

Education Financing Priorities in Developing Countries[#]

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Abstract

We use the latest surveys of 15 low income, lower-middle income and upper-middle income countries to estimate the average private and social returns by levels of education. We compare returns across country type and to alternative investments in order to establish financing priorities. Our findings indicate that for low income countries, the priority is expansion of schooling at the primary level. For lower-middle income countries there is justification for further expansion at the primary level. For upper-middle income countries, returns justify an additional push at the secondary level.

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Introduction

Returns to investment in education have been estimated since the late 1950s. Recent analyses and reviews show a high private return to schooling, especially for higher education (Montenegro and Patrinos 2014; Peet, Fink and Fawzi 2015). The typical approach to estimating returns to schooling — the Mincer equation (Patrinos 2016)— provides information on the average monetary returns of one additional year of education. This is important for policymakers who must decide on education policy. But these estimates provide private returns to schooling, whereas government/public costs and other benefits are needed to estimate social rates of return (Psacharopoulos 1995). Social returns are more useful for policymakers and in the allocation of resources (Psacharopoulos and Mattson 1998).

In this paper, we estimate private and social returns by level of education for a selected group of low and middle income countries. We compare returns across country type and to alternative investments. We make policy recommendations for the financing of education by level of schooling and for type of country.

We argue that for low income countries, the social returns indicate that the priority is expansion of schooling at the primary level. For lower middle income countries, there is justification for further expansion at the primary level. For upper middle income countries, returns justify an additional push at the secondary level.

Data

Benefits: We used the latest household surveys in 15 low, lower-middle and upper-middle income countries according to the World Bank (2016) countries classification.

The countries in each group were selected on the basis of their size and the number of observations in each education-age category.

- Low income: Kenya; Congo Democratic Republic; Ethiopia; Gambia; Nepal
- Lower-middle: Indonesia; Sri Lanka; Pakistan; Vietnam; Zambia
- Upper-middle: Argentina; Brazil; China; Panama; Venezuela

We selected workers with dependent employment earnings. Earnings in local currency were converted to \$US at the 2012 exchange rate.

For each country group we constructed age-education-earnings profiles for four levels of education — no schooling, primary, secondary and tertiary. Profiles were averaged within each country group weighted by the country's population, resulting in the graphs included in Annex 1 (see smoothed profiles in Annex 2).

The earnings (Y) profiles for each schooling level were smoothed out by using the following quadratic function (1):

$$Y = a + b AGE + c AGE^2 \quad (1)$$

Costs: We used the costs by level of schooling and country income group presented in Table 1. The costs refer to central government, local government and private expenditure.

For all country groups we assumed a 6–6–4 year cycle for primary, secondary and tertiary education, respectively.

TABLE 1
Annual Cost per Student and Per Capita Income, 2012 (\$US)

<i>Educational level</i>	<i>Low income</i>	<i>Lower middle income</i>	<i>Upper middle income</i>
Primary	68	234	1,276
Lower secondary	135	299	1,415
Upper secondary	303	431	1,293
Post-secondary	1,433	2,496	4,763

Source: Education Commission (2016)

Returns Estimation

We used the full discounting method to estimate private and social returns to education where the social rate of return to investment in a given level of education is found by solving for r in the following equation (2). For example, in the case of university education, lasting four years and a working life of 42 years, we estimate r from:

$$\sum_{t=0}^{T-1} \frac{Y_u - Y_s}{(1+r)^t} = \sum_{t=0}^{T-1} \frac{C_u}{(1+r)^t} + \frac{C_u}{(1+r)^T} \quad (2)$$

$(Y_u - Y_s)_t$ is the earnings differential between a university graduate (subscript u) and a secondary school graduate (subscript s , the control group) at time t . C_u represents the direct costs of university education (tuition fees, books), and Y_s denotes the students' foregone earnings or indirect costs.

