiness and related educational outcomes
2) Improving physical and mental health and reducing reliance on the health care system
3) Reducing engagement in high-risk behaviour

Although remedial interventions are possible later in a child's life, the guide highlights that the rate of return to human development decreases with age (Figure 1.1.2 taken from Carneiro and Heckman 2003). Evidence suggests a potential return rate of 7 to 16 percent annually

from high-quality ECD programmes targeting vulnerable groups[1,2], although large-scale interventions that target a broader range of beneficiaries may yield smaller returns. Moreover, ECD investment is a cost-efficient way to produce a well-trained capable labour force and specifically can have a positive impact on girls e.g. school enrolment rate for older female siblings.

The report identifies a number of areas for further research including:
- Relative effectiveness and cost-effectiveness of formal vs. community-based vs. family-based models in the developing world.
- Optimal intensity and duration of centre-based programmes for low-income children in developing countries
- Relationship between programme quality (including group size and adult-to-child ratio) and children's outcomes in developing countries.

Developmental potential in the first 5 years for children in developing countries.
Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B and the International Child Development Steering Group. 2007. Lancet 369: 60-70.
http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(07)60032-4/abstract

This paper conservatively estimate that more than 200 million children under 5 years of age in developing countries are not developing to their full potential. Sub-Saharan African countries have the highest percentage of disadvantaged children but the largest number live in South Asia. The authors estimate that loss of human potential is associated with more than a 20% deficit in adult income and will have implications for national development.

Child Development Steering Group. Child development: risk factors for adverse outcomes in developing countries.
Walker SP, Wachs TD, Gardner JM, Lozoff B, Wasserman GA, Pollitt E, Carter JA and the International Child Development Steering Group. 2007. Lancet 369: 145-157
http://download.thelancet.com/pdfs/journals/lancet/PIIS0140673607600762.pdf?id=40bade47 53939e7f:-6d80ed0d:13ccdbe0fb2:1dfd1360663864033

The authors identify four key risk factors in preventing children under 5 developing their full potential: malnutrition that leads to stunting, iodine and iron deficiency, and inadequate stimulation. Three aspects of parenting are consistently related to young children's cognitive and social-emotional competence: cognitive stimulation, caregiver sensitivity and responsiveness to the child and caregiver affect (emotional warmth or rejection of child). The effect of these factors is sensitive to contextual factors such as poverty, cultural values and practices. Follow-up studies of intervention studies, which assessed the effect of cognitive stimulation on young children consistently, reported lasting effects of early cognitive intervention[3,4] maintained up to 17 years[5].

1 Rolnick, A. J., and R. Grunewald. 2007. "The Economics of Early Childhood Development as Seen by Two Fed Economists." Community Investments 19 (2), Federal Reserve Bank of San Francisco.
2 Heckman, J. J., S. H. Moon, R. Pinto, P. A. Savalyev, and A. Yavitz. 2009. "The Rate of Return to the High/Scope Perry Preschool Program." Working Paper 200936, Geary Institute, University College Dublin. http://www.ucd.ie/ geary/static/publications/workingpapers/gearywp200936.pdf

3 Kagitcibasi C, Sunar D, Bekman S. Long-term effects of early intervention: Turkish low-income mothers and children. *J Appl Dev Psychol* 2001; 22: 333-361
4 Magwaza AS, Killian BJ, Petersen I, Pillay Y. The effects of chronic violence on preschool children living in South African townships. *Child Abuse Negl* 1993; 17: 795-803.
5 Walker SP, Chang SM, Powell CA, Grantham-McGregor SM. Effects of early childhood psychosocial stimulation and nutritional supplementation on cognition and education in growth-stunted Jamaican children: prospective cohort study. *Lancet* 2005; **366**:1804-1807

Strategies to avoid the loss of developmental potential in more than 200 million children in the developing world.
Engle PL, Black MM, Behrman JR, Cabral de Mello M, Gertler PJ, Kapiriri L, Martorell R, Eming Young E, and the International Child Development Steering Group. *Lancet* 2007; 369: 229-242
http://download.thelancet.com/pdfs/journals/lancet/PIIS0140673607601123.pdf?id=40bade47 53939e7f:-6d80ed0d:13ccdbe0fb2:1dfd1360663864033

The authors state that the most effective early child development programmes that provide direct learning experiences to children and families, are targeted towards younger and disadvantaged children, are of longer duration, high quality, and high intensity, and are integrated with family support, health, nutrition, or educational systems and services.

