Policy Research Working Paper 8773

Mobilizing Resources for Education and Improving Spending Effectiveness

Establishing Realistic Benchmarks Based on Past Trends

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WORLD BANK GROUP
Education Global Practice
March 2019

Policy Research Working Paper 8773

Abstract

This paper looks at how countries have mobilized additional resources for education and assesses their impact on access and learning outcomes, using the World Bank's new Learning-Adjusted Years of Schooling measure. The paper shows that global spending on education has risen significantly over the past two decades, although spending as a share of gross domestic product has remained relatively unchanged, at about 4.5 percent. However, global trends mask large differences across regions and country income groups. For example, low-income countries recorded the largest increases in terms of the share of GDP spent on education, but the absolute amount they devoted to education remained low compared to other countries. Economic growth has been the main driver of increases in public education spending. Yet, countries that achieved the largest and most rapid spending increases did this through a combination of increases in overall government revenues, a greater prioritization of education in the government budget as well as healthy economic growth. Increases in public education spending did not generally result in major improvements in average education outcomes. Using the available data, the paper shows that a doubling of government spending per child led to an increase in learning-adjusted years of schooling of only half a year. Preliminary findings also show that countries with lower efficiency and spending are expected to get the most from increases in spending in improved education outcomes. The paper concludes by outlining an approach that allows countries to assess their potential for increasing education funding and the expected effects on their education outcomes, based on benchmarks drawing from the data of comparable countries. It also underscores the urgent need to improve data on public education spending and education outcomes, to extend this analysis to cover a wider set of countries and increase the robustness of country-level benchmarks.

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Mobilizing Resources for Education and Improving Spending Effectiveness: Establishing Realistic Benchmarks Based on Past Trends[*]

Keywords: Education Finance, Education Outcomes, Fiscal Space, Public Education Spending
JEL codes: E62, H20, H52, I21, I22, O15

[*] We are grateful for comments and advice from Omar Arias, Mohammed Audah, Deon Filmer, Mercedes Garcia-Escribano, Baoping Shan, Igor Kheyfets. Jaime Saavedra and Lars Sondergaard.

1. Introduction and Main Findings

When countries around the world pledged to achieve the Sustainable Development Goals (SDGs) in 2015, they also agreed to meet an ambitious set of targets for their education systems. Estimates suggest that an additional $191 billion to $311 billion will be needed each year to expand access and improve the quality of basic education for all children and to attain the other education targets by 2030 (Education Commission 2016; UNESCO 2015).[1] Yet mobilizing additional resources alone does not guarantee that education outcomes will improve. It will also be necessary to strengthen the effectiveness and efficiency of education spending if countries are to meet these ambitious goals.

This paper seeks to contribute to the global push to improve education systems by analyzing education spending and outcomes across countries and by providing governments with an approach to benchmarking performance that can guide their own policy making. Specifically, the paper does the following three things: First, it documents global-, regional-, and country-level trends in public education spending, identifying the main sources of spending increases around the world and exploring differences in spending trends across income levels and regions. Second, it looks at how countries have mobilized additional resources for education and assesses their impact on access and learning outcomes using the World Bank's learning-adjusted years of schooling measure. Third, the paper outlines an approach that allows countries to assess their own potential for increasing education funding and the expected effects on their education outcomes, based on benchmarks drawing from data of comparable countries.

The proposed approach to benchmarking spending decisions is a key contribution of the paper. The exercise does not seek to provide a definitive answer to whether countries should increase their spending or by how much. Instead, the benchmarking exercise can serve as a starting point for budget discussions. Specifically, the benchmarks seek to influence decision making in several, crucial ways. By comparing both levels of spending and changes in spending across countries, they can provide evidence on whether and by how much countries could increase their funding for education. By predicting how spending increases might impact outcomes, this approach can also identify which countries could be expected to see the largest returns from additional education funding. And by linking spending and expected outcomes, the benchmarks can increase accountability in the education sector.

While data limitations currently do not allow us to perform this benchmarking for all countries, the expectation is that this approach can help guide countries' spending decisions. By identifying countries that have the capacity to mobilize more resources and achieve high expected returns from additional spending, the proposed approach may persuade such countries to increase their funding. Countries categorized as having little fiscal space or low expected returns, on the other hand, may use the opportunity to strengthen accountability and effectiveness in education spending. Overall, this benchmarking approach can help bring about a more efficient allocation of education resources across the globe.

The paper's main findings are:

Global public spending on education has risen significantly over the last two decades but spending as a share of gross domestic product (GDP) remained relatively unchanged at about 4.5 percent, and overall, growth has been uneven. Low-income countries recorded the largest increases in terms of the share of GDP spent on education, but the absolute amount they devoted to education remained low compared to other countries. Countries in Africa and Latin America also saw marked growth in terms of education spending as a percentage of GDP, while the Middle East and North Africa saw a significant decline.

[1] Unless noted, all $ figures refer to US$.

Low-income countries devote the highest share of public spending to primary education and have mostly used funding increases to expand access to education rather than spend more on each student. In contrast, middle-income countries tend to spend a greater share of the government budget on post-primary education and have increasingly used additional funding to spend more on each student enrolled.

Economic growth has been the main driver of increased public education spending worldwide. However**,** countries that achieved the largest and most rapid increases in public education spending did this through a combination of increases in overall government revenues, a greater prioritization of education in the government budget as well as healthy economic growth.

Increases in public education spending did not generally result in major improvements in average education outcomes. Using the available data, the paper shows that a doubling of government spending per child led to an increase in learning-adjusted years of schooling (LAYS) of only half a year. Even for countries that achieved the most with an increase in resources, the improvements were fairly limited. For example, a 10 percent increase in spending per child, even for these countries, was associated with a 2.0 percent increase in learning-adjusted years of schooling compared to a 0.8 percent increase for countries at the average.

Our preliminary findings also show that the effectiveness of public education spending in any given country depends on its initial levels of efficiency and spending. The historical evidence suggests that countries with lower efficiency and lower spending are expected to get the most out of increases in spending in terms of improved education outcomes. For these countries, outcomes tend to be relatively low and increases in spending can have a bigger impact on enrolling more children in school and achieving basic learning outcomes. Higher spending countries and those with already high levels of outcomes relative to their spending saw "less bang for the buck," suggesting they need significant reforms to their education and financial management systems to yield further improvements in outcomes from additional spending.

The paper also underscores the urgent need to improve data on public education spending and on education outcomes to extend this analysis to cover a wider set of countries and to increase the robustness of country-level benchmarks.

The paper is organized as follows. Section 2 documents how public education spending has changed globally over the last 20 years and identifies the sources of these changes. Section 3 looks at how governments have mobilized additional resources for education and how this has impacted learning outcomes. Section 4 outlines how countries can use benchmarks on public education spending changes and the effect of spending increases on education outcomes to inform their own decision making. Section 5 offers some conclusions drawn from our analysis.

2. How Has Education Spending Changed across the World over the Last 20 Years?

The world has seen significant gains in education outcomes over the last two decades. Specifically, a greater proportion of children now start school at an earlier age and stay in school longer than ever before. The purpose of this section is to document the changes in public education spending that underlay these significant improvements in outcomes.

2.1 Key Variables and Data Sources

It was difficult to establish patterns and trends in public education spending because of the low coverage and poor quality of the available data (Box 1). For example, only about half of the 218 economies classified

by the World Bank have data on the most commonly reported indicator on education: government education spending as a proportion of gross domestic product (GDP) (Figure 1). Also, of the 124 countries that reported this information in 2000, only 75 reported the same information in 2015. This limited coverage stands in stark contrast to the data available for the health sector. Since 2000, 186 countries have compiled detailed health-financing data each year. We also found discrepancies between statistics provided by UNESCO's Institute of Statistics (UIS) and the International Monetary Fund (IMF) on the estimated value of countries' public education spending as a share of GDP, with the IMF's numbers averaging 0.7 percentage point higher. Similarly, we found an average 0.8 percentage point difference between UIS data for this measure and those reported in the World Bank's public expenditure reviews (PERs), since 2013 (Figure 1).[2]

Box 1: Indicator Definitions and Sources [a]

We primarily used data from UNESCO's Institute of Statistics (UIS) to document country-level changes in education spending between 1999 and 2015 (Table 1). Where there were gaps in the UIS database, we used data from the International Monetary Fund's (IMF) Government Finance Statistics (GFS) database, with these comprising about 12 percent of all observations. We used data from the same sources to break down spending by level of education (primary, secondary, and tertiary).[b] Our data on overall government spending and GDP came from the World Bank's World Development Indicators (WDI), supplemented by data from the Organisation for Economic Co-operation and Development (OECD).[c]

Indicator	Source
1. Government expenditure on education (2015 purchasing power parity [PPP] dollars)	UIS & IMF
2. Government education expenditure as a percentage of GDP	UIS & IMF
3. Government education expenditure as a percentage of total government expenditure	UIS & IMF
4. Education level (primary, secondary, tertiary) share of government education expenditure	UIS & IMF
5. Government education expenditure per student and by education level (2015 PPP dollars)	UIS & IMF
6. Government expenditure as a percentage of GDP	WDI
7. GDP in 2011 constant PPP dollars	WDI

a. Online databases were accessed in November 2018.
b. While UIS collects data on the functional classification of government education spending worldwide, we chose not to use them because establishing patterns and trends is difficult given the relatively low coverage of these indicators across countries.
c. Annex Table A1 presents the averages and numbers of observations for each of these variables in each year. A full description of data sources for each variable and the approach to the statistics reported in the paper are available from the authors on request.

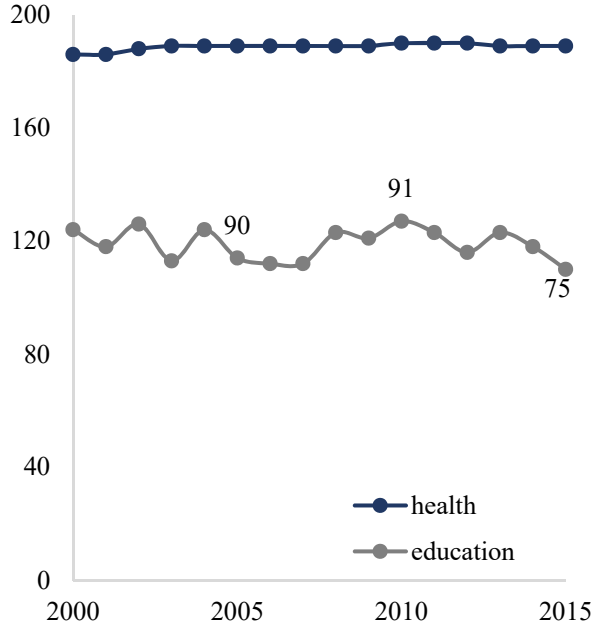
These gaps in data coverage and quality presented challenges for our analysis. With regard to trends in public education spending across all countries and for groups of countries (for example, classified by income or region), the difference in average spending from one year to the next is a function of actual changes in spending at the country level but also of the number of countries reporting each year. For example, average public spending on education for all countries dropped from 4.7 percent of GDP in 2003 to 4.4 percent of GDP in 2004. However, a large share of this drop resulted from the exclusion of several countries with higher-than-average spending which had reported in 2003 but did not in 2004. While it is beyond the scope of this paper to address issues of data quality, we had to find ways to surmount these

[2] We also found that related indicators are frequently inconsistent. For example, the raw data on public education spending as a percentage of GDP are often not the same as the figure we get if we multiplied together a country's public education spending as a percentage of government expenditure and government expenditure as a percentage of GDP. On average, there was a discrepancy of 55 percent between these two estimates of public education spending as a share of GDP.

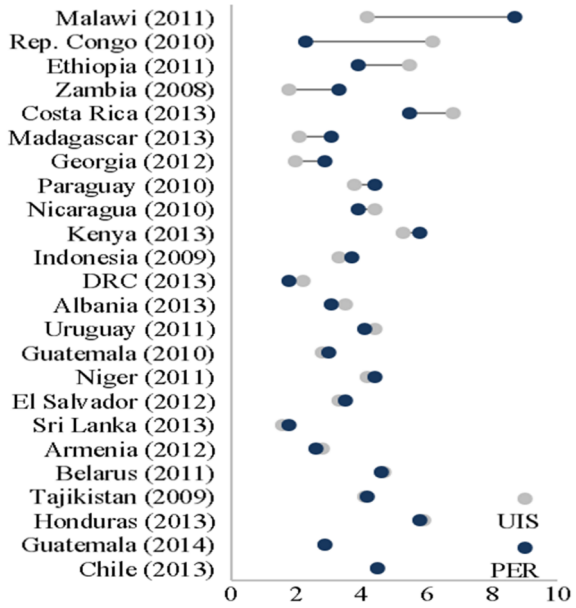
problems in our analysis. To compensate for this volatility, we used different approaches to measure spending for each year, including using the median and four-year country averages, interpolating data to fill data gaps, and excluding countries with less than 10 years of reported data. While these different approaches yielded slightly different estimates, the patterns and trends reported in the paper remained broadly the same. The rest of the paper uses four-year averages when analyzing patterns and trends in public education spending based on country groupings by income and regions.[3]

Figure 1: The Coverage of Education Spending Data is Limited, and of Low Quality

a. Countries reporting public sector spending as a percentage of GDP



b. Alternative estimates of government education spending as a percentage of GDP



Sources: WHO Global Health Expenditure Database; World Bank public expenditure reviews (PER); UIS online database.

Note: The data labels in the left hand panel shows the number of countries that reported educaiton spending as a percentage of GDP in 2000 that continued to report in subsequent years. Years in parentheses in the right hand panel's horizontal axis refer to the year of the data.

A further data limitation that we faced was a lack of information on household education spending, which meant that we had to focus on public spending rather than total (public and private) spending. The UIS has only recently begun to collect information on private education spending and has data on private household education spending as a percentage of GDP for only 34 countries per year on average between 1999 and 2015 (Box 2). Taking private spending into account can often change what conclusions can be drawn from making comparisons between countries. A recent study that used data from national education accounts to estimate total spending found that public spending in Nepal was much less than in Vietnam. However, when private spending was included, Nepal spent much more than Vietnam (UIS 2016). The exclusion of private spending may help explain why some country governments that allocate a similar share of public funding to education achieve very different levels of education outcomes.

[3] These consist of averages of country-level data over five four-year periods (1998–2001, 2002–05, 2006–09, 2010–2013, and 2014–17) that were then averaged across income or region groups. These averages included all countries with data available for at least one year in the four-year period. There was relatively little information for each country in 2017 for the final period, 2014–17.

Box 2: Household spending on education makes up a large proportion of total spending in low-income and lower-middle-income countries

Household spending on education tends to account for a greater percentage of GDP in low-income countries than wealthier countries (see figure below). Comparable information on household education spending at the country level is relatively scarce. However, using country averages over four-year periods, we found that, on average, household spending on education in 2010-13 accounted for 2.6 percent of GDP in low-income countries but only 0.7 percent in high-income countries.

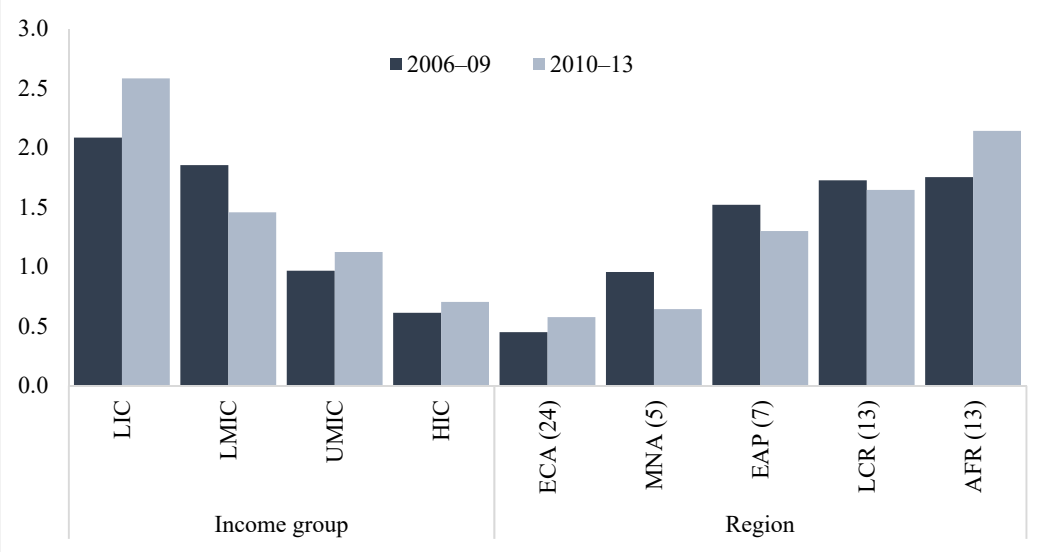
It also appears that household spending makes up a larger share of total education spending in low-income countries. In 2010–13, we found that average government spending on education accounted for 3.7 percent of GDP in low-income countries and 4.8 percent in high-income countries. Combining the data on household spending with those on government spending, it becomes clear that households in low-income countries provided 41 percent of all education spending compared to only about 13 percent in high-income countries.

In terms of regions, households in Africa and Latin America contribute the most to education as a share of GDP. In the four-year period from 2010 to 2013, households in Africa spent the equivalent of 2.1 percent of GDP on education. When household and government spending are combined, African countries spent the equivalent of 6.4 percent of GDP on education and Latin American countries spent 6.8 percent.

Only about 40 countries have more than 10 data points on household education spending between 2000 and 2015 in the UIS database. In this limited sample of countries, average household spending appears to have fallen during the first half of the 2000s from 1.4 percent in 2000 to 0.8 percent in 2005, but then began to rise and in 2013 accounted for about 1.2 percent of GDP.

