the Education Commission

Background Paper
The Learning Generation

Financing Education
Domestic Resource Mobilization
and Allocation

Shakira Mustapha and Philipp Krause
Overseas Development Institute

Financing education: domestic resource mobilization and allocation

Shakira Mustapha*

Philipp Krause**

* Research Officer, Overseas Development Institute

** Team Leader, Public Finance, Overseas Development Institute

Table of Contents

Executive Summary

Despite considerable efforts by governments, civil society and the international community, the world is still far from its goal of providing a quality education for all. This is partly due to challenges in mobilizing the necessary financial resources and ensuring their effective use. The aim of this paper is to identify opportunities for improving the allocation of spending towards priority sectors like education by examining spending patterns and allocation mechanisms.

First, it identifies key patterns and trends of public education spending by income, by region and by level of education since the mid/late 1990s.

Second, it uses correlation analysis and multivariate regressions to explore the drivers and correlates of government expenditure on education.

Third, it assesses mechanisms that could potentially enable governments to alter the composition of their expenditure in favour of education (and other priority sectors generally). These mechanisms include:

- Medium-term expenditure framework
- Performance budgeting
- Fiscal decentralization
- Hypothecation/earmarking

Our analysis of available estimates of government expenditure on education identify the following trends:

- Although education is increasingly a priority in many national budgets across income classifications and regions, the vast majority of countries fall short of spending the recommended 15-20% of their total public expenditure on education.
- Sub-Saharan Africa is where countries have allocated the largest median share of government expenditure to education (17.2%), followed by East Asia and the Pacific (15.8%) and Latin America and the Caribbean (15.7%)
- Relative to other income groups, LICs and LMICs have increased their spending on education the most between 2000 and 2013.
- As a country's level of income increases, the primary level of education appears to decrease in priority while the higher levels of secondary and tertiary education increase in priority.
- Although most countries have increased the share of total public expenditure on education allocated to the pre-primary level, the share remains small, especially for LICs and countries in Sub-Saharan Africa.
- Despite declining since the early 2000s, especially in Sub-Saharan Africa and Latin America and the Caribbean, the primary level of education still constitutes the largest share of the education sector's budget in Sub-Saharan Africa, while being roughly on par with the secondary level of education in Latin America and the Caribbean.

Without making claims for causality, our cross-section regressions only find a strong positive association between government spending on education and tax revenues. On the other hand, there is a lack of a statistically significant relationship with GDP per capita, transparency, primary enrolment

rates and population age structure. However, tax appears to have little relationship with the share of expenditure allocated to the different levels of education with demographic factors playing the more pivotal role instead. Our final set of models confirms that there is a positive association between education expenditure and various sources of government revenues. Nonetheless, we find no evidence that the greater use of direct taxes is associated with higher levels of public education spending.

Given that many of the countries furthest from the Education for All (EFA) goals do not devote sufficient revenue to education, we explore mechanisms that governments can use in principle to allocate more resources towards education. Three of these mechanisms are common public financial management reforms that have been used in various countries with the aim of overcoming incremental budgeting and improving allocative efficiency. They are, medium-term budgeting, performance budgeting, and fiscal decentralization. The reality, however, is that these reforms often impose additional work on capacity-constrained finance ministries without producing the desired change in budgetary outcomes. Hypothecation is the fourth mechanism, and is often criticised for introducing budgetary rigidity and inefficiency.

Therefore, in designing reforms to improve the allocation of government expenditure to priority sectors such as education, we recommend the following:

i.   Get the basics right first: operate a reliable budget for inputs, provide relevant information on available resources, and establish a timely and inclusive budget preparation process.
ii.   Take small steps and start simple, avoiding overly complex reforms that are not appropriate given the space and capacity for reform.
iii. Adopt a long-term time horizon and do proper planning since budgeting reforms are likely to take many years to implement in full.
iv.   Use political gambits such as earmarking within reason and with proper safeguards.
v.   Invest in improving the transparency and accountability for the use of public funds
vi.   Balance allocative efficiency with fiscal discipline to ensure that reforms that seek to improve the allocation of resources amongst competing priorities do not undermine other objectives.
vii. Develop a deeper understanding of political calculations and motivation surrounding budget allocation process, and identify opportunities for building coalitions of support.

1. Introduction

Public expenditure is a powerful instrument for governments to use in achieving their development goals. Understanding the linkages between the composition of public expenditure and the broader economic, political and social context can help governments to better allocate their resources in a manner consistent with their policy objectives and citizens' needs and priorities. This is especially critical since the government's spending decisions tend to be incremental and as such major shifts in the composition of spending are rare. A potential disconnect may therefore exist between the global framework for financing development which places great emphasis on mobilizing and allocating domestic resources to finance the Sustainable Development Goals, and how government budgetary decisions are made in the real world. This paper seeks to start bridging this gap by providing insight into trends in public education spending as well as the drivers and correlates of these trends.

The structure of the paper is as follows. Section 2 reviews historical trends of government education expenditure by income, by region and by level of education. Section 3 employs a combination of correlation and multivariate techniques to assess theoretical determinants of government expenditure on education. Section 4 discusses mechanisms that can allow governments to allocate more funds towards priority sectors such as education. This final section summarizes the findings of previous sections and concludes with some practical recommendations regarding how education financing can be increased through reforming the government's own budgeting system.

2. Trends in public spending on education

Given that government plays a major role in providing educational services, it is important to analyse public investment in education. One of the critical questions to ask when analysing the financing of education is how much resources are available for educational development. The most common indicators for addressing this question are public education expenditure as a percentage of gross domestic product (GDP) and as a percentage of total government expenditure (TGE). This section explores trends in these two indicators by income classification[1] and region between 1995 and 2013 (subject to data availability). Finally, it looks at the distribution of these resources by level of education (pre-primary, primary, secondary, and tertiary) across income groups and regions.

2.1 Education expenditure relative to the size of the economy

Government spending on education has increased among LICs, LMICs and UMICs since 1995. Figure 1 shows that although government spending on education in LICs fell below the average of the other income groups, it has generally been increasing from 1998 onwards, from a low of 3% in 1998 to a high of 4.2% in 2012. In contrast, there has been a noticeable decline in government spending on education among HICs, UMICs and LMICs from 2009 onwards. This can partly be explained by the onset of the global financial crisis in 2008/09 and the subsequent austerity measures adopted in these countries.

Figure 1: Public expenditure on education (% of GDP), 1995-2012
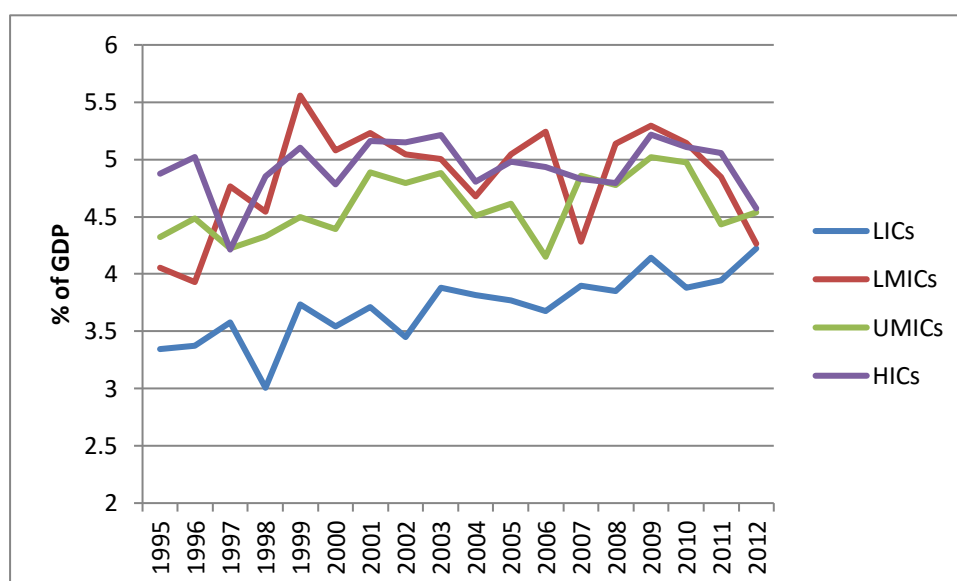
Source: WDI, 2016
Note: Country income classification is based on income classification for corresponding year. Figure A.1 in Annex 1 shows graph when 2015 country income classification is used for all years.