The authors cite three papers that provide evidence that both cognitive and social-emotional skills provide the basis for later academic and employment success.[6,7,8] They also cite that for children younger than 3 years, combining family and centre-based components is more effective than either alone[9,10]. Cost-benefit ratios for seven programmes in developed countries ranged from 1·8 to 17·0[11].

The authors put a panel of suggestions together on why governments should invest in interventions for early child development. Suggestions are:

- It is the most cost-effective period in the child's life to invest.
- Events in the early years of a child's life influence the child's productivity and learning ability throughout the life course, and are effective strategies for reducing poverty among disadvantaged populations.
- Programmes increase the efficiency and effectiveness of school expenditures by reducing drop-out and repetition.
- Increased schooling for girls has a long-term effect on their children's survival, growth and development.
- Interventions are more sustainable because parents and families carry these changes over to subsequent children.
- There is a strong evidence base on effective interventions for early child development.
- The Convention on the Rights of the Child ensures every child the right to development as well as survival, and requires governments to support families in childrearing.

Skill formation and the economics of investing in disadvantage children
Heckman, J.J. 2006. Science 312:1900-1902

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6 Grantham-McGregor S, Cheung Y, Cueto S, Glewwe P, Richter L, Strupp B. Developmental potential in the first 5 years for children in developing countries. *Lancet* 2007; **369**: 60-70.
7 Heckman JJ. Skill formation and the economics of investing in disadvantaged children. *Science* 2006; **312**: 1900-1902.
8 Berlinski S, Galiani S, Gertler P. The effect of pre-primary education on primary school performance. London, Buenos Aires, Washington DC: University College London, Institute for Fiscal Studies, Universidad de San Andres and World Bank, 2006.
9 Love JM, Kisker EE, Ross C, et al. The effectiveness of early head start for 3-year-old children and their parents: lessons for policy and programs. *Dev Psychol* 2005; **41**: 885-901.
10 Sweet MA, Appelbaum MI. Is home visiting an effective strategy? A meta-analytic review of home visiting programs for families with young children. *Child Dev* 2004; **75**: 1435-1456.
11 Karoly L, Kilburn M, Canon . Early childhood interventions. Santa Monica, CA: Rand Corporation, 2005.

This paper presents an adapted figure (2.6) from Carneiro and Heckman 2003 to highlight that the rate of return to human capital investment in disadvantaged children from early interventions is higher than the return from later interventions. The figure also shows that a certain level of investment in adolescent and young adult years can be economically inefficient. However, Heckman cautions that although investments in older disadvantaged children can result in relatively less overall return, such investments are still beneficial in sustaining the positive impact of effective early interventions.

The High/Scope Perry Preschool Study Through Age 40.
Schweinhart LJ, Montie J, Xiang Z, Barnett WS, Belfield CR and Nores M. /Scope, Ypsilanti, MI, 2005.
http://www.highscope.org/content.asp?contentid=219

This landmark follow-up study conducted on African-Americans at the Perry Preschool in Ypsilanti, Michigan, found that adults aged 40 who had received the high-quality preschool programme intervention at ages 3 and 4 years earned higher salaries, were more likely to keep a job, had committed fewer crimes and were more likely to have graduated from high school than adults who had not received the intervention. The High/Scope study found that for every dollar invested in the programme over $8 in benefits were returned to the programme participants and society as a whole.

The success of this programme has been attributed to the growth in noncognitive skills (e.g. motivation and perseverance) as well as to cognitive skill development. Other initial early childhood development programme studies found only a short-term benefit to early intervention in cognitive test scores as those in the control groups caught up in their IQ within a few years.

Early childhood development: Economic development with a high public return.
Rolnick A, Grunewald R. Tech. rep. Federal Reserve Bank of Minneapolis, Minneapolis, MN 2003.
http://www.minneapolisfed.org/publications_papers/studies/earlychild/abc-part2.pdf

This paper presents the rate of return (increment in earnings and other relevant outcomes per year for each dollar invested in the child) for the Perry School programme at 15 to 17%.