Households Contribute the Largest Share of National Income to Education in Low-income Countries

Household Education Spending as a Percentage of GDP, 2006–13



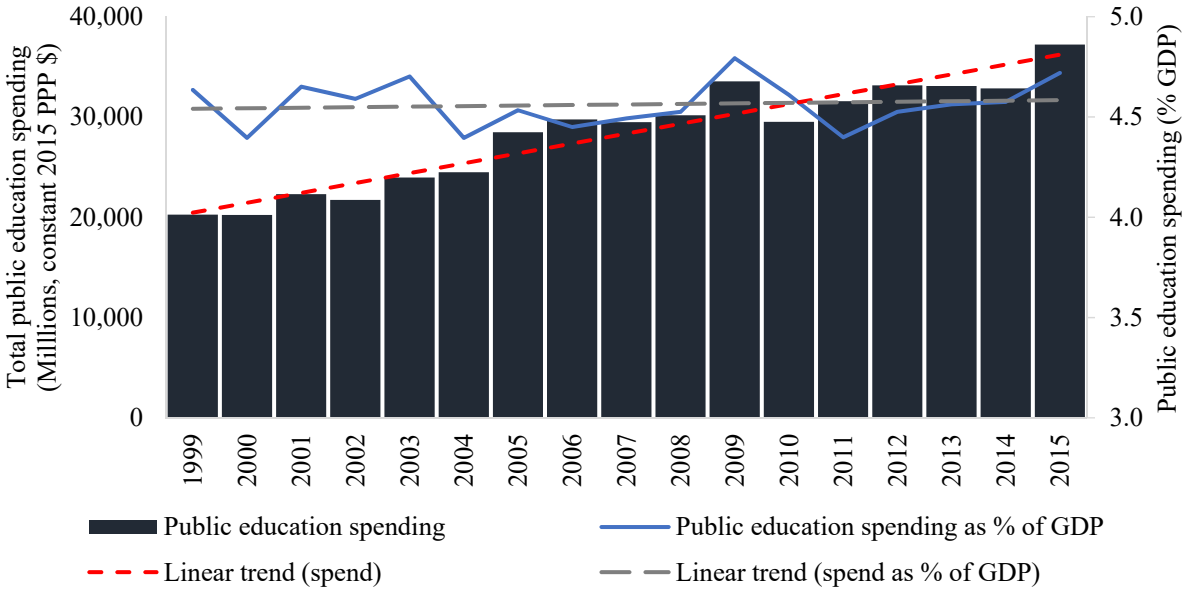
Source: World Bank calculations using UIS and IMF online databases.
Note: Income groups are defined by World Bank country income group classification in 2017. Figures in parentheses record the average number of countries in each region for which data are available. LIC = low-income country, LMIC = lower-middle-income country, UMIC = upper-middle-income country, and HIC = high-income country. AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, EAP = East Asia and the Pacific, MNA = Middle East and North Africa. There was no information for South Asia.

2.2 Trends in Education Spending

Average government education spending around the world doubled in real terms between 1999 and 2015 but spending in terms of share of GDP increased only slightly (Figure 2). Much of the 4 percent annual growth in public education spending was fueled by economic growth rather than significant increases in the share of GDP devoted to education. The share of GDP devoted to public education spending increased from an average of 4.6 percent in 1999 to an average of 4.7 percent in 2015.

Figure 2: Real government spending on education has grown significantly since 1999

Public education spending, constant 2015 PPP dollars and percentage of GDP, 1999-2015



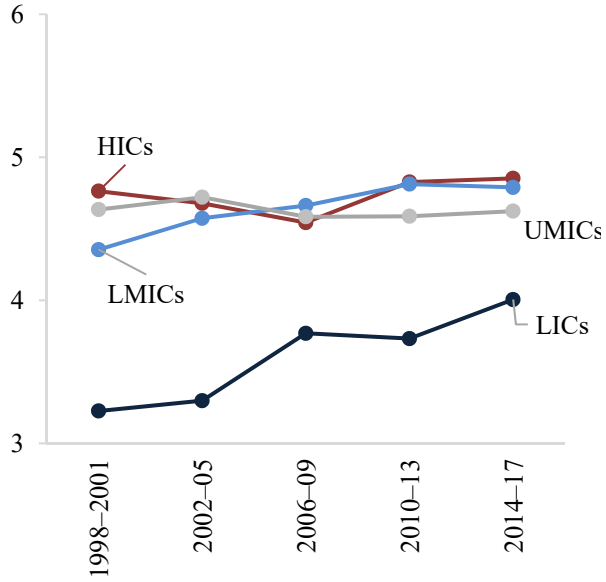
Source: World Bank calculations based on UIS and IMF online databases.
Note: The bars show the country average of total public spending on education for all countries with data available in each year.

Low-Income Countries Have Seen Faster Growth of Public Education Spending as Share of GDP

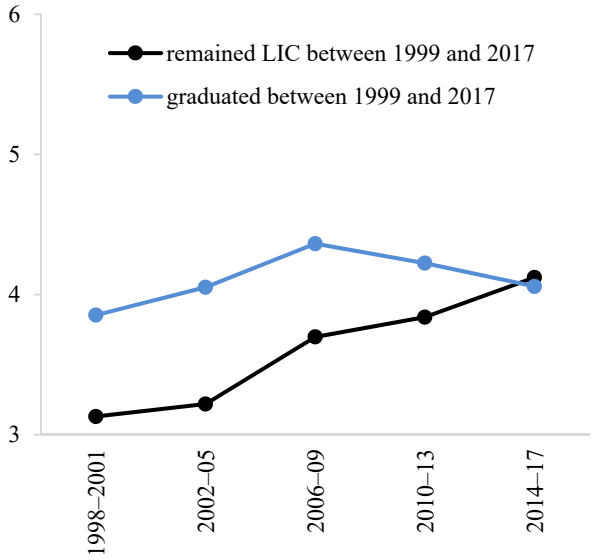
Low-income and upper-middle-income countries have registered relatively large increases in the share of GDP devoted to government education spending since 1999 (Figure 3). For example, countries that were classified as low-income in 2017 increased their public education spending from 3.2 percent of GDP in 1998–2001 to 4.0 percent in 2014–17. In contrast, government education spending as a share of GDP has remained relatively constant for upper-middle-income countries (4.6 percent) and high-income countries (4.8 percent) (Figure 3). These trends have resulted in a narrowing of the gap between country income groups in terms of share of GDP allocated to public education spending.

Figure 3: Government Education Spending as a Share of National Income Has Risen Fastest in Low-income and Lower-middle-income Countries

a. Public education spending as percentage of GDP by income group classifications as of 2017



b. Public education spending as percentage of GDP in low-income countries by graduation status



Source: World Bank calculations based on UIS and IMF online databases.
Note: World Bank income group classifications in 1999 are used to group countries and are as follows: LIC = low-income country, LMIC = lower-middle-income country, UMIC = upper-middle-income country, and HIC = high-income country.

Overall, countries that graduated out of low-income status between 1999 and 2017 devoted a larger share of GDP to public education spending than those countries that remained in the low-income group (Figure 3). Between 1998 and 2013, countries that graduated from low-income status spent approximately 4.1 percent of GDP on education compared to 3.5 percent for countries that did not graduate.[4] However, this gap has narrowed over time because of a decline in the spending share among graduating countries and an increase in the share among non-graduating countries. Between 2006–09 and 2014–17, government education spending as a share of GDP declined from an average of 4.4 to 4.1 percent among graduating countries but increased from an average of 3.7 to 4.1 percent among non-graduating countries.

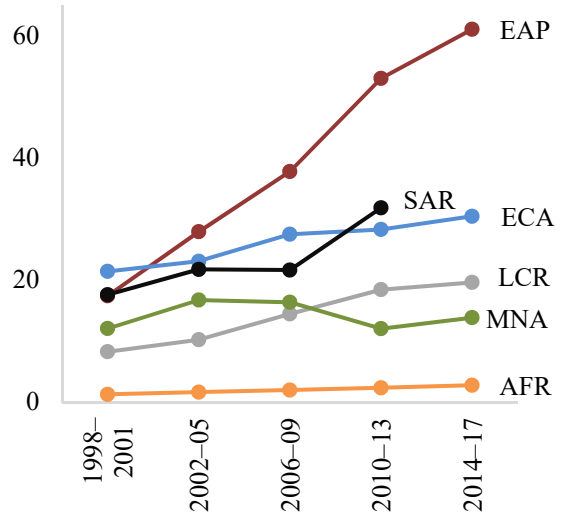
Government Education Spending Has Grown in All Regions in Absolute Terms, But Trends in Spending as a Percentage of GDP Have Varied

Real public education spending growth has been most rapid in East Asia and the Pacific, Latin America and the Caribbean, and Africa. While public education spending has grown in real terms in all geographic regions since the late 1990s, the rate of growth differs enormously (Figure 4). For example, since the late 1990s, spending in East Asia and the Pacific has more than trebled and in Africa it has increased by 120 percent. Trends in other regions were more muted. For example, public education spending in the Middle East and North Africa increased by only 12 percent over the same period.

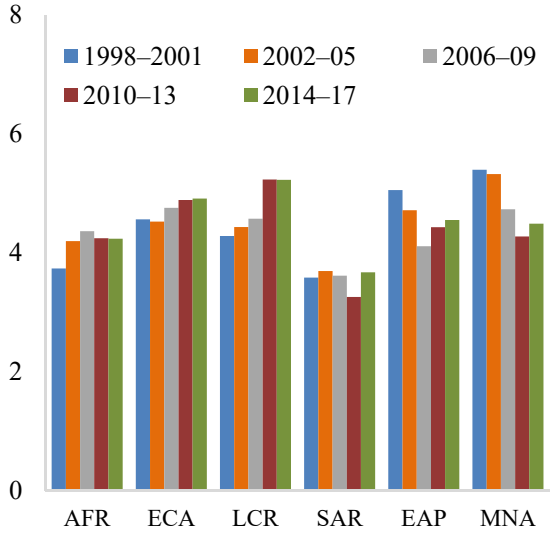
[4] Between 1998 and 2013, low-income countries and countries that graduated from that status allocated between 15 and 16 percent of total government expenditure to education. In 2014–17, education as a share of total government expenditure declined to 14 percent for countries that graduated but increased to 17 percent for non-graduating countries.

Figure 4: Government education spending has grown rapidly in East Asia and the Pacific but has not kept pace with economic growth in the Middle East and North Africa

a. Public education spending (Billions, constant 2015 PPP $)



b. Public education spending as a percentage of GDP



Source: World Bank calculations using UIS and IMF online databases.
Note: Statistics on public education spending are averages for countries in each region that have data available for at least one year in the four-year period. World Bank regional classifications are used to group countries as follows: AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, EAP = East Asia and the Pacific, MNA = Middle East and North Africa, and SAR = South Asia.

Even as all regions have registered growth in government spending on education, the share of GDP they have allocated to education has varied widely. In 1998–2001, Africa and South Asia devoted a similar share of GDP to public education spending. However, by 2014–17, the percentage for Africa exceeded that for South Asia by 0.6 percentage point. Latin America and the Caribbean has also increased considerably the share of GDP used for public education spending since the late 1990s (Figure 4). In contrast, in the Middle East and North Africa, the share of government education spending declined from 5.4 to 4.5 percent of GDP over the same period, which explains the relatively slow absolute growth in such spending for the region since 2000. The available data show that patterns and trends in public education spending in countries that are classified as Fragile and Conflicted-Affected Situations (FCS) are similar to those in other countries at a similar stage of development (Box 3).

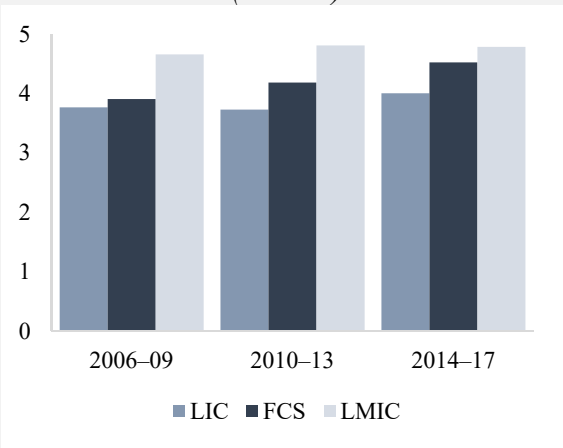
Box 3: Trends in Public Education Spending in Fragile and Conflict-Affected Countries

Fragility, conflict, and violence can have a profoundly negative impact on a country's education system and its ability to provide a quality education to all children. A lack of funding often exacerbates the difficulties faced by the governments of these countries (Commins 2017; UNESCO 2011).

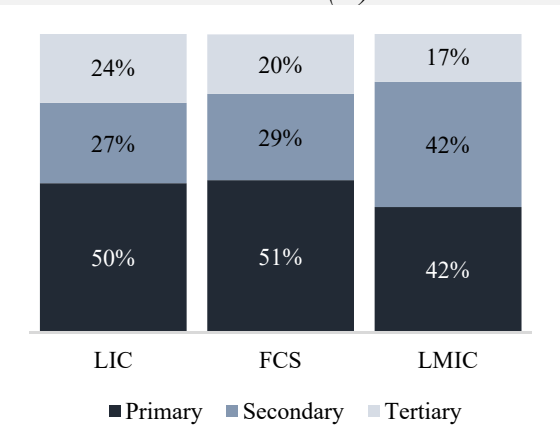
On the face of it, countries on the World Bank's Fragile and Conflict-Affected Situations (FCS) list seem to devote similar shares of GDP to public education spending as other low-income and lower-middle-income countries, and to spend the money in similar ways. The figure below compares the public education spending aggregates for these three categories of countries. The data show that patterns and trends in public education spending for FCS countries are similar to those for other countries at a similar stage of development.

Public Education Spending in FCS Countries is Similar to Funding in Other Low-income and Lower-middle-income Countries

a. Public education spending (% GDP)



b. Public education spending by education level, 2014–17 (%)



Source: World Bank calculations using UIS and IMF online databases.
Note: World Bank income group classifications in 2017 are used to group countries and are as follows: LIC = low-income country, and LMIC = lower-middle-income country. FCS = country classified as a fragile and conflict-affected situation.

The lack of data on financing in fragile and conflict-affected countries and the need to go beyond national aggregates to understand spending inequalities make it difficult to draw any firm conclusions on public spending on education in these countries. Fifty-five countries have appeared on the Fragile and Conflict-Affected Situations list since its introduction in 2006. Data on public education spending as a percentage of GDP are only available for approximately half of these countries at any one time. It is possible the countries that fail to report are those in which systems have broken down and, as a result, they spend less on education. Even when FCS countries have managed to report spending data, weaknesses in their public financial management systems make it more likely that the funds are not distributed fairly and are not used for their intended purposes.

Education's Share of Government Budgets Has Remained Relatively Stable over the Last 20 Years

Governments must make difficult trade-offs when deciding how to allocate public funds to support a variety of priorities and policy objectives. Channeling more resources into education inevitably means channeling less into other sectors and it can be difficult for governments to take such action. In some cases, increased peace and stability–and corresponding declines in military spending–have allowed governments to devote a greater share of public spending to education. During its war with Eritrea, Ethiopia spent nearly one-third of the government budget on military expenditures, but this figure began to decline as the conflict wound

down, falling to 4 percent in 2017. Meanwhile, education expenditures as a share of the budget almost doubled, rising from 15 percent in 2000 to 27 percent in 2013. In other cases, reductions in fuel subsidies (e.g., Ghana and Indonesia) have allowed governments to allocate more to education (Van Der Burg and Whitley 2016).

Overall, the share of government budgets allocated to education has remained relatively stable over the last 20 years across all regions and income groups (Table 1). Only in upper-middle-income countries has the share decreased. However, looking at regional averages, education expenditures as a percentage of government budgets have increased in Africa but declined in the Middle East and North Africa and in East Asia.

Low-income and lower-middle-income countries tend to devote a greater share of government spending to the education sector than richer countries (Table 1). For example, in 2014–17, low-income countries spent an average of 16.4 percent of government funds on education compared to 12.6 percent for high-income countries. Regional differences tend to follow a similar pattern, with lower-income regions such as Africa devoting a greater share of government spending to education than higher income regions like Europe and Central Asia.

Table 1: Share of Government Budget Used for Education, by Income Group and Region

	1998–2001	2002–05	2006–09	2010–13	2014–17
Income Group					
LIC	15.0	15.8	16.0	15.9	16.4
LMIC	15.7	16.7	16.3	16.0	15.7
UMIC	16.0	15.5	14.9	14.9	14.5
HIC	13.1	13.2	13.1	12.7	12.6
Region					
AFR	14.8	16.2	16.6	16.7	16.1
ECA	11.9	12.2	12.2	12.4	12.2
LCR	16.2	15.7	16.1	17.3	17.4
SAR	15.5	16.3	14.1	13.5	15.0
EAP	16.1	17.2	15.4	14.5	14.0
MNA	17.3	16.5	15.4	12.9	13.6

Source: World Bank calculations using UIS and IMF online databases.
Note: Income groups are defined by country income group classification in 2017. LIC = low-income country, LMIC = lower-middle-income country, UMIC = upper-middle-income country, and HIC = high-income country. AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, SAR = South Asia, EAP = East Asia and the Pacific, and MNA = Middle East and North Africa.

Low-Income Countries Have Spent More on Primary Education, Richer Ones on Post-Primary

Wealthier countries have devoted a greater share of government spending to post-primary education than less well-off countries. In 2014–17, less than one-third of public education spending in high-income countries went to primary education compared to about one-half for low-income countries (Table 2). This suggests that as countries become wealthier and their education systems expand and develop, additional public funding tends to be spent on post-primary education (Box 4).[5]

[5] The correlation coefficient between per capita GDP and the share of public education spending going to secondary education is 0.4 and for tertiary education it is 0.3. This is statistically significant at the 1 percent level.

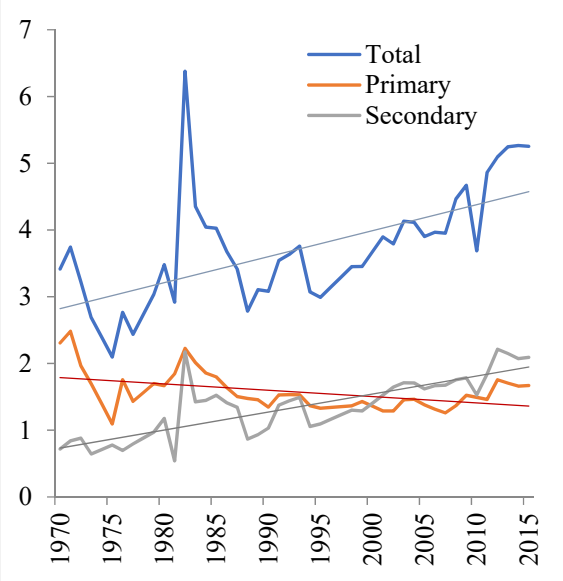
Box 4: Financing Education Development in the Republic of Korea

The Republic of Korea has taken a progressive approach to universalizing primary and secondary education. In 1954, the government launched its first plan for free compulsory primary education financed by the Education Tax Act of 1958 and foreign aid. Between 1954 and 1959, public education spending as a share of the overall government budget increased threefold from 4.2 percent to 14.9 percent. Nearly 80 percent of this increase was devoted to primary education, and by the late 1950s and early 1960s, primary school enrollment was nearly universal (Kim 2002).