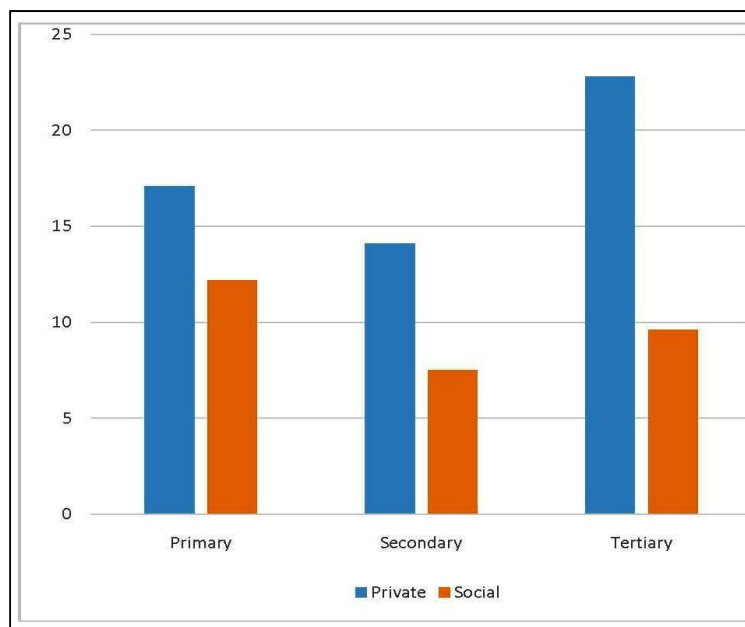
Findings

The returns to education by country income group and level of schooling are presented in Table 2 and Fig. 1. As expected, returns are higher in lower income countries, where the quantity of schooling is scarcer. The low returns to primary education in upper middle income countries can be explained by the fact that primary education has reached most of the population and there is not a sufficient number of illiterates to serve as a control group. It may also mean that given near universal coverage of primary education in these countries, there is not much room to further expand this level of schooling. It might, instead, make sense to increase investment in the quality of primary schooling.

TABLE 2
Returns to Education by Country Income Group

<i>Income level</i>	<i>Education level</i>	<i>Rate of return (per cent)</i>	
		<i>Private</i>	<i>Social</i>
Low income	Primary	17.1	12.2
	Secondary	14.1	7.5
	Tertiary	22.8	9.6
Lower middle	Primary	13.8	8.4
	Secondary	9.4	6.7
	Tertiary	17.6	7.0
Upper middle	Primary	2.3	0.4
	Secondary	4.5	2.9
	Tertiary	16.9	9.2

FIGURE 1
Returns to Investment in Education, Low Income Countries (per cent)



In low income countries, the private returns to schooling are high at all levels. Given the social returns, the priority for expansion of schooling is at the primary level. In most low income countries, the primary enrolment rate is significantly below the universal rate. The net enrolment ratio for primary school in low income countries is just over 82 per cent (Table 3).

TABLE 3
Enrollment Ratios by Income Group

<i>Country income Level</i>	<i>Schooling Level</i>	2005	2006	2007	2008	2009	2010	2011	2012	2013
Low income	Primary	74.7	76.8	78.7	80.3	81.0	81.1	82.0	82.6	82.8
	Secondary	29.6	30.9	31.8	33.0	34.3	35.5	36.2	37.1	37.1
	Tertiary	5.3	5.7	6.2	6.8	7.6	8.4	9.0	9.1	9.1
Lower middle income	Primary	83.7	84.7	86.6	86.3	86.9	87.3	87.0	86.9	86.6
	Secondary	48.3	49.4	51.4	53.0	53.0	55.3	57.8	59.6	59.7
	Tertiary	14.0	14.6	15.7	17.1	17.9	19.1	21.8	23.0	23.2
Upper middle income	Primary	94.7	94.1	94.6	94.5	94.5	94.4	94.4	94.2	94.3
	Secondary	64.2	66.1	68.6	71.0	73.3	75.4	77.4	78.5	80.5
	Tertiary	23.7	25.2	26.1	27.2	28.7	30.4	31.9	34.2	36.6

Source: World Bank EdStats, <http://datatopics.worldbank.org/education/>

Note: Net enrolment ratios for primary and secondary; gross enrolment rate for tertiary

For lower middle income countries, the private returns are high at every level, but only 8 per cent at the secondary level. Net primary enrolment for lower middle income countries is 87 per cent, so there is a justification for further expansion. For upper middle income countries, private returns are only high at the tertiary level. Enrolment is near universal at the primary level, though it has stagnated at 94 per cent since 2005. The returns to secondary are low, but the enrolment ratio at secondary level is increasing rapidly, from only 64 per cent in 2005 to over 80 per cent today. Given the high private and relatively high social returns to tertiary education in upper middle income countries, an additional push at the secondary level to improve access for the poor would make sense, so that they may be able to take advantage of high private returns to tertiary education.