Schools, Skills and Synapses
Heckman, J.J., 2008, Economic Enquiry 46: 289
http://heckman.uchicago.edu/sites/heckman.uchicago.edu/files/uploads/Heckman_2008_Schools%20skills%20and%20synapses.pdf

This paper discusses (a) the role of cognitive and noncognitive ability in shaping adult outcomes, (b) the early emergence of differentials in abilities between children of advantaged families and children of disadvantaged families, (c) the role of families in creating these abilities, (d) adverse trends in American families, and (e) the effectiveness of early interventions in offsetting these trends. Practical issues in the design and implementation of early childhood programs are discussed.

Inequality in early childhood: risk and protective factors for early child development.
Walker SP, Wachs TD, Grantham-McGregor S, Black MM, Nelson CA, Huffman SL, Baker-Henningham H, Chang SM, Hamadani JD, Lozoff B, Meeks Gardner JM, Powell CA, Rahman A, Richter L. *Lancet* 2011 378: 1325-1338

The authors summarise and review evidence on risk factors that affect children younger than 5 years on developmental inequality, economic implications and suggest strategies to promote early child development.

Lack of early childhood development has negative consequences for adult cognitive and psychological functioning educational attainment and subsequent income.

Biological and psychosocial risk factors prenatally and during early childhood, including inadequate stimulation and opportunities for learning, are likely to co-occur. Stimulation or education intervention alongside nutritional and economic interventions results in cognitive benefits greater than nutrition and economic interventions alone. This highlights the importance of integrated interventions to reduce developmental inequalities.

3. Secondary education data

Returns to Investment in Education: A Further Update
Psacharopoulos, G. & Patrinos, H.A. 2004. Education Economics, Vol. 12, No. 2
http://siteresources.worldbank.org/INTDEBTDEPT/Resources/468980-1170954447788/3430000-1273248341332/20100426_16.pdf

Returns to investment in education based on human capital theory have been estimated since the late 1950s. This paper reviews and presents the latest estimates and patterns as found in the literature at the turn of the century. Because the availability of rate of return estimates has grown exponentially, a new section is included on the need for selectivity in comparing returns to investment in education and establishing related patterns.

Data from the report include:

Mean returns to secondary education (%) (From table A3)

Country	Year	Men	Women
Indonesia	1982	23.0	11.0
Indonesia	1986	11.0	16.0
Puerto Rico	1959	27.3	40.8
South Korea	1971	13.7	16.9
Sri Lanka	1981	12.6	35.5
Suriname	1993	10.7	-0.8

Returns to investment in secondary education, latest year, regional averages (%) (From table 1)

Region	Social returns	Private returns
Asia*	11.1	15.8
Europe/Middle East/North Africa*	9.7	13.6
Latin America/Caribbean	12.9	17.0
OECD	9.4	11.3
Sub-Saharan Africa	18.4	24.6
World	13.1	17.0

*Non-OECD

Returns to investment in secondary education, latest year, averages by per-capita income group (%) (From table 2)

Per-capita income group	Social	Private
High income ($9266 or more)	10.3	12.2

Low income ($755 or less)	15.7	19.9
Middle income (to $9265)	12.9	18.0
World	13.1	17.0

See also Psacharopoulos, George. 1994. "Returns to investment in education: a global update," World Development, 22(9):1325-1343
http://ideas.repec.org/p/wbk/wbrwps/1067.html

Evidence of Returns to Schooling in Africa from Household Surveys: Monitoring and Restructuring the Market for Education
Shultz, T.P. 2003. Yale Economic Growth Center Discussion Paper No. 875,
http://www.africathinktank.org/wp-content/uploads/2010/09/Evidence-of-Returns-to-Schooling-in-Africa-from-Household-Surveys-Monitoring-and-Restructuring-the-Market-for-Education-Schultz.pdf

Wage-differentials by education of men and women are examined from African household surveys to suggest private wage returns to schooling. It is commonly asserted that returns are highest at primary school levels and decrease at secondary and postsecondary levels, whereas private returns in six African countries (Ghana, Côte d'Ivoire, Kenya, South Africa, Nigeria and Burkina Faso) are today highest at the secondary and post secondary levels, and rates are similar for women as for men.