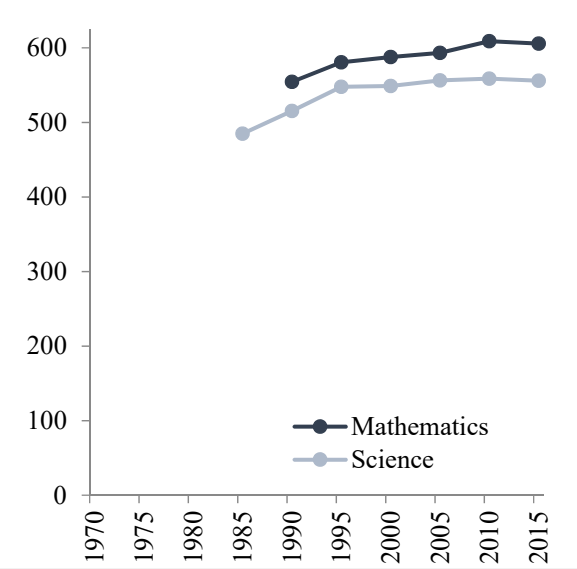
After the expansion of primary schooling was complete, the government shifted the focus of its funding to secondary education (see figure below). Secondary education spending as a percentage of total public education spending surged from 21 to 39 percent between 1970 and 1987. This funding provided schools with enough resources to increase the secondary school gross enrollment rate from 39 percent in 1971 to 101 percent by 1996.[a] While primary public education spending as a proportion of GDP fell, absolute levels of public education spending at the primary level continued to rise in real terms over the same period. Since the universalization of secondary schooling in Korea in the late 1990s, the government's focus has shifted, to expanding higher education.

As Universal Primary Enrollment Was Achieved, Government Spending Shifted toward Secondary Education

a. Education spending as a percentage of GDP



b. Secondary school learning outcomes (Harmonized Learning Outcomes (HLO) scale)



Sources: World Bank calculations using UIS, IMF online databases; Altinok, Angrist, and Patrinos (2018).

Learning outcomes have improved alongside the continual increase in public education spending as a share of GDP. While information on secondary school learning outcomes only goes back to 1985, the data show an upward trend that corresponds to increases in spending on secondary education. More recently, average learning outcomes have remained relatively unchanged, even while public education spending on secondary education has continued to increase rapidly. While learning outcomes only measure one objective of the education system, this situation points to a potential lack of efficiency in the education system.

a. The secondary gross enrollment rate is the number of children enrolled in secondary school divided by the number of children of official secondary school going age.

Over the last 20 years, the focus of public education spending in middle-income countries has shifted away from primary education towards secondary and tertiary education (Table 2), even as absolute figures for public spending have generally increased for all levels of education. In 1998–2001, lower-middle-income countries spent half of their public education resources on primary education, but in 2010–13, this share dropped to 42 percent. The shift of public education spending away from primary education has mainly benefited secondary education, with its share increasing from 33 to 42 percent over the same period. A similar trend is evident for upper-middle-income countries but not for low-income and high-income countries. However, since 2010–13, high-income countries have seen a shift in funding emphasis from secondary to tertiary education (Table 2).

Table 2: Composition of Education Spending, by Income Groups and Regions (%)

	1998–2001			2002–05			2010–13			2014–17		
	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.
Income Groups												
LIC	51	29	20	58	25	17	51	28	21	50	27	24
LMIC	50	33	17	46	34	19	42	38	20	42	42	17
UMIC	43	36	21	43	38	18	36	42	22	35	41	24
HIC	31	45	23	30	46	24	31	43	26	31	41	28
Regions												
AFR	48	32	19	50	31	19	47	32	21	45	31	24
ECA	26	49	25	29	47	24	27	47	26	28	46	26
LCR	47	34	19	45	37	18	42	35	22	40	36	24
SAR	48	36	17	42	45	13	42	38	20	45	39	15
EAP	44	33	23	43	34	23	40	36	24	38	40	23
MNA	36	44	19	34	43	22	32	45	23	37	38	25
All countries	41	38	21	41	39	21	39	39	23	37	39	24

Source: World Bank calculations using UIS and IMF online databases.
Note: The figures in the tables show the percentage of the public budget spent on each education level. Pri. = Primary, Sec. = Secondary, and Tert. = Tertiary. Income groups are defined by World Bank country income group classifications as of 2017. LIC = low-income country, LMIC = lower-middle-income country, UMIC = upper-middle-income country, and HIC = high-income country. AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, SAR = South Asia, EAP = East Asia and the Pacific, and MNA = Middle East and North Africa.

How regions spend their public education funds often mirrors the spending patterns of the income group into which most of a region's countries fall. For example, trends in public education spending in Africa and Europe and Central Asia tend to resemble spending patterns for low-income countries, while trends for Europe resemble those for high-income countries. Patterns and trends in South Asia appear to mirror those for lower-middle-income countries. Both Latin America and the Caribbean and East Asia and the Pacific have shifted spending from primary to post-primary education over the last 20 years, reflecting the regions' strong economic growth and the resulting expansion of their education systems. The Middle East and North Africa has experienced strong shifts in public education spending from secondary to tertiary education even though public education spending in the region has seen limited growth in absolute terms.

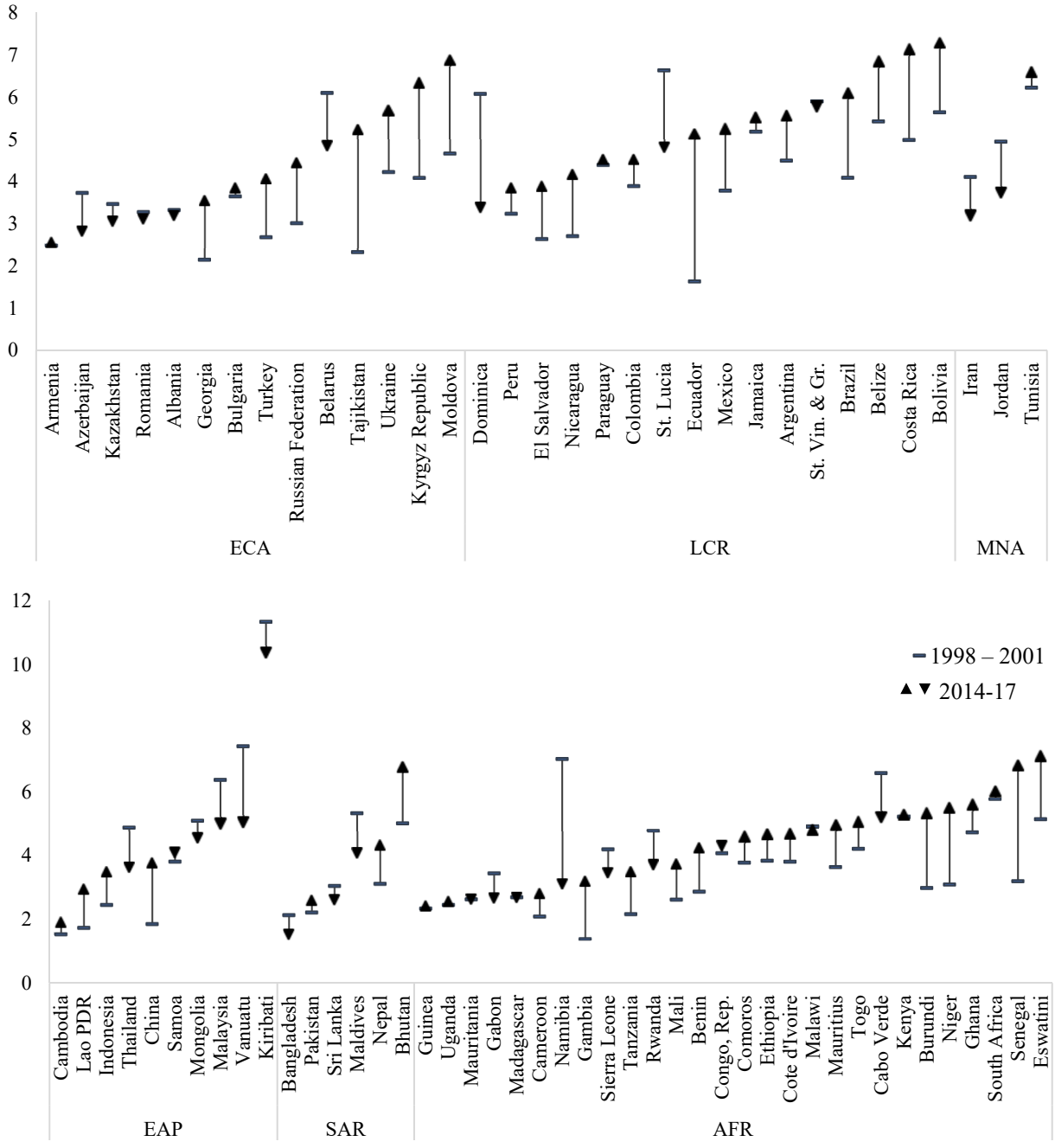
Spending Trends Can Vary Widely across Countries in the Same Region or Income Group

These regional and income group averages mask large differences among individual countries. For example, Figure 4 (above) highlighted the large increases in public education spending's share in GDP in Africa over the last 20 years, but government education spending as a share of GDP actually declined in some countries, such as Sierra Leone and Cabo Verde. There has also been significant variation in the magnitude of the increases. In Latin America and the Caribbean, the share of GDP allocated to public

education in Brazil increased by nearly 2 percentage points, while in Colombia, it increased by only 0.6 percentage point.

Figure 5: Trends in Regional Averages Mask Country-Level Differences in Spending

Public education spending as percentage of GDP (excluding high-income countries), 1998–2001 to 2014–17



Source: UIS and IMF online databases.

Note: AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, SAR = South Asia, EAP = East Asia and the Pacific, and MNA = Middle East and North Africa.

2.3 Sources of Increase in Public Education Spending

Identifying the main drivers of change in public education spending can provide important insights into how countries have mobilized additional funding for education. As we saw in the previous section, government spending on education has increased over the last 20 years in the aggregate and in many countries. Do these increases simply reflect growth in the overall government budget due to economic growth? Or are they the result of changes in the size of the public sector or in the priority that policy makers give to education in the government budget? We used a simple accounting identity to disaggregate changes in public education spending over the last 20 years to try to answer these questions (Box 5).

Box 5: Decomposition of Public Education Spending into Main Fiscal Components

A simple accounting identity is used to disaggregate changes in public education spending over the last 20 years into three component parts:

$$T \equiv YGE \quad (1)$$

where T is total public education spending, Y is GDP, G is total government spending as a percentage of GDP, and E is total public education spending as a percentage of total government spending.[a] Using Taylor's expansion, the percentage change in total public education spending can be decomposed as:

$$\frac{T_t - T_{t-1}}{T_{t-1}} \approx \left(ln(Y_t) - ln(Y_{t-1})\right) + \left(ln(G_t) - ln(G_{t-1})\right) + \left(ln(E_t) - ln(E_{t-1})\right) \quad (2)$$

We ignore second and higher order terms of the Taylor expansion, which implies that our decompositions are approximations to the overall total change. These approximations are more accurate when proportional changes in total public education spending are small.[b] Where they are large, differences between the sum of the three components in equation 2 and actual changes in education spending can be large.[c]

a. It would be possible to break down total government spending further to analyze revenue, borrowing, and development assistance, but we did not pursue this line of analysis in this paper.
b. See Rolleston (2009) for a similar approach to decomposing trends in public primary education spending.
c. See Section 3 for further discussion.

Economic Growth Has Been the Main Driver of Increased Public Spending

This decomposition shows that economic growth has been the key driver of public education spending increases (Figure 6). Using equation 2, economic growth accounted for 88 percent of global increases in government spending on education between 2000 and 2015. Except for the aftermath of the 2008 financial crisis, this period was characterized by global GDP growth of 2.9 percent per year, which accounts for most of the near-doubling of real public education spending over the same period. Income groups that registered the most rapid economic growth also had the fastest growth in public education spending. For example, low-income countries grew at 4.8 percent while upper-middle-income countries grew by 5.7 percent.

Overall changes in the size of the government sector played a limited role overall, and only played an important role in low-income and upper-middle-income countries. Growth in overall public spending accounted for approximately 28 percent of the increase in education spending in low-income countries and 18 percent for upper-middle-income countries (Figure 6). In low-income countries, average public spending as a proportion of GDP increased from 13.3 percent in 1998–2001 to 19.5 percent in 2014–17 (Annex Table A2). However, overall public spending as a share of GDP still remains relatively low compared to other

income groups, and it is a key driver of the lower proportion of GDP devoted to public spending on education outlined in Figure 3 (see Box 6).[6]

Box 6: Key Drivers of Overall Levels of Public Spending

Governments mainly finance public spending through tax and other domestic revenue streams, concessional aid, and net borrowing. The combination of sourcing for public spending will depend on a country's specific context and overall level of development. On the whole, tax revenues tend to be higher in wealthier countries. For example, in 2014–17, average tax revenues for low-income countries were 15 percent of GDP compared to 19 percent in high-income countries.

The gap in total government revenues (from tax revenues, social contributions, and other revenues such as rent, fees, and income from property, but excluding grants) is much bigger between these two income groups. In 2014–17, average total government revenues were 31 percent of GDP in high-income countries compared to only 18 percent in low-income countries. Overall levels of deficit financing also differ among income groups. For example, in 2014–17 government budget deficits (net borrowing) were 3 percent of GDP on average in low-income countries compared to 1.4 percent and 2.6 percent in lower-middle and upper-middle income countries, respectively.

Total Official Development Assistance (ODA) as a Percentage of GDP (%), 2002–2017

	2002–05	2006–09	2010–13	2014–17
Income Groups				
LIC	1.1	1.1	0.9	0.8
LMIC	0.9	0.9	0.7	0.6
UMIC	0.5	0.6	0.6	0.5
HIC	0.1	0.1	0.1	0.1
Regions				
AFR	1.0	0.9	0.7	0.6
ECA	0.2	0.2	0.2	0.2
LCR	0.2	0.2	0.1	0.1
SAR	0.6	0.7	0.5	0.3
EAP	1.9	2.1	1.9	1.7
MNA	0.4	0.6	0.5	0.5

Source: World Bank calculations using OECD Creditor Reporting System and World Bank online databases.
Note: Overseas development assistance is measured as gross disbursements, and figures only include countries that received some assistance. Income groups are defined by country income group classification in 2017. LIC = low-income country, LMIC = lower-middle-income country, UMIC = upper-middle-income country, and HIC = high-income country. AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, SAR = South Asia, EAP = East Asia and the Pacific, and MNA = Middle East and North Africa.

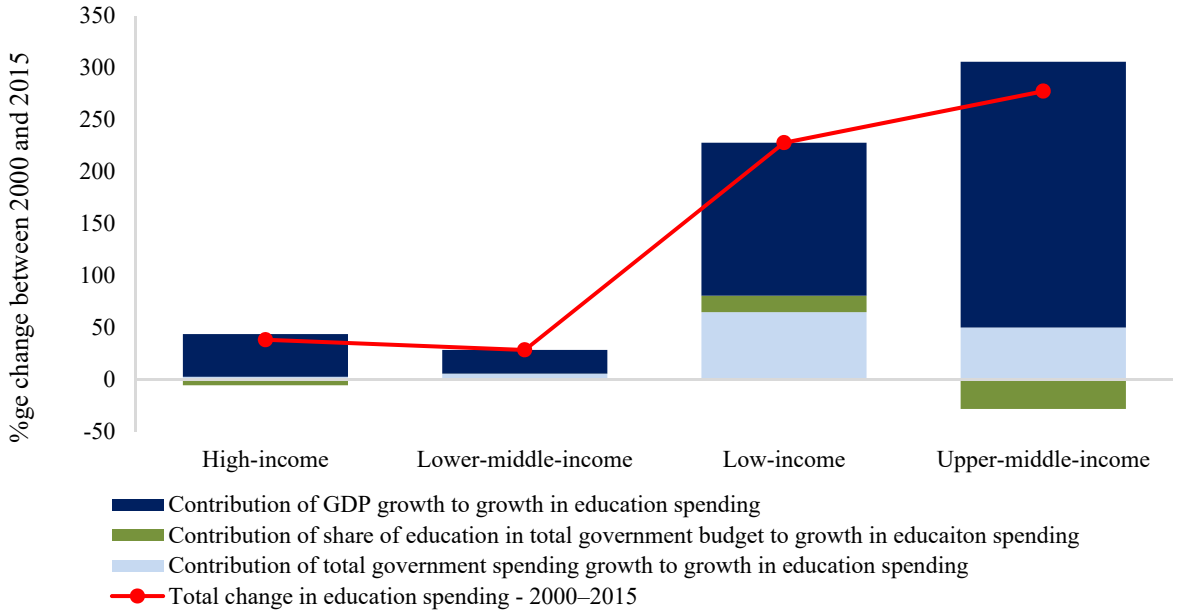
While overall levels of official development assistance (ODA) have been declining over the last 15 years, such aid provides an important source of education funding for low- and middle-income countries (see table above). Given average levels of public spending on education, ODA on average made up about 21 percent of total public education spending in low-income countries. However, this average masks large disparities among different low-income countries. For example, in 2017 Malawi received ODA for education equivalent to 2.4 percent of GDP compared to Madagascar's 0.4 percent.

[6] Average public spending as a percentage of GDP in lower-middle income countries was 24 percent in 2014–17 (see Annex Table A2).

Changes in the priority that policy makers gave to education in government budgets also generally contributed little to the increases in public education spending. For example, upper-middle-income countries had the largest increases in public spending on education overall but devoted a smaller share of their government spending to education in 2015 than they did in 2000. The exception was low-income countries, where making education a higher priority in government budgets did lead to greater public education spending (Figure 6), although this represented a relatively small proportion of the overall increase. Over this period, the share of the budget devoted to the education sector increased from an average of 15 to 16 percent in those countries (see Table 1).

Figure 6: Economic Growth Has Been the Main Driver of Increased Public Spending on Education

Decomposition of public education spending changes (%), 1998–2017



Source: World Bank calculations based on UIS and IMF data.
Note: Average percentage growth in all variables calculated as the percentage change from the four-year average in 1998–2001 to the four-year average in 2014–17, for all countries with data available in at least one year across both four-year periods.

Regions with the fastest growth in public education spending were those that experienced rapid economic growth and managed relatively large increases in government spending as a share of GDP. For example, about one-third of increased public education spending in the East Asia, Latin America, and South Asia regions was due to an increase in the size of the government sector (Table 3). Between 1998–2001 and 2014–17, government spending as a percentage of GDP increased from 20 to 26 percent in East Asia and the Pacific and from 20 to 24 percent in Latin America and the Caribbean.[7] In contrast, the impact of economic growth on increased public education spending in the Middle East and North Africa was reduced because both government spending as a share of GDP and the share of government spending allocated to education declined.