Policy Implications

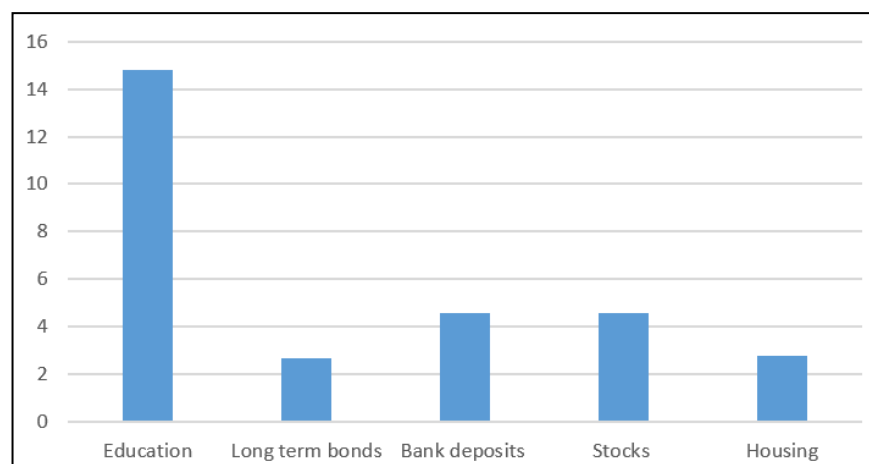
The patterns of the returns to education have several policy implications. Focusing on the social returns to education, primary education is an investment priority in low income countries, followed by secondary and tertiary. This finding is in line with previous findings in the literature (Psacharopoulos and Patrinos 2004; Montenegro and Patrinos 2014). The range of social returns to education from 12 to 17 per cent in low income countries is well above any alternative investment (Table 4 and Fig. 2).

TABLE 4
Long Term Returns to Alternative Investments

Investment type	Return (per cent)
Education	12-17
Long-term bonds	2.7
Bank deposits	4.6
Stocks	4.6
Housing	2.8

Source: Education from Table 3, primary, low income countries; Alternative investments from <http://money.cnn.com/calculator/pf/home-rate-of-return/>; <http://data.worldbank.org/indicator/FR.INR.DPST>; stern.nyu.edu/

FIGURE 2
Returns to Alternative Investments (per cent)



Note: Education returns, average of private and social returns in low income countries

The difference between private and social rates of return, especially for tertiary education, calls for innovative financing mechanisms that will expand access and effective demand for enrolment, especially among the poor (Psacharopoulos, Jimenez and Tan 1985). Such mechanisms may include, but are not limited to: selective cost-recovery, income contingent loans, human capital contracts, social impact bonds and conditional cash transfers.

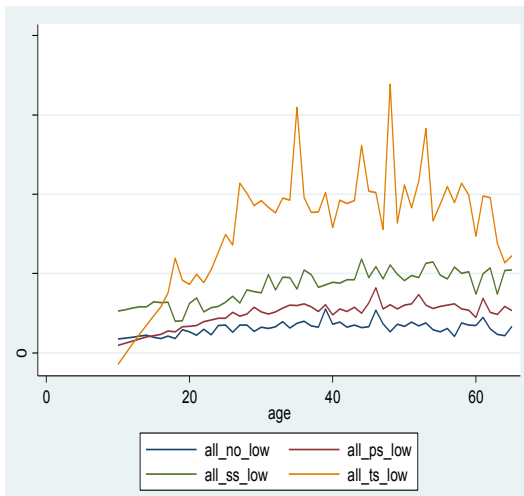
To expand access and quality at the secondary level, alternative models may be needed to reach the poor in remote and rural areas. Special measures may be needed to increase enrolment among ethnic minorities and indigenous peoples in some countries, such as bilingual education or tailor-made delivery modes. Selected scholarships will play a role, especially for enticing girls to enter non-traditional fields at the upper secondary level. The much higher cost for secondary education, especially at the upper level, may require the use of public-private partnerships – for example, industry links for skills formation and charter schools to reach the poor and disadvantaged, vouchers and scholarships to encourage enrolment to complete secondary.