It is found that across six African countries manufacturing wage returns from secondary education are between 7 and 19%

Private Rate of Return in Percent per Annum for Ghana by gender (From table 2)

		1987		1988		1991		1998	
Level	**Yrs of schooling**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Primary	4	7.2	5.1	5.5	9.7	6.0	7.6	8.4	2.5
Middle	6	4.8	-0.7	4.3	4.2	5.4	2.2	4.6	4.9
Secondary	5	11.0	2.6	12.0	12.0	10.0	8.0	9.8	15.0
University	4	14.0	27.0	18.0	4.4	18.0	22.0	25.0	-0.1

Private Rate of Return in Percent per Annum for Kenya by age and gender, 1994 (From table 5)

		Age 25-34		Age 34-54	
Level	**Yrs of schooling**	**M**	**F**	**M**	**F**
Primary and middle	8	11.0	8.1	10.0	5.8
Secondary	4	7.4	20.0	12.0	19.0
University	4	21.0	26.0	13.0	16.0

The estimated returns are higher for the younger rather than older cohorts, with the exception of males at the secondary level, suggesting that the supply of primary and post-secondary trained workers has not caught up to the derived demand by 1994.

Mean estimates of wage returns to secondary schooling in Nigeria, 1996-9 (From table 7)

Age group	15-64		25-34		35-44		45-64	
Sex	M	F	M	F	M	F	M	F
Mean return	3.98	4.29	4.39	4.58	4.16	4.31	3.46	3.48

Among wage earners in Nigeria, hourly wage rates increase by about 3.9 and 4.4 percent for each year of secondary school, for men and women, respectively.

In Burkina Faso, at the secondary school level, men's wage returns are higher at 22 and 17 percent in 1994 and 1998, whereas for women they are 22 and 26 percent, respectively

Private Rate of Return in Percent per Annum for Côte d'Ivoire in 1985-87 by gender, 1994 (From Table 4)

Level	Yrs of schooling	Age 25-34		Age 34-54	
		M	F	M	F
Primary	6	15.0	4.5	17.0	10.0
Middle	4	14.0	9.6	12.0	3.8
Secondary	2	22.0	12.0	26.0	28.0
University	5	16.0	3.6	3.6	28.0

There is some evidence that parents who were educated to secondary level had children who were higher educational achievers.

The Knowledge Economy and Education and Training in South Asia
Riboud, M., Savchenko, Y. & Tan, H. 2007. IBRD
http://siteresources.worldbank.org/INTINDIA/2132853-
1191444019328/21497956/TheKnowledgeEconomyandEducationinSouthAsia.pdf

This regional study relies on data from Household surveys, labour force surveys and Investment climate surveys.

Rate of Return to Schooling by Education Level, Selected South Asian Countries and Years (percent) (From table 3.2)

Bangladesh		2000	2004
Secondary		6.4	4.1
Higher secondary		10.8	7.1
India	**1993**	**1999**	**2004**
Middle	9.5	8.4	10.7
Secondary	23.3	22.7	16.8
Higher secondary	11.7	15.0	16.3
Pakistan	**1993-4**	**1996-7**	**2000-1**
Middle	5.7	6.4	6.6
Secondary	9.5	9.3	14.2
Higher secondary	10.1	11.4	13.9
Sri Lanka	**1992-3**	**1997-8**	**2001-2**
Middle	13.2	12.1	11.6
Secondary	10.6	7.8	8.8
Higher secondary	14.4	16.0	18.4

This report also presents this information disaggregated by gender (p33, table 3.3). While returns to primary education are significantly higher for men than for women in India and Sri Lanka (in Bangladesh and Pakistan, returns to primary education are higher for women than for men), returns to higher levels of education are usually much higher for women, especially at the secondary level, and to a lesser extent at the tertiary level.

The evidence indicates that rates of return to higher secondary and tertiary education increased over time in the three countries for which there is time series data.

In Pakistan, returns for higher secondary education rose in business services and manufacturing, with increasing returns being especially pronounced for the former. However, the returns to higher secondary education declined over this period for utilities and construction and for wholesale, retail, hotels, and restaurants.