[7] Annex Table A2 presents a summary of patterns and trends in government spending as a share of GDP.

Table 3: Regional Decomposition of Public Education Spending Changes (%), 1998–2017

	Real change in public education spending	Source of changes in public education spending		
		Economic growth	Total public spending as a share of GDP	Education prioritization – education spending as a share of the total government budget
	(1)	(2)	(3)	(4)
East Asia and Pacific	251	215	69	-33
Europe and Central Asia	42	34	6	2
Latin America and the Caribbean	137	86	37	14
Middle East and North Africa	15	37	-8	-14
North America	134	189	13	-68
South Asia	81	75	22	-16
Africa	116	91	15	9

Source: World Bank calculations based on UIS and IMF data.
Note: Education spending is measured in PPP (constant 2015 dollars). Average percentage growth in all variables calculated as the percentage change from the four-year average in 1998–2001 to the four-year average in 2014–17, for all countries with data available in at least one year across both four-year periods. Column 1 shows the total percentage change in education spending. Columns 2 – 4 break down the overall change into its component parts (see Box 5). Column 1 is equal to the sum of columns 2 – 4 with small differences due to rounding errors.

Boosting the priority given to education in government budgets contributed to increased public education spending in Africa and Latin America but not in many other developing regions. Giving a higher priority to education accounted for 8 percent of the increase in public education spending in Africa and 10 percent in Latin America. Giving a higher priority to education combined with fast economic growth and increases in government spending as a share of GDP resulted in these two regions having the largest regional increases in public education spending. In all other regions except Europe and Central Asia, the share that education claimed in government budgets declined between 2000 and 2015.

2.4 Expanding Places versus Increasing per Student Spending

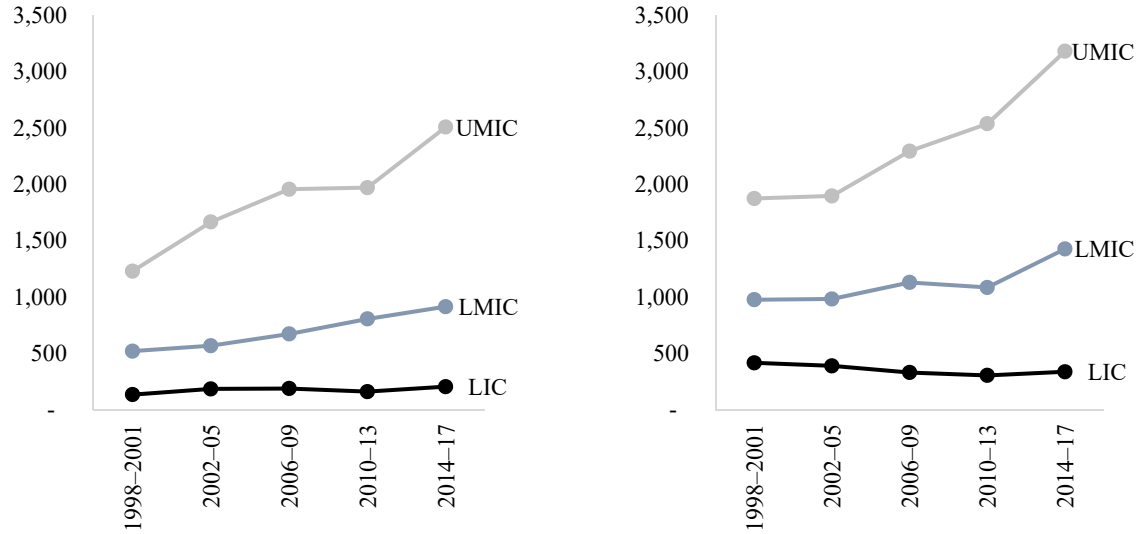
On the whole, public spending per primary and secondary school student has risen steadily in low-income and middle-income countries (Figure 7). However, the per student average has grown much more rapidly in wealthier countries and has led to a widening of the per student spending gap between low-income and middle-income countries. For example, in 1998–2001, lower-middle-income countries spent more than three times as much per primary school student than low-income countries ($522 in purchasing power parity dollars compared to PPP $136). By 2014–17 they spent almost 4.5 times as much as low-income countries (PPP $916 compared to PPP $207).[8] The only exception to the upward trend in per student spending was public spending on secondary school students in low-income countries. Between 1998–2001 and 2014–17, per secondary student spending for this group declined by 19 percent from PPP $418 to PPP $339. Since low-income countries' overall spending on secondary education rose over the same period, the decline in per student spending resulted from faster growth in the number of students attending secondary school.[9]

[8] Annex Table A3 reports per student spending for regional groupings. With the exception of secondary education, spending per school-aged child follows similar trends to those discussed in the main text and are reported in Annex Table A4.
[9] Annex Table A4 reports spending per school-aged child, which increased for secondary school children in low-income countries, unlike spending per student.

Figure 7: Real Spending per Student Has Generally Risen in Low-Income and Middle-Income Countries, but the Gap between Income Groups Has Widened

Public education spending per student (constant 2015 PPP $), 1998–2001 to 2014–17

a. Primary education *b. Secondary education*



Source: World Bank calculations using UIS and IMF online databases.
Note: LIC = low-income country, LMIC = lower-middle-income country, and UMIC = upper-middle-income country.

Recent Spending Increases Have Mostly Financed School Expansion in Low-Income Countries

Increases in government funding for education can go towards expanding the number of student places, increasing the average amount spent on each student, or a combination of the two. To determine if countries are finding a balance between quantity and quality, it can be useful to explore how policy makers have used additional public education funding and how their country's level of education development has influenced their choices. The data can also help to identify the transition points where countries shift spending priorities from increasing access to improving quality. These transitions are where spending inefficiencies potentially can increase if policy makers fail to pay due attention to how increases in levels of spending per student are used. To understand how governments have historically used funds over the last two decades, we broke down public education spending by education level (primary, secondary, and tertiary) and decomposed it into spending per student and enrollment (Box 6).

Box 6: Decomposition of Changes in Public Education Spending between Changes Due to Enrollment and Spending per Student

A second simple accounting identity is used to disaggregate changes in public education spending over the last 20 years into two component parts:

$$T_l \equiv S_l E_l \tag{3}$$

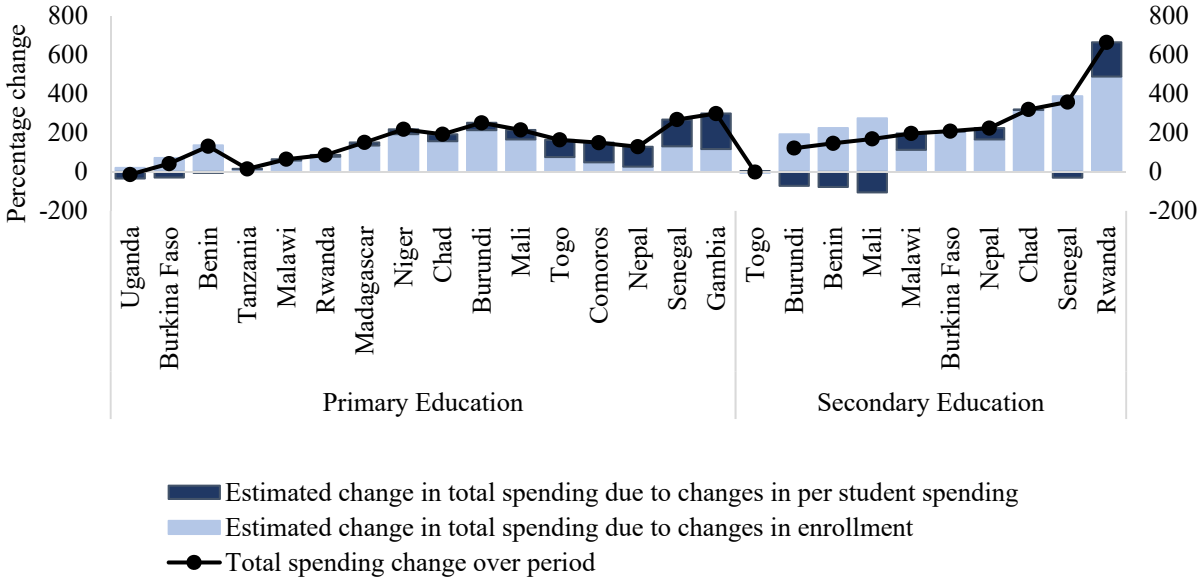
where T_l is total public education spending for education level l, S_l is public education spending per student in level l and E_l is total enrollment in level l. In a similar way as in equation (2), the percentage change in total public education spending in level l can be decomposed as:

$$\frac{T_{l,t} - T_{l,t-1}}{T_{l,t-1}} \approx \left(ln(S_{l,t}) - ln(S_{l,t-1})\right) + \left(ln(E_{l,t}) - ln(E_{l,t-1})\right) \tag{4}$$

In low-income countries, increased public education spending over the last 20 years has largely funded efforts to expand access to primary and secondary education rather than to increase the amount spent per student (Figure 8). In countries with complete data, we found that 66 percent of the total increase in spending at the primary level and 80 percent at the secondary level went towards expanding access (Table 4). This partly reflects the relatively low rates of access in these countries in the early 2000s. For example, between 1998 and 2001, the average net enrollment rate in primary school in low-income countries was 56 percent while the average rate in secondary schools was only 16 percent.

Figure 8: Primary and Secondary Spending Growth in Low-income Countries was Driven by Increases in Access

Decomposition of public education spending changes (%), 1998–2017



Source: World Bank calculations based on UIS and IMF data.

Note: Only countries for which there are data that span across at least four out of five periods (1998–2001, 2002–05, 2006–09, 2010–13, and 2014–17) between 1998 and 2017 are included in the figure. For each country, spending is from the earliest four-year period for which data are available to the latest four-year period for which data are available.

Recent Spending Increases Have Gone to Providing More Spending per Student in Middle-Income Countries

In middle-income countries where access to primary and secondary education started out much higher, increases in public education spending have tended to be used to boost the level of spending per student. Average enrollment rates in 1998–2001 in upper-middle-income countries were 92 percent for primary school and 62 percent for secondary school. This has meant that in upper-middle-income countries more than half of all the public spending increases in primary school and three-quarters of the public spending increases in secondary school was devoted to increasing the amount of funding spent on each student (Table 4). These increases in spending per student were often implemented as part of reform attempts by governments to improve the quality of education. As countries make the transition between spending for expansion and spending for quality, it is important to focus on the efficiency of public spending to ensure that increases in spending are used effectively to improve education outcomes.

Table 4: Public Education Spending Changes by Level and Income Groups, 1998–2017

	Low income	Lower-middle income	Upper-middle income	High income
Primary (total % change)	**148**	**89**	**83**	**62**
% devoted to access	66	30	38	26
% devoted to per student spending	34	70	62	74
Secondary (total % change)	**241**	**121**	**162**	**43**
% devoted to access	80	49	25	43
% devoted to per student spending	20	51	75	57
Tertiary (total % change)	**167**	**147**	**118**	**136**
% devoted to access	69	64	73	55
% devoted to per student spending	31	36	27	45

Source: World Bank calculations based on UIS and IMF data.

Note: Only countries for which there are data that span across at least four out of the five periods (1998–2001, 2002–05, 2006–09, 2010–13, and 2014–17) between 1998 and 2017 are included in the figure. The percentage devoted to access and percentage devoted to per student spending sum to 100 percent of the total percent change over five-year episodes for each level of education.

2.5 Summary

While the overall patterns and trends in public education spending vary widely across income groups and regions, we can draw some general conclusions from our analysis in this section.

- Global averages:
  - Average government education spending doubled in real terms between 1998 and 2017, but spending as a share of GDP increased only slightly.
  - The composition of public education spending remained relatively stable over the same period.
  - Economic growth has been the main source of financing increases in government education spending.
- Differences among regions:
  - Real government education spending has increased more than threefold in East Asia and the Pacific since 1999.
  - Government education spending as a share of GDP has declined in the Middle East and North Africa region.
  - Both Africa and Latin America and the Caribbean have seen rapid increases in terms of share of GDP going to government education spending.

- Differences among income groups:
    - Low-income countries had the largest increases in terms of share of GDP allocated to government education spending.
    - Countries in wealthier income groups devoted a greater share of their public education funding to tertiary education and less to primary education.
    - Low-income countries have tended to use increases in their government education budgets to expand access to education while middle-income countries have increasingly used their additional funding to spend more on each student.

3. How Have Governments Secured More Education Funding and Improved Outcomes?

The previous section focused on long-term trends in government spending on education. This section zooms in on specific country experiences on two fronts. First, we zoom in on changes in spending over a shorter time period. We use five-year periods, a time horizon that is more aligned with the average length of a political cycle and the medium-term planning cycles of ministries of finance. In looking at these episodes, we seek to provide guidance for countries based on the experience of other countries. In particular, we explore how countries have been able to mobilize resources for education over a five-year period, as well as the extent to which their initial conditions affected their pathway. Second, we explore how countries have translated these boosts in spending into changes in learning outcomes over the subsequent period, also exploring how this depends on initial conditions of the country.

In deciding whether to increase spending on education, policy makers should consider the potential impact of such a move on learning outcomes. Countries may have the resources to boost their education spending, but that does not necessarily mean they will translate bigger budgets into better learning outcomes. Experience varies widely among countries, and a range of factors besides funding can help determine success or failure. These factors include, for example, the quality of existing teachers, a country's governance structure, and the incentives associated with its financing of the education sector. However, even if the precise returns that a country will get are uncertain, one can estimate a range of possible outcomes based on the experience of other countries with similar levels of initial spending and education outcomes. This range of potential outcomes can serve as a helpful guide for policy makers as they seek to make decisions about education spending.

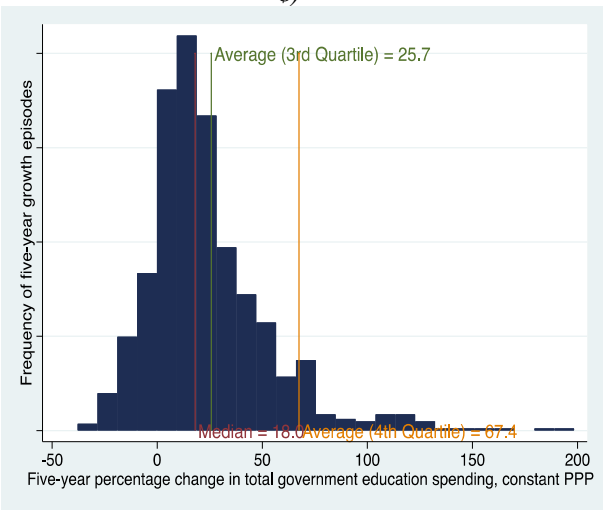
Even if a country should increase education spending from an efficiency standpoint – that is, if it expects big returns from its increased spending – the political process must be aligned to ensure that a boost to funding materializes. The previous section identified prioritization of education in budget allocations as a driver of increased education spending. But even if relevant departments such as the ministry of finance agree to an increase, spending more on education means spending less on other priorities if the overall budget remains unchanged. Governments need to be able to justify such a move, and data showing a potentially positive impact of funding increases on learning outcomes can provide evidence to support arguments of this kind. The proposed approach to benchmarking spending increases and changes in outcomes in five-year periods seeks to inform these decisions in practice. We present this approach in more detail in Section 4.

3.1 Historical Evidence on the Magnitude and Pace of Resource Mobilization for Education

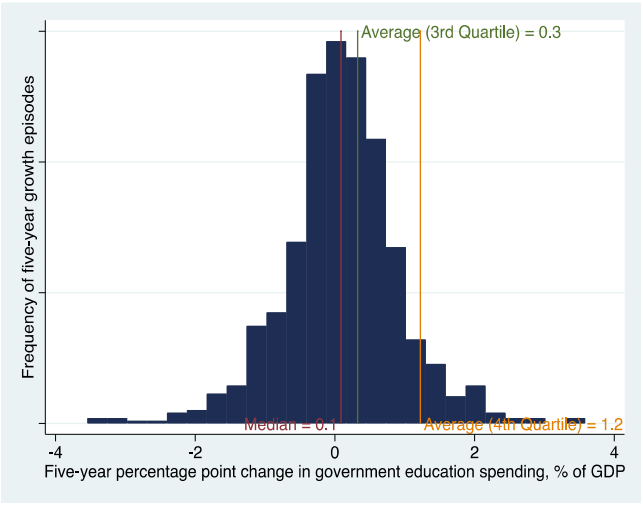
We examine public education spending growth at the country level for every five-year period between 1999 and 2015. There were 852 instances in the database where data were available on a country's total public education spending and its three underlying components (economic growth, aggregate public spending, and education prioritization) at both the beginning and the end of a five-year period.

Figure 9: Magnitude of Changes in Education Spending over Five-Year Periods

a. Distribution of five-year growth episodes for total education spending, 1999–2015 (constant 2015 PPP $)



b. Distribution of five-year growth episodes for spending as a % of GDP, 1999–2015



Source: World Bank calculations based on UIS and IMF data.

The overall distribution of these 852 five-year growth episodes shows that spending has grown in most cases (Figure 9). Consistent with our findings from Section 2, real public education spending increased in 83 percent of these five-year growth episodes. Over all five-year growth episodes, public education spending grew by a median of 18 percent, but there was wide variation between countries and time periods. The changes ranged from a 71 percent decline in spending in Malta between 2003 and 2008 to a 166 percent increase in spending in Afghanistan from 2006 to 2011. However, public education spending as a proportion of GDP changed only slightly, with the median five-year episode being associated with a 0.1 percentage point increase in public education spending as a percentage of GDP.

There was considerable variation in the characteristics of five-year changes in public education spending across and within income groups. The average increase in public education spending growth was much higher for the low-income group (39 percent) than the high-income group (13 percent) (Table 5).[10] Real public education spending for countries in the top growth quartile[11] grew by an average of 36 percent for high-income countries and 92 percent for low-income countries. Patterns among countries in the lowest growth quartile were less clear and ranged from an average decline of 4 percent for low-income countries to an average decline of 15 percent for the upper-middle-income group (Table 5).

[10] Annex Table A5 includes details on the second and third quartiles.
[11] Those country growth episodes in the 75th percentile in terms of the growth rate in real public education spending.