A similar story emerges when we restrict the analysis to 122 countries with available data between 2000 and 2013, and use the 2015 income classification for all years (as shown in Figure 2 below and Figure A.1 in Annex 1). In particular, although the average public education spending of 18 LICs relative the size of the economy was less than the average of other income groups, the LIC category has

---

[1] World Bank income classifications were used for the corresponding calendar year.

experienced the largest increase between 2000[2] and 2013[3] (from 3.2% to 3.9% of GDP in Figure 2). LMICs also experienced an increase of similar magnitude- from 4% in 2000 to 4.6% in 2013.

Progress in prioritizing education is nevertheless mixed. Globally, the median share of GDP devoted to education was equivalent to 4.6% in 2013. The median share was 4% for LICs; 4.5% for LMICs, 4.8% for UMICs and 4.9% for HICs. Of the 122 countries with data, 78 spent 4% or more of GDP on education (including 9 low income and 15 lower middle income countries) and of these 78 countries, 23 spent 6% or more on education. Furthermore, 83 of the 122 countries with data in 2000 and 2013 increased their commitment to education – 34 by one percentage point or more of GDP between 2000 and 2013 (of which 7 were low income and 11 lower middle income) – though 13 reduced education spending by the same increment (of which 1 was low income and 3 were lower middle income countries).

Figure 2: Comparing public expenditure on education (% of GDP) in 2000 and 2013 based on 2015 income classification
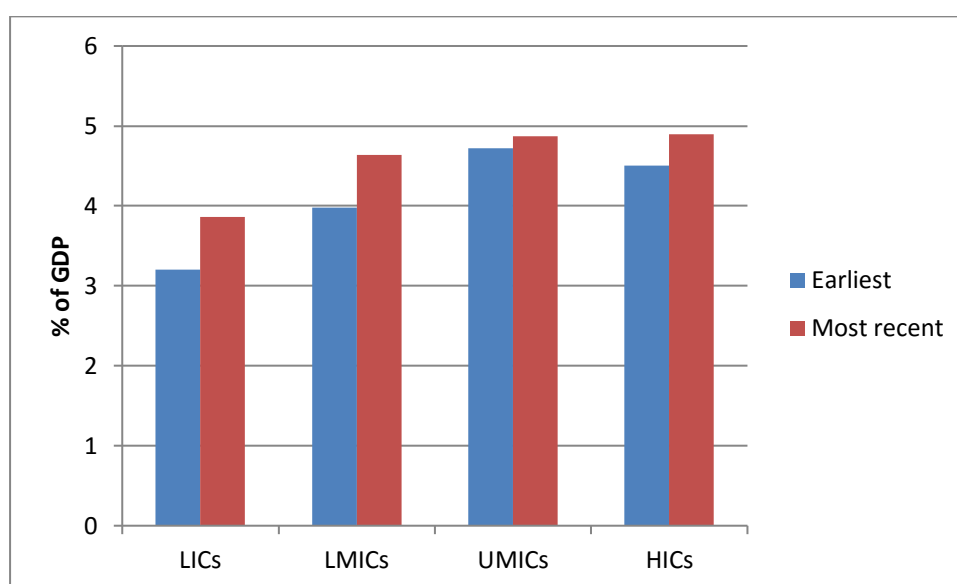
Source: WDI, 2016

In addition, there are significant differences within income groups, with several outliers among LICs and LMICs. Lesotho is one of the low income countries that lie consistently and significantly above the LIC average, spending 10-16% of GDP between 1997 and 2004 when it was a LIC. Following its transition to lower middle income status in 2005, Lesotho's spending on education increased by almost two percentage points to reach 15% of GDP. More recent estimates suggest that spending has fallen, but remains high even among LMICs at 11% of GDP in 2012 (IFPRI, 2015). The prioritisation of education for developing a 'functionally literate society' is made very clear in its Education Sector Strategic Plan (2005 – 2015) (ESSP), which was based on a Medium Term Expenditure Framework (MTEF) in 2005. As shown in Figure 3, other low income and middle countries outliers throughout the period include Botswana, Ghana, Togo and Vanuatu.

---

[2] Data refers to the earliest year between 2000 and 2003.
[3] Most recent figures are latest available from 2010 to 2013.

Figure 3: Outliers among LICs and MICs between 1995 and 2013
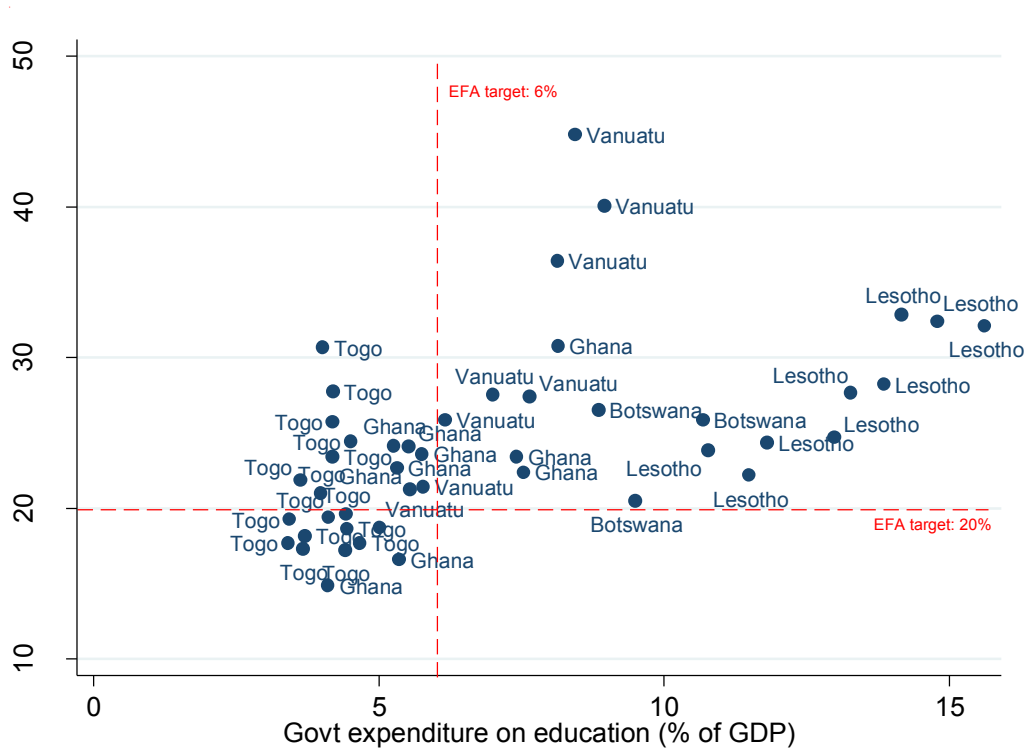
Source: WDI, 2016
Note: Observations are between 1995 and 2013

The available data further shows that education spending as a share of GDP has increased for most regions between 2000 and 2013, ranging from as high as 5.2% of GDP in 2013 in Latin America and Caribbean to as low as 3.9% in South Asia (Figure 4 below). The three regions which experienced the most noticeable increase between 2000 and 2013 were Sub-Saharan Africa (0.7 percentage points), Latin America and the Caribbean (0.6 percentage points), and Europe and Central Asia (0.5 percentage points). In contrast, the average for the Middle East and North African declined by 0.6 percentage points between 2000 and 2013. This decline is due to the fall in education spending in Djibouti (from 9.7% in 2000 to 4.5% of GDP in 2013).