Educating out of Poverty? A Synthesis Report on Ghana, India, Kenya, Rwanda, Tanzania and South Africa
Palmer, R. at al. 2007. DFID Educational Paper
http://www.dfid.gov.uk/r4d/PDF/Outputs/PolicyStrategy/ResearchingtheIssuesNo70.pdf

This research project has explored the ways in which both the achievement and the developmental impact of the goal of Universal Primary Education (UPE) rely on strengthening of systems for post-basic education and training (PBET). Reviewing the relevant policies, institutions, and experience in six countries (India, Ghana, Rwanda, Kenya, South Africa, Tanzania), policy-relevant lessons are sought concerning the ways in which the poverty reducing benefits of basic education depend on PBET's contributions to an enabling environment.

Table 4.2.Social Rates of Return Reported in different Country Studies

Country	Source year	Secondary
Ghana	1997	10.6 (junior) 14.0 (senior)
Ghana	2002 (based on 1967 data)	13.0
South Africa	2002 (based on 1980 data)	17.7
Kenya	1999 (based on 1995 data)	6
Tanzania	2000 (based on 1990/1 data)	1.5

Table 4.3 Private Rates of Return From Country Studies

Country	Source year	Secondary
Rwanda	2004	21.3
Ghana	1997	13.5 (junior) 19.5 (senior)
Ghana	2002 (based on 1967 data)	17.0
India	1998 (based on 1995 data)	17.6
S. Africa	1998	9.7
Kenya	1999 (based on 1995 data)	7
Tanzania	1999 (based on 1990/1 data)	6.9

One of the main criticisms of the rates of return estimates is that they focus on the waged workforce in the formal economy. Psacharopoulos and Patrinos themselves point out that few of the studies that they draw on take truly representative samples of the population. Many studies using large firms automatically exclude populations in rural areas and those working for micro- small- and medium-enterprises. Given that the majority of people in SSA and other developing countries, including India, are not in formal sector employment, rates of return estimates are very problematic and can be misleading. Bennell comments that, "the oft-repeated assertion that public investment in education is relatively attractive because actual social rates of return to education (ROREs) are relatively high vis-à-vis other types of investment can probably be no longer sustained in many SSA countries, in particular where wage employment opportunities remain minimal and traditional agricultural practices persist".

More recent RORE measurements have looked at returns in the informal or casual labour sector. The findings of two such studies are shown in table 4.4. These studies do not provide easy comparisons between employment sectors as few primary graduates are employed in the formal sector and few degree holders work in the informal sector, but the findings imply that the private returns in the informal sector are higher than in the formal sector in Rwanda but lower in India.

Table 4.4: Private Returns to Education by Employment Sector (Informal / Formal)

	Source	Secondary
Rwanda – formal sector	World Bank (2004) Education in Rwanda. Rebalancing Resources to Accelerate Post-Conflict Development and Poverty Reduction	10.8
Rwanda – informal sector	World Bank (2004) Education in Rwanda. Rebalancing Resources to Accelerate Post-Conflict Development and Poverty Reduction	25.3
India – formal sector	Vasudeva-Dutta, P. (2004) The Structure of Wages in India, 1983-1999, University of Sussex	2.0 (middle) 4.6 (upper)
India – informal sector	Vasudeva-Dutta, P. (2004) The Structure of Wages in India, 1983-1999, University of Sussex	Not significant (0.21)

The difference between private and social returns may be due to the fact that the social rates of return add in the costs to society but do not factor in the benefits. The term 'social' is somewhat misleading as the social rates do not take into account the benefits that the society as a whole may gain from an individual's education. These benefits, referred to as externalities in the economic literature, are likely to be large when an individual has a higher level of education than his/her neighbours; thus they may be more significant at post-basic levels of education. For example, a farmer educated to secondary level may inspire his primary educated neighbours to introduce new technologies based on his own example. Appleton and Balihuta found that in Uganda, a farmer's productivity was more closely associated with the neighbours' level of schooling than his own. Professionals such as health workers, agricultural extension officers and teachers will tend to increase the levels of productivity of populations that they serve. These externalities or 'spill over' effects are difficult to measure and so they tend to be omitted. This potentially major omission means that considerable caution needs to be used when basing policy decisions on the rates of return data.