Table 5: Average Size and Decomposition of Five-Year Growth Episodes by Income Group, 1999–2015

	Real change in public education spending in five- year period	Decomposition into sources of five-year growth:		
		Economic growth	Total public spending as a share of GDP	Education prioritization – education spending as a share of the total government budget
	(1)	(2)	(3)	(4)
Low income	**39**	**27**	**5**	**6**
Slowest growth quartile	-4	25	-10	-19
Fastest growth quartile	92	34	15	44
Lower-middle income	**24**	**20**	**6**	**-2**
Slowest growth quartile	-6	12	-2	-16
Fastest growth quartile	57	26	23	8
Upper-middle income	**18**	**17**	**0**	**1**
Slowest growth quartile	-15	12	-12	-14
Fastest growth quartile	48	20	10	17
High income	**13**	**11**	**2**	**0**
Slowest growth quartile	-7	6	-5	-8
Fastest growth quartile	36	21	7	7
All low- and middle-income countries	**26**	**21**	**4**	**1**
Slowest growth quartile	-8	15	-8	-16
Fastest growth quartile	63	26	17	20

Source: World Bank calculations based on UIS and IMF data.
Note: Slowest and fastest growth quartiles refer to the 25th and 75th percentile growth rates within an income category. Column 1 shows the total percentage change in education spending. Columns 2 – 4 breakdown the overall change into its component parts (see Box 5). Column 1 is equal to the sum of columns 2 – 4 with small differences due to rounding errors. In Figure 9, we used actual percentage changes in spending, whereas in this table we use the results from the decomposition using logs, which explains the slight differences in some of the variables.

Countries in the top quartile of public education spending growth almost universally derived growth from all three sources:[12] they enjoyed fast-growing economies, their government spending accounted for a growing share of GDP, and they increasingly prioritized education over other components of their government budgets. In contrast, for countries in the slowest growth quartile, reductions in education spending were due to two main factors: a drop in aggregate public education spending as a percentage of GDP and a decrease in the percentage of the national budget allocated to education (Table 5). For example, low-income and middle-income countries in the fastest-growing quartile increased their public education spending by 26 percent due to GDP growth, 17 percent due to increased government spending, and 20 percent due to increased prioritization of education. In contrast, decreases in government spending as a share of GDP and in education spending as a share of total government spending contributed to an 8 and 16 percent decline, respectively, in spending among the slowest growth quartile.

[12] We use the same approach, outlined in Box 5, to decompose overall spending changes. In some five-year country growth episodes, there are discrepancies between calculations on the change in total government education spending and those on the change in its three components (GDP, government spending as a percentage of GDP, and education spending as a percentage of government spending). However, the overall magnitude of these discrepancies is small. Overall, the average log change in total government education spending is 20 percent over five years, while the average sum of the log changes in the three component variables is 21 percent over five years.

Initial conditions of a country are key to explaining differences in the magnitude of spending changes over a five-year period. When we examined initial levels of government spending as a percentage of GDP and the share of government spending devoted to education, we saw that those countries registering the fastest growth in public education spending were frequently those that started with more fiscal space, that is, a low share of the government budget spent on education and with a relatively small share of government spending in GDP. For example, in low-income countries, education accounted for only 13 percent of the government budget during the fastest episodes of growth compared with an average of 16 percent for all growth episodes.[13] In upper-middle-income countries, the fastest growth episodes occurred in countries with initial levels of total government spending accounting for 27 percent of GDP, compared to an average of 30 percent across all growth episodes. A simple regression analysis confirmed this negative relationship between initial government spending and changes in government spending (Table 6). Countries with higher initial levels of national income, higher rates of government spending as a percentage of GDP, and higher shares of education expenditures in the total budget had lower levels of public education spending growth during the five-year periods.

Table 6: Association Between Changes in Education Spending and Initial Country Conditions

Explanatory Variable	(1)	(2)
Initial GDP	-0.03***	-0.01***
	(0.005)	(0.005)
Initial Gov't Spend (% of GDP)	-0.11***	-0.06***
	(0.02)	(0.02)
Initial Educ. Spend (% of Gov't)	-0.17***	-0.24***
	(0.04)	(0.04)
Income Group Fixed Effects	No	Yes
Region Fixed Effects	No	Yes
N	852	852
R-squared	0.13	0.21

Source: World Bank calculations based on UIS and IMF data.
Notes: The table shows regression estimates of five-year change in total education spending in constant PPP-adjusted dollars (dependent variable) on initial country conditions. Standard errors in parentheses.
* p<0.10; ** p<0.05; *** p<0.01. All variables are logged.

3.2 Evidence on How Governments Have Translated Spending into Education Outcomes

In the previous section, we explored how countries have increased their spending and how this was influenced by their initial conditions. However, having the *ability* to mobilize resources for education is not enough to guarantee that those resources *should* be mobilized from an efficiency point of view or that they *will* be mobilized even if they should. So, the first question is: Should a country always aim for an ambitious increase in resources for its education sector? The answer is no. The desired level of public spending on education can depend on numerous factors, including the importance of competing demands on the public purse. However, a crucial consideration in determining whether a country should spend more on education, regardless of other demands, is the outcomes that can be realized from such an increase.

Defining Our Outcome of Interest: Learning-Adjusted Years of Schooling (LAYS)

The first step in answering these questions is to establish the outcomes and spending measures of interest. Should governments focus on increasing enrollments, improving learning, or both? Since we are interested in both access to education and learning, we used a measure that captures the levels of educational attainment and learning of the whole population (not just of those who are in school). We used the Human

[13] See Annex Table A6.

Capital Index (HCI) data set developed by the World Bank and its measure of Learning-Adjusted Years of Schooling (LAYS). The LAYS measure is made up of two components:

- Expected years of schooling. This measures the number of years of school a child born today can expect to obtain by age 18. It is based on age-specific enrollment rates between ages 4 and 17 and has a maximum value of 14.
- Harmonized measures of learning from global and regional learning assessments (Altinok, Angrist, and Patrinos 2018; Patrinos and Angrist 2018). Relative scores for learning are calculated for each country by dividing its harmonized score by 625, which corresponds to the "advanced" benchmark on the TIMSS and PIRLS learning assessments.

These two measures are multiplied together to arrive at the expected *learning-adjusted years of schooling* (LAYS) we use as our measure of education outcomes (Filmer et al. 2018; Kraay 2018). For example, if a country had 10 years of expected years of schooling and an average test score of 500 (80 percent of 625), then its LAYS would be 8 years.

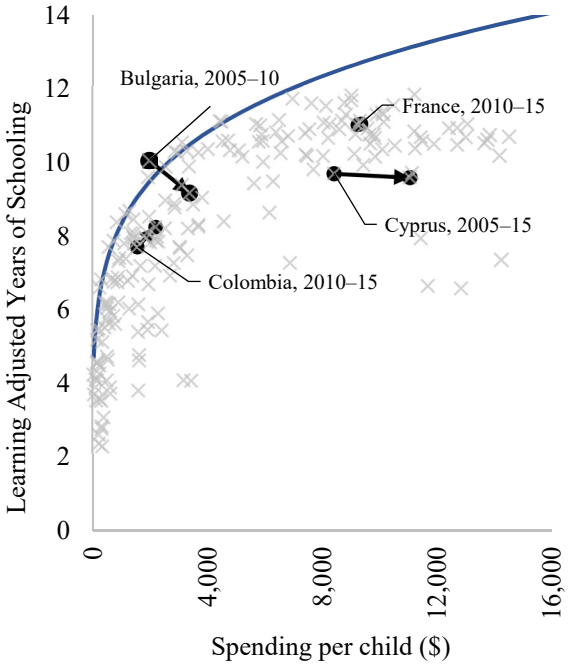
A crucial benefit of the LAYS measure is that it captures changes in both educational attainment and average learning outcomes. If a country maintains its average learning levels while increasing enrollment rates, our measure will increase since the average levels of learning of the population are now higher. If average learning levels increase because some children drop out of school and enrollments decrease as a result, the level of the LAYS will depend on the magnitude of those changes. Its limitations are mainly related to a lack of data in some countries.

We propose to measure spending as *total expenditure per child* calculated as total spending in primary and secondary education divided by the total number of school-aged children in the country. This captures how much a country is spending on the population that it needs to serve (not just the population that it is currently serving). Thus, if a country is spending a lot on its students, but enrollment rates are very low, the country would effectively be spending too little on the population that it should be serving. Because it measures total spending in U.S. dollars (constant PPP-adjusted dollars), this measure is strongly correlated with per capita GDP.

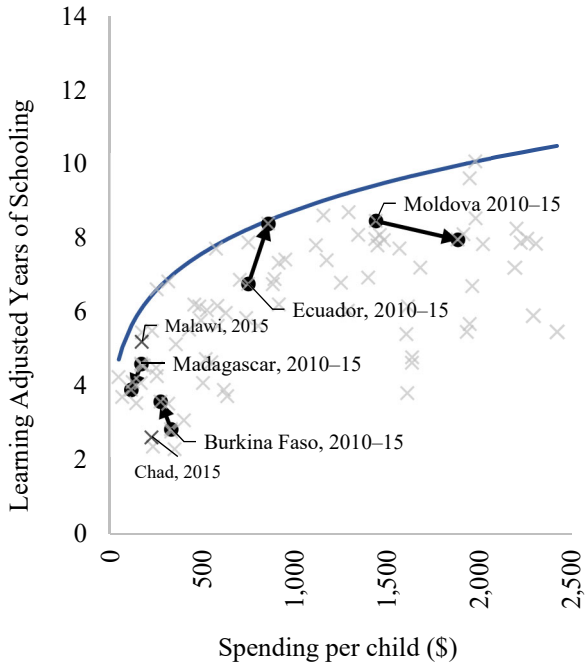
Figure 10: Association Between Spending and Enrollment-Adjusted Learning

Expenditure Per Child and Learning-Adjusted Years of Schooling (LAYS), 1991–2015

a. All countries (constant 2015 PPP dollars)



b. Countries spending less than $2,500 per child (constant 2015 PPP dollars)



Source: World Bank calculations based on HCI, UIS and IMF data.
Note: Calculations only incorporate countries with available data.

There is a clear relationship between our measures of spending and outcomes, which change with the level of spending. Figure 10 plots our measures of spending and outcomes averaged for each country within five-year periods (1991–1995, 1996–2000, 2001–05, 2006–10, and 2011–15) and includes a stochastic frontier curve that estimates the maximum learning-adjusted years of schooling that is expected for a given level of spending per child.[14] The frontier does not estimate the relationship between learning-adjusted years of schooling and spending per child, but the vertical distance from a particular country observation to the frontier provides a measure of how well the country is able to translate spending per child into education outcomes.[15] However, there are large differences among countries at similar levels of spending, with some countries getting significantly better outcomes for the same (or lower) levels of spending. For example, in the right-hand panel of Figure 10, Malawi and Chad spent a similar amount per child but in Malawi this translates into five learning-adjusted years of schooling, while in Chad, it translates into only 2.6 years.[16] These differences between a country's actual and potential outcomes are usually referred to as *efficiency*, and this can be measured in different ways, one of which is by comparing a country's position to the stochastic frontier line in Figure 10. We will come back to the discussion on efficiency in the next section.

[14] We use Stata's Frontier command to estimate the stochastic frontier and assume that the production frontier is linear in logs.
[15] We also conducted Ordinary Least Squares regressions of LAYS on public education spending per child and found a positive and statistically significant relationship, both with and without a control for gross domestic product per capita.
[16] In 2015, spending per child in Malawi was $176 and in Chad $229 (constant 2015 PPP dollars).

Mapping Pathways of Spending and Outcomes

The ranges of outcomes that a country is likely to achieve as a result of changes in spending can be mapped to the four pathways shown in Figure 10.[17] Each path is not equally desirable. Completely vertical moves would be desirable in countries with limited fiscal space as they would represent large improvements in outcomes resulting from small (or zero) changes in resources. Movement towards the upper left corner of the figure depicts examples of improvements in outcomes accompanied by decreases in spending, which may seem ideal from an efficiency point of view. However, as we saw in the previous section, reductions in real spending over a five-year period only happened in 17 percent of cases. In most cases, countries will move to the right on the spending axis (increases in resources), and in those cases, the steeper the line is, the better, as this shows a fast increase in outcomes. Completely lateral movements would represent increases in resources with no improvements in outcomes. The most undesirable scenarios are those where the movement in the figure is downward (regardless of resources), as these reflect deteriorating outcomes.

In Figure 10, it is the change in outcomes relative to the change in spending that reflects the direction of a given path. In this paper we use elasticities to quantify how countries translate additional spending into outcomes, measured by the change in learning-adjusted years of schooling associated with a 1 percent change in spending. We use changes in both measures over a five-year period (with changes in spending lagged by five years), which is enough time to observe any significant changes in outcomes:

$$\text{Spending elasticity of outcomes} = \frac{\%\ change\ in\ outcome}{\%\ change\ in\ spending}$$

While elasticities are a useful way to measure the relationship between changes in resources and outcomes, their interpretation is not straightforward. Changes in both resources and outcomes can have positive or negative signs, which makes the elasticity hard to interpret on its own. In addition, when the change in the denominator is very small (or zero), the resulting elasticity is extremely large (or infinite), which can bias average results if not interpreted carefully, especially with such small samples.

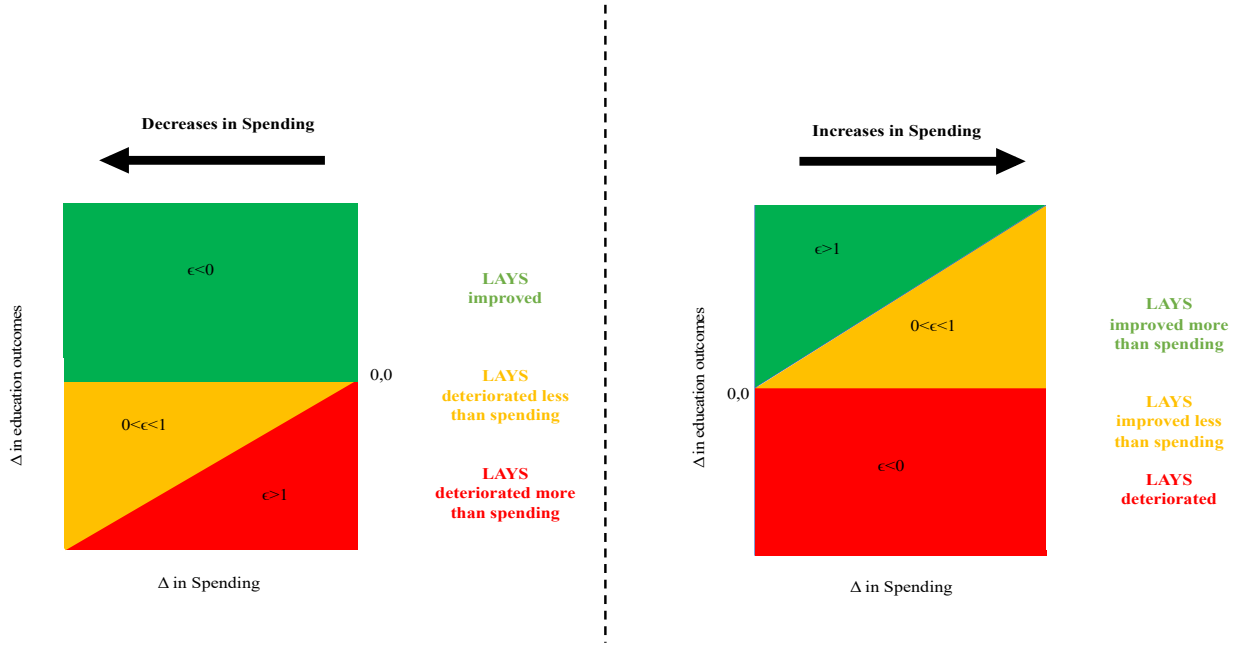
To facilitate the interpretation of elasticities, we separated the analysis of episodes with positive changes in spending from those with negative changes, which made the sign of the elasticity easier to interpret in each case. In addition, we focused on the *desirability* of different ranges of elasticities. The most desirable scenarios were those where outcomes improve more than spending increases (or outcomes improve and spending decreases). Less desirable scenarios are those where outcomes improve by less than resources increase (or outcomes deteriorate less than spending decreases). The least desirable scenarios are those where resources increase but outcomes deteriorate (or outcomes deteriorate by more than resources decrease).

The interpretation of elasticities is presented in Figure 11, using LAYS as the education outcome. The color coding corresponds to the desirability of the scenarios. Episodes of spending decreases are green if outcomes improved (resulting in an elasticity smaller than 0, as in the left-hand graph). They are yellow if outcomes deteriorated by less than spending decreased (elasticity between 0 and 1, as in the left-hand graph), and red if outcomes deteriorated even more than spending decreased (elasticity larger than 1, as in the left-hand graph). In episodes of spending increases, episodes are coded as green if outcomes improved by more than spending increased (elasticity larger than 1, in green in the right-hand graph). They are yellow if outcomes improved by less than spending increased (elasticity between 0 and 1 in the right-hand graph)

[17] We selected 5-year episodes to demonstrate the four different directions countries can take but pathways over longer periods of time for selected countries are described in Box 7. France is an example of a country where spending and LAYS declined over the five-year period selected.

and red if outcomes decreased (negative elasticity, in red in the right-hand graph). We next categorized all the changes across five-year episodes into the six categories depicted in Figure 11.

Figure 11: Elasticities Provide a Way of Summarizing the Effect of Spending Changes on Outcomes
Values of Spending Elasticities Depending on Direction of Spending Changes and Magnitude of Associated Outcome Changes



How Have Countries Managed to Translate Changes in Spending into Changes in Outcomes?

Looking at all the episodes in our data, we found that countries did not transform resources into outcomes very effectively. When we explored each country's changes in spending and outcomes from one five-year period to the next, we found that *green* scenarios represented only 18 percent of episodes (Figure 12). Most of these episodes also resulted from *reductions in spending* with very small changes in LAYS (10 percent) as opposed to large improvements in outcomes resulting from increases in spending. In episodes where resources increased–which was the case for most of the episodes in our data set–outcomes improved more than resources in only 7 percent of cases. Outcomes improved by less than resources in more than half of these episodes, and in roughly a third, learning outcomes actually deteriorated.

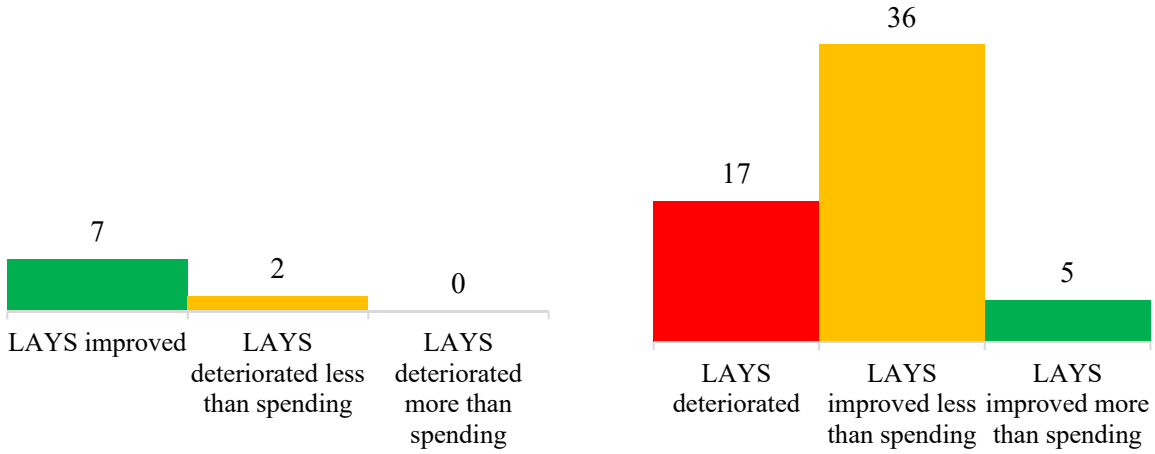
The low elasticities that we observed reflect the prevalence of less desirable scenarios. For episodes of spending increases, the average five-year elasticity of learning-adjusted years of schooling was **0.08**, meaning that, for every 10 percent increase in resources, outcomes improved by only 0.8 percent. [18] This is a very low elasticity but similar to those that have been found in the health sector (Gallet and Doucouliagos 2017). However, the elasticity at the 75th percentile of the distribution was **0.20**. The elasticity is also different when we break down the LAYS into its two component parts: expected years of schooling and harmonized test scores. A country could achieve the same improvement in LAYS either by improving

[18] We excluded outliers in this calculation so that they did not distort the averages. We included episodes with changes in resources smaller than 0.01 percent in Figure 2, but we did not use them in our calculations of average elasticities. We also replicated this analysis on only those country episodes where the PISA learning assessment was used, and the results were not significantly different.

expected years of schooling while test scores remain constant or vice versa, so it is useful to break down these overall elasticities to illuminate which component is most responsible for gains in LAYS due to increased spending. The elasticity of spending on expected years of schooling was higher (0.04) than the elasticity of increasing resources on improvements in harmonized learning outcomes (0.02). This shows that countries have found it somewhat easier to transform increases in resources into higher educational attainment rates than into better learning outcomes.

Figure 12: Outcomes Increased by a Greater Amount than Spending in Only 18 Percent of Cases

a. Country episodes with spending decreases *b. Country episodes with spending increases*



Source: World Bank calculations based on HCI, UIS, and IMF data.

How Do a Country's Initial Conditions Affect Its Ability to Transform Resources into Outcomes?

While intuition suggests that a country's initial conditions determine the most likely paths for education outcomes, their relationship is not straightforward. First, it depends on which outcome is in question. Transforming resources into wider access has proven to be easier to achieve than improving learning outcomes. Second, starting from a low spending point may result in larger or smaller changes in outcomes depending on how access and learning are determined. If inputs have decreasing returns (that is, the provision of additional inputs has a larger effect on outcomes when existing inputs are low), we would expect that low-spending countries would have larger expected returns. If, on the other hand, it takes a combination of various good-quality inputs to generate learning, and a single input has a very small impact, we would expect low-spending countries to have low returns. As countries spend more and cover more than the most basic needs, we would expect the marginal return to additional resources to decline. Third, the initial level of outcomes is also likely to drive future outcomes, but the effect is also ambiguous. While improving from a lower starting point may seem easier–suggesting that low-income countries should register larger gains in outcomes–existing inefficiencies in a country can also impact results and contribute to poor outcomes. Thus, pouring more resources into a system with inefficiencies may not yield any improvements in outcomes. We explore this question empirically later in this section.

Four approaches are commonly used in the literature to measure the distance between the current level of outcomes and the potential level a country may be able to achieve. This is usually referred to as *efficiency,* and it is a measure of the ability of countries to transform resources into improved education outcomes.[19] In the first approach, the residuals from an ordinary least squares (OLS) regression of education outcomes

[19] For a fuller discussion of the advantages and disadvantages of the approaches outlined, see Grigoli (2014), Ravallion (2005), and Wagstaff and Wang (2011).

on levels of public spending provide a simple measure of the difference between a country's actual and expected level of education outcomes at its current level of spending. Second, data envelopment analysis (DEA) estimates a non-parametric frontier that maps out the best possible education outcomes for a given level of spending.[20] A country's efficiency level is then measured by the vertical distance between its current position and the frontier. Third, in a similar way to data envelopment analysis, stochastic frontier analysis (SFA) estimates a frontier using a regression model but uses a specified functional form and assumptions about the distribution of the error term (see for example, Jayasuriya and Wodon 2003). The fourth and final approach, based on (Wagstaff and Wang 2011), aims to address a number of limitations inherent in the DEA and SFA efficiency measures while at the same time incorporating the best elements of each approach. It uses a grid search to identify the most efficient countries within specific ranges of spending. It measures a country's efficiency by the distance between its own outcomes and the closest "efficient" country in terms of spending.

These different measures of spending efficiency are all highly correlated and tend to rank countries in similar ways. In the main text of the paper, we used the efficiency measures derived from the stochastic frontier analysis approach as this is most highly correlated with other efficiency measures.[21] To check that these estimates are effectively measuring efficiency, we looked at their correlations with some common proxies for efficiency (see Annex Table A9). These generally confirm that the estimates are on the whole measuring efficiency appropriately.

Patterns and Trends of Spending Changes and Outcomes

We used each country's level of spending and efficiency scores to create four categories for countries based on where they were in the distribution of spending and efficiency.[22] The categories were: (i) high-spending, high efficiency, (ii) high spending, low efficiency, (iii) low spending, high efficiency, and (iv) low spending, low efficiency.[23] We then calculated elasticities for each category. The elasticities are presented in Table 7.

The elasticities varied significantly by country category. The elasticity of learning-adjusted years of schooling is highest for low-spending countries that are far from the efficiency frontier. Empirically, those are the countries that have experienced the fastest increases in learning-adjusted years of schooling in the past. As countries get closer to the efficiency frontier, their elasticity decreases, indicating that they tend to follow the frontier (that is, the maximum level of outcomes countries at the same level of expending have been able to achieve). For high-spending countries, the trends are similar. For those that started at a high efficiency point, increases in spending have been accompanied by small increases in learning-adjusted years of schooling, whereas high-spending countries that are far from the efficiency frontier have experienced higher elasticities of learning-adjusted years of schooling.

[20] In this paper, we used output-based measures of efficiency since the primary policy focus of most countries was on improving outcomes from existing levels of resources rather than looking at ways to reduce funding while maintaining existing levels of education outcomes.
[21] Results using the other efficiency measures are available from the authors on request.
[22] Median values are used to categorize countries.
[23] We define low (high) spending and low (high) efficiency as below (above) average spending and efficiency respectively.

Table 7: Median Elasticities by Initial Spending and Efficiency Levels

Country episodes with spending increases

	Low-Spending	High-Spending	Total
Learning-adjusted years of schooling			
High-efficiency	0.01	0.04	**0.02**
Low-efficiency	0.19	0.14	**0.15**
Total	**0.10**	**0.07**	**0.08**
Learning			
High-efficiency	0.01	-0.001	**0.0001**
Low-efficiency	0.05	0.04	**0.05**
Total	**0.04**	**0.001**	**0.02**
Expected years of schooling			
High-efficiency	0.02	0.04	**0.03**
Low-efficiency	0.07	0.09	**0.08**
Total	**0.04**	**0.05**	**0.04**

Source: World Bank calculations based on HCI, UIS, and IMF data.

The elasticities of learning outcomes and expected years of schooling also vary by category but follow similar trends. Low-efficiency countries have higher elasticities on both indicators, with elasticities declining as countries approach the frontier. For high-efficiency countries, the elasticities of both indicators are small, indicating that, in those countries, spending more resources on education has led to minimal improvement in outcomes. The differences in elasticities based on high or low spending are less pronounced for these two indicators than they are for LAYS.

This analysis suggests that while countries are on average not very effective in transforming resources into outcomes, they are more effective if they start from a low-spending and low-efficiency point. The average elasticity for LAYS is only 0.08, but for low-spending, low-efficiency countries, the average elasticity is 0.19 (Table 7). For those countries, increases in spending have historically resulted in significant improvements in outcomes. For example, with a median LAYS of 6.3 years and a median elasticity of 0.19, these low-spending, low-efficiency countries would need to increase spending by 159 percent to achieve the upper-middle-income country median of 8.2 years–a large but achievable spending increase. On the other hand, the median low-income or lower-middle-income country, which also has a median LAYS of 6.3 years but an elasticity of 0.10, would have to increase spending by more than 300 percent to achieve the same level of outcomes. Similarly, high-spending, high-efficiency countries have experienced small improvements, or in some cases even declines in outcomes, following increases in spending.

The results of this analysis could have important implications for policy. First, they imply that boosting public education spending in countries with low spending and poor outcomes is likely to yield significant improvements in outcomes, even if the country is inefficient. This would imply that such countries that have the fiscal space to increase their public education spending should do so as their outcomes are likely to improve. Second, as countries get closer to the efficiency frontier, it becomes increasingly difficult to transform resources into outcomes and thus these countries will tend to follow a flatter path in Figure 10. While this does not mean that such countries should not spend more on education, it does signal the need for policy makers to make greater efforts to increase efficiency if they want to improve outcomes significantly. Even if these countries have the ability to increase spending, any growth in resources should be accompanied by explicit efforts to increase the efficiency of education spending. Based on countries' previous experiences, these efforts are only likely to be effective if they fundamentally change the way that

education resources are spent and therefore push the efficiency frontier outward, rather than continuing with "business as usual." Third, countries that are at low-efficiency levels may also be able to increase the efficiency of their education spending, and in some cases this approach has allowed countries to achieve vertical movement, that is, improvements in education outcomes without increasing spending.

Because of our data limitations, these results need to be interpreted cautiously.[24] First, our sample is small. The episodes in our data set include only 67 country episodes that have complete educational-attainment, learning, and spending data in consecutive five-year periods. Second, those countries with complete data on the three indicators also tend to have better outcomes on average, so our analysis may be biased because we focused on relatively high-spending and high-performing countries. Thus, it will be important to expand this analysis to include more countries at the lower end of the spending and education outcomes distributions.

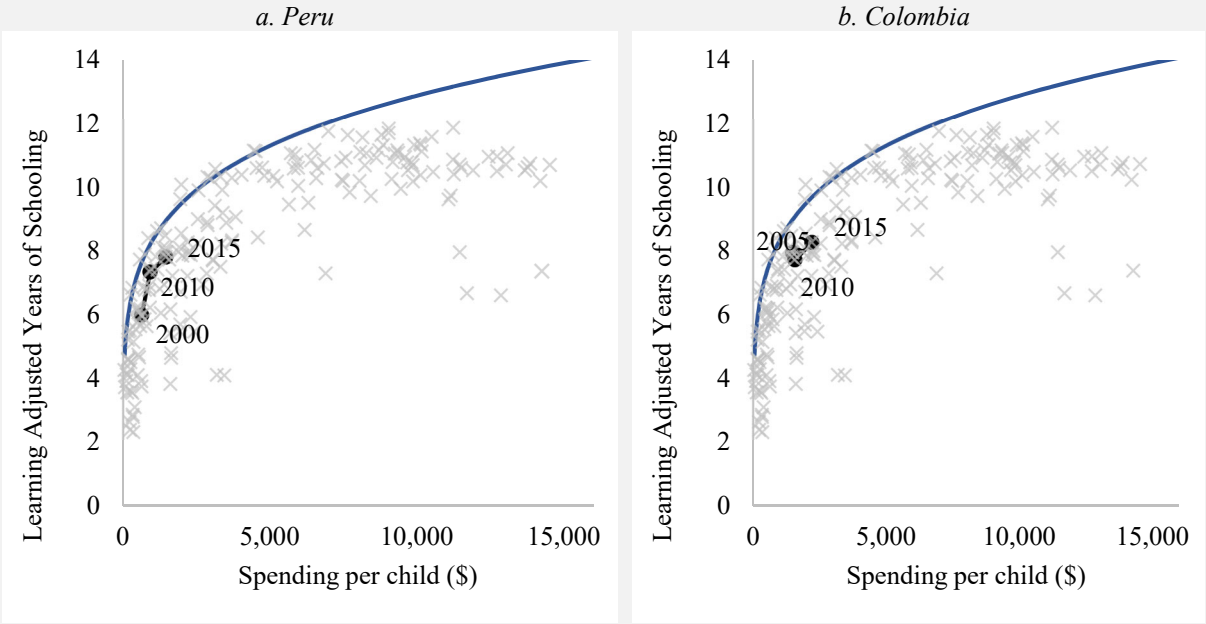
[24] We also carried out the same analysis on an alternative measure of education outcomes that enabled us to look at 130 country episodes. The measure multiplied a combined primary and secondary gross enrollment ratio by a country's harmonized learning score. The magnitude of the elasticities was similar, and the overall patterns described in the paper are not materially affected by using this alternative measure of education outcomes.

Box 7: Spending and Outcome Pathways for Countries with Different Spending, Efficiency Levels

Our analysis of elasticities and pathways can be illustrated by six country examples: two relatively low-spending countries with different levels of efficiency (Colombia being efficient and Peru inefficient), two high-spending countries with different levels of efficiency (France being efficient and Kuwait inefficient), and two countries that decreased their spending (Argentina and Burkina Faso).

As the figure below shows, Peru managed to move almost vertically between 2000 and 2010. Spending increased relatively little (from PPP$630 per child to PPP$916 per child), but outcomes improved significantly, moving Peru closer to the efficiency frontier. However, as Peru reached that frontier between 2010 and 2015, spending increased significantly but outcomes did not improve commensurately**.** For Colombia, the starting point was $1,250 per child in 2000, and the country was closer to the frontier than Peru. While outcomes did improve in Colombia, they did so at a slower pace than in Peru during the same period. In fact, Colombia seems to have followed the frontier trend line in its path over the past 15 years.

Low-Spending, Low-Efficiency Countries Can Improve Their Education Outcomes Significantly
Expenditure Per Child and Learning-Adjusted Years of Schooling (LAYS), 1991–2015 (constant 2015 PPP dollars)

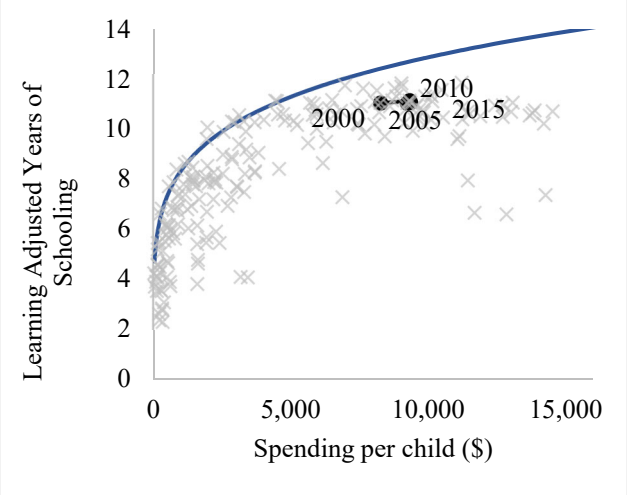


In the case of high-spending countries, the elasticities show that some countries, including France, have not experienced significant improvements in outcomes as a result of increasing their spending (see figure below). While France increased its per child spending from $8,300 to $9,200 between 2000 and 2015, its outcomes deteriorated. Meanwhile, Kuwait increased its per child spending from $12,000 to $14,000 which resulted in only a small improvement in outcomes, leaving Kuwait still far below the efficiency frontier.

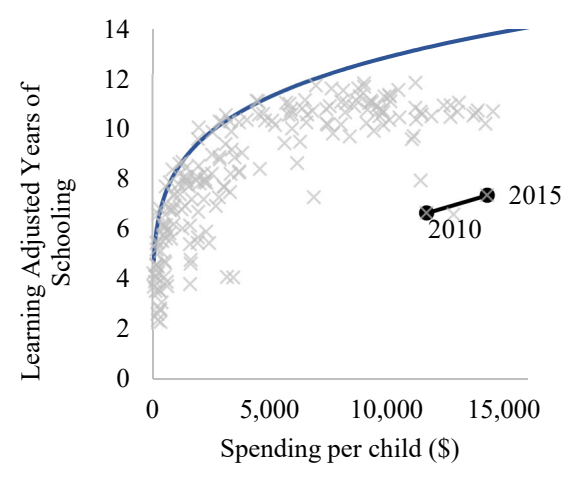
Increases in Spending for High-Spending Countries Has Limited Impacts on Education Outcomes

Expenditure Per Child and Learning-Adjusted Years of Schooling (LAYS), 1991–2015 (constant 2015 PPP dollars)

c. France



d. Kuwait

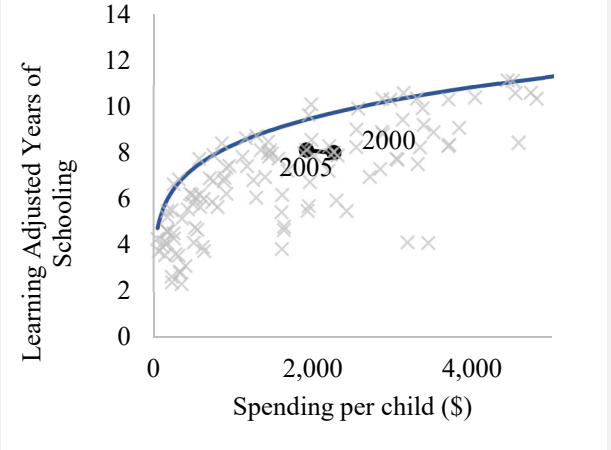


In the case of countries that decreased their public education spending, the elasticities show that some countries are able to increase education outcomes even while reducing spending, while others are able to maintain high levels of outcomes with lower spending. Argentina reduced its spending per child from $2,300 in 2000 to $1,900 in 2005, a decrease of 15 percent, while its outcomes increased slightly, by 1 percent. In contrast, Burkina Faso decreased its spending by 17 percent from 2010 to 2015, while its outcomes improved by 26 percent. In both cases, these countries increased their spending efficiency, although the impact on outcomes was very different.

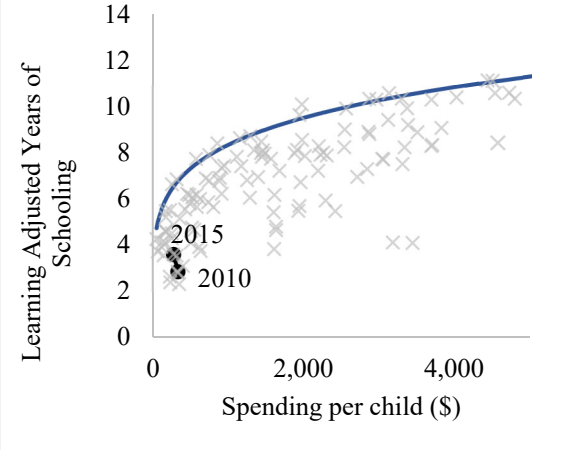
Decreases in Spending Have Varied Effects on Education Outcomes

Expenditure Per Child and Learning-Adjusted Years of Schooling (LAYS), 1991–2015 (constant 2015 PPP dollars)

e. Argentina



f. Burkina Faso



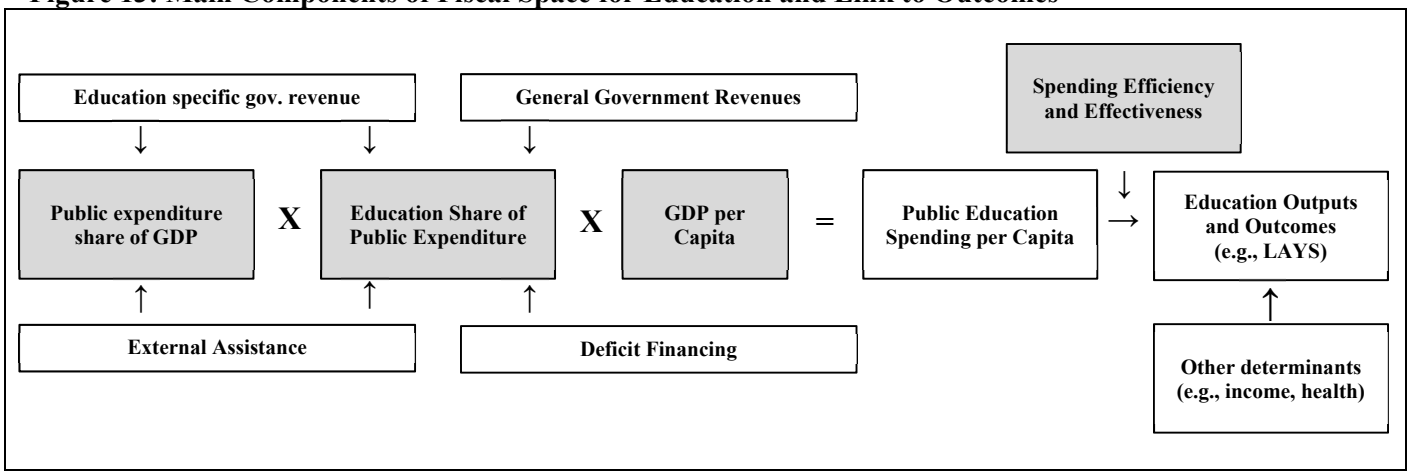
These six examples illustrate the possible pathways that countries can take in funding education. The figures also show the benchmarking that is possible with these elasticities. The benchmarking of resource mobilization can be mapped to the x-axis in the figures above, while the expected pathways for outcomes can be mapped to the y-axis. If data were available for all countries and all years, this would allow countries to compare where they stand in relation to other countries and to chart a pathway to achieve their desired goals in terms of spending and outcomes. This would enable policy makers to have much more informed discussions about what their countries can and cannot achieve given their starting points and would guide them in making policy decisions on education spending.

4. Benchmarking Changes in Spending and Outcomes: A Guide for Policy Making

Determining how much to spend on education is in part a political decision. While education experts and policy makers might always advocate for more resources to be spent on education, finance ministers must balance competing fiscal demands and priorities for the country. Roads, health, sanitation, and infrastructure all require resources, and countries with low educational outcomes generally suffer from deficits in many of these sectors. Thus, when governments are deciding whether to give more funding to education as opposed to other sectors, they need to consider both the country's capacity to mobilize these additional resources and the potential effect of such a move on learning outcomes. Whether the education sector ultimately gets the funding can also depend on the education minister's ability to lobby effectively for these resources, which in turn depends on his or her ability to commit to specific results from a spending increase.

The objective of this benchmarking exercise is to establish the basis for a tool that allows countries to guide these spending decisions. It seeks to help countries compare themselves to reasonable benchmarks of changes in spending and educational outcomes based on their initial conditions. In order to benchmark spending increases, this section uses a simplified fiscal space framework to guide these types of decisions and provide country-specific benchmarks for changes in spending and changes in outcomes. These references for potential increases in spending and outcomes are based on similar country episodes and are then used for (i) benchmarking education spending for a specific country, both in terms of level of, and potential to increase, resource mobilization; and (ii) benchmarking changes in outcomes associated with increases in resources based on the country's initial conditions. These benchmarking approaches are then used to assess the need and ability of specific countries to increase public financing for education in a financially sustainable, efficient, and equitable way (Figure 13).

Figure 13: Main Components of Fiscal Space for Education and Link to Outcomes



Source: World Bank adaptation of diagram in Tandon (2017).
Note: Shaded boxes highlight the key components of fiscal space used in the approach outlined in this section.

In practice, this approach is designed to provide information that can help policy makers answer a series of questions to guide their decisions on whether to mobilize additional public resources for education. These questions include:

- How does the level of spending per student in my country compare with spending in similar countries?
    - Is my country spending too much or too little?

    - Is my country's level of spending explained by:
        - Size of the economy or economic growth?
        - Size of government (share of government revenues in GDP)?
        - Prioritization of education in the government budget?
- How fast can my country mobilize additional resources:
    - If I follow the average country?
    - If I follow countries with the fastest spending growth?
- What are the policy levers that I can move to increase spending?
    - Is prioritization of education in the budget low, thus requiring only a change in priorities?
    - Does the increase in spending depend on the overall government budget and thus needs a fiscal reform?
- What is my country likely to achieve in terms of outcomes from this increase in spending:
    - If I compare myself to the countries with average returns?
    - If I compare myself to the countries with the highest returns?
    - If I compare myself to the countries with the lowest returns?

Jointly, all these questions guide the decision of how much education spending should increase. They also require accountability from the education sector by asking: What should I expect from this increase in resources?

The approach outlined in this section is not expected to provide a complete country-level education financing strategy. It uses broad public finance indicators to identify whether a country has the fiscal space to mobilize additional public resources for education. Ideally, the results from this exercise would serve as a starting point for a more detailed country-level assessment of whether and how additional funds should be diverted to the education sector. For example, the approach outlined will identify whether a country has the potential to increase public spending as a share of national income, based on a comparison with similar countries. However, a more detailed country assessment would be needed to determine whether increases in public spending are feasible and whether they could be financed through a growth in tax revenues, borrowing, or increased external assistance (see Figure 13).

The approach has some limitations due to the poor quality of existing spending data. If we had complete data on spending and outcomes for all countries, this approach would be able to provide much more realistic scenarios on the feasibility of adjusting resource levels and improving outcomes in all countries. As highlighted in Section 2, there is only limited information on private education spending and this can affect the conclusions that can be drawn. For example, trends in outcomes will be affected not only by changes in public spending but also by changes in private education spending. Excluding these changes in private spending has the potential to affect elasticities and the conclusions that can be drawn. Moreover, the quality and coverage of public education spending data also limited the number of countries that could be included in our analysis as well as the precision of the benchmarks that could be estimated. It is expected that as more and better data become available, the benchmarking approach outlined in this section can be further refined and improved. Despite these limitations, the analysis performed on existing data highlights how the proposed approach can help guide spending decisions on education.

Benchmarking Spending

It is not difficult for finance ministers to determine whether their country is spending too much or too little on education relative to comparable countries. The UNESCO Institute of Statistics has information for most countries about their total public education spending, the share of GDP or government budget spent on education, and their education spending per student. Choose comparable countries and the minister will have the answer. For countries to establish the path forward, on the other hand, is not so straightforward. If a country is spending below what comparable countries are spending, how fast can that country expect to increase its resources? What are the policy levers that need to be pulled to achieve that level of spending?

The experience of countries that have registered the fastest growth in resources, as well as those that have invested the most in education, can provide additional useful information for other countries assessing the fiscal space they have to mobilize further public resources for education. The former countries' experiences provide a benchmark for how much a country with similar conditions can expect to grow its resources and how quickly, while the latter countries' experiences provide a benchmark for what level of spending a country with similar conditions may expect to achieve. In this exercise, we use the 75th percentile of both the level of spending and the change in spending as benchmarks for high spending and fast growth.

For example, Table 8 shows that over the last 20 years, only a quarter of all low- and middle-income countries worldwide have devoted more than 19 percent of their overall government budgets to education, and it seems unlikely that most countries would be able to devote a larger share over the long term. A 19 percent share of education spending in the government budget may therefore provide a benchmark for what above-average, education-prioritizing countries have spent in the past, and against which other countries that wish to increase their prioritization of education could set their own efforts. Similarly, only a quarter of low- and middle-income countries have government budgets that account for more than 28 percent of gross domestic product, so governments that wish to increase their public spending might consider this as a benchmark to aim for.

Table 8: Spending Growth of High-Spending Countries

	Real education spending growth (%)	**Public education spending as a % of GDP**		**Share of education in total government budget**		**Share of total government budget as % of GDP**	
	75th percentile of five-year average growth	75th percentile	75th percentile of five-year percentage point growth	75th percentile	75th percentile of five-year percentage point growth	75th percentile	75th percentile of five-year percentage point growth
Low- and middle-income total	43	5.5	0.6	19	1.6	28	3.2
UMICS	32	5.3	0.6	19	1.4	30	3.0
LMICs	41	6.3	0.6	20	1.6	26	3.8
LICs	60	4.8	0.8	19	2.4	22	2.4

Source: World Bank calculations based on UIS and IMF data.
Note: The 75th percentile is defined separately for each indicator. The averages for the share of education and the total government budget are based on the country period averages for 2010–13 and 2014–17. LIC = low-income country, LMIC = lower-middle-income country, and UMIC = upper-middle-income country.

Table 8 also shows that the growth rate of public education spending for low-income and middle-income countries at the 75th percentile of the five-year growth episodes was 43 percent. The specific growth rates for the 75th percentile countries varied by income group, with the fastest rates recorded in low-income countries. These growth rates can provide one potential benchmark for countries to consider when developing targets for their resource-mobilization efforts.

While the 75th percentile's growth rate may provide a reasonable benchmark for an optimistic scenario for resource mobilization, just considering this one figure is not enough. Increases in public education spending typically occur as a result of a variety of factors, including faster economic growth, changes in the size of the public sector as part of GDP, and the priority policy makers give to education in the government budgets (see Figure 13).[25] Breaking down the sources that fuel episodes of growth into these component parts and identifying the countries with the largest contributions from each component can provide more specific information for policy makers to answer the question: How did fast spending growth countries mobilize additional resources for education?

However, a country's capacity to mobilize further resources also depends on its initial fiscal situation. Education often must compete against other sectors for scarce resources, and the overall share of education in government budgets cannot rise indefinitely. Similarly, the share of government spending as a percentage of GDP cannot rise without increasing tax revenues, external grant assistance, government borrowing, or a combination of these. How much resource mobilization can be achieved over a five-year period also depends on the rate at which additional resources can be raised and absorbed into the education sector. For countries that are starting significantly below the 75th percentile benchmarks above, it is unlikely that they would be able to achieve these benchmarks all at once. Table 8 shows the percentage point increases in the overall size of the government sector as a percentage of GDP and in the share of education in the government budget for 75th percentile countries over a five-year period. For example, low-income and middle-income countries that ranked in the 75th percentile in terms of prioritizing education increased education spending as a share of the government budget by 1.6 percentage points over a five-year period, and those ranking in the 75th percentile in terms of increasing government spending as a share of GDP saw an average 3.2 percentage points rise in education spending over a five-year period. These could serve as additional benchmarks for the progress that countries can expect to achieve in a single five-year period.

The combination of a country's initial fiscal situation, the levels of spending of high-spending countries, and the rate of improvement registered by fast-spending growth countries can provide a useful benchmark for a country gauging its potential for increasing public education spending. The first step for policy makers seeking to develop a realistic plan for future growth of public education spending is to compare their country's initial fiscal situation with those of high-spending countries. If the size of the government sector for their country and the share of their budget earmarked for education are smaller compared to those of the high-spending countries, then the country may have space to increase spending. The second step is to establish the magnitude of any possible increase by looking at how quickly fast-spending growth countries were able to expand their overall government spending as a share of GDP and the share going specifically to education. Besides setting such benchmark targets, countries will also need to consider their initial conditions, their own unique situation and priorities, as well as the experience of high-spending and fast-spending growth countries. Another option would be to set a less ambitious benchmark target by looking at the levels of spending and spending growth rates of the average country over all five-year growth episodes.[26] These two benchmarks can provide policy makers with a useful range to assess their country's prospects for mobilizing future resources. However, these are just one set of potential benchmarks. Policy

[25] We do not include economic growth in this section since our focus is on exploring the potential for governments to make fiscal adjustments to mobilize additional resources for education.
[26] Annex Table A7 includes the same information as in Table 8 for the median country.

makers could choose other country groupings (e.g., regional competitors or resource-rich countries) that may provide more appropriate benchmarks for future resource-mobilization efforts.

Benchmarking Expected Outcomes from Spending Changes

These spending benchmarks would provide the basis for how much a country could expect to mobilize in a reasonable period and what a reasonable target would be for its main policy options (the share of government expenditure over GDP and the share of the budget going to education). The next step is to establish whether the country should indeed increase its education funding and how quickly, by looking at the expected return from that investment in terms of outcomes. We use a similar approach as the one proposed above to benchmark the way countries translate an increase in resources into outcomes.

We propose using outcome elasticities of spending increases to benchmark these changes. In particular, we propose using ranges of elasticities of country-periods with comparable initial conditions to estimate the expected range of outcomes for specific countries. Given our current data limitations, we only attempt to use four categories of countries for comparison based on their level of spending and their efficiency: (i) high spending, high efficiency, (ii) high spending, low efficiency, (iii) low spending, high efficiency, and (iv) low spending, low efficiency. We do this to illustrate the differences in elasticities. With much more complete and accurate data, we could estimate elasticities for other subgroups much more precisely.

Having these ranges of potential outcomes based on real country examples would be helpful for both education and finance ministers in their budget deliberations. For education ministers of countries with high expected returns (that is, where initial conditions are those where countries in the past have experienced large improvements in outcomes after an increase in resources), this data could be a powerful tool in budget discussions, increasing the likelihood that these countries would increase education funding. In countries with low expected returns, the data could serve as a powerful accountability tool and help spearhead reforms to improve the efficiency of spending, especially in situations where the country is close to the efficiency frontier. In both cases, the resulting allocation of resources is likely to be more efficient than it is now.

Putting It All Together: An Example

To explain how the proposed approach might work in practice, we explore Sierra Leone's current spending on education to assess i) what may be possible in terms of mobilizing additional resources for education, and ii) what the government might expect from any increases in public spending on education.

Average public spending on education in Sierra Leone was only 1.6 percent of GDP in 2015 compared to a low-income country average of 4.3 percent. Sierra Leone's low education spending was a result of the relatively small percentage of government spending in the country's GDP as well as the low priority given to education in the government budget. Specifically, Sierra Leone devoted 13.8 percent of government spending to education while the low-income country median was 16.2 percent and countries at the 75th percentile in terms of the share of their budgets devoted to education was 18.7 percent (Table 9). Similarly, government spending in Sierra Leone was 11.8 percent of GDP, compared to a low-income country median of 15.6 percent and 21.9 percent for countries at the 75th percentile. This suggests that Sierra Leone has space to increase its education spending by expanding government revenue and making education a higher priority in the budget.

Table 9: Financing Parameters in Sierra Leone, 2014–17 Averages

	Share of total government spending as % of GDP	Share of education in total government spending
Sierra Leone	11.8	13.8
Median for LICs	**15.6**	**16.2**
75th percentile for LICs	**21.9**	**18.7**

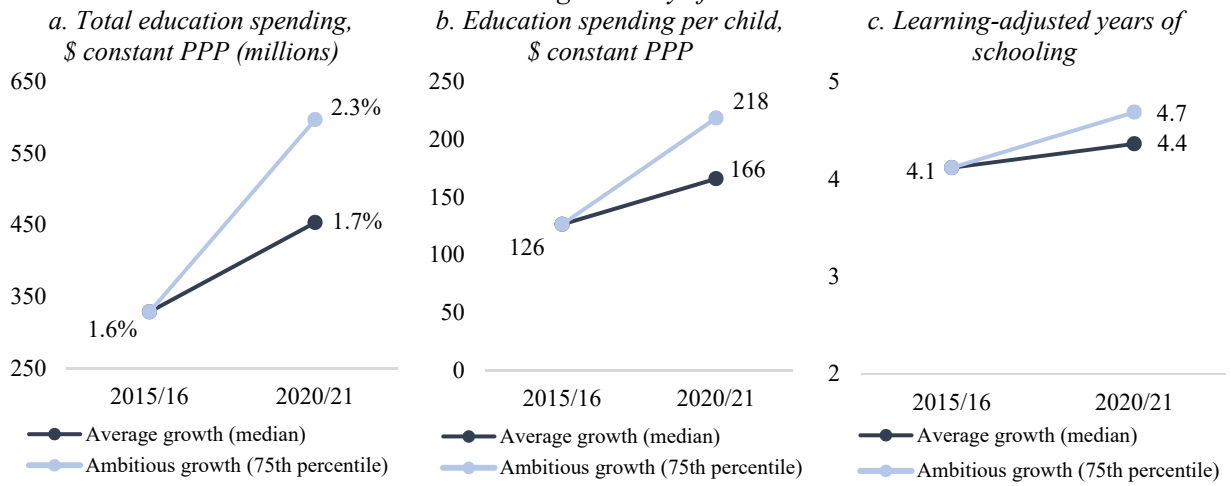
Source: World Bank calculations based on UIS and IMF data.
Note: LIC = low-income country.

How rapidly could Sierra Leone increase its public spending on education? The underlying drivers of public education spending growth can provide useful benchmarks. It is not realistic to expect Sierra Leone to reach the levels of the 75th percentile countries in five years. Table 8 shows that over a given five-year period, fast-spending-growth low-income countries expanded the overall size of their government sector as a share of GDP by 2.4 percentage points and increased education spending's share of the government budget by 2.4 percentage points. These figures show that these rates of growth are feasible within five years and suggest that Sierra Leone should be able to increase its public education spending from 1.6 to 2.3 percent of GDP over a five-year period. A less ambitious expansion path would be to try to emulate median countries rather than 75th percentile countries. In this case, Sierra Leone would aim for the average growth of spending in low-income countries by increasing its public education spending as a share of GDP from 1.6 to 1.7 percent over five years (Figure 14a). These two potential pathways provide a plausible range of targets within which Sierra Leone could increase its public education spending over the next five years.

Using school-age population projections, these possible spending paths translate into a range of per child funding of between $166 and $218 in 2020/21 compared to $126 per child in 2015/16 (Figure 14b). Are these spending increases worth pursuing for Sierra Leone? Based on the past record of low spending in inefficient countries (see Table 8, Share of total government budget as % of GDP), spending increases in this range have on average resulted in an increase of approximately one-third to two-thirds of one year of learning-adjusted years of schooling (Figure 14c). This is not to say that just by increasing spending these improvements in education outcomes are automatic, only that this is the average conversion of spending into resources for countries like Sierra Leone.

Figure 14: Sierra Leone Has Space to Expand Education Spending and Improve Outcomes

Potential Financing Pathways for Sierra Leone



Source: World Bank calculations based on HCI, UIS, and IMF data.
Note: The data labels in panel (a) show education spending as a percentage of GDP.

In the Sierra Leone example, we have used high-spending and fast-spending-growth low-income countries as benchmarks for gauging the scope for increasing public education spending over five years. However, other benchmarks may be more relevant for specific countries and for more detailed analysis. For example, Sierra Leone has recently come out of a protracted civil war, so benchmarks associated with similar post-conflict countries might be more appropriate in this case. The World Bank is currently developing a benchmarking tool that includes common comparison groups as well as the possibility for analysts to choose specific groups.

As countries run out of fiscal space or approach the efficiency frontier, the room for increasing funding for education will be limited. In the case of inadequate fiscal space, our benchmarking tool would show that a country's resources could not increase dramatically, and thus improvements in outcomes would need to come from efficiency gains while policy makers increase fiscal space through tax reform or other means. In this case, the tool may help make the case for broader tax reform, for example. Within the education sector, however, the tool would suggest the need for efficiency gains: getting better outcomes out of existing resources. Similarly, and regardless of fiscal space, for countries approaching the efficiency frontier and not expecting large gains in outcomes, the tool would also underscore the need to increase efficiency even if resources are increased.

5. Spending More and Spending Better

In this paper, we have shown that government spending on education has increased significantly around the world over the last 20 years, with low-income countries registering the highest rates of growth. Economic growth has been the key driver of these gains in most countries. Other factors that have played a smaller role include the expansion of government spending as a share of GDP and an increase in the share of government budgets being allocated to education spending.

Over a single five-year period, all countries with available data between 1998 and 2017 have boosted public spending on education by an average of 21 percent. Episodes of more rapid growth have been associated with rapid increases in the prioritization of education in the budget. These rapid-growth periods have also tended to occur in countries that share a similar set of initial conditions, including budgets that devoted a smaller percentage of funds to education and government budgets that took up a smaller percentage of GDP.

With this rapid growth in global public education spending–fueled in part by investments by low-spending countries– education systems around the world today are enjoying greater levels of funding than two decades earlier.

While countries have been relatively effective at mobilizing more resources for education, they have been less effective in transforming these funding increases into improved learning outcomes. Using the limited available data in this area, we found that the magnitude of improvements in education outcomes associated with increased public education spending has been relatively small. On average, a 10 percent increase in spending has led to a 0.8 percent improvement in education outcomes. Our findings suggest that the effectiveness of public education spending depends in part on a country's initial levels of efficiency and spending, and that countries starting from a low-spending and low-efficiency base have been able to improve outcomes significantly. This implies that efforts by these countries to catch up to other countries in terms of spending have resulted also in their catching up in terms of outcomes. In fact, our findings conclude that countries with fiscal flexibility, low spending, and poor outcomes are the best candidates for increasing education funding, *especially* if they start from a very inefficient point.

We also used our findings on the speed and effectiveness of resource mobilization efforts to benchmark the space that countries have to mobilize further public resources for education as well as the improvements in outcomes they can expect from these spending increases. In particular, we used a combination of current public education spending, the growth and level of the government budget as a percentage of GDP, and the priority that high-spending countries give to education spending in their budgets to suggest a range of realistic pathways for expanding the education budget in any given country. We also showed, by using elasticities, that it is possible to benchmark a feasible pathway for outcomes as a result of different levels of spending increases.

These pathways could prove useful for policy making in at least two ways. First, they help to answer the two key questions any finance minister would ask: (i) Do I have the space to grow spending on education? and (ii) What will I get out of this spending? By referring to these benchmarks, decision makers can get basic information about what other countries with conditions similar to their own country have experienced in terms of spending and outcomes, and what they can expect in their own country. Second, our findings on the role that efficiency plays in the elasticity of outcomes can help countries better understand whether and what types of education and financial management reforms they should undertake to accompany an education funding increase. Specifically, we find that countries already at a high level of efficiency must make further, significant improvements in efficiency if funding increases are to generate any noticeable improvements in outcomes.

Our general results and the analysis we performed on specific countries have shown that the benchmarking approach can be effective at the country level. However, existing data limitations currently make it difficult for this approach to be used in many countries. There is an urgent need for better quality and coverage of data on education spending and outcomes at the country level. Initiatives in the health sector show that it is possible to collect better data on both public and private spending in all countries. Drawing on the lessons learned from initiatives of this kind, countries should intensify their efforts to gather the data that policy makers need to make better-informed spending decisions and to more effectively monitor learning outcomes.

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Annex Tables

Table A1: Descriptive Statistics of Main Government Spending Variables

Year		Ed. Spend, (2015 $PPP, millions)	Ed. Spend, % GDP	Ed. Spend, % Govt.	Ed. Spend/ Student, Primary (2015 $PPP)	Ed. Spend/ Student, Secondary (2015 $PPP)	Ed. Spend/ Student, Tertiary (2017 $PPP)	GDP, PPP (2011 $PPP, millions)	Total Govt. Spend, % GDP
1999	Mean	20,256	4.6	15.0	3,030	4,360	8,342	325,702	25.4
	n	125	135	118	57	59	52	183	96
2000	Mean	20,231	4.4	14.7	2,778	4,265	8,060	334,180	25.0
	n	126	135	128	65	64	60	187	95
2001	Mean	22,300	4.7	15.3	3,104	4,725	7,937	340,328	24.9
	n	118	127	117	65	62	61	188	103
2002	Mean	21,724	4.6	15.1	3,400	4,688	6,967	347,799	25.0
	n	127	135	128	73	71	66	189	109
2003	Mean	23,958	4.7	15.4	3,604	5,223	7,873	360,914	24.7
	n	118	125	117	67	67	59	189	116
2004	Mean	24,492	4.4	14.7	3,432	4,778	6,583	380,360	24.2
	n	122	132	126	74	76	75	189	120
2005	Mean	28,474	4.5	15.0	3,471	5,082	7,332	398,307	24.6
	n	114	123	116	77	73	70	189	121
2006	Mean	29,757	4.5	15.0	3,852	5,225	7,371	419,545	24.6
	N n	113	123	116	67	70	71	189	124
2007	Mean	29,484	4.5	15.0	3,941	5,315	7,504	439,852	24.3
	n	111	121	114	74	76	72	190	124
2008	Mean	30,172	4.5	15.0	3,882	4,999	6,897	452,529	25.5
	n	127	134	128	90	86	82	190	132
2009	Mean	33,545	4.8	14.5	3,788	4,924	6,879	450,860	26.9
	n	122	131	127	92	85	93	190	135
2010	Mean	29,508	4.6	14.4	3,889	4,845	6,724	474,367	26.3
	n	133	140	136	99	94	100	190	142
2011	Mean	31,561	4.4	14.3	3,855	4,800	6,153	481,309	26.2
	n	130	135	131	106	102	100	195	142
2012	Mean	33,146	4.5	14.6	3,521	4,713	6,025	510,314	26.3
	n	127	130	128	96	96	103	190	139
2013	Mean	33,080	4.6	14.4	3,865	4,675	6,557	527,705	26.6
	n	131	136	132	101	100	101	190	131
2014	Mean	32,838	4.6	14.4	4,119	5,131	7,524	549,152	27.0
	n	126	131	129	93	95	92	189	128
2015	Mean	37,221	4.7	14.6	4,495	5,069	7,237	568,123	27.3
	n	119	125	121	83	89	86	188	119

Note: Ed. = Education; PPP = Purchasing Power Parity; GDP = Gross Domestic Product; Govt. = Government; Mean = Average Value; n = Number of Observations.
Source: UIS, IMF, and WDI online databases.

Table A2: Patterns and Trends in Government Spending as a Share of GDP, 1998–2017

	1998–2001	2002–05	2006–09	2010–13	2014–17
Income Groups					
LIC	13.3	13.3	15.7	18.2	19.5
LMIC	19.0	19.4	20.9	21.7	23.9
UMIC	22.1	23.2	25.6	25.6	26.3
HIC	31.0	30.9	30.9	31.8	31.7
Regions					
AFR	19.0	19.1	18.6	19.4	21.9
ECA	31.2	31.5	33.4	33.8	33.2
LCR	19.6	21.0	21.5	22.8	23.8
SAR	17.3	16.4	20.7	20.9	21.1
EAP	19.6	17.8	22.3	23.6	26.0
MNA	30.6	30.0	28.1	27.0	26.9

Source: World Bank calculations based on UIS and IMF data.
Note: Income groups are defined by countries' income group classifications as of 2017. LIC = low-income country, LMIC = lower-middle-income country, UMIC = upper-middle-income country, and HIC = high-income country. AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, SAR = South Asia, EAP = East Asia and the Pacific, and MNA = Middle East and North Africa.

Table A3: Public Education Spending Per Student (Constant 2015 PPP $), 1998–01 to 2014–17

	1998–2001			2002–05			2010–13			2014–17		
	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.
Income Groups												
LIC	136	418	6,611	187	391	3,874	162	307	3,105	207	339	2,010
LMIC	522	978	4,783	570	985	4,199	808	1,087	2,390	913	1,414	2,573
UMIC	1,232	1,876	4,837	1,668	1,899	4,810	1,973	2,540	3,786	2,510	3,183	4,060
HIC	5,319	7,160	11,887	6,231	8,237	10,711	8,401	9,452	12,155	8,205	9,134	13,217
Regions												
AFR	441	1,121	7,691	563	1,225	6,940	489	724	3,658	664	1,135	3,747
ECA	5,795	7,600	9,329	6,629	8,123	8,902	7,039	7,982	8,643	7,127	7,257	9,085
LCR	1,390	1,537	4,105	1,302	1,447	2,765	1,858	2,122	3,926	2,527	2,749	3,772
SAR	-	-	-	599	1,364	1,229	608	600	2,515	884	898	2,323
EAP	2,193	2,400	7,025	2,510	2,741	6,233	4,028	5,800	8,482	3,990	5,104	10,381
MNA	3,901	4,211	13,525	3,833	4,340	5,756	5,102	6,066	7,109	6,143	7,244	8,955

Source: World Bank calculations based on UIS and IMF data.
Note: Income groups are defined by countries' income group classifications as of 2017. LIC = low-income country, LMIC = lower-middle-income country, UMIC = upper-middle-income country, and HIC = high-income country. AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, SAR = South Asia, EAP = East Asia and the Pacific, and MNA = Middle East and North Africa.

Table A4: Public Education Spending Per Child (Constant 2015 PPP $), 1998–01 to 2014–17

	1998–2001			2002–05			2010–13			2014–17		
	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.	Pri.	Sec.	Tert.
Income Groups												
LIC	109	74	96	148	85	125	153	120	145	188	140	165
LMIC	611	440	483	628	635	635	793	770	786	894	1,118	908
UMIC	1,226	1,312	1,308	1,656	1,442	1,424	1,971	2,323	2,246	2,488	3,021	2,582
HIC	5,276	6,821	5,954	6,198	8,037	7,103	8,305	9,202	8,851	8,130	8,992	8,887
Regions												
AFR	413	557	528	514	701	669	472	461	466	647	849	811

ECA	5,682	7,421	6,676	6,461	7,976	7,107	6,984	7,646	7,841	7,079	7,206	7,469
LCR	1,390	1,202	1,251	1,295	1,241	1,230	1,825	1,912	1,796	2,460	2,550	2,549
SAR	-	-	-	589	864	858	604	408	409	874	682	683
EAP	2,225	2,071	2,285	2,353	1,988	1,796	3,787	5,493	3,939	3,942	4,891	5,280
MNA	3,741	3,278	3,010	3,790	3,879	3,965	5,015	5,556	6,144	6,111	6,713	7,334

Source: World Bank calculations based on UIS and IMF data.
Note: Income groups are defined by countries' income group classifications as of 2017. LIC = low-income country, LMIC = lower-middle-income country, UMIC = upper-middle-income country, and HIC = high-income country. AFR = Africa, ECA = Europe and Central Asia, LCR = Latin America and Caribbean, SAR = South Asia, EAP = East Asia and the Pacific, and MNA = Middle East and North Africa.

Table A5: Five-Year Episodes of Public Education Spending Growth by Income Group, 1999–2017

	Total five-year spending growth	Decomposition into sources of five-year growth:		
		Economic growth	Aggregate public spending (govt. exp. as % of GDP)	Education prioritization (govt. ed. exp. as % of govt. exp.)
Low income	**39**	**27**	**5**	**6**
Lowest growth quartile	-4	25	-10	-19
2nd quartile	20	21	5	-7
3rd quartile	46	29	11	7
Highest growth quartile	92	34	15	44
Lower middle income	**24**	**20**	**6**	**-2**
Lowest growth quartile	-6	12	-2	-16
2nd quartile	15	20	0	-6
3rd quartile	31	23	4	4
Highest growth quartile	57	26	23	8
Upper middle income	**18**	**17**	**0**	**1**
Lowest growth quartile	-15	12	-12	-14
2nd quartile	14	15	1	-2
3rd quartile	25	19	2	4
Highest growth quartile	48	20	10	17
High income	**13**	**11**	**2**	**0**
Lowest growth quartile	-7	6	-5	-8
2nd quartile	7	8	1	-2
3rd quartile	15	9	4	2
Highest growth quartile	36	21	7	7
All low- and middle-income countries	**26**	**21**	**4**	**1**
Lowest growth quartile	-8	15	-8	-16
2nd quartile	16	19	2	-5
3rd quartile	33	23	5	4
Highest growth quartile	63	26	17	20

Source: World Bank calculations based on UIS and IMF data.

Table A6: Initial Country Conditions by Quartile of Five-Year Public Education Spending Growth

	Total five-year spending growth	Initial conditions (values at start of five-year period)	
		Aggregate public spending (govt. exp. as % of GDP)	Education prioritization (govt. ed. exp. as % of govt. exp.)
Low income	**39**	**18**	**16**
Lowest growth quartile	-4	20	18
2nd quartile	20	16	17
3rd quartile	46	17	15
Highest growth quartile	92	20	13
Lower middle income	**24**	**24**	**16**
Lowest growth quartile	-6	27	16
2nd quartile	15	23	17
3rd quartile	31	24	16
Highest growth quartile	57	22	14
Upper middle income	**18**	**30**	**13**
Lowest growth quartile	-15	36	14
2nd quartile	14	29	13
3rd quartile	25	29	13
Highest growth quartile	48	27	13
High income	**13**	**33**	**13**
Lowest growth quartile	-7	36	13
2nd quartile	7	35	13
3rd quartile	15	32	13
Highest growth quartile	36	30	13
All low- and middle-income countries	**26**	**25**	**15**
Lowest growth quartile	-8	28	16
2nd quartile	16	23	16
3rd quartile	33	24	15
Highest growth quartile	63	23	13

Source: World Bank calculations based on UIS and IMF data.

Table A7: Public Education Spending Growth of Median Countries

	Real education spending growth (%)	Public education spending as a % of GDP		Share of education in total government budget		Share of total government budget as % of GDP	
	50th percentile of five-year percent growth	50th percentile	50th percentile of five-year percentage point growth	50th percentile	50th percentile of five-year percentage point growth	50th percentile	50th percentile of five-year percentage point growth
Low- and middle-income total	22.2	4.3	0.1	14.6	0.04	22.3	0.9
UMICS	19.8	4.5	0.1	12.8	0.3	27.8	0.4
LMICs	22.1	4.5	0.1	14.9	-0.3	23.0	1.2
LICs	29.7	3.7	0.2	16.2	0.1	15.6	0.8

Source: World Bank calculations based on UIS and IMF data.

Note: The median is defined separately for each indicator. The averages for the share of education and the total government budget are based on the country period averages for 2010–13 and 2014–17.

Table A8: Rank Correlation Coefficients between Efficiency Measures

	OLS	DEA	SFA	W&W
1. Outcome: expected years of schooling Spending: public education spending per child				
OLS	1			
DEA	0.781***	1		
SFA	0.815***	0.916***	1	
W&W	0.773***	0.965***	0.890***	1
2. Outcome: harmonized test scores Spending: public education spending per student				
OLS	1			
DEA	0.774***	1		
SFA	0.853***	0.919***	1	
W&W	0.742***	0.915***	0.825***	1
3. Outcome: learning-adjusted years of schooling Spending: public education spending per student				
OLS	1			
DEA	0.744***	1		
SFA	0.817***	0.917***	1	
W&W	0.769***	0.924***	0.842***	1

Note: OLS = Ordinary Least Squares; DEA = Data Envelopment Analysis; SFA = Stochastic Frontier Analysis; W&W = Wagstaff and Wang (2011).
* p<0.05, ** p<0.01, ***, p<0.001.

Table A9: Correlation Coefficients between SFA Efficiency Measure and Proxies of Education Spending Efficiency

	Efficiency measure based on:		
	Expected years of schooling per student	**Learning per student**	**Learning-adjusted years of schooling per student**
Student-teacher ratio (primary)	0.646***	0.114	0.515***
Student-teacher ratio (secondary)	0.492***	0.263***	0.414***
Population density	-0.020	-0.128*	-0.108

Notes: A positive correlation coefficient shows that efficiency increases as the values of the proxy variable rise. SFA = Stochastic Frontier Analysis.
* p<0.05, ** p<0.01, *** p<0.001