Figure 4: Public expenditure on education (% of GDP) has increased for most regions between 2000 and 2013
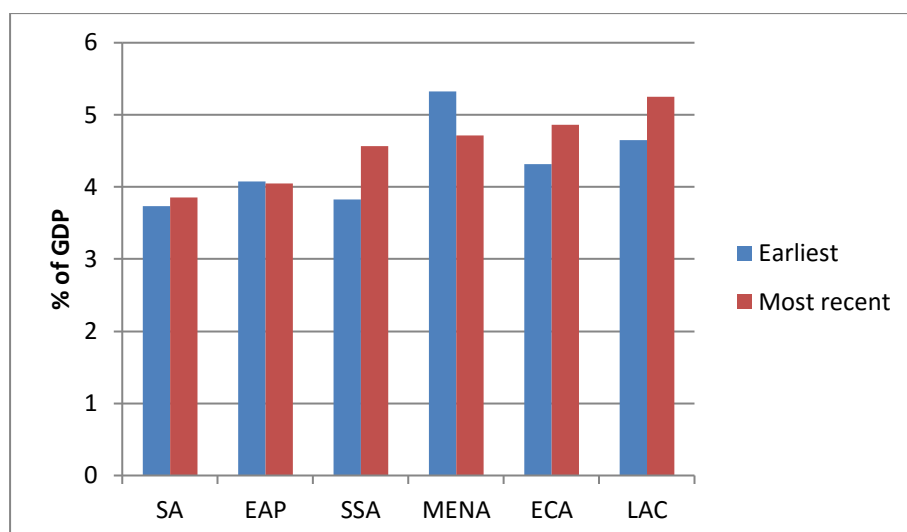
Source: WDI, 2016

2.2 Education spending in national budgets

On average, education is increasingly a priority in national budgets across most income classifications and regions (as shown in Figures 5-7). In 2006, the High Level Group on Education for All proposed that governments should spend 15-20% of their budgets on education and 4-6% of GDP. According to the most recent estimates from between 2010 and 2013, education expenditure represented 15% of total government spending on average globally[4]. However, 61 of these 114 countries lie below this 15% average- of which 7[5] are LICs and 10[6] are LMICS.

As a share of government spending, education spending has increased significantly for all income groups with the exception of LMICs which appear to be on downwards trajectory since 1999 (figure 5). However, when the analysis is repeated holding a country's income classification for all years and comparing the same set of countries between 2000 and 2013, education's share of the budget has declined in UMICs, but increased for all other income groups (as shown figure 6). At the same thime, this decline in UMIC average, was largely driven by three countries: St. Vincent and the Grenadines, Azerbaijan and St. Lucia. Excluding these three countries leaves the UMIC average at roughly the same level (of 16%) in 2000 and 2013.

For LICs, it is noteworthy that this group has surpassed the lower end of recommended 15%-20% target for education spending within government budgets since 1999 (as shown in Figure 5 and figure A.2 in the Annex). Moreover, despite the LMIC decline in Figure 5 (and figure A.2 in the Annex 1), LMICs also remained above 15% for the enitire period.

---

[4] Global average based on 114 countries with data in 2000 and 2012.
[5] This includes: Central African Republic, Gambia, Uganda, Chad, Cambodia, Madagascar, and Guinea.
[6] This includes: Georgia; Guyana, Pakistan, Lao PDR, Djibouti, Bangladesh, Cameroon, Ukraine, India and Cabo Verde

Figure 5: Public expenditure on education (% of total government expenditure), 1998-2012
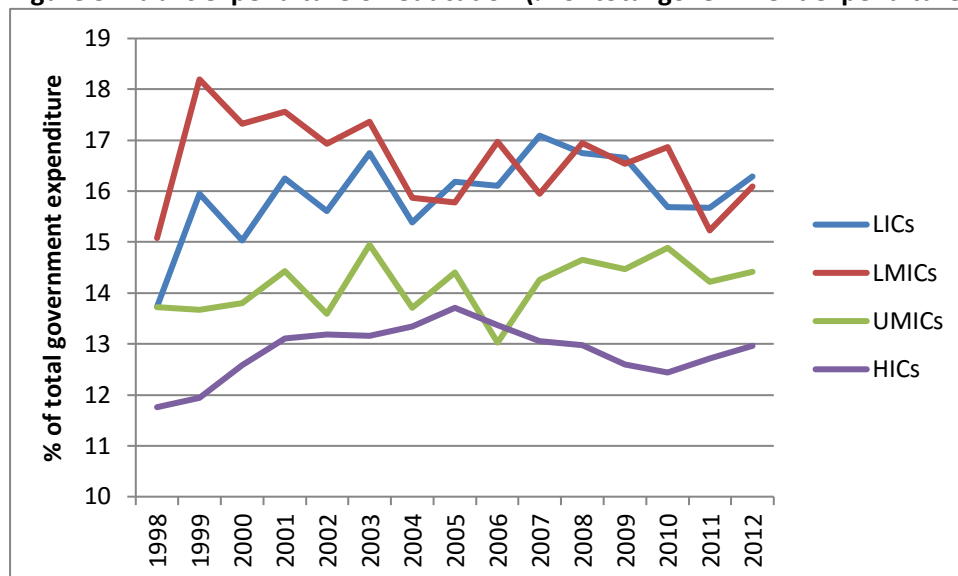
Source: WDI, 2016

Note: Country income classification is based on income classification for corresponding year. Figure A.2 in Annex 1 shows graph when 2015 country income classification is used for all years.

Figure 6: Comparing education's share of total government expenditure in 2000 and 2013 based on 2015 income classification
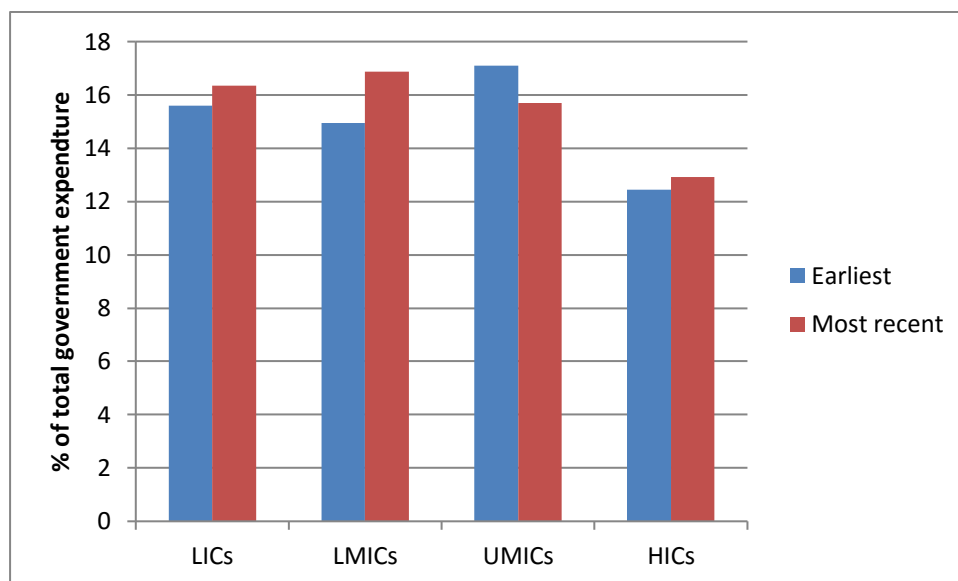
As shown in Figure 7, most regions also surpassed this 15% target with the exception of Europe and Central Asia which fell well below at 12%. Sub-Saharan Africa is where countries have allocated the largest median share of government expenditure to education (17.2%) inn 2013, followed by East Asia and the Pacific (15.8%) and Latin America and the Caribbean (15.7%). Nonetheless, spending within the world's regions varies considerably. For instance, in Sub-Saharan Africa, education spending ranged from 7.8% of total government expenditures in the Central African Republic to 21.7% in Ghana. The difference of prioritization of education was also particularly stark in the South Asia region- 12% in Pakistan compared to 21% in Nepal. Finally, like education expenditure expressed as a percentage

of GDP, the decline in education spending as a share of government expenditure in the Middle East and North Africa region was driven by Djibouti.