The author of a study of 35 households in Rwanda (Reiss, 2003) draws the conclusion that primary education has social welfare benefits but is not sufficient for meaningful employment to improve socio-economic status. It is the years of secondary education that begin to make a difference. There was no significant difference in income between those respondents who had not completed primary education and those who had; they were just as likely to be involved in unpaid farming activity. It was with some years of secondary or post-primary vocational training that significant differences in livelihoods were observed. These people were much more likely to have access to paid employment and income-generating activities, as well as having better housing and health.

Data from the 2000/2001 Integrated Labour Force Survey in Tanzania (World Bank, 2004) was used to show that primary graduates earned almost double the wages of those with no education; however, the increment between those with secondary and those with only primary education was much greater. Controlling for experience, location and gender, it was found that a wage earner with completed primary education earned 75% more than one with no schooling, whereas a secondary school graduate earned 163% more. In its rationale for supporting the expansion of secondary education in Tanzania, the World Bank argued that the large earning differential between those with and those without secondary education, and

also the low prevalence of post-primary educated people among paid employees, indicate scarcities in the supply of labour with secondary education and above.

Where the labour market shows signs of saturation for those with post-basic education it might be difficult for governments to justify high educational spending at this level. However, there is a case for arguing that education has the potential to stimulate job creation. There is some evidence from our six countries that secondary and post-secondary education is associated with the capacity to establish enterprises that create new employment opportunities.

Tettey (2003) shows that infant and child mortality are lowest amongst mothers with higher education in Ghana and Nigeria. The infant and child mortality for children of mothers with secondary education or higher is around half that of children of women with primary education only.

Changes in returns to education in India, 1983-94: By gender, age-cohort and location
Duraisamy, P. 2000. University of Madras
http://www.econ.yale.edu/growth_pdf/cdp815.pdf

There is hardly any estimate of the returns to schooling in India based on a national level representative data for the recent period. This paper provides estimates of the returns to education in India by gender, age cohort and location (by rural-urban) for the most recent period 1993/4, and also evaluates the changes in returns over a period of time from 1983-94 using a large national level household survey data. The data show that the returns to education increases up to the secondary level and declines thereafter. There is evidence of substantial gender and rural-urban differences in the returns to schooling. The returns to women's education for the primary and middle levels have declined while those for secondary and college levels have increased during the decade 1983-94.

Private returns to schooling in India 1993-4

School Level	Middle	Secondary	Higher secondary
Overall	7.4	17.3	9.3
Men	6.4	15.7	8.9
Women	10.3	33.7	11.8

Estimating the returns to education in Argentina using quantile regression analysis: 1992-2002
Fiszbein, A., Giovagnoli, P.I. & Patrinos, H.A. 2007. Económica, La Plata, Vol. LIII, Nro. 1-2
http://economica.econo.unlp.edu.ar/documentos/20081127033457PM_Economica_555.pdf

Workers who completed secondary school show returns of 13% on average for the period 1980-1999, and 11% in 1999.

The returns to schooling in urban Argentina increased over a ten-year period, 1992 to 2002. The overall rate of return to an additional year of schooling increased from 8.6 percent in 1992 to 11.4 percent in 2002. Returns to schooling increased as real wages decreased. In fact, returns continued to rise even during times of severe economic crisis. This finding could be related to human capital theory, in that a disequilibrium situation causes an increase in the rewards for schooling.

Rate of Return to Education. Human Resources and the Labor Market of Thailand
Amornthum, S., & Chalamwong, Y. 2001. Thailand Development Research Institute (TDRI)
http://www2.hawaii.edu/~amornthu/pdf/Return2ed.pdf

This study aimed to update the rates of return to education in Thailand previously estimated by the World Bank. This paper mainly followed the World Bank's methodology with some minor changes in definitions and calculations for the accuracy of results.

Data for 2000 reported:
- Private returns for males finishing upper secondary are 8.46%.
- Private returns for females finishing upper secondary are 7.35%.
- The social rate of return for males finishing upper secondary is 6.33%.
- The social rate of return for females finishing upper secondary is 5.60%.

Can Cost-Benefit Analysis Guide Education Policy in Developing Countries?
Jimenez, E. & Patrinos, H.A. 2008. World Bank Policy Research Working Paper 4568
https://openknowledge.worldbank.org/bitstream/handle/10986/6544/wps4568.pdf?sequence=1

This paper outlines a formula for estimating rates or return to education based for a number of years of schooling.

Household survey data was used to estimate the returns to schooling, in 1996, in Ethiopia. Overall, another year of schooling is associated with a 23 percent gain in earnings. Returns are high for both males and females, at 23 and 22 percent; in rural and urban areas, at 21 and 15 percent; and by level, that is, primary, secondary and university, at 25, 24 and 27 percent.

The efficiency of public education in Uganda
Winkler, D. & Sondergaard, L. 2008. World Bank
http://info.worldbank.org/etools/docs/library/244476/day7Uganda%20Efficiency%20Study.pdf

The most common indicators of external efficiency in education are estimates of the private and social rates of return to expenditures on education at the different levels or types (e.g., academic vs. vocational secondary) of education. Unfortunately, at this point there is no good country level indicator of the appropriate levels of access and quality of education.

There are two serious problems with estimates of rates of return that argue for using them with caution to guide public policy. First, the estimates are calculated based on what individuals with different education levels have earned in the past, which may not necessarily be a good predictor of future earnings. Thus, while the social rate of return to secondary education in Uganda is relatively low, evidence from surveys of national competitiveness suggest that future returns may be considerably higher. Also, these estimates ignore the non-monetary, social benefits of additional education, such as better health and nutrition, better child-rearing, reduced poverty, and scientific advancement.

Finally, we lack information on the rate of return in which many countries are most interested these days—the rate of return to investing in quality improvements in the classroom. Raising quality, and thus student learning or achievement, in most cases requires additional resources. In principal, one could calculate the increased income that results from the additional learning resulting from additional investments. In practice these are extremely difficult calculations to make, but the little evidence we have suggests the returns may be very high indeed

Many parents appear to know this and make sizeable private investments to raise their child's learning and future educational and career prospects.   .

The rates of return estimated using the 2000 household survey data for secondary education:
- Private return 11.5%
- Social return 10.5%

Absent from this report is evidence on the returns to pre-primary education. International evidence on early childhood development programs suggests these returns can be very high, especially for children from disadvantaged backgrounds. Investing in the health and school preparedness of pre-school children can reduce delayed entry to primary school and increase the likelihood of success in school.

Cost-Benefit Analysis of Secondary Education in Imo State
Christiana, U. 1995. University of Nigeria Nsukka, PhD Study
http://www.nerdc.gov.ng/i/contents/abstracts2/abstract_content/edufound/cos_bene_analysis.html
The study involves the determination of the costs and benefits of the secondary education in Imo State through the internal rate of return analysis and the comparison of private and social internal rates of return to investment in secondary grammar, technical and commercial education. It investigated. the relationship between educational expenditure and performance of JSSC and SSC students in secondary grammar, secondary technical and secondary commercial institutions and determined the actual contribution of the government and the individuals to secondary education. The private and social costs data were collected from 728 students and 30 principals of the 30 sampled schools. For benefits, cross-sectional data on earnings were collected from 947 workers. The rates of return were adjusted for wastage/stagnation alpha-coefficient, unemployment and future growth of income.

The results showed that the secondary grammar, technical and commercial private rates of return were 10.27, 10.09 and 9.85 percent respectively, while the corresponding social rates of return were 13.25; 18.55 and 18.94 percent. These social rates of return were higher than the corresponding private rates of return. Therefore, it seemed more profitable for the society to invest in secondary education particularly secondary commercial than the individual. The secondary grammar's private rate of return was the highest. Thus, there is more likelihood for private investment to be made in secondary grammar. The mean performance of secondary grammar students in Junior Secondary School Certificate examinations was higher than those of secondary technical and secondary commercial students even though secondary grammar education appeared the least costly. The secondary commercial education appeared the most expensive but recorded the lowest mean performance of students in Junior Secondary School Certificate and Senior Secondary Certificate examinations. The secondary technical students' mean performance was the highest yet its cost was lower than that of commercial secondary. Recommendations were made from the findings.

4. Further resources on returns to secondary education

The Pattern of Returns to Education and its Implications
Colclough, C., Kingdon, G. & Patrinos, H.A. 2009. RECOUP Policy Brief No. 4.
http://recoup.educ.cam.ac.uk/publications/pb4.pdf

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.

Cost-benefit analysis in educational planning

Woodhall, M. 2004. UNESCO
http://www.mp.gov.rs/resursi/dokumenti/dok100-eng-Cost-benefit_analysis.pdf

This is the fourth edition of this booklet, first published in 1970, which examines the uses and applications of cost-benefits analysis for education in developing countries. It explains the theory underlying estimation of the rate of return to investment in education, as well as describing methods of calculation; considers theoretical and practical objections to the use of cost-benefit analysis as a way of measuring the economic contribution of education; and summarizes the results of cost-benefit studies in nearly 100 countries.

The booklet discusses problems of interpreting cost-benefit analysis, examines recent criticisms of both its theory and practice as applied to education, and considers its practical usefulness for educational planners. It concludes that although precise measurement of the economic benefits of education is not possible, cost-benefit analysis does provide a useful framework for evaluating and comparing alternative ways of allocating and using resources for education in developing countries.

Rates of Return to Education in Asia: A Review of the Evidence
Bennell, P. 1998. Education Economics, v6 n2 p107-20
http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=EJ573492&ERICExtSearch_SearchType_0=no&accno=EJ573492

At regular intervals during the past 20 years, George Psacharopoulos has presented aggregate rates of return (RORs) to investments in education for each major geographical region. He argues forcibly that clear global ROR patterns are discernible. Perhaps the most well known of these is that the aggregate social RORs to primary education are consistently the highest throughout the world. However, by carefully scrutinizing the original ROR studies for all Asian countries that form the basis for Psacharopoulos' aggregate ROR estimates, this article shows that none of his ROR patterns exists in Asia.

Rates of return to education: Does the conventional pattern prevail in sub-Saharan Africa?
Bennell, P. 1996. World Development 24 (1).
http://www.sciencedirect.com/science/article/pii/0305750X9500115S

In his most recent review of rates of return to education (RORE), Psacharopoulos reaffirms that the conventional pattern of continent-wide aggregate social and private ROREs continues to prevail among both developed and developing countries. In particular, "primary education continues to exhibit the highest social profitability in the world regions" (Psacharopoulos, 1994). A detailed examination of individual RORE studies undertaken in sub-Saharan African countries reveals, however, pervasive theoretical and empirical shortcomings which seriously undermine the credibility of aggregate RORE estimates for the continent as a whole.

The full social returns to education: estimates based on countries economic growth performance
Mingat, A. & Tan, J. 1996. Human Capital Working Papers, World Bank.
http://bit.ly/UiYb0h

This paper reports new estimates of the social returns to education, using countries' economic performance during 1960-85 to capture the externalities from education. The results confirm the social profitability of investing in education but indicate that the returns by level of education are sensitive to countries' economic context. To interpret our results

meaningfully it is useful to make a distinction between investments to maintain existing coverage, and investments to expand it. Our findings relate mainly to the second type of investment decision in the context of the following observed initial gross enrollment ratios: 58 percent in primary education, 9 percent in secondary education, and 1 percent in higher education in low-income countries; 95 percent, 28 percent, and 4 percent, respectively, in middle-income countries; and 109 percent, 53 percent, and 9 percent, respectively, in high-income countries. Given these initial levels of coverage, our results suggest that low-income countries benefited most from investments to expand primary education, while in middle-income countries, it was investments to expand secondary education that brought the highest social returns. In the high-income countries, investing to expand coverage in higher education yielded the best returns. Investments with poor social returns include expansion of higher education in low- and middle-income settings and expansion of secondary education in high-income settings.

Educational cost-benefit analysis
Hough, J.R. 1993. Education Research Paper No. 02, ODA
http://www.dfid.gov.uk/r4d/PDF/Outputs/Misc_Education/paper02.pdf

This paper reports on rates of returns to education (including secondary) from different studies. The data are not very recent but might be of interest.

5. Additional information

Author
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