Chapter 5

Economic impacts of achieving the basic skills goal by 2030

This chapter proposes three scenarios to examine the economic impact of achieving the goal of universal basic skills: each student now in school acquires a basic level of proficiency in mathematics and science; universal enrolment in secondary school, without changing the quality of schooling; and both universal enrolment and at least basic skills among all students. A fourth scenario posits improvements to be made over 30 years rather than over 15 years.

It is now possible to consider the proposed development goal – all youth acquire basic skills – in its relation to countries' access and achievement levels and to determine the economic value of achieving the goal. The idea is straightforward. For each of the 76 countries, the data show what kind of improvement would be necessary to reach the goal of universal basic skills. If the relationship between growth rates and achievement observed over the past half century holds into the future, one can calculate how much GDP would differ in the future if countries reached this development goal as opposed to doing nothing to change their knowledge capital. These projections allow both for the fact that education reform is not instantaneous (as implied by setting the goal to be achieved by 2030) and for the fact that the labour force changes as more skilled people progressively enter the labour market.

The analysis is decomposed into a series of reform projections that represent intermediate outcomes. The starting point is baseline projections in which achievement of students improves by 25 points in the Programme for International Student Assessment (PISA) test and in which gender achievement equalises for those now in school. The subsequent scenarios model reaching the goal of universal basic skills in separate steps: first, bringing all current students to basic skills (420 PISA points); second, achieving full participation in secondary school at current quality levels; and third, completely satisfying the goal by achieving full participation in school and bringing all students to basic skills.

These projections are followed by an analysis of the results' sensitivity to alterations in the estimation and projection approach. Finally, the report summarises and contrasts the alternative policy outcomes and shows unmistakably that improving schools so that all young people acquire basic skills should be the dominant objective.

Projection model and parameter choices

The projections rely on a simple description of how skills enter the labour market and have an impact on the economy.[1] The development goal is framed as the standard that should be met by 2030, leading to the assumption that improvement occurs linearly from today's schooling situation to attainment of the goal in 15 years. But of course, the labour force itself will only become more skilled as increasing numbers of new, better-trained people enter the labour market and replace the less-skilled individuals who retire. The analysis assumes that a worker remains in the labour force for 40 years, implying that the labour force will not be made up of fully skilled workers until 55 years have passed (15 years of reform and 40 years of replacing less-skilled workers as they retire).

The growth rate of the economy (according to the estimate of 1.98% higher annual growth rate per standard deviation in educational achievement; see column 3 of Table A.1 in Annex A) is calculated each year into the future based on the average skills of workers (which changes as new, more skilled workers enter). The gain in GDP is then estimated with an improved workforce over GDP with the existing workforce from 2015 until 2095.[2] The projection is carried out for 80 years to correspond to the life expectancy of somebody born in 2015.

Future gains in GDP are discounted to the present with a 3% discount rate. The resulting present value of additions to GDP is thus directly comparable to the current levels of GDP.[3] The gains to the discounted value of projected future GDP without reform can also be calculated to arrive at the average increase in total GDP over the 80 years.

Increasing average achievement of current students by 25 PISA points

In order to understand the impact of improved achievement, it is useful to begin with a simple improvement in existing schools equivalent to 25 PISA points. The improvement takes place by 2030 and involves no expansion in school enrolment. As discussed below, this kind of improvement is achievable by both low- and high-income countries. Some 28 countries have improved at this rate over the past 15 years.[4]

Table 5.1 summarises the results of this improvement for countries grouped by income category: lower-middle income countries, upper-middle income countries, high-income non-OECD countries, and high-income OECD countries. (The categories follow the World Bank classification of countries by income groups. No country classified as low income provides the international achievement data required for the projections.)

TABLE 5.1 EFFECT ON GDP OF INCREASING AVERAGE PERFORMANCE OF CURRENT STUDENTS BY 25 PISA POINTS

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Lower-middle income countries						
Armenia	75	293%	6.3%	25%	0.43	21.8
Georgia	99	271%	5.8%	23%	0.40	20.3
Ghana	175	150%	3.2%	13%	0.23	11.5
Honduras	100	246%	5.3%	21%	0.37	18.4
Indonesia	7 954	290%	6.2%	25%	0.43	21.6
Morocco	716	264%	5.6%	23%	0.39	19.8
Ukraine	1 095	285%	6.1%	25%	0.42	21.3
Viet Nam	1 149	210%	4.5%	18%	0.31	15.9
Upper-middle income countries						
Albania	70	216%	4.6%	19%	0.32	16.3
Argentina	2 926	315%	6.7%	27%	0.46	23.3
Botswana	70	198%	4.2%	17%	0.30	15.0
Brazil	8 256	260%	5.6%	23%	0.39	19.5
Bulgaria	366	286%	6.1%	25%	0.42	21.3
Colombia	1 580	231%	4.9%	20%	0.35	17.4
Costa Rica	198	264%	5.6%	23%	0.39	19.7
Hungary	825	330%	7.1%	29%	0.48	24.3
Iran	3 291	246%	5.3%	21%	0.37	18.5
Jordan	278	328%	7.0%	29%	0.48	24.2
Kazakhstan	1 450	323%	6.9%	28%	0.47	23.9
Lebanon	209	250%	5.3%	22%	0.37	18.8
Macedonia	75	259%	5.5%	22%	0.38	19.4
Malaysia	2 259	282%	6.0%	25%	0.42	21.0
Mexico	5 223	231%	4.9%	20%	0.34	17.4
Montenegro	34	340%	7.3%	30%	0.50	25.0
Peru	1 182	293%	6.3%	25%	0.43	21.8
Romania	1 371	340%	7.3%	30%	0.50	25.0
Serbia	299	320%	6.9%	28%	0.47	23.7
South Africa	1 703	239%	5.1%	21%	0.36	18.0
Thailand	2 820	267%	5.7%	23%	0.40	20.0
Tunisia	449	340%	7.3%	30%	0.50	25.0
Turkey	4 034	254%	5.4%	22%	0.38	19.1

TABLE 5.1 EFFECT ON GDP OF INCREASING AVERAGE PERFORMANCE OF CURRENT STUDENTS BY 25 PISA POINTS (continued)

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
High-income non-OECD countries						
Bahrain	193	300%	6.4%	26%	0.44	22.3
Croatia	293	328%	7.0%	29%	0.48	24.2
Cyprus*	87	340%	7.3%	30%	0.50	25.0
Hong Kong-China	1 316	312%	6.7%	27%	0.46	23.1
Latvia	169	332%	7.1%	29%	0.48	24.5
Lithuania	259	312%	6.7%	27%	0.46	23.1
Oman	473	275%	5.9%	24%	0.41	20.5
Qatar	1 189	335%	7.2%	29%	0.49	24.7
Russian Federation	12 335	339%	7.2%	30%	0.49	24.9
Saudi Arabia	4 205	239%	5.1%	21%	0.36	18.0
Singapore	1 540	330%	7.1%	29%	0.48	24.3
Chinese Taipei	3 670	340%	7.3%	30%	0.49	25.0
United Arab Emirates	2 169	337%	7.2%	29%	0.49	24.8
Uruguay	208	285%	6.1%	25%	0.42	21.2
High-income OECD countries						
Australia	3 863	335%	7.2%	29%	0.49	24.7
Austria	1 293	322%	6.9%	28%	0.47	23.8
Belgium	1 611	334%	7.1%	29%	0.49	24.6
Canada	5 475	332%	7.1%	29%	0.49	24.5
Chile	1 341	310%	6.6%	27%	0.46	23.0
Czech Republic	1 019	326%	7.0%	28%	0.48	24.0
Denmark	857	332%	7.1%	29%	0.49	24.5
Estonia	123	334%	7.1%	29%	0.49	24.6
Finland	769	338%	7.2%	30%	0.49	24.9
France	8 575	322%	6.9%	28%	0.47	23.8
Germany	12 711	340%	7.3%	30%	0.50	25.0
Greece	959	322%	6.9%	28%	0.47	23.8
Iceland	49	339%	7.2%	30%	0.49	24.9
Ireland	782	332%	7.1%	29%	0.48	24.4
Israel*	905	322%	6.9%	28%	0.47	23.8
Italy	6 716	317%	6.8%	28%	0.46	23.4
Japan	16 311	332%	7.1%	29%	0.48	24.5
Korea	6 287	332%	7.1%	29%	0.48	24.5
Luxembourg	175	333%	7.1%	29%	0.49	24.6
Netherlands	2 788	338%	7.2%	30%	0.49	24.9
New Zealand	547	329%	7.0%	29%	0.48	24.3
Norway	1 194	339%	7.3%	30%	0.49	24.9
Poland	3 238	327%	7.0%	29%	0.48	24.1
Portugal	970	340%	7.3%	30%	0.50	25.0
Slovak Republic	529	338%	7.2%	30%	0.49	24.9
Slovenia	206	330%	7.1%	29%	0.48	24.3
Spain	5 134	323%	6.9%	28%	0.47	23.9
Sweden	1 542	339%	7.3%	30%	0.49	25.0
Switzerland	1 525	331%	7.1%	29%	0.48	24.4
United Kingdom	8 653	340%	7.3%	30%	0.50	25.0
United States	62 120	340%	7.3%	30%	0.50	25.0

* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to the reform, expressed in billion dollars (PPP), as a percentage of current GDP, and as a percentage of discounted future GDP. "GDP increase in year 2095" indicates by how much GDP in 2095 is higher due to the reform (in %). "Long-run growth increase" refers to increase in annual growth rate (in percentage points) once the whole labour force has reached higher level of educational achievement. "Increase in PISA score" refers to the ultimate increase in educational achievement due to the reform. See text for reform parameters.

Note first that this improvement of 25 points would have a uniform effect on all countries if there were a 100% enrolment rate. The present value of added GDP would be 340% of a country's current GDP, or 7.3% higher GDP over the entire 80 years of the projection. By 2095, GDP would be 30% higher than that expected with today's skills level, representing the result of an annual growth rate that, in the end, is 0.5 percentage points higher. Of course, the total value of the added GDP differs by the size of the economy, so that the United States, for instance, would see a present value of gains of over USD 62 trillion, while much smaller Portugal would see gains of USD 970 billion.

Because enrolment is not fully universal, however, an increase of 25 points for those in school will have a varying (and lesser) impact on different countries.[5] Most of the high-income countries see close to these percentage gains because of their near-universal enrolment rates. The exceptions are the high-income countries that have historically relied on oil revenues and whose enrolment rates are comparatively low: Bahrain, Oman and Saudi Arabia. In the future, however, particularly if oil revenues become less significant, these countries will also have to rely on developing a skilled workforce in order to follow a sustainable development path. (Indeed, if oil revenues were to fall in the future because of supply reasons or changes in demand, the GDP of these oil countries might also fall, absent any skills improvement. The same would also hold for other resource-dependent economies if future revenues falter for some reason).