Figure 7: Public expenditure on education as % of total government expenditure has increased for most regions
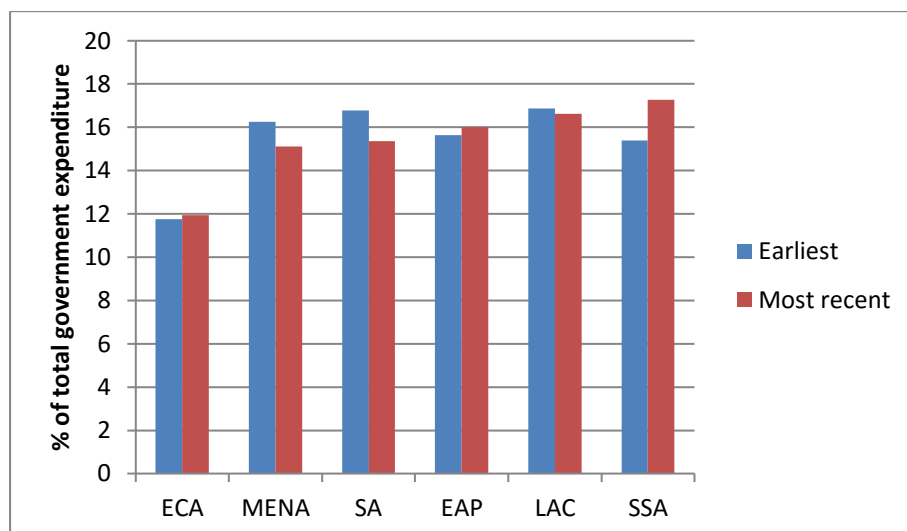
Source: WDI, 2016

2.3 Education spending on different levels of education

Resource allocation by level of education evolves over time with shifting priorities of a country. An analysis of the historical trends of resource allocation by education level may therefore show distinct development patterns. Data limitations, however, result in a small number of observations for the various country categories[7] considered over the period 2000 and 2013, especially for low income countries and Middle East and North Africa, thus the trend analysis in this section should be treated with caution.

Based on the available estimates, as a country becomes more developed, the proportion of public education spending allocated to the primary level appears to decline in favour of higher levels (as shown in Figures 8-11). The exception is the pre-primary level which is consistently lower among LICs compared to countries in the other income groups. Based on the most recent estimates for 18 LICs with data in 2013, the pre-primary level accounts for roughly 1.5% of total public education spending compared to an average of 7-9% for the other higher income groups. This lack of prioritization of the pre-primary level of education is consistent with the most recent EFA Global Monitoring Report (UNESCO, 2015) which states that governments (and donors) have neglected to fund EFA goals outside of the primary level, and as a result pre-primary education remains underfunded.

In fact, the pre-primary share of education expenditure continues to be low at all country income levels. Of the 112 countries with data in 2013, median public expenditure on pre-primary education as a share of total education expenditure was just 6.9% in 2013 for all countries: 0.4% for LICs, 6.6% for LMICs, 6% for UMICs and 9.6% for HICs. The median value for 27 Sub-Saharan African countries in

---

[7] Country income classification for the year 2015 is used for all years in this section.

2013 was only 0.7% of total government expenditure, ranging from a low of 0.01% in Burkina Faso to a high of 11% in Sao Tome and Principe.

Nonetheless, most countries have increased expenditure on pre-primary education as a percentage of total government education expenditure. This holds for all income categories (as shown in Figure 8) and regions (as shown in Figure 12). Of the 71 countries with available data in 2000 and 2013, 51 increased public expenditure on pre-primary education as a share of total education expenditure. Disaggregated by income, the differences are notable. Among 38 high income countries, 31 increased the pre-primary share of education budgets, with 20 experiencing an increase of 1 percentage point or more. Of the 13 low income and lower middle income countries with data, less than half increased their share by 1 percentage point or more between 2000 and 2013 –Benin, Congo, Kyrgyz Republic, Ukraine, and Comoros.

There is wide variation in financing trends for primary education. **In 2013, the median share of primary education in total public education expenditure was 50% for 24 low income countries on average and 34% for 26 lower-middle income countries.** While primary education accounted for the largest share of public education expenditure in most low income countries, there was great variation among countries of similar income levels, ranging from Burkina Faso's allocation of nearly 60% of its education budget to primary education to Rwanda's almost 30% in 2013.

Furthermore, in contrast to the abovementioned increase in pre-primary education spending, there appears to be a decline in the share of the education budget allocated to the primary level of education (as show in Figure 9). Of the 75 countries with data on primary education in both 2000 and 2013, just 23 increased its share of the education budget. This 23 includes only 3 low income countries–Burundi, Comoros and Togo- while the remaining 6 low income countries deprioritized primary education in the total education budget. It is worth noting that these 3 countries were spending less than 50% of their education budget on primary education in 2000 while 5 of the remaining 6 countries were already devoting 50% or more of their education budget to this level of education in this earlier period. Notably, Malawi, one of the 6 low income countries that decreased their share of total education spending on primary education, allocated less than 37% of the budget to primary education in 2013, down from nearly 53% in 2000. The country's primary completion and learning outcomes are among the worst in sub-Saharan Africa (UNESCO, 2015). The decrease largely benefited secondary and tertiary education; 28% of the education budget was distributed to the tertiary level in 2013. A World Bank report (2010) noted that subsidizing higher education in Malawi perpetuates wide inequity with more than 90% of university students coming from the wealthiest quintile (World Bank, 2010).

In terms of regional patterns, the most recent[8] estimates of public spending on education by level shows that while pre-primary education accounts for the smallest share of government spending on education, it has increased across all regions since the early 2000s (see Figure 12). Moreover, while the average for 8 Sub-Saharan African countries (2%) is well-below the average of other regions, several Sub-Saharan African countries for which data is available in 2013 have successfully allocated more that 5% of education resources to pre-primary education in recent years: São Tomé and Principe (11.5%), Ghana (6.6%), Comoros (7.4%), and Niger (5.1%).

---

[8] Regional estimates are not shown for South Asia due to insufficient number of observations.

On the other hand, primary education's share of the education budget has declined significantly for several regions, specifically Latin and the Caribbean and Sub-Saharan Africa, with no region spending more than 45% of their education budget on this level of education in recent years. In fact, of the 73 countries in these 5 regions, only 7 countries allocate more than 45% of their education budget to the primary level, all of which are in Sub-Saharan Africa and mostly low income countries. In fact, this level of education still constitutes the largest share of the sector's budget in Sub-Saharan Africa (41%), and East Asia and the Pacific to a lesser extent. On the other hand, public spending on primary and secondary education are roughly on par in Latin America and the Caribbean (34%) while the secondary level gets most of the education resources in Europe and Central Asia, and the Middle East and North Africa.

Finally, the tertiary sector represented more than 21% of the public expenditure on education across all regions, ranging from an average of 18% in Sub-Saharan Africa to 24% in Middle East and North Africa. **It is noteworthy that while this sector's importance has increased for most regions, it has declined for the Sub-Saharan Africa region[9].** Nevertheless, there is a great deal of country heterogeneity across Sub-Saharan Africa. For example, based on the most recent estimates of education spending[10], the tertiary sector received more than 25% of the education budget in several Sub-Saharan countries in 2013: Seychelles (33%) and Malawi (28%) as well as Ethiopia (43%); Guinea (35%); Chad (32%) and the Central African Republic (27%).

2.4 Summary of key trends
Based on available estimates of government expenditure on education the following trends emerge:

- Education is increasingly a priority in many national budgets across income classifications and regions. However, progress in prioritizing education is mixed with the vast majority of countries falling short of spending the recommended 15-20% of their total public expenditure on education.
- Sub-Saharan Africa is where countries have allocated the largest median share of government expenditure to education (17.2%), followed by East Asia and the Pacific (15.8%) and Latin America and the Caribbean (15.7%)
- Relative to other income groups, LICs and LMICs have increased their spending on education the most between 2000 and 2013.
- As a country's level of income increases, the primary level of education appears to decrease in priority while the higher levels of secondary and tertiary education increase in priority.
- Although most countries have increased the share of total public expenditure on education allocated to the pre-primary level, the share remains small, especially for LICs and countries in Sub-Saharan Africa.
- Despite declining since the early 2000s, especially in Sub-Saharan Africa and Latin America and the Caribbean, the primary level of education still constitutes the largest share of the education sector's budget in Sub-Saharan Africa, while being roughly on par with the secondary level of education in Latin America and the Caribbean.

---

[9] Sub-Saharan African average is based on the 15 countries with data in both 2000 and 2013.
[10] This list Includes 4 countries for which there is data in 2013, but not in 2000-2003.

- And while the tertiary sector's importance has been prioritized in most regions, spending on this level of education has declined for the Sub-Saharan Africa region. Nevertheless, there is a great deal of country heterogeneity across Sub-Saharan Africa.