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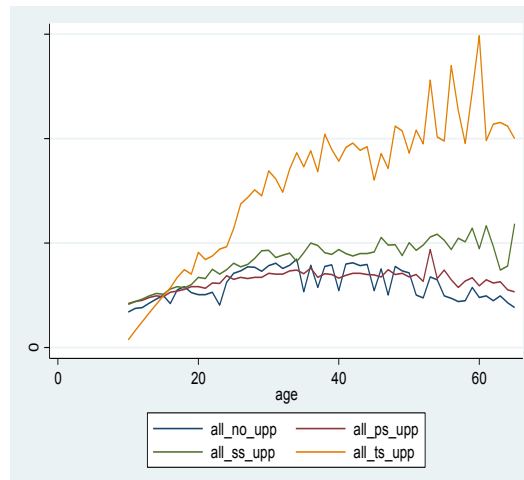
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Average Age-Earnings Profiles

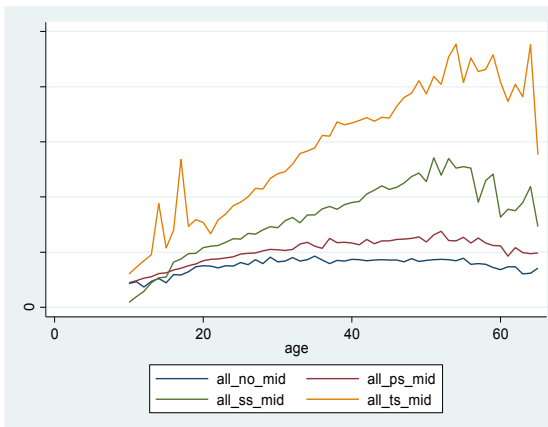
Low Income Countries
\$US



Upper Middle-Income Countries
\$US



Low Middle-Income Countries
\$US



Smoothed Age-Earnings Profiles by Level of Education

Low Income Countries (\$ US)

<i>Age</i>	<i>No School</i>	<i>Primary</i>	<i>Secondary</i>	<i>Tertiary</i>
10				
11				
12	179			
13	191			
14	202	207		
15	213	231		
16	224	254		
17	234	276		
18	244	298		
19	253	319		
20	262	340	646	
21	271	359	664	
22	279	378	682	
23	287	396	699	
24	295	414	716	1361
25	302	431	732	1439
26	309	447	748	1512
27	315	462	764	1582
28	321	476	779	1648
29	327	490	793	1710
30	332	503	807	1769
31	337	516	820	1823
32	342	528	833	1874
33	346	538	846	1921
34	350	549	858	1964
35	353	558	869	2003
36	356	567	881	2038
37	359	575	891	2070
38	361	582	901	2097
39	363	589	911	2121
40	364	595	920	2141
41	365	600	928	2157
42	366	604	937	2170
43	366	608	944	2178
44	366	611	951	2183
45	366	613	958	2184
46	365	615	964	2181
47	364	616	970	2174
48	362	616	975	2163
49	360	615	980	2149
50	358	614	984	2130
51	355	612	988	2108

Table Contd...