In most middle-income countries, where enrolment is more limited, merely improving the education of those currently in school has a more limited impact on the future labour force, and this shows up in economic gains. Albania, Botswana, Colombia, Ghana, Mexico and Viet Nam all see less than a 5% higher future GDP from this improvement. Yet history shows clearly that even for the countries with low enrolment rates, improving the quality of schools yields very large economic gains.

Obtaining the projected gains will require a variety of structural changes in each country's economy so that the new, more skilled workers can be productively absorbed into the labour force. However, these skill changes occur over a long period, giving firms in the different economies time to develop and adjust their production technologies. Such changes are simply a part of the productivity improvements seen over past half century.[6] Moreover, the record suggests that the technologies available when there is a more highly skilled workforce are superior in terms of productivity and output.

Achieving gender equality in achievement among current students

In seeking to achieve gender equality in schooling, development policy has focused almost exclusively on the issue of lower enrolment rates among girls. This report looks instead at achieving gender parity in learning.

Interestingly, in the 76 countries studied here, boys outperform girls (on average in mathematics and science) in 45 countries, whereas girls outperform boys in 31 countries.[7] The better-performing gender in each country is then used as an indicator of the achievement levels that are possible in the current schools.

For each country, the implications of a reform that lifts the lower-performing gender to the current average achievement of the higher-performing gender is then shown. Table 5.2 displays the results of this policy outcome.

TABLE 5.2 EFFECT ON GDP OF ATTAINING GENDER EQUALITY IN ACHIEVEMENT AMONG CURRENT STUDENTS

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Lower-middle income countries						
Armenia	21	83%	1.8%	7%	0.13	6.5
Georgia	8	22%	0.5%	2%	0.03	1.7
Ghana	90	77%	1.6%	6%	0.12	6.0
Honduras	48	118%	2.5%	10%	0.18	9.1
Indonesia	113	4%	0.1%	0%	0.01	0.3
Morocco	26	10%	0.2%	1%	0.02	0.8
Ukraine	79	21%	0.4%	2%	0.03	1.6
Viet Nam	129	24%	0.5%	2%	0.04	1.9
Upper-middle income countries						
Albania	5	17%	0.4%	1%	0.03	1.3
Argentina	201	22%	0.5%	2%	0.03	1.7
Botswana	17	46%	1.0%	4%	0.07	3.6
Brazil	1 597	50%	1.1%	4%	0.08	4.0
Bulgaria	82	64%	1.4%	5%	0.10	5.0
Colombia	699	102%	2.2%	9%	0.16	7.9
Costa Rica	72	95%	2.0%	8%	0.15	7.4
Hungary	98	39%	0.8%	3%	0.06	3.1
Iran	33	2%	0.1%	0%	0.00	0.2
Jordan	169	199%	4.3%	17%	0.30	15.1
Kazakhstan	109	24%	0.5%	2%	0.04	1.9
Lebanon	36	43%	0.9%	4%	0.07	3.4
Macedonia	19	65%	1.4%	5%	0.10	5.1
Malaysia	392	49%	1.0%	4%	0.08	3.8
Mexico	1 035	46%	1.0%	4%	0.07	3.6
Montenegro	5	53%	1.1%	4%	0.08	4.2
Peru	286	71%	1.5%	6%	0.11	5.5
Romania	16	4%	0.1%	0%	0.01	0.3
Serbia	14	15%	0.3%	1%	0.02	1.2
South Africa	180	25%	0.5%	2%	0.04	2.0
Thailand	781	74%	1.6%	6%	0.11	5.8
Tunisia	73	55%	1.2%	5%	0.09	4.3
Turkey	89	6%	0.1%	0%	0.01	0.4
High-income non-OECD countries						
Bahrain	206	320%	6.8%	28%	0.47	23.6
Croatia	25	28%	0.6%	2%	0.04	2.2
Cyprus*	10	40%	0.9%	3%	0.06	3.2
Hong Kong-China	253	60%	1.3%	5%	0.09	4.7
Latvia	31	61%	1.3%	5%	0.09	4.8
Lithuania	36	44%	0.9%	4%	0.07	3.4
Oman	691	401%	8.6%	35%	0.58	29.1
Qatar	600	169%	3.6%	14%	0.26	12.9
Russian Federation	813	22%	0.5%	2%	0.03	1.8

TABLE 5.2 EFFECT ON GDP OF ATTAINING GENDER EQUALITY IN ACHIEVEMENT AMONG CURRENT STUDENTS (continued)

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Saudi Arabia	1 780	101%	2.2%	9%	0.16	7.9
Singapore	57	12%	0.3%	1%	0.02	1.0
Chinese Taipei	218	20%	0.4%	2%	0.03	1.6
United Arab Emirates	661	103%	2.2%	9%	0.16	8.0
Uruguay	22	30%	0.6%	2%	0.05	2.3
High-income OECD countries						
Australia	594	52%	1.1%	4%	0.08	4.0
Austria	380	95%	2.0%	8%	0.15	7.4
Belgium	227	47%	1.0%	4%	0.07	3.7
Canada	664	40%	0.9%	3%	0.06	3.2
Chile	419	97%	2.1%	8%	0.15	7.5
Czech Republic	118	38%	0.8%	3%	0.06	3.0
Denmark	194	75%	1.6%	6%	0.12	5.9
Estonia	3	9%	0.2%	1%	0.01	0.7
Finland	143	63%	1.3%	5%	0.10	4.9
France	499	19%	0.4%	2%	0.03	1.5
Germany	1 523	41%	0.9%	3%	0.06	3.2
Greece	46	16%	0.3%	1%	0.02	1.2
Iceland	4	29%	0.6%	2%	0.05	2.3
Ireland	139	59%	1.3%	5%	0.09	4.6
Israel*	94	34%	0.7%	3%	0.05	2.6
Italy	1 298	61%	1.3%	5%	0.09	4.8
Japan	4 228	86%	1.8%	7%	0.13	6.7
Korea	1 180	62%	1.3%	5%	0.10	4.9
Luxembourg	66	126%	2.7%	11%	0.19	9.8
Netherlands	342	42%	0.9%	3%	0.06	3.3
New Zealand	99	59%	1.3%	5%	0.09	4.7
Norway	16	5%	0.1%	0%	0.01	0.4
Poland	40	4%	0.1%	0%	0.01	0.3
Portugal	85	30%	0.6%	2%	0.05	2.4
Slovak Republic	79	50%	1.1%	4%	0.08	4.0
Slovenia	11	17%	0.4%	1%	0.03	1.4
Spain	1 143	72%	1.5%	6%	0.11	5.6
Sweden	146	32%	0.7%	3%	0.05	2.5
Switzerland	270	59%	1.3%	5%	0.09	4.6
United Kingdom	2 100	82%	1.8%	7%	0.13	6.4
United States	1 614	9%	0.2%	1%	0.01	0.7

* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to the reform, expressed in billion dollars (PPP), as a percentage of current GDP, and as a percentage of discounted future GDP. "GDP increase in year 2095" indicates by how much GDP in 2095 is higher due to the reform (in %). "Long-run growth increase" refers to increase in annual growth rate (in percentage points) once the whole labour force has reached higher level of educational achievement. "Increase in PISA score" refers to the ultimate increase in educational achievement due to the reform. See text for reform parameters.

The largest impacts on the economy – where the present value of GDP gains from growth is greater than 1.5 times current GDP – are found in Oman, Bahrain, Jordan and Qatar. In all of these countries, girls outperform boys, and the gains would come from increasing boys' skills.

It is important to remember that these results reflect data only for those enrolled in school. None of the improvement comes from change for those young people who are not in school. Moreover, a portion of the achievement gap might be explained by greater selection into schools for girls than boys. Unfortunately, neither this possibility nor the ramifications of any adjustments for differential enrolment can be easily explored, because the underlying data sources do not provide gender-specific enrolment rates.

The Education For All Global Monitoring Report for 2013/14 (UNESCO, 2014) reports a relatively low gender-parity index for gross enrolment rates in secondary schools for the Arab states, although it is slightly above that for sub-Saharan Africa and for South and West Asia. These values suggest the considerable untapped potential that would be released from closing gender achievement gaps coupled with a commensurate expansion in participation. Within this report, however, it is difficult to provide a precise quantitative evaluation of the components of this potential. The scenarios below, however, do so in the aggregate across genders without breaking out the gender effects explicitly.

Scenario I: Each current student attains a minimum of 420 PISA points

The following sections examine the goal of all youth reaching basic skill levels by 2030. Scenario I, which considers just those young people now in school, involves a somewhat artificial simulation whereby all students who score above 420 PISA points remain at their current level and only those who score under 420 points improve. In this scenario, all current students in each country acquire at least the basic skills. To estimate how this reform would improve the average achievement of each country, the performance of each student who now scores below 420 points is raised to 420 points and then the new average achievement of each country is calculated.[8]

Table 5.3 reports results on the impact of this policy. The heterogeneity of the impact is now even greater than considered in the previous sections, because the economic impact is driven by both the proportion of students in secondary school and their scores. Compare, for example, South Africa and Viet Nam. South Africa has the higher enrolment rate (72% vs. 64%), but the performance of students in Viet Nam is much higher than that of students in South Africa. As a result, this in-school policy increases South Africa's GDP over the next 80 years by almost 30%, on average, but it lifts GDP in Viet Nam by less than 1% because those currently in school achieve at the highest levels.