Comparison of allocation of government spending on education by level of education across income classifications

Figure 8: Pre-primary education

Figure 9: Primary education

Figure 10: Secondary education

Figure 11: Tertiary education

Comparison of allocation of government spending on education by level of education across regions
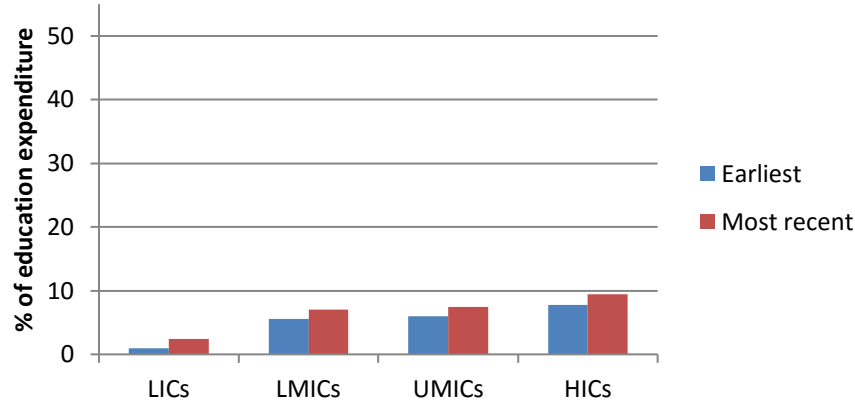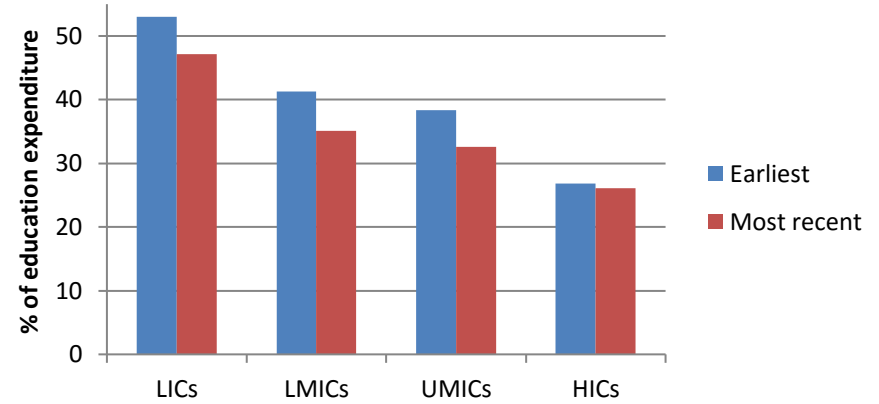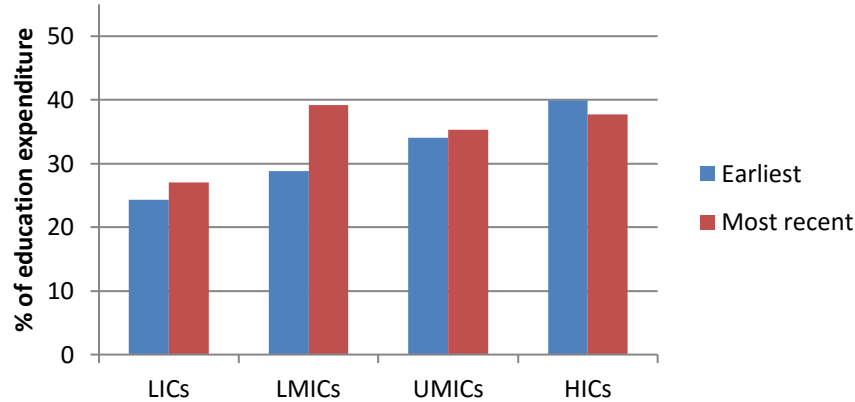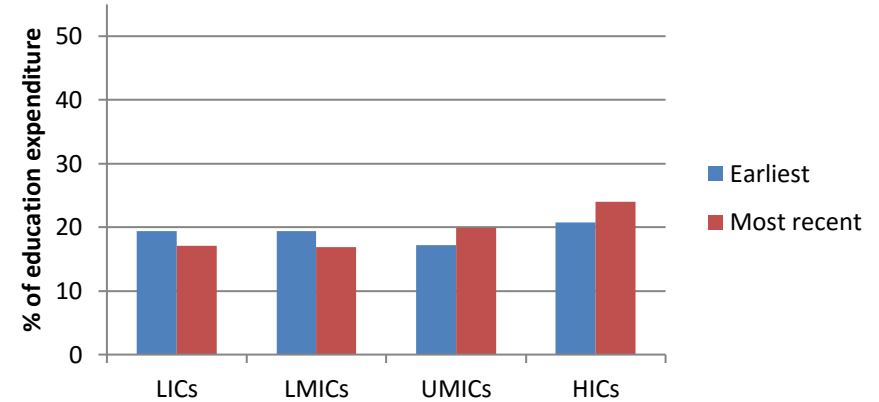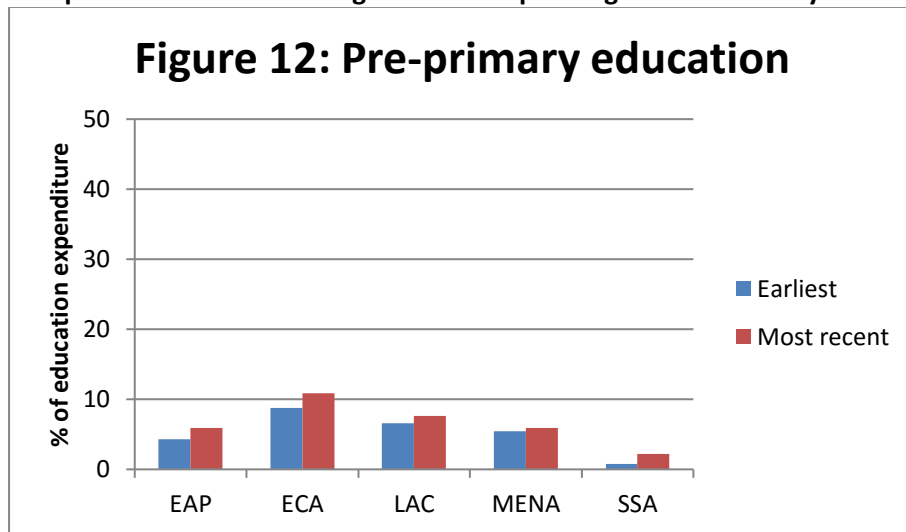