Education Financing Priorities in Developing Countries

<i>Age</i>	<i>No School</i>	<i>Primary</i>	<i>Secondary</i>	<i>Tertiary</i>
52	352	609	991	2082
53	349	605	994	2052
54	345	601	996	2019
55	341	596	998	1981
56	336	590	999	1940
57	331	584	1000	1895
58	326	577	1000	1846
59	320	569	1000	1793
60	314	560	1000	1737
61	307	551	998	1676
62	300	541	997	1612
63	293	530	995	1544
64	285	519	992	1472
65	277	507	989	1396

Low Middle Income Countries (\$ US)

<i>Age</i>	<i>No School</i>	<i>Primary</i>	<i>Secondary</i>	<i>Tertiary</i>
10				
11				
12	479			
13	506			
14	533	599		
15	559	638		
16	583	675		
17	607	711		
18	630	746		
19	652	780		
20	673	812	978	
21	693	843	1054	
22	712	873	1127	
23	730	902	1198	
24	747	930	1266	2088
25	763	956	1332	2180
26	778	981	1395	2269
27	792	1005	1456	2356
28	806	1028	1515	2441
29	818	1049	1571	2525
30	830	1069	1625	2606
31	840	1088	1676	2686
32	850	1106	1725	2764
33	858	1123	1772	2840
34	866	1138	1816	2914
35	872	1152	1858	2986
36	878	1165	1897	3056
37	883	1177	1934	3124
38	887	1187	1969	3190
39	890	1197	2001	3255
40	891	1205	2030	3317
41	892	1211	2058	3378
42	892	1217	2083	3437

Table Contd...

George Psacharopoulos, Claudio Montenegro and Harry Anthony Patrinos

<i>Age</i>	<i>No School</i>	<i>Primary</i>	<i>Secondary</i>	<i>Tertiary</i>
43	892	1221	2105	3494
44	890	1224	2125	3548
45	887	1226	2143	3602
46	883	1227	2158	3653
47	878	1227	2171	3702
48	873	1225	2181	3749
49	866	1222	2189	3795
50	858	1218	2195	3838
51	850	1212	2198	3880
52	840	1206	2199	3919
53	830	1198	2198	3957
54	819	1189	2194	3993
55	806	1178	2187	4027
56	793	1167	2178	4059
57	779	1154	2167	4090
58	764	1140	2153	4118
59	748	1125	2137	4144
60	730	1109	2119	4169
61	712	1091	2098	4191
62	693	1072	2075	4212
63	674	1052	2049	4231
64	653	1031	2021	4248
65	631	1008	1991	4263

Upper Middle Income Countries (\$ US)

<i>Age</i>	<i>No School</i>	<i>Primary</i>	<i>Secondary</i>	<i>Tertiary</i>
10				
11				
12	1979			
13	2107			
14	2230	2485		
15	2349	2566		
16	2462	2644		
17	2570	2719		
18	2672	2791		
19	2770	2860		
20	2863	2925	3297	
21	2951	2989	3399	
22	3033	3049	3498	
23	3111	3106	3594	
24	3183	3160	3687	5614
25	3250	3211	3776	5916
26	3313	3259	3863	6210
27	3370	3305	3946	6495
28	3422	3347	4026	6771
29	3469	3386	4103	7038
30	3510	3423	4177	7297
31	3547	3456	4248	7547
32	3579	3487	4316	7788
33	3605	3514	4381	8020

Table Contd...

Education Financing Priorities in Developing Countries

<i>Age</i>	<i>No School</i>	<i>Primary</i>	<i>Secondary</i>	<i>Tertiary</i>
34	3627	3539	4442	8244
35	3643	3561	4501	8459
36	3655	3579	4556	8665
37	3661	3595	4608	8863
38	3662	3608	4657	9052
39	3658	3618	4703	9232
40	3649	3625	4746	9403
41	3635	3629	4785	9566
42	3616	3630	4822	9720
43	3591	3628	4855	9865
44	3562	3623	4886	10002
45	3528	3615	4913	10129
46	3488	3604	4937	10248
47	3443	3590	4958	10359
48	3394	3574	4976	10460
49	3339	3554	4991	10553
50	3279	3531	5002	10637
51	3214	3506	5011	10713
52	3144	3477	5016	10779
53	3069	3446	5019	10837
54	2988	3411	5018	10886
55	2903	3374	5014	10927
56	2813	3334	5007	10959
57	2717	3290	4996	10982
58	2617	3244	4983	10996
59	2511	3195	4967	11001
60	2400	3143	4947	10998
61	2284	3088	4925	10986
62	2163	3030	4899	10966
63	2037	2969	4870	10936
64	1906	2905	4838	10898
65	1770	2838	4803	10852