TABLE 5.3 EFFECT ON GDP OF EVERY CURRENT STUDENT ACQUIRING BASIC SKILLS

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Lower-middle income countries						
Armenia	110	429%	9.2%	38%	0.61	31.0
Georgia	212	579%	12.4%	52%	0.80	40.5
Ghana	1 101	944%	20.2%	90%	1.22	61.7
Honduras	468	1145%	24.5%	112%	1.43	72.2
Indonesia	18 569	677%	14.5%	62%	0.92	46.5
Morocco	2 747	1013%	21.7%	97%	1.29	65.4
Ukraine	748	195%	4.2%	17%	0.29	14.8
Viet Nam	209	38%	0.8%	3%	0.06	3.0
Upper-middle income countries						
Albania	147	455%	9.7%	41%	0.65	32.7
Argentina	5 632	605%	13.0%	55%	0.84	42.2
Botswana	190	533%	11.4%	48%	0.75	37.7
Brazil	14 823	467%	10.0%	42%	0.66	33.5
Bulgaria	434	339%	7.2%	30%	0.49	24.9
Colombia	3 310	485%	10.4%	43%	0.69	34.6
Costa Rica	231	308%	6.6%	27%	0.45	22.8
Hungary	417	167%	3.6%	14%	0.25	12.7
Iran	5 299	397%	8.5%	35%	0.57	28.8
Jordan	531	625%	13.4%	57%	0.86	43.4
Kazakhstan	1 449	323%	6.9%	28%	0.47	23.9
Lebanon	404	484%	10.3%	43%	0.68	34.5
Macedonia	202	697%	14.9%	64%	0.94	47.7
Malaysia	2 952	369%	7.9%	32%	0.53	27.0
Mexico	6 762	299%	6.4%	26%	0.44	22.2
Montenegro	55	553%	11.8%	50%	0.77	39.0
Peru	3 336	827%	17.7%	77%	1.09	55.2
Romania	1 194	296%	6.3%	26%	0.44	22.0
Serbia	280	299%	6.4%	26%	0.44	22.2
South Africa	9 782	1374%	29.4%	137%	1.65	83.4
Thailand	2 715	257%	5.5%	22%	0.38	19.3
Tunisia	903	683%	14.6%	63%	0.93	46.9
Turkey	2 968	187%	4.0%	16%	0.28	14.2
High-income non-OECD countries						
Bahrain	408	633%	13.5%	58%	0.87	43.9
Croatia	140	156%	3.3%	13%	0.24	12.0
Cyprus*						
Hong Kong-China	183	43%	0.9%	4%	0.07	3.4
Latvia	48	94%	2.0%	8%	0.14	7.3
Lithuania	114	138%	2.9%	12%	0.21	10.6
Oman	1 654	960%	20.5%	91%	1.24	62.5
Qatar	3 562	1005%	21.5%	96%	1.29	64.9
Russian Federation	5 303	146%	3.1%	12%	0.22	11.2

TABLE 5.3 EFFECT ON GDP OF EVERY CURRENT STUDENT ACQUIRING BASIC SKILLS (continued)

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Saudi Arabia	9 516	542%	11.6%	49%	0.76	38.2
Singapore	281	60%	1.3%	5%	0.09	4.7
Chinese Taipei	852	79%	1.7%	7%	0.12	6.1
United Arab Emirates	2 367	368%	7.9%	32%	0.53	26.9
Uruguay	355	486%	10.4%	43%	0.69	34.7
High-income OECD countries						
Australia	1 368	119%	2.5%	10%	0.18	9.2
Austria	459	114%	2.4%	10%	0.17	8.8
Belgium	729	151%	3.2%	13%	0.23	11.6
Canada	1 286	78%	1.7%	7%	0.12	6.1
Chile	1 405	325%	7.0%	28%	0.48	24.0
Czech Republic	381	122%	2.6%	10%	0.19	9.4
Denmark	302	117%	2.5%	10%	0.18	9.1
Estonia	14	39%	0.8%	3%	0.06	3.1
Finland	150	66%	1.4%	6%	0.10	5.1
France	4 415	166%	3.6%	14%	0.25	12.7
Germany	4 027	108%	2.3%	9%	0.17	8.3
Greece	724	243%	5.2%	21%	0.36	18.3
Iceland	28	193%	4.1%	17%	0.29	14.7
Ireland	216	92%	2.0%	8%	0.14	7.1
Israel*	847	301%	6.4%	26%	0.44	22.4
Italy	3 290	155%	3.3%	13%	0.24	11.9
Japan	3 256	66%	1.4%	6%	0.10	5.2
Korea	959	51%	1.1%	4%	0.08	4.0
Luxembourg	98	187%	4.0%	16%	0.28	14.2
Netherlands	777	94%	2.0%	8%	0.14	7.3
New Zealand	238	143%	3.1%	12%	0.22	11.0
Norway	588	167%	3.6%	14%	0.25	12.8
Poland	639	64%	1.4%	5%	0.10	5.0
Portugal	474	166%	3.6%	14%	0.25	12.7
Slovak Republic	387	247%	5.3%	21%	0.37	18.6
Slovenia	63	101%	2.2%	8%	0.15	7.8
Spain	2 156	136%	2.9%	12%	0.21	10.5
Sweden	930	205%	4.4%	18%	0.31	15.5
Switzerland	394	86%	1.8%	7%	0.13	6.7
United Kingdom	3 650	143%	3.1%	12%	0.22	11.0
United States	27 929	153%	3.3%	13%	0.23	11.7

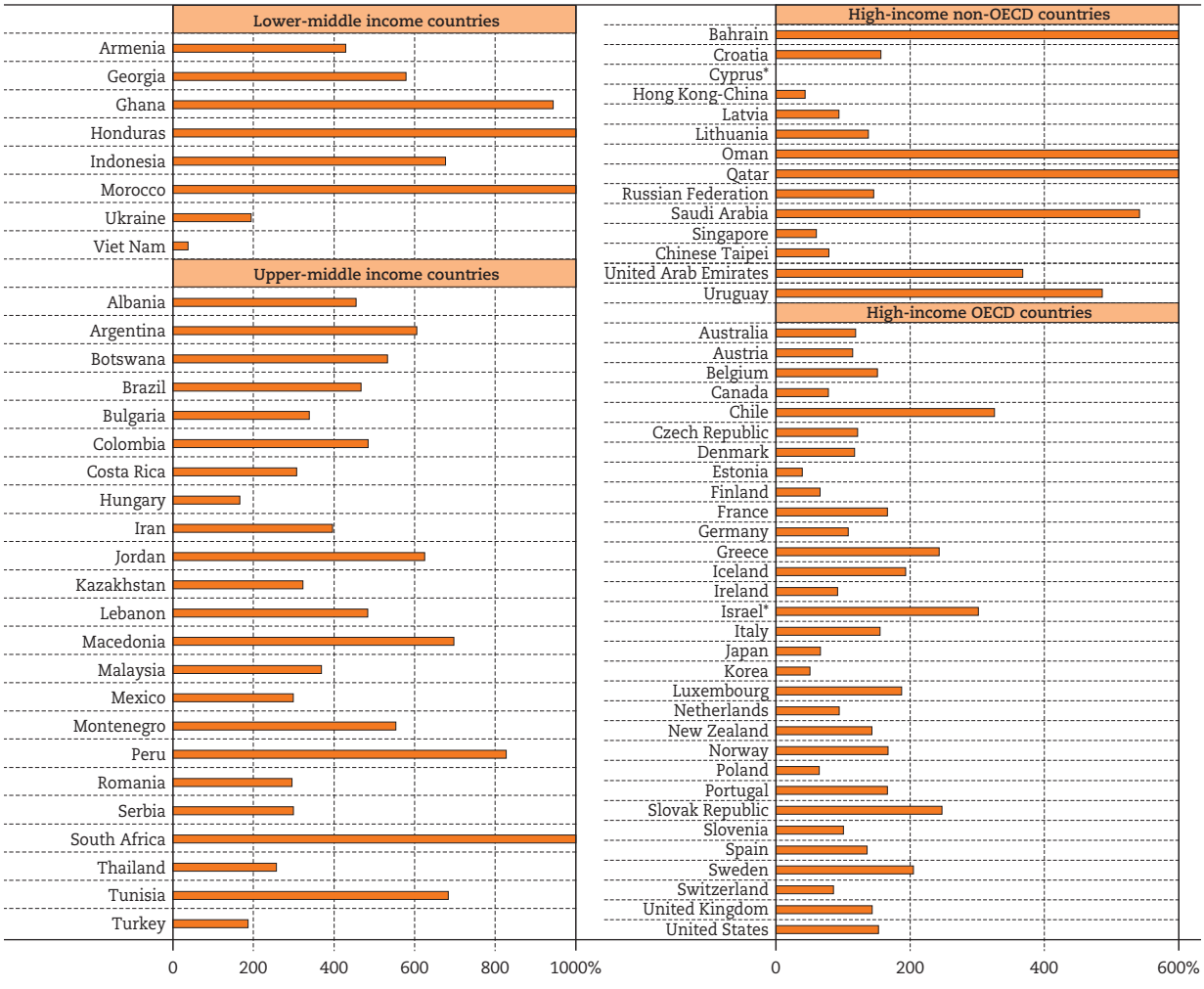
* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to the reform, expressed in billion dollars (PPP), as a percentage of current GDP, and as a percentage of discounted future GDP. "GDP increase in year 2095" indicates by how much GDP in 2095 is higher due to the reform (in %). "Long-run growth increase" refers to increase in annual growth rate (in percentage points) once the whole labour force has reached higher level of educational achievement. "Increase in PISA score" refers to the ultimate increase in educational achievement due to the reform. See text for reform parameters.

The present value of gains in a number of these countries is astounding. If current students in South Africa, Honduras, Morocco and Qatar were all to acquire basic skills, the gains would be over ten times the value of current GDP for those countries.

Figure 5.1 shows the distribution of increases in the present value of future GDP compared to current GDP levels by country. The high-income OECD countries – those that have historically been left out of discussions about goals for education improvement – have gains averaging 1.4 times their current GDP. This amounts to an average annual gain of 3% of future GDP over the next 80 years. The heterogeneity of the results reflects the variations in current performance across countries. While there is less than a 1.5% gain in Korea, Estonia, Singapore, Japan, Poland and Finland, the gain is over 6% in Israel. Again, gains for the high-income oil producers Qatar and Oman are very large: these countries would see a gain in GDP of more than 20% if all of their current students acquired basic skills.

FIGURE 5.1 EFFECT ON GDP OF EVERY CURRENT STUDENT ACQUIRING BASIC SKILLS (in % of current GDP)



* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to a reform that brings each student currently in school to a minimum of 420 PISA points, expressed as a percentage of current GDP. Value is 1 145% for Honduras, 1 013% for Morocco, 1 374% for South Africa, 960% for Oman and 1 005% for Qatar. See Table 5.3 for details.

Scenario II: Achieving full participation in secondary school at current quality

The estimates under Scenario I pertain to current schools and do not include any expansion of enrolment. For most of the high-income countries, enrolment expansion has little effect.[9] For most of the middle- and lower-income countries, however, access to education is an important component of economic improvement and has been central to much of the past policy discussion.

This section estimates the impact of providing all youth with access to schools at the current quality level (Scenario II). In the next section, the quality goal and the impact of full inclusion are jointly added to the analysis – i.e. all youth in the country acquire basic skills.

There is little information available about the skills level of young people not currently in school. Obviously, there are multiple reasons why young people are not enrolled, implying that youth outside of school have varying skills. For the projections, it is assumed that those currently not enrolled in school have an average achievement level equal to the 25th percentile of those currently in school in their country.[10] Of course, there is a lot of uncertainty about this assumption, which can serve only as a vague benchmark for any possible actual effect. For the calculations, young people who are not now enrolled in school do go to school, and they achieve at the average level of current students in the country. The achievement of those now in school does not change.[11] Countries like Brazil and Mexico, which have raised enrolment rates significantly over the past decade without lowering achievement levels, do show that this is possible.

Table 5.4 shows the estimates of how each country's current system would expand under Scenario II. These estimates, following in the spirit of the prior Education for All and Millennium Development Goals, identify the lost economic opportunities from limited access to schools.

The size of the loss is obviously related to how far a country is from universal enrolment, but it is also affected by the variation in quality of students. Figure 5.2 shows the present value of GDP gains over the current GDP of each country under Scenario II. For the high-income OECD countries, the gains average 19% and are uniformly below one-half of current GDP (except for Italy and Chile). But in the high-income non-OECD countries, 4 out of the 14 countries (Saudi Arabia, Oman, Uruguay and Bahrain) would see gains that exceed their current GDP.

Of course the largest gains come in the middle-income countries. Nine countries would gain more than double their current GDP from simple expansion at the current quality levels.[12] Note again that Viet Nam, a high-achieving country on the PISA rankings, would gain dramatically by expanding its system – if it is also able to maintain the current quality of its schools.

The difficulty with a policy of expanded enrolment – one seen repeatedly over the past decades as the policy has been implemented – is that countries may focus on access without clear commitment to quality. Many of the policies designed to promote broader enrolment, such as conditional cash transfers or various enrolment subsidies, have brought more students into the classroom, but they have failed to improve education outcomes.[13] These estimates of expansion at current quality levels are provided in order to show how attaining basic skills adds value, even if mere expansion should not be considered an effective policy goal.

TABLE 5.4 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AT CURRENT SCHOOL QUALITY

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Lower-middle income countries						
Armenia	28	109%	2.3%	9%	0.17	8.4
Georgia	62	169%	3.6%	14%	0.26	12.9
Ghana	644	552%	11.8%	50%	0.77	38.9
Honduras	78	191%	4.1%	16%	0.29	14.5
Indonesia	2 292	84%	1.8%	7%	0.13	6.5
Morocco	455	168%	3.6%	14%	0.25	12.8
Ukraine	425	111%	2.4%	9%	0.17	8.6
Viet Nam	1 431	261%	5.6%	23%	0.39	19.6
Upper-middle income countries						
Albania	85	265%	5.7%	23%	0.39	19.8
Argentina	438	47%	1.0%	4%	0.07	3.7
Botswana	120	336%	7.2%	29%	0.49	24.7
Brazil	5 220	165%	3.5%	14%	0.25	12.6
Bulgaria	173	135%	2.9%	11%	0.21	10.4
Colombia	1 392	204%	4.4%	17%	0.31	15.4
Costa Rica	97	128%	2.7%	11%	0.20	9.9
Hungary	53	21%	0.5%	2%	0.03	1.7
Iran	3 054	229%	4.9%	20%	0.34	17.2
Jordan	18	21%	0.5%	2%	0.03	1.7
Kazakhstan	127	28%	0.6%	2%	0.04	2.2
Lebanon	175	209%	4.5%	18%	0.31	15.8
Macedonia	69	237%	5.1%	20%	0.35	17.9
Malaysia	924	115%	2.5%	10%	0.18	8.9
Mexico	4 403	195%	4.2%	17%	0.29	14.8
Montenegro	0	0%	0.0%	0%	0.00	0.0
Peru	368	91%	2.0%	8%	0.14	7.1
Romania	0	0%	0.0%	0%	0.00	0.0
Serbia	38	41%	0.9%	3%	0.06	3.2
South Africa	1 929	271%	5.8%	23%	0.40	20.2
Thailand	1 472	140%	3.0%	12%	0.21	10.7
Tunisia	0	0%	0.0%	0%	0.00	0.0
Turkey	3 045	192%	4.1%	16%	0.29	14.6
High-income non-OECD countries						
Bahrain	65	101%	2.2%	9%	0.16	7.9
Croatia	23	26%	0.6%	2%	0.04	2.0
Cyprus*	0	0%	0.0%	0%	0.00	0.0
Hong Kong-China	227	54%	1.2%	5%	0.08	4.2
Latvia	8	15%	0.3%	1%	0.02	1.2
Lithuania	48	58%	1.2%	5%	0.09	4.5
Oman	320	186%	4.0%	16%	0.28	14.1
Qatar	37	11%	0.2%	1%	0.02	0.8
Russian Federation	81	2%	0.0%	0%	0.00	0.2
Saudi Arabia	3 997	227%	4.9%	20%	0.34	17.2
Singapore	117	25%	0.5%	2%	0.04	2.0
Chinese Taipei	1	0%	0.0%	0%	0.00	0.0
United Arab Emirates	41	6%	0.1%	1%	0.01	0.5
Uruguay	89	122%	2.6%	10%	0.19	9.4

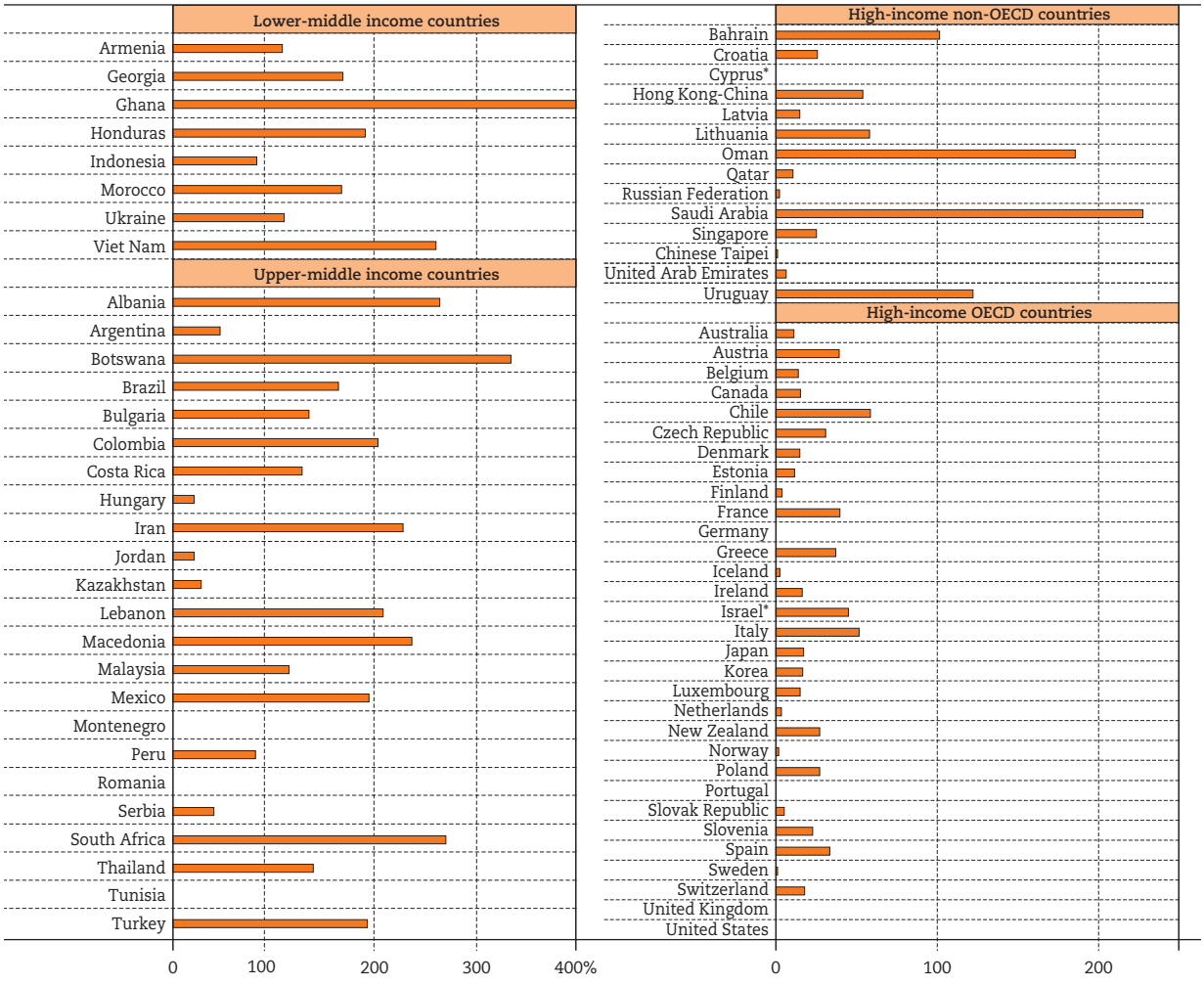
TABLE 5.4 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AT CURRENT SCHOOL QUALITY (continued)

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
High-income OECD countries						
Australia	128	11%	0.2%	1%	0.02	0.9
Austria	157	39%	0.8%	3%	0.06	3.1
Belgium	67	14%	0.3%	1%	0.02	1.1
Canada	251	15%	0.3%	1%	0.02	1.2
Chile	253	59%	1.3%	5%	0.09	4.6
Czech Republic	97	31%	0.7%	3%	0.05	2.4
Denmark	38	15%	0.3%	1%	0.02	1.2
Estonia	4	12%	0.2%	1%	0.02	0.9
Finland	9	4%	0.1%	0%	0.01	0.3
France	1 055	40%	0.8%	3%	0.06	3.1
Germany	0	0%	0.0%	0%	0.00	0.0
Greece	111	37%	0.8%	3%	0.06	2.9
Iceland	0	2%	0.1%	0%	0.00	0.2
Ireland	38	16%	0.3%	1%	0.03	1.3
Israel*	126	45%	1.0%	4%	0.07	3.5
Italy	1 094	52%	1.1%	4%	0.08	4.0
Japan	843	17%	0.4%	1%	0.03	1.4
Korea	315	17%	0.4%	1%	0.03	1.3
Luxembourg	8	15%	0.3%	1%	0.02	1.2
Netherlands	28	3%	0.1%	0%	0.01	0.3
New Zealand	45	27%	0.6%	2%	0.04	2.1
Norway	6	2%	0.0%	0%	0.00	0.1
Poland	269	27%	0.6%	2%	0.04	2.1
Portugal	0	0%	0.0%	0%	0.00	0.0
Slovak Republic	8	5%	0.1%	0%	0.01	0.4
Slovenia	14	23%	0.5%	2%	0.04	1.8
Spain	531	33%	0.7%	3%	0.05	2.6
Sweden	2	0%	0.0%	0%	0.00	0.0
Switzerland	82	18%	0.4%	1%	0.03	1.4
United Kingdom	0	0%	0.0%	0%	0.00	0.0
United States	0	0%	0.0%	0%	0.00	0.0

* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to the reform, expressed in billion dollars (PPP), as a percentage of current GDP, and as a percentage of discounted future GDP. "GDP increase in year 2095" indicates by how much GDP in 2095 is higher due to the reform (in %). "Long-run growth increase" refers to increase in annual growth rate (in percentage points) once the whole labour force has reached higher level of educational achievement. "Increase in PISA score" refers to the ultimate increase in educational achievement due to the reform. See text for reform parameters.

FIGURE 5.2 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AT CURRENT SCHOOL QUALITY
(in % of current GDP)



* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to a reform that achieves full participation in secondary school at current quality, expressed as a percentage of current GDP. Value is 552% for Ghana. See Table 5.4 for details.

Scenario III: Achieving full participation in secondary school and every student attains a minimum of 420 PISA points

The implications of meeting the proposed development goal of all youth reaching basic skill levels by 2030 can now be considered. This goal combines universal access with quality improvement and has meaning for all countries. The performance of those young people currently not in school is raised either to the mean achievement of the country's current students or to 420 points, whichever is higher.

Table 5.5 presents the projected gains for each country under this third scenario. Unsurprisingly, the lowest-income countries of the sample would show by far the largest gains. The simple estimates for the eight lower-middle income countries indicate a present value of gains averaging 13 times the current GDP of these countries. Translated into a percentage of future GDP, this implies a GDP that is 28% higher, on average, every year for the next 80 years. By the end of the projection period in 2095, GDP with school improvement would average some 140% greater than would be expected with the current skills of the labour force.

TABLE 5.5 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AND EVERY STUDENT ACQUIRING BASIC SKILLS

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Lower-middle income countries						
Armenia	143	561%	12.0%	51%	0.78	39.4
Georgia	315	858%	18.4%	81%	1.13	57.0
Ghana	4 526	3 881%	83.0%	477%	3.37	170.3
Honduras	824	2 016%	43.1%	215%	2.20	111.0
Indonesia	24 409	889%	19.0%	84%	1.16	58.7
Morocco	4 316	1 591%	34.0%	163%	1.85	93.3
Ukraine	1 213	316%	6.8%	28%	0.46	23.4
Viet Nam	1 667	304%	6.5%	26%	0.45	22.6
Upper-middle income countries						
Albania	300	929%	19.9%	88%	1.21	60.9
Argentina	6 448	693%	14.8%	64%	0.94	47.5
Botswana	465	1 303%	27.9%	129%	1.58	80.0
Brazil	23 841	751%	16.1%	70%	1.01	50.9
Bulgaria	636	496%	10.6%	44%	0.70	35.4
Colombia	6 218	910%	19.5%	86%	1.19	59.9
Costa Rica	346	461%	9.9%	41%	0.65	33.1
Hungary	474	190%	4.1%	16%	0.29	14.4
Iran	8 946	670%	14.3%	61%	0.91	46.1
Jordan	565	665%	14.2%	61%	0.91	45.8
Kazakhstan	1 596	356%	7.6%	31%	0.52	26.1
Lebanon	682	816%	17.5%	76%	1.08	54.6
Macedonia	329	1 137%	24.3%	111%	1.42	71.8
Malaysia	4 043	505%	10.8%	45%	0.71	35.9
Mexico	12 448	551%	11.8%	50%	0.77	38.8
Montenegro	55	553%	11.8%	50%	0.77	39.0
Peru	4 341	1 076%	23.0%	104%	1.36	68.7
Romania	1 194	296%	6.3%	26%	0.44	22.0
Serbia	323	346%	7.4%	30%	0.50	25.5
South Africa	18 678	2 624%	56.1%	295%	2.63	133.1
Thailand	4 371	414%	8.9%	37%	0.59	30.0
Tunisia	903	683%	14.6%	63%	0.93	46.9
Turkey	6 288	396%	8.5%	35%	0.57	28.8
High-income non-OECD countries						
Bahrain	510	789%	16.9%	74%	1.05	53.1
Croatia	164	184%	3.9%	16%	0.28	14.0
Cyprus*						
Hong Kong-China	414	98%	2.1%	8%	0.15	7.6
Latvia	56	109%	2.3%	9%	0.17	8.5
Lithuania	166	200%	4.3%	17%	0.30	15.1
Oman	2 459	1 427%	30.5%	143%	1.70	85.9
Qatar	3 649	1 029%	22.0%	99%	1.31	66.2

TABLE 5.5 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AND EVERY STUDENT ACQUIRING BASIC SKILLS (continued)

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Russian Federation	5 389	148%	3.2%	13%	0.22	11.4
Saudi Arabia	17 134	975%	20.9%	93%	1.25	63.4
Singapore	402	86%	1.8%	7%	0.13	6.7
Chinese Taipei	852	79%	1.7%	7%	0.12	6.2
United Arab Emirates	2 415	375%	8.0%	33%	0.54	27.4
Uruguay	479	656%	14.0%	60%	0.90	45.2
High-income OECD countries						
Australia	1 504	130%	2.8%	11%	0.20	10.1
Austria	624	156%	3.3%	13%	0.24	11.9
Belgium	801	166%	3.6%	14%	0.25	12.7
Canada	1 546	94%	2.0%	8%	0.14	7.3
Chile	1 698	393%	8.4%	35%	0.57	28.6
Czech Republic	483	154%	3.3%	13%	0.23	11.8
Denmark	342	133%	2.8%	11%	0.20	10.2
Estonia	19	51%	1.1%	4%	0.08	4.0
Finland	159	70%	1.5%	6%	0.11	5.4
France	5 554	209%	4.5%	18%	0.31	15.8
Germany	4 027	108%	2.3%	9%	0.17	8.3
Greece	848	285%	6.1%	25%	0.42	21.2
Iceland	28	196%	4.2%	17%	0.29	14.9
Ireland	257	109%	2.3%	9%	0.17	8.4
Israel*	991	353%	7.6%	31%	0.51	25.9
Italy	4 466	210%	4.5%	18%	0.32	15.9
Japan	4 126	84%	1.8%	7%	0.13	6.5
Korea	1 282	68%	1.4%	6%	0.10	5.3
Luxembourg	107	204%	4.4%	17%	0.31	15.4
Netherlands	806	98%	2.1%	8%	0.15	7.6
New Zealand	286	172%	3.7%	15%	0.26	13.1
Norway	595	169%	3.6%	14%	0.26	12.9
Poland	916	92%	2.0%	8%	0.14	7.2
Portugal	474	166%	3.6%	14%	0.25	12.7
Slovak Republic	396	253%	5.4%	22%	0.38	19.0
Slovenia	78	124%	2.7%	11%	0.19	9.6
Spain	2 721	171%	3.7%	15%	0.26	13.1
Sweden	933	205%	4.4%	18%	0.31	15.6
Switzerland	479	104%	2.2%	9%	0.16	8.1
United Kingdom	3 650	143%	3.1%	12%	0.22	11.0
United States	27 929	153%	3.3%	13%	0.23	11.7

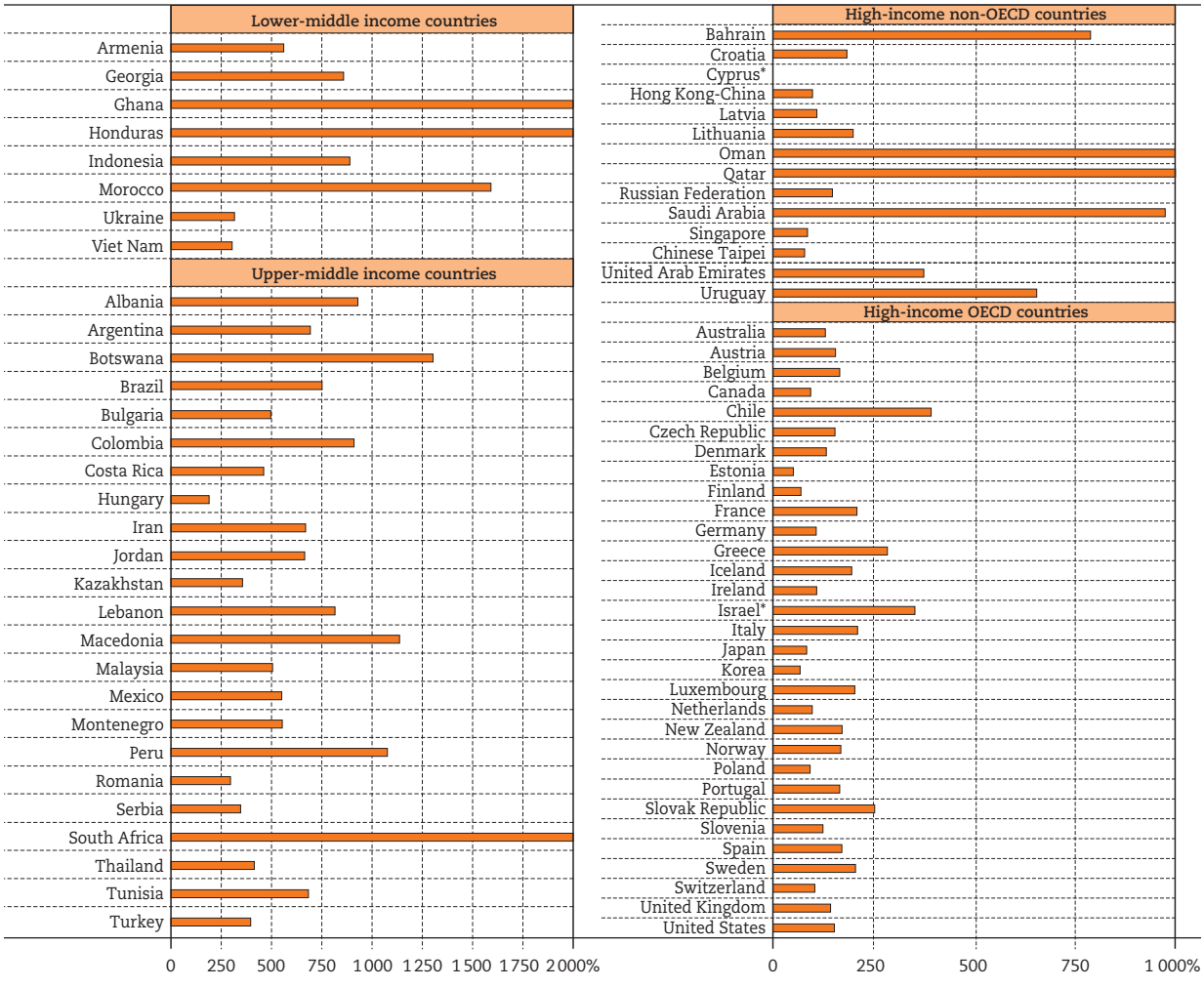
* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to the reform, expressed in billion dollars (PPP), as a percentage of current GDP, and as a percentage of discounted future GDP. "GDP increase in year 2095" indicates by how much GDP in 2095 is higher due to the reform (in %). "Long-run growth increase" refers to increase in annual growth rate (in percentage points) once the whole labour force has reached higher level of educational achievement. "Increase in PISA score" refers to the ultimate increase in educational achievement due to the reform. See text for reform parameters.

Increases of this magnitude are, of course, unlikely, because the gains in achievement over the next 15 years are outside any real expectations. Ghana and Honduras, for example, would require an increase in achievement of over one standard deviation during this period. Nothing like that has ever been seen. But the calculations do show the value of improvement and suggest the lengths to which a country should be willing to go to improve its schools.

Figure 5.3 compares the gains from attaining universal basic skills (in present value terms) to current GDP. Perhaps the most interesting part of the figure is the right side. It shows that among the high-income non-OECD countries, the impact on the oil-producing countries is particularly dramatic. Improved basic skills among the populations of Oman, Qatar and Saudi Arabia imply gains exceeding eight times current GDP for these countries, and Bahrain follows closely. If oil resources are depleted or if the price of oil falls, say through new technologies, these countries will have to rely on the skills of their populations – and the data suggest there is substantial room for improvement.

FIGURE 5.3 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AND EVERY STUDENT ACQUIRING BASIC SKILLS (in % of current GDP)

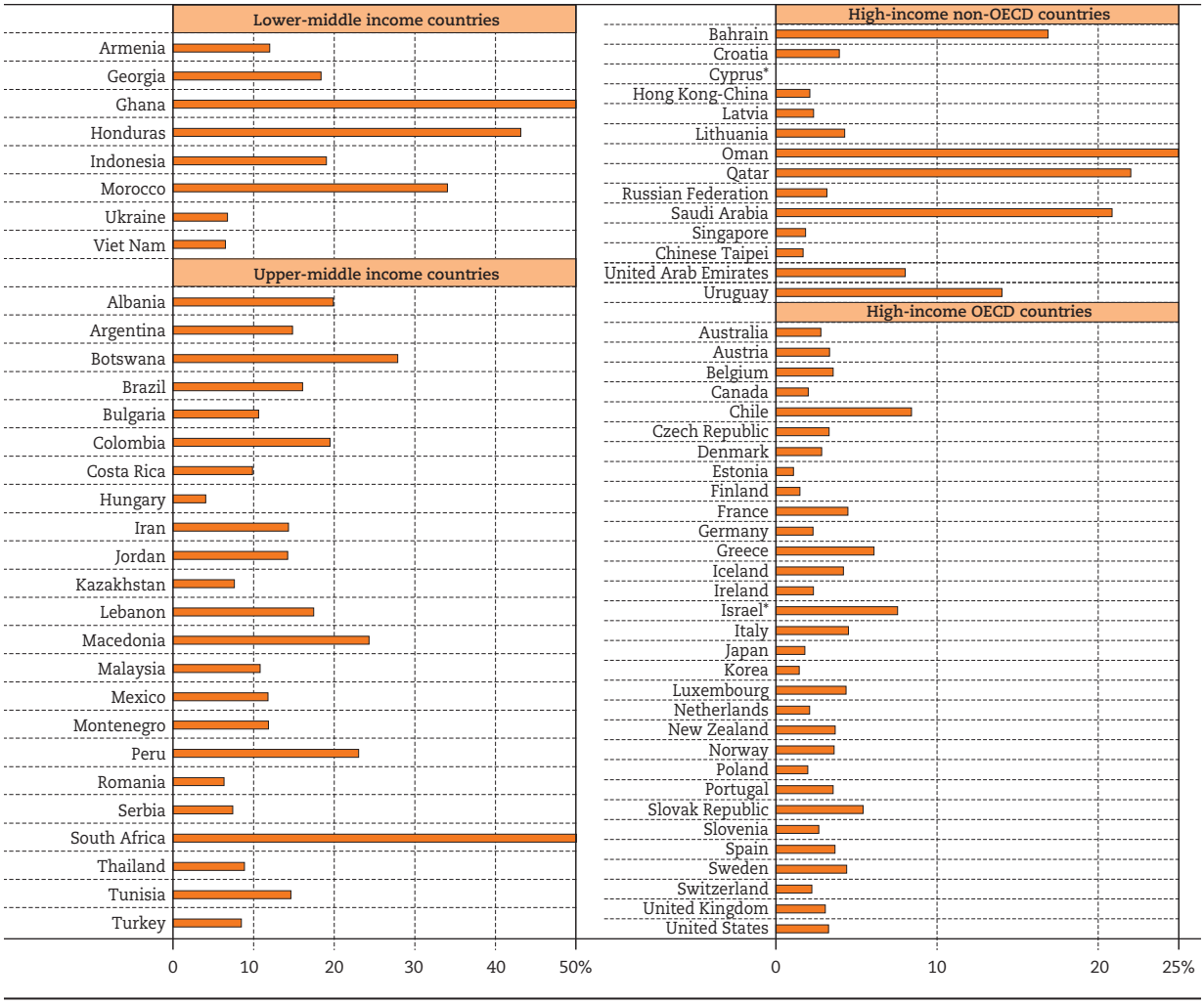


* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to a reform that achieves full participation in secondary school and brings each student to a minimum of 420 PISA points, expressed as a percentage of current GDP. Value is 3 881% for Ghana, 2 016% for Honduras, 2 624% for South Africa, 1 427% for Oman and 1 029% for Qatar. See Table 5.5 for details.

Equally interesting are the high-income OECD countries, which typically do not figure in discussions of development goals. For 8 of these 31 countries, the present value of GDP gains from meeting the basic skills goal would be more than twice the size of their current GDP.[14] The average gain across the high-income OECD countries is 162% of current GDP. This implies a GDP that is on average 3.5% higher than would be expected with no improvement in the quality of the schools (see Figure 5.4). Almost all of the gain comes from improving achievement at the bottom end, since enrolment in these countries is near universal.[15]

FIGURE 5.4 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AND EVERY STUDENT ACQUIRING BASIC SKILLS (in % of discounted future GDP)



* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to a reform that achieves full participation in secondary school and brings each student to a minimum of 420 PISA points, expressed as a percentage of discounted future GDP. Value is 83.0% for Ghana, 56.1% for South Africa and 30.5% for Oman. See Table 5.5 for details.

Scenario IV: Scenario III with 30-year improvement

Changing the quality of schools takes time. Changing the teaching force, for example, frequently means attracting a new group of people into teaching, altering their training, establishing new pay and incentive structures, and waiting for retirements so that the new teachers can be hired. Moreover, the full benefit of the new teaching staff is obtained only after students experience an entire education career with the new teachers. Moving to universal access also takes time because it involves adding both new personnel and new facilities. For all these reasons, the desired gains in achievement are likely to come slowly.

Here, the impact of a fourth scenario is considered, which lengthens the period before universal basic skills are attained. The prior estimates of economic gains all relied on quality improvements taking place by 2030 – that is, in 15 years – rather than the 30 years considered here. Relatively quickly-met goals might be more politically feasible in the sense that tangible gains could be seen sooner, but they might also be unrealistic.

The estimates for the last scenario, in which the goal of universal basic skills was met, are now reproduced, except that 30 years rather than 15 years are allowed to carry out the improvements. Two facets of this estimation, which is shown in Table 5.6, stand out. First, fairly obviously, the pattern of gains across countries remains the same as that seen in Table 5.5. Second, while the lengthened time frame under Scenario IV reduces the magnitude of economic gain, the gains remain stunningly large. For example, among the lower-middle income countries, the average gain is "only" a bit over nine times current GDP, as compared with 13 times under the 15-year calculations in Scenario III.

TABLE 5.6 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AND EVERY STUDENT ACQUIRING BASIC SKILLS, ACHIEVED OVER 30 YEARS

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Lower-middle income countries						
Armenia	106	414%	8.9%	42%	0.78	39.4
Georgia	230	628%	13.4%	66%	1.13	57.0
Ghana	3 077	2 638%	56.4%	352%	3.37	170.3
Honduras	584	1 428%	30.5%	168%	2.20	111.0
Indonesia	17 837	650%	13.9%	69%	1.16	58.7
Morocco	3 091	1 139%	24.4%	130%	1.85	93.3
Ukraine	903	235%	5.0%	23%	0.46	23.4
Viet Nam	1 242	227%	4.8%	22%	0.45	22.6
Upper-middle income countries						
Albania	219	678%	14.5%	72%	1.21	60.9
Argentina	4 741	510%	10.9%	53%	0.94	47.5
Botswana	335	940%	20.1%	104%	1.58	80.0
Brazil	17 497	551%	11.8%	58%	1.01	50.9
Bulgaria	470	367%	7.9%	37%	0.70	35.4
Colombia	4 541	665%	14.2%	71%	1.19	59.9
Costa Rica	257	342%	7.3%	34%	0.65	33.1
Hungary	355	142%	3.0%	14%	0.29	14.4
Iran	6 583	493%	10.5%	51%	0.91	46.1
Jordan	415	489%	10.5%	51%	0.91	45.8
Kazakhstan	1 187	265%	5.7%	26%	0.52	26.1
Lebanon	499	597%	12.8%	63%	1.08	54.6
Macedonia	238	824%	17.6%	90%	1.42	71.8

TABLE 5.6 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AND EVERY STUDENT ACQUIRING BASIC SKILLS, ACHIEVED OVER 30 YEARS (continued)

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Malaysia	2 991	374%	8.0%	38%	0.71	35.9
Mexico	9 196	407%	8.7%	41%	0.77	38.8
Montenegro	41	409%	8.7%	42%	0.77	39.0
Peru	3 154	782%	16.7%	85%	1.36	68.7
Romania	890	221%	4.7%	22%	0.44	22.0
Serbia	241	258%	5.5%	26%	0.50	25.5
South Africa	13 035	1 831%	39.2%	226%	2.63	133.1
Thailand	3 244	307%	6.6%	31%	0.59	30.0
Tunisia	664	503%	10.8%	52%	0.93	46.9
Turkey	4 669	294%	6.3%	29%	0.57	28.8
High-income non-OECD countries						
Bahrain	374	579%	12.4%	61%	1.05	53.1
Croatia	123	138%	2.9%	13%	0.28	14.0
Cyprus*						
Hong Kong-China	311	74%	1.6%	7%	0.15	7.6
Latvia	42	82%	1.8%	8%	0.17	8.5
Lithuania	124	149%	3.2%	15%	0.30	15.1
Oman	1 769	1 026%	22.0%	115%	1.70	85.9
Qatar	2 655	749%	16.0%	81%	1.31	66.2
Russian Federation	4 037	111%	2.4%	11%	0.22	11.4
Saudi Arabia	12 488	711%	15.2%	76%	1.25	63.4
Singapore	302	65%	1.4%	6%	0.13	6.7
Chinese Taipei	640	59%	1.3%	6%	0.12	6.2
United Arab Emirates	1 794	279%	6.0%	28%	0.54	27.4
Uruguay	353	483%	10.3%	50%	0.90	45.2
High-income OECD countries						
Australia	1 127	98%	2.1%	9%	0.20	10.1
Austria	468	117%	2.5%	11%	0.24	11.9
Belgium	600	124%	2.7%	12%	0.25	12.7
Canada	1 161	70%	1.5%	7%	0.14	7.3
Chile	1 261	292%	6.2%	29%	0.57	28.6
Czech Republic	362	116%	2.5%	11%	0.23	11.8
Denmark	256	99%	2.1%	10%	0.20	10.2
Estonia	14	38%	0.8%	4%	0.08	4.0
Finland	119	52%	1.1%	5%	0.11	5.4
France	4 151	156%	3.3%	15%	0.31	15.8
Germany	3 021	81%	1.7%	8%	0.17	8.3
Greece	632	212%	4.5%	21%	0.42	21.2
Iceland	21	146%	3.1%	14%	0.29	14.9
Ireland	193	82%	1.7%	8%	0.17	8.4
Israel*	737	262%	5.6%	26%	0.51	25.9
Italy	3 338	157%	3.4%	15%	0.32	15.9
Japan	3 098	63%	1.3%	6%	0.13	6.5
Korea	963	51%	1.1%	5%	0.10	5.3
Luxembourg	80	152%	3.3%	15%	0.31	15.4
Netherlands	605	73%	1.6%	7%	0.15	7.6
New Zealand	214	129%	2.8%	12%	0.26	13.1

TABLE 5.6 EFFECT ON GDP OF UNIVERSAL ENROLMENT IN SECONDARY SCHOOL AND EVERY STUDENT ACQUIRING BASIC SKILLS, ACHIEVED OVER 30 YEARS (continued)

	Value of reform (bn USD)	In % of current GDP	In % of discounted future GDP	GDP increase in year 2095	Long-run growth increase	Increase in PISA score
Norway	445	126%	2.7%	12%	0.26	12.9
Poland	687	69%	1.5%	7%	0.14	7.2
Portugal	355	124%	2.7%	12%	0.25	12.7
Slovak Republic	296	189%	4.0%	19%	0.38	19.0
Slovenia	58	93%	2.0%	9%	0.19	9.6
Spain	2 037	128%	2.7%	12%	0.26	13.1
Sweden	697	153%	3.3%	15%	0.31	15.6
Switzerland	360	78%	1.7%	8%	0.16	8.1
United Kingdom	2 735	107%	2.3%	10%	0.22	11.0
United States	20 917	114%	2.4%	11%	0.23	11.7

* See notes at the end of this chapter.

Notes: Discounted value of future increases in GDP until 2095 due to the reform, expressed in billion dollars (PPP), as a percentage of current GDP, and as a percentage of discounted future GDP. "GDP increase in year 2095" indicates by how much GDP in 2095 is higher due to the reform (in %). "Long-run growth increase" refers to increase in annual growth rate (in percentage points) once the whole labour force has reached higher level of educational achievement. "Increase in PISA score" refers to the ultimate increase in educational achievement due to the reform. See text for reform parameters.

Robustness of projections

The projections described in the various scenarios above rely upon a common model of growth and a common set of economic parameters. It is useful to see how altering these projections affects the results. Two major alterations to the original analysis are considered: including a "neoclassical growth model", where education makes labour and capital more efficient but does not change growth rates in the long run; and including institutional measures related to the quality of the underlying economic environment.[16]

NEOCLASSICAL GROWTH

The projections so far assume that higher educational achievement allows a country to keep on growing at a higher rate in the long run. Such a specification captures the basic ideas of what economists call endogenous growth theory, where a better-educated workforce leads to a larger stream of new ideas that produces technological progress at a higher rate. In the contrasting augmented neoclassical growth model, changes in test scores lead to higher steady-state levels of income but do not affect the long-run growth path. An alternative approach for the projections is thus to interpret the growth model in the neoclassical rather than endogenous-growth framework.[17] The neoclassical model converges to a 1.5% growth rate in the steady state, and this implies slower growth than would be predicted by the increased knowledge capital under the universal acquisition of basic skills, thus lowering the total estimated gains.

For purposes of comparison, the basic growth model is re-estimated and projections are performed based on the neoclassical model.[18] Table 5.7 provides a direct comparison across country income groups of meeting the goal of universal basic skills by 2030 (Scenario III) using the two sets of estimates, one with the endogenous growth model and one with the neoclassical growth model. Country-by-country results of the neoclassical projection model for all scenarios are found in Table C.1 in Annex C.

TABLE 5.7 COMPARISON OF ESTIMATES WITH ENDOGENOUS AND AUGMENTED NEOCLASSICAL GROWTH MODELS

	Endogenous growth model		Augmented neoclassical model	
	In % of current GDP	In % of discounted future GDP	In % of current GDP	In % of discounted future GDP
Lower-middle income countries	1 302%	27.9%	679%	18.0%
Upper-middle income countries	731%	15.6%	383%	10.7%
High-income non-OECD countries	473%	10.1%	205%	6.1%
High-income OECD countries	162%	3.5%	142%	3.0%

Notes: Scenario III. Simple averages of countries in each income group. See Tables 5.5 and C.1 for details.

The neoclassical estimates are taken as the lower bound on the effect of knowledge capital on future economic gains. Table 5.7 shows that the neoclassical model estimates for lower- and upper-middle income countries are roughly one-third lower in terms of percentage of discounted future GDP than the endogenous model estimates. That said, lower-middle income countries, as a group, can expect at least an 18% higher average GDP over the next 80 years, amounting to almost seven times the current GDP in these eight countries. The estimates for the neoclassical growth projections show a 10.7% higher average discounted GDP for the upper-middle income countries. For the high-income OECD countries, the gains are 3.0% instead of 3.5% of discounted future GDP.

The data do not permit distinguishing empirically between the two competing models of growth, but both alternatives suggest dramatic economic gains to be made for nations that meet the standard of universal basic skills.

MEASURES OF ECONOMIC INSTITUTIONS

Increasingly, discussions of economic growth and development have acknowledged the fundamental role of economic institutions in promoting or retarding development. For the past decade, a debate has also focused on the relative roles played by social institutions and by human capital.[19] This section explores whether consideration of various economic institutions affects the pattern of growth across nations as described above.

The analysis described here is not designed to resolve the divergent views about the predominance of institutions or about how precisely to measure the key economic institutions. Social institutions are almost certainly a component of differences in economic growth, and it is important to understand how they interact with countries' knowledge capital. But without seeking to resolve the debates, the analysis raises concerns about the measurement of human capital. Prior efforts to investigate the interaction between institutions and human capital across countries have carried out the analysis in terms of school attainment, something that is demonstrated to be an incomplete measure of the relevant skills of nations.

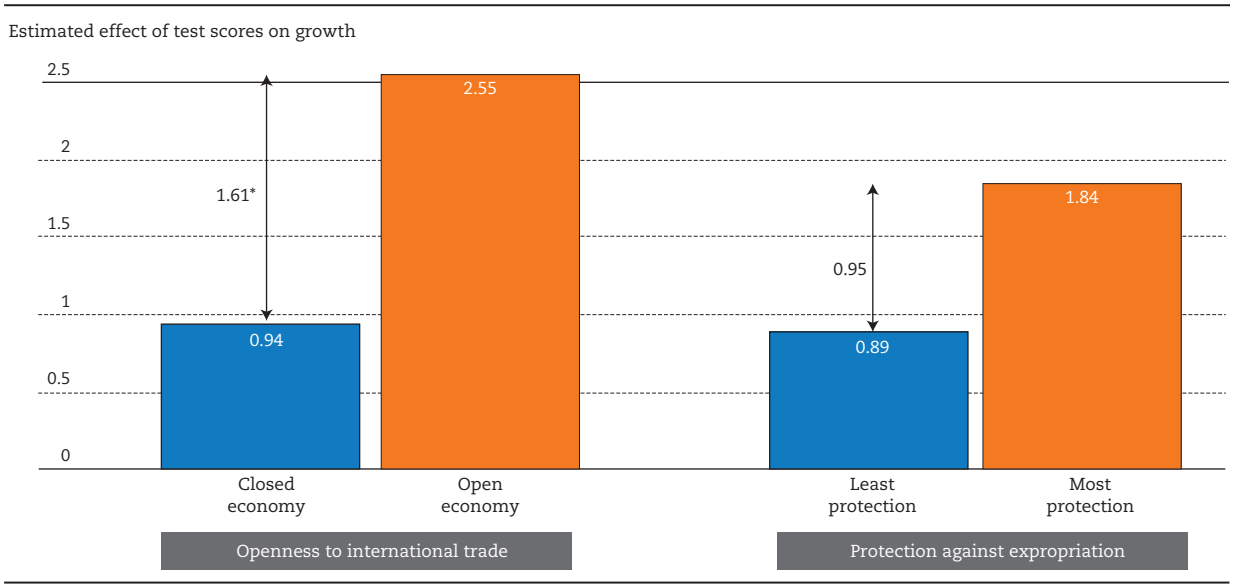
There are reasons to believe that the effect of cognitive skills may differ depending on the economic institutions of a country. The institutional framework plays an important role in shaping the relative profitability of piracy versus productive activity (North, 1990). If the available knowledge and skills are used in the former rather than the latter, the effect on economic growth is likely to be substantially different, and might even turn negative. Similarly, the allocation of talent between rent-seeking and entrepreneurship matters for economic growth: countries with relatively more engineering college majors have been shown to grow faster, and countries with relatively more law students to grow more slowly. (Murphy, Shleifer and Vishny, 1991).

Institutional barriers may also prevent skills from being properly allocated to different tasks on the labour market.(OECD, 2013a). Some have also argued that education may not have much impact in low-income countries that lack functioning markets and legal systems. In such countries, cognitive skills may be applied to socially unproductive activities, rendering the average effect of education on growth negligible (Easterly, 2001; Pritchett, 2001, 2006).

The authors have addressed elsewhere the estimation of how growth is affected by institutions; the results and implications are just summarised here. (Hanushek and Woessmann, 2015, section 3.2). Specifically, alternative measures of economic institutions are considered within the context of the basic growth models (see above). The approach is simply to add to the baseline models two common – and powerful – institutional measures related to the quality of the underlying economic environment: openness of the economy and security of property rights.[20] These measures are jointly significant in explaining growth, and the property rights measure is individually significant.[21] At the same time, the results show that cognitive skills continue to exert a positive and highly significant effect on economic growth independent of the measures related to the quality of institutions, although the estimated impact of cognitive skills is reduced from 2.0 to around 1.3, on average.

The estimation further adds an interaction term between cognitive skills and the two institutional measures. The results suggest that openness and cognitive skills not only have significant individual effects on economic growth but also show a significant positive interaction. This result is depicted in Figure 5.5.

FIGURE 5.5 HOW THE IMPACT OF KNOWLEDGE CAPITAL ON GROWTH VARIES BY ECONOMIC INSTITUTIONS



Notes: Estimated effect of average achievement test scores on the average annual rate of growth of real per capita GDP from 1960 to 2000, depending on the degree of openness to international trade and on the protection against expropriation risk of a country.

* Statistical significance at 5%.

Source: Hanushek and Woessmann (2015).

The effect of cognitive skills on economic growth is indeed significantly higher in countries that have been fully open to international trade than in countries that have been fully closed, though it is significantly positive in both. In closed economies, skills have a relatively low impact of 0.9 on growth rates, but the impact increases to 2.6 in open economies. When using protection against expropriation, rather than openness to trade, as the measure of quality of institutions, there is also a positive interaction term with cognitive skills, although it lacks statistical significance (Figure 5.5). Cognitive skills remain a significant determinant of growth differences. While the growth effects of knowledge capital are estimated to be reduced in the presence of institutional factors, the institutional measures include any effects of cognitive skills on the development of good institutions.

The overall interpretation in the context must be nuanced, since the high-income nations almost uniformly show no variation in either property rights or openness to international trade.[22] This suggests that developing countries with restrictive institutions have room for improving their economic performance by moving toward better institutions. But once they have, in fact, corrected the imperfect economic institutions, they too must return to relying on knowledge capital for any further improvements in growth.

Summary of the economic impacts of educational improvement

After considering the details of the separate policy movements, it is useful to put them all into perspective. In particular, it is instructive to compare Scenarios I-III, the three policy regimes: where all current students acquire basic skills; where universal enrolment is achieved at current quality levels; and where the goal of universal basic skills is achieved.

Table 5.8 summarises the results for the country groupings. Presenting the results by country grouping highlights how the impact and the policy implications vary across the groupings. For each grouping, the results in the table are in blocks based on the policy that is pursued.

TABLE 5.8 SUMMARY OF GAINS FROM SEPARATE POLICY OPTIONS

	Lower-middle income countries	Upper-middle income countries	High-income non-OECD countries	High-income OECD countries
Scenario I: All current students to basic skills				
In % of current GDP	627%	480%	362%	142%
In % of discounted future GDP	13.4%	10.3%	7.7%	3.0%
Long-run growth increase	0.83	0.66	0.50	0.21
Scenario II: Full enrolment at current quality				
In % of current GDP	206%	134%	60%	19%
In % of discounted future GDP	4.4%	2.9%	1.3%	0.4%
Long-run growth increase	0.30	0.20	0.09	0.03
Scenario III: Universal basic skills				
In % of current GDP	1302%	731%	473%	162%
In % of discounted future GDP	27.9%	15.6%	10.1%	3.5%
Long-run growth increase	1.42	0.94	0.63	0.24
Descriptive data				
Number of countries	8	23	14	31
Enrolment rate	0.752	0.830	0.930	0.977
Average score	395.4	410.7	460.8	502.0
Share below 420 points	0.585	0.545	0.355	0.201

Notes: Simple averages of countries in each income group. See Tables 5.3-5.5 for details.

Lower-middle income countries: Across the eight lower-middle income countries, if all current students attained the basic skills level, the present value of income gains would be over six times the current aggregate GDP of these countries. In these countries, 59% of students perform under the basic level of skills, consistent with an average achievement score of 395 PISA points. But historically the attention has been much more focused on ensuring universal access to school. While only 75% of youth are enrolled in secondary school in these countries, the gains from achieving universal access at current school quality are much smaller than those from raising achievement among current students: 4.4% of discounted future GDP for the former, compared to 13.4% for the latter. However, the third panel shows the extraordinary gains from ensuring universal basic skills – an increase of 27.9% in GDP (on average over the projection period) compared to what would be expected with current skill levels.[23]

Upper-middle income countries: The 23 upper-middle income countries in the sample are doing somewhat better than the lower-middle income countries in terms of enrolment rates (83%), achievement levels (411 points), and share of students who score below 420 points (54%). But the differences are not huge, and the economic impacts follow a pattern similar to that described for the lower-middle income group. The smallest impacts come from expanding enrolment at current school quality, larger impacts accrue from raising achievement levels among current students, and the largest, by far, come from achieving universal basic skills. Meeting this last goal yields an average growth dividend of seven times current GDP and would

increase discounted future GDP by 15.6%, on average, over the economic outcomes of staying at the current education levels.

High-income non-OECD countries: The 14 high-income non-OECD countries represent a somewhat more heterogeneous grouping. The low enrolment rates in the Arab states of Bahrain (89%), Oman (82%) and Saudi Arabia (72%) imply the possibility of gains from expanded enrolment. But for these countries and for the group as a whole, the same pattern holds as for the two middle-income groupings: gains when current students acquire basic skills are greater than those when access to school is expanded, and the gains from achieving universal basic skills are greatest. Even for the oil states, then, more highly skilled populations have a significant impact on future growth and economic rewards.

High-income OECD countries: The high-income OECD countries are often left out of discussions of development goals. But these countries – with near universal secondary school enrolments – can make significant gains by improving education outcomes among the 20% of their students who score below Level 2. Enrolment expansion has little impact, but these 31 countries could see gains of 1.6 times current GDP, on average, and a 3.5% increase in discounted future GDP if all students acquired basic skills.

Of course, these projections have uncertainty imbedded in them. Alternative models and alternative interpretations of the underlying factors of growth can yield different estimates of the future. But in all cases, the economic gains from universal basic skills are large. These gains also very much overshadow the gains from just expanding access to schools at their current quality levels.

NOTES

1. The details of the projection methodology, in somewhat different circumstances, can be found in Hanushek and Woessmann (2011, 2015) and OECD, Hanushek and Woessmann (2010), where the authors focused on different policy scenarios (that do not take non-universal enrolment into account) just for OECD countries. Hanushek and Woessmann (2012) provided projections for European Union countries. Apart from the substantial expansion of country coverage, the clear focus of policy scenarios on reaching universal basic skills, and the treatment of less-than-universal participation, the main differences from the previous projection models are that reforms start in 2015 rather than 2010, that they take 15 rather than 20 years to complete, and that the growth coefficient is taken from a global, rather than OECD, sample.

2. The growth of the economy with the current level of skills is projected to be 1.5%, or the rough average of OECD growth over the past two decades.

3. The initial GDP refers to 2015 estimates based on PPP calculations in current international dollars; see International Monetary Fund (2014) [http://www.imf.org/external/pubs/ft/weo/2014/02/weodata/index.aspx (accessed 1/24/2015)].

4. For detailed descriptions of how Brazil, Korea and Turkey have achieved substantial improvements at different levels in PISA, see the respective boxes in this report and in OECD, 2013b.

5. The calculations take the weighted average of the 25-point gain for the proportion of young people enrolled in school and the zero gain for those who are not in school.

6. Hanushek and Woessmann (2015) analyse, across OECD countries, the long-run impact of a variety of labour and product market restrictions that are known to distort short-run economic decisions and outcomes. They find no discernible impact on long-run growth from these, but a pervasive impact of skill differences, suggesting that economies adjust to absorb increased skills of their workforces.

7. The 31 countries where girls outperform boys are Albania, Armenia, Bahrain, Botswana, Bulgaria, Cyprus (see note at the end of this chapter), Finland, Georgia, Greece, Iceland, Jordan, Kazakhstan, Latvia, Lithuania, Macedonia, Malaysia, Montenegro, Morocco, Norway, Oman, Qatar, Romania, the Russian Federation, Saudi Arabia, Singapore, Slovenia, South Africa, Sweden, Thailand, Turkey and the United Arab Emirates. See Table B.1 for details.

8. Assessing the impact of raising the performance for those who score below 420 points requires using the micro student data for each country. All analyses were performed separately for each of the five plausible values of the test scores and then averaged across the five plausible values.

9. In earlier work that estimated the impact on economic outcomes of various changes in knowledge capital, only OECD countries were considered where enrolment is not a serious issue and did not incorporate any school expansion. This omission was more serious for Mexico and Turkey, but the quality issues are themselves overwhelming. See Hanushek and Woessmann (2010, 2011, 2015).

10. Filmer, Hasan, and Pritchett (2006) pursue a different strategy of estimating performance from the distribution of PISA scores across grades (for the sampled 15-year-olds). There is currently no way to assess the validity of either this approach or that used in the projections here.

11. Knowledge capital thus increases by the difference between the current mean achievement and the current 25th percentile times the proportion of new enrollees.

12. These countries, in order of gain, are Ghana, Botswana, South Africa, Albania, Viet Nam, Macedonia, Iran, Lebanon and Colombia.

13. See the review and discussion in Hanushek and Woessmann (2015), section 8.4.

14. In order, OECD countries with gains exceeding twice GDP are Chile, Israel, the Slovak Republic, Greece, Italy, France, Sweden and Luxemburg.

15. The lowest secondary enrolment rates among high-income OECD countries are found in Chile (92%), Italy (94%), Greece (95%) and France (95%).

16. For additional sensitivity analyses of the projection models with respect to alternative parameter choices, see Hanushek and Woessmann (2011).

17. The standard description of the augmented neoclassical model can be found in Mankiw, Romer and Weil (1992). For a comparison of the alternatives, see Hanushek and Woessmann (2015).

18. The growth model is estimated with the logarithmic (rather than linear) initial per capita GDP as control. The test-score coefficient shows an imperceptible change in this specification (1.985 rather than 1.980), and the coefficient on log initial income is -0.879. With convergence, projections of growth rates with and without education reform will differ only during the transition to the new balanced growth path. The estimated convergence implies that a country will get halfway to a new steady state after 79 years. This is almost exactly the projection period employed here except that the projections show knowledge capital improvements that stretch out for 55 years.

19. In one influential line of research, Acemoglu, Johnson and Robinson (2001, 2005) have argued that major social institutions created the fundamental building blocks for modern development (see also Acemoglu, Gallego and Robinson [2014]). They particularly emphasise the centrality of strong property rights, arguing that the causal role of this institution can be seen analytically by tracing back the different colonial paths of different countries. On the other hand, Glaeser et al. (2004) have argued that the colonists brought human capital in addition to knowledge of good social institutions, and that it is more likely that better human capital led both to the development of good institutions and higher economic growth.

20. The measure of openness is the Sachs and Warner (1995) index. It reflects the fraction of years between 1960 and 1998 that a country was classified as having an economy open to international trade, based on five factors (tariffs, quotas, exchange rate controls, export controls, and whether or not a socialist economy). Following Acemoglu, Johnson and Robinson (2001), the measure of security of property rights is an index of the protection against expropriation risk, averaged over the period 1985-95, from Political Risk Services, a private company that assesses the risk that investments will be expropriated in different countries. Note that data limitations reduce the sample from 50 countries to 47.

21. Note that protection against expropriation and openness are strongly correlated, with a simple correlation of 0.71.

22. Having openness to trade and secure property rights does not, of course, imply that high-income countries uniformly employ the skills of their workers to the greatest extent possible. As a simple observation about the differences in use of skills, analysis of the PIAAC data of labour market earnings shows large differences in the productivity gains associated with greater skill. See the discussion in Chapter 6 and in Hanushek et al. (2015).

23. The gains in Scenario III are more than the simple addition of gains in Scenarios I and II because students who newly enter school do so in schools of higher quality than currently exist.

Notes regarding Cyprus

Readers should note the following information provided by Turkey and by the European Union Member States of the OECD and the European Union regarding the status of Cyprus:

Note by Turkey

The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Note by all the European Union member States of the OECD and the European Union

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Note regarding Israel

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

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