Figure 12: Pre-primary education

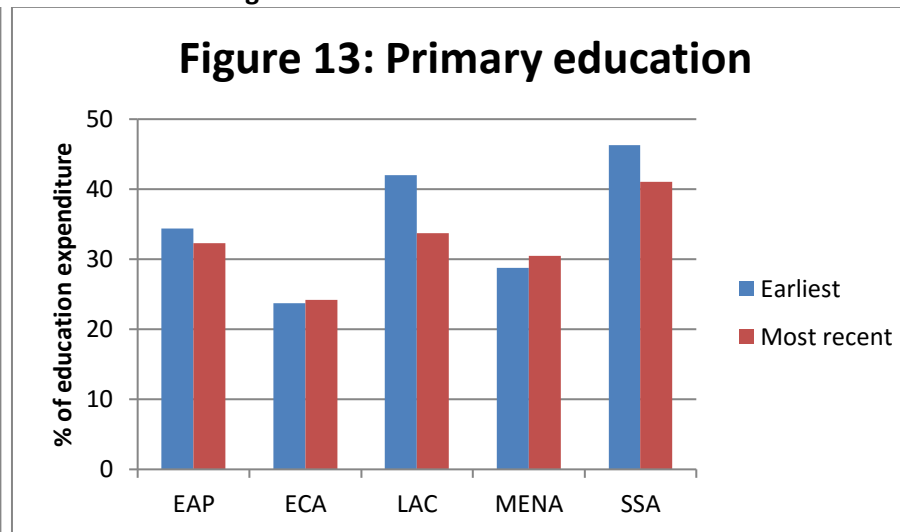

Figure 13: Primary education
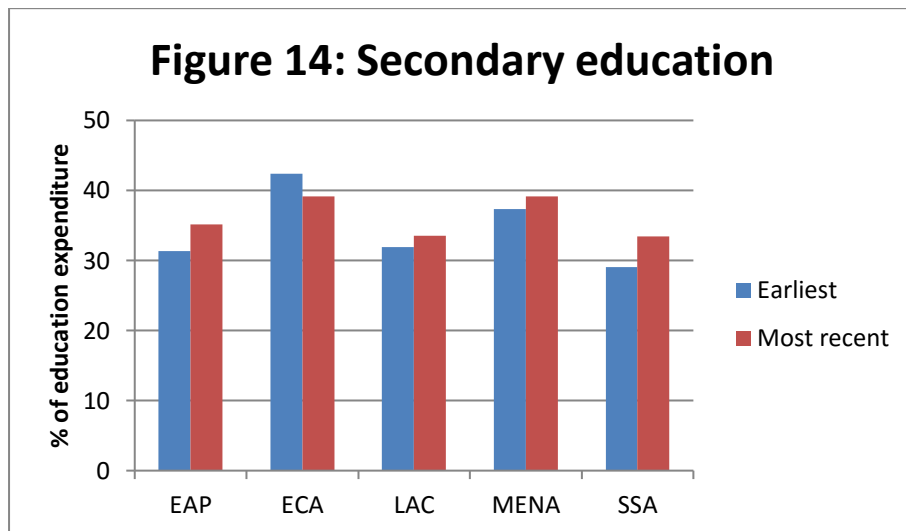

Figure 14: Secondary education

Figure 15: Tertiary education
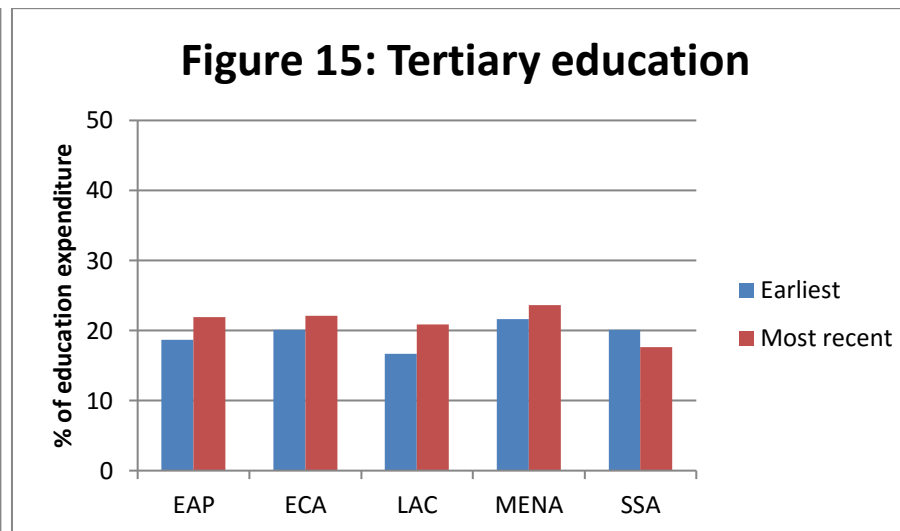
3. Correlates of government education expenditure

In light of the trends noted in the previous section, it is important to understand why certain countries commit more of their resources to one sector than others. By focusing on major forces behind existing patterns we can better help developing countries reallocate government resources toward their priority sectors.

The correlation analysis and multivariate regressions in this section consider government education expenditure both as a share of GDP and as a share of total government expenditure as appropriate indicators of the resources devoted by government to a particular activity. The latter is important, because if spending variables are expressed relative to GDP, then changes in relative prices in the economy may lead to apparent changes in spending without a government actually altering its budgetary priorities.

3.1 Theoretical determinants of education expenditure

We adopt a multi-dimensional approach, taking into account economic, demographic, social, institutional, political, and decision-making theories, to explore the determinants of educational expenditure. More specifically, the variables included in this section are derived from using these theories to construct an appropriate and useful conceptual framework for the analysis of the determinants of educational expenditure. These are briefly summarized below:

i. GDP per capita (and total government expenditure)**:** Various studies stipulate a positive association between economic development (as measured by GDP per capita) and public expenditure, which also covers educational expenditure as a percentage of the GDP (Wagner, 1958; Wilensky, 1975, 2002). The underlying logic is the level of economic development influences the availability of economic resources on hand for the purposes of public spending. Consequently, as a country becomes richer and its national government budget increases, so too does its education spending. GDP per capita and general government expenditures should therefore both demonstrate positive relationships with education spending. A country's development status may also influence the type of education services demanded, with the demand for the provision of higher education increasing as a country becomes more developed and demands more skilled labor. GDP per capita and government spending at the tertiary level could therefore potentially be positively correlated.

ii. Tax revenues: Another hypothesis is that tax revenue can influence government spending decisions. According to the political determinants of government expenditure in general, an increase in tax revenues , particularly direct taxes, can lead to the expansion of responsiveness and accountability with citizens accepting and complying with taxes in exchange for government provision of services that they value, thereby altering the composition of government expenditure (Moore, 2007, 2008). From this argument it follows on that a greater reliance on donor resources or resource revenues which do not foster this element of reciprocity between government and citizens can weaken this social contract and skew spending away from sectors such as education.

iii. Demographic factors: Population structure of a country should have an impact on education expenditure (Grob and Wolter 2007; Poterba 1997). Developing countries tend to spend more on lower levels of education because of their higher fertility rates and younger populations, while developed countries spend relatively more on post-secondary levels partly because their fertility rates

are lower and life expectancy is higher. The proportion of population under 15 years is included to account for differences in its demographic structure that might influence education expenditure. Also because the unit costs for education increase with the level of education, it is possible that spending on education may increase as a country becomes more developed and spends more on higher levels.

iv. Enrolment rate: The education level of a country's population may also affect how much its government spends on education. A country with very poor education indicators (low enrolment rate or low literacy rates) may spend more money on education to improve these outcomes. However, countries with the least favorable education indicators are often the countries with lower GDP per capita and hence lower amounts of money to spend on education. Finally, low spending on education itself might contribute to low enrolment rates.

v. Transparency and accountability: Public expenditure composition is, at heart, a political matter. Political economists have argued that the basis for expenditure decisions is subordinate to the process by which expenditure allocations are made (Fozzard, 2001). In particular, greater budget transparency potentially allows for better public engagement in the budget process, making politicians more sensitive to broad-based public interests such as those promoted by the Millennium Development Goal (MDG) agenda (Simson, 2014). Greater budget transparency may also put pressure on authorities to continuously search for ways to produce and deliver better public service under limited resources. Improving the efficiency of total public spending, including education spending, could in turn translate into additional resource for education if needed. We could therefore expect government spending on education to be positively correlated with a country's level of transparency and accountability for the use of public funds.

3.2 Data

Using data from over 120 countries for the period 1995-2013 we examine the relationship between government expenditure on education and each of the factors frequently highlighted in the literature. We obtained data primarily from the World Bank's World Development Indicators (WDI) and UNESCO Institute for Statistics (UIS). This was supplemented with additional government revenue data obtained from the ICTD Government Revenue Dataset which isolates government revenue from resource industries as well as an instrumental variable for the relative size of the mining sector (Edwards, 2016). Definitions and summary statistics for each variable considered in this section are shown in Annex 2 and 3 respectively.

3.3 Analysis of correlations with government education expenditure

Results presented in Table 1 show the correlations using observations for all countries, and then for each income group. A comparison of these correlations yields several noteworthy observations.

Firstly, tax as a percentage of GDP is the only indicator that remains positive and statistically significant at the 1% level across all samples and for both measures of education expenditure (column 3). This suggests that countries with higher tax to GDP ratios are likely to allocate more resources to education in proportion to the size of their economy and budget than countries with lower ratios (See Figure 11). The strength of this correlation is particularly strong for LICs and LMICs with correlations of 0.7 and 0.6 respectively in the first panel. In light of this, it is unsurprising that government education spending (% of GDP) in column 2 is also strongly positively correlated with the size of total government spending. Government expenditure and government revenue make up either side of the budget

constraint so generally as one goes up so does the other. Tax itself tends to be the largest component of government revenue.

Figure 11: Positive and statistically significant correlation between spending of education and tax revenue
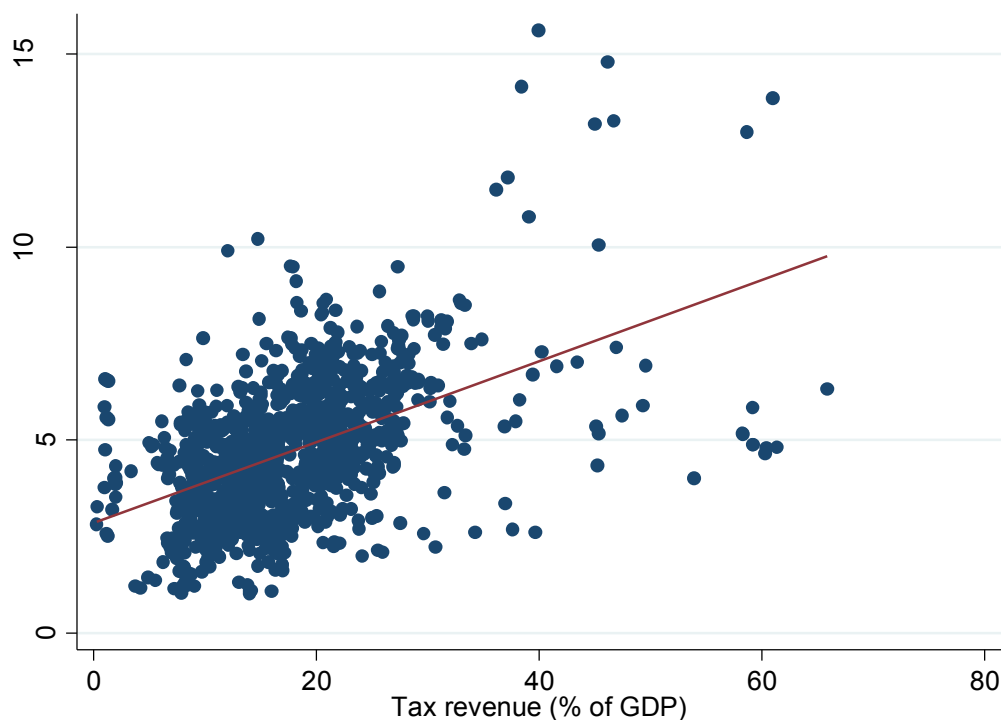
Source: WDI, 2016

However, for each income group, total government expenditure is inversely related to education expenditure as a share of total government expenditure. This correlation is strongest for UMICs and HICs at 0.5. This suggests that education may become less of a priority relative to other sectors as the budget increases in relation to the size of the economy. Nonetheless, as shown in Figure 12, there are several LICs and LMICs who contradict this relationship, with their education share of the budget considerably higher than would be predicted by their total expenditure alone: Ghana, Republic of Congo, Namibia, Swaziland, Nicaragua, Benin, Nepal, Tunisia, Vietnam and Moldova.

Figure 12: Several countries are spending more on education than would be predicted by the size of their budget alone.
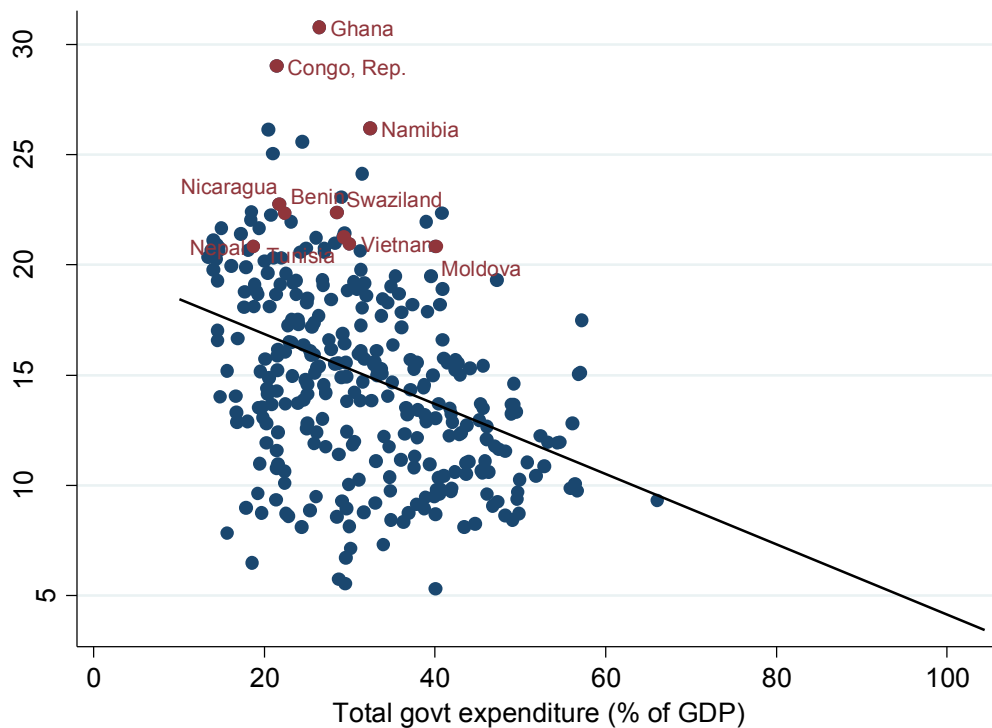
Source: WDI 2016 and WEO 2016
Note: Line of best fit is based on all observations since 1995, however, for ease of clarity,only observations since 2010 shown with the most recent years labelled for select countries.

Thirdly, in column 6, budget transparency itself appears to be a poor predictor of whether or not education is a priority in the national budget especially for LMICs, which show a negative correlation. This is possibly because the potential benefits may be conditional on other factors –such as civil society space, public participation in the budget process, or government leadership and technical capacity. As shown in Figure 13, the best fit line is pulled upwards by a number of LICs and MICs in the upper left-hand quadrant with very high education expenditure shares yet poor OBI scores- Benin, Tunisia, Niger, Cameroon, Rwanda and Tunisia, and Vietnam. Furthermore, while the broader measure of voice and accountability (column 7) is positively correlated with both indicators of education spending in LICs (significant at 1% level), it is not so much for the higher income groups.

Figure 13: Weak relationship between budget transparency and education's priority in the national budget
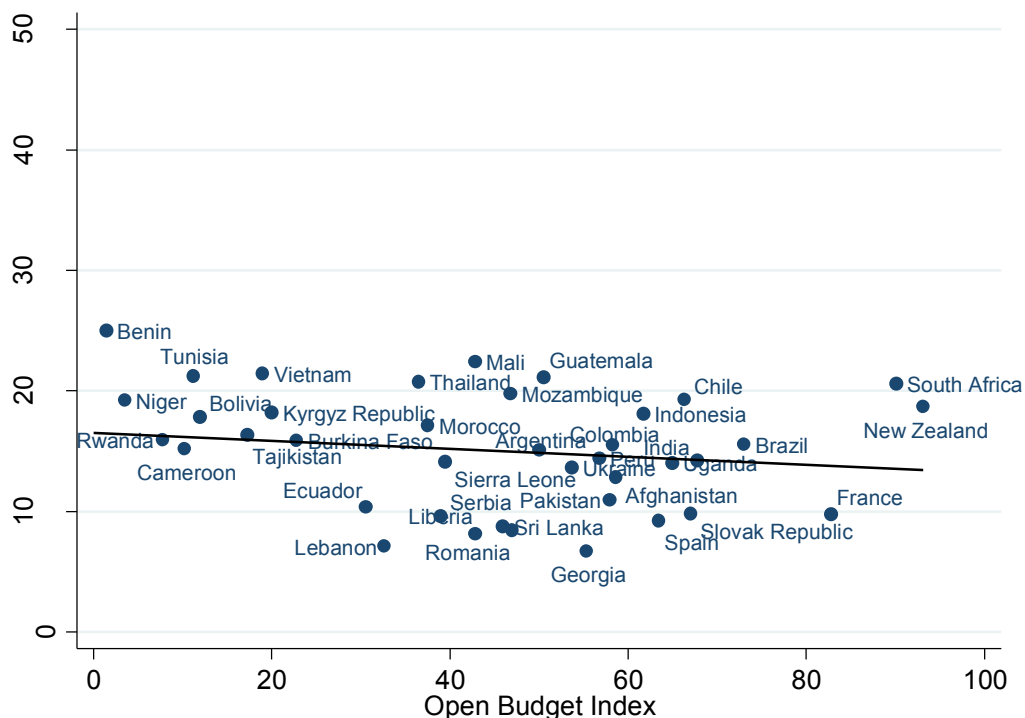
Source: Open Budget Index and WDI, 2016
Note: Fitted line is based on observations since 2006, however graph only shows observations since 2011 for ease of clarity

Fourthly, education's priority in the budget appears to increase with the share of population (<15 years) for all income groups with the exception of LICs (column 4). This holds when the crude birth rate is used as an alternative demographic measure. Among the countries with more than 40% population below 15 years of age, Vanuatu, Lesotho and Yemen stand out in regards to their education spending representing more than 30% of their overall budget for several years over the period considered.

The relationships with the remaining three variables are generally weak with a few exceptions. For LMICs, GDP per capita and education spending (% of GDP; % of total government expenditure) have a significant negative correlation (column 1). However, this is driven by outliers such as Lesotho and Vanuatu with their spending on education significantly above what would be predicted by their income level alone (and as suggested above may be partly related to their population structure). The opposite holds for HICs, where education spending increases as a share of the budget (but falls as a share of GDP) as income increases. Singapore, Hong Kong, Kuwait and Macedonia appear to be leading this trend. Finally, contrary to expectations there is no clear relationship between primary enrolment rate and government spending on education except for LICs (column 5). This is likely to arise because enrolment itself is an outcome of education spending. It is therefore logical that LICs and UMICs that enjoy higher primary enrolment rate are those that invest more on education.

Table 1: Correlates of government education expenditure

Government education expenditure (% of GDP)							
Variable	**(1)** **GDP per capita**	**(2)** **TGE** **(% of GDP)**	**(3)** **Tax** **revenue**	**(4)** **Pop** **(0-14)**	**(5)** **Primary NER**	**(6)** **Open Budget** **Index**	**(7)** **Voice &** **Accountability**
ALL	0.184*** (1834)	**0.536*** (1717)**	**0.504*** (1227)**	-0.184*** (1852)	0.125*** (1675)	0.163** (197)	0.231*** (1555)
LICs	0.029 (469)	**0.549*** (423)**	**0.746*** (257)**	-0.089* (472)	0.225*** (419)	-0.133 (46)	0.280*** (371)
LMICs	-0.363*** (489)	**0.565*** (449)**	**0.601*** (281)**	0.103** (497)	-0.060 (462)	-0.331** (56)	0.064 (403)
UMICS	-0.075 (382)	**0.263*** (376)**	**0.264*** (261)**	0.045 (383)	0.00 (334)	0.327** (53)	-0.070 (330)
HICs	-0.115** (494)	**0.560*** (469)**	**0.397*** (428)**	0.203*** (500)	-0.043 (460)	0.518*** (42)	0.404*** (450)
Government education expenditure (% of Total Government Expenditure)							
ALL	-0.271*** (1543)	**-0.370** **(1560)**	**0.087*** (1074)**	0.320*** (1573)	0.068* (1407)	-0.180* (194)	-0.163*** (1374)
LICs	-0.052 (395)	**-0.149*** (394)**	**0.419*** (223)**	0.029 (396)	0.168*** (350)	0.037 (46)	0.206*** (335)
LMICs	-0.252*** (399)	**-0.128*** (409)**	**0.283*** (243)**	0.274*** (406)	-0.027 (374)	-0.223* (56)	0.020 (354)
UMICs	-0.340*** (329)	**-0.525*** (344)**	**0.237*** (232)**	0.450*** (330)	0.241*** (288)	0.221 (53)	-0.00 (295)
HICs	0.220*** (420)	**-0.536*** (413)**	**0.154*** (376)**	0.236*** (427)	-0.050 (395)	0.196 (39)	-0.070 (390)

Number of observations shown in brackets

As demonstrated in the previous table, tax and education spending have a strong, positive correlation. Focusing solely on the revenue size of the budget constraint, Table 2 shows the results of correlations with three broad categories of government revenues: non-resource taxes, total resource revenues and grants. These correlations generally suggest that countries which collect more revenue in relation to the size of their economy tend to spend more on education (% of GDP), regardless of the source. In particular, the positive correlation between non-resource taxes and education spending ranges from moderate to strong for the individual income groups with LICs and HICs among the latter. Notably, HICs' weak but positive correlation for grants is driven by observations for Antigua and Barbuda, Aruba, Estonia, Israel, Latvia, and Malta. Excluding these countries, the correlation becomes insignificant.[11]

When education spending is measured as a share of total spending, however, a less favorable picture emerges in regards to the link between resource revenues (column 2) and grants (column 3) and government education spending. Higher resource revenues (% of GDP) is associated with lower levels of education spending for LICs, LMICs and UMIC- with correlations being significant at the 1% level. The lack of correlation for HICs, on the other hand, can be attributed to the much smaller number of observations. More grants are also negative associated with education spending (% of government expenditure) with a negative coefficient for all income groups. Finally, while LICs and LMICs' education spending is positively associated with non-resource taxes, the association is negative for UMICs and HICs. This discrepancy suggests a possible income effect with a country's spending priority shifting away from education as it becomes richer and its economy more diversified.

The subsequent section will probe these relationships in explaining variance in government education expenditure through the use of a series of multivariate cross-section regressions.

Table 2: Focusing on the composition of government revenue

GEE (% of GDP)	(1) Non-resource tax	(2) Resource revenue	(3) Grants
All	0.488*	0.282***	0.225***
LICs	0.677***	0.139	0.191**
	(434)	(120)	(436)
LMICs	0.449***	0.294***	0.402***
	(457)	(118)	(419)
UMICs	0.222***	0.176*	0.253***
	(377)	(91)	(247)
HICs	0.545***	0.415*	0.183**
	(462)	(20)	(127)
GEE (% of TGE)	**Non-resource tax**	**Resource revenue**	**Grants**
All	-0.205***	-0.262***	-0.042
	(1452)	(301)	(1053)
LICs	0.280***	-0.260***	-0.103**
	(365)	(102)	(368)
LMICs	0.107**	-0.393***	-0.046
	(371)	(102)	(354)

---

[11] Observations fall to 87.

GEE (% of GDP)	(1) Non-resource tax	(2) Resource revenue	(3) Grants
UMICs	-0.293*** (326)	-0.288** (79)	-0.050 (224)
HICs	-0.312*** (390)	0.267 (18)	-0.315*** (107)

3.4 Multivariate analysis of correlations

The previous section noted several statistically significant correlations between government education expenditure with tax revenue and total government spending, and weaker correlations with other variables in our dataset. We now turn to a series of cross-national longitudinal models to determine whether these associations remain significant or whether these associations can be "explained away" by other factors. Ultimately we are interested in investigating the following three questions through multivariate regressions:

1. What are the correlates of government education expenditure?
2. What are the correlates of spending across different levels of educations?
3. What types of revenues are associated with more education spending?

We first report the results of cross-section regressions which are widely regarded as better suited to capturing average long-run relationships (Pesaran et al., 1996). We then report results from static fixed effects models that are based on within-country variation. One concern is business cycle frequency changes in economic activity may drive both expenditures and revenues, particularly when based on within-country variation in panel data (Carter and Cobham, forthcoming). In developing countries, fiscal policy tends to particularly pro-cyclical, with government expenditure rising during good times whilst overall taxes fall, as a share of GDP. We therefore use data averaged over five year periods to mitigate this concern. Moreover, we do not include total government expenditure (% of GDP) in the regressions given the strong positive correlation between size of government revenue and government expenditure, and thus the possibility of multicollinearity[12] which may affect calculations regarding individual predictors.

---

[12] Multicollinearity occurs when two or more predictor variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a substantial degree of accuracy. In this situation the coefficient estimates of the multiple regression may change erratically in response to small changes in the model or the data. We do, however, report the results of the regression models which control for total government expenditure (% of GDP) rather than tax (% of GDP) in Tables A.3 and A.4 in Annex 4.

3.5 Results of Multivariate regressions

3.5.1. Correlates of government education expenditure

Model: We start by investigating the extent to which each of the factors highlight above is related to public expenditure on education (as a % of GDP) (see Table 3). Model 1a uses the Open Budget Index as a measure of budget transparency while Models 2a adopts a broader measure of governance and transparency for which there are more country year observations. Model 3a repeats Model 2a but restricts the analysis to the countries which are currently classified as LICs and LMICs. These first three sets of models are estimated using OLSs, while Models 1b, 2b, and 3b are estimated with fixed effects. As a robustness check, we rerun these 6 models using education expenditure (% of total government expenditure) as the dependent variable in Table 4.

Results: Although the cross-section regressions confirm a positive and statistically significant correlation between education expenditure (both as a % of GDP and % of total government expenditure) and tax revenues, these relationships generally becomes insignificant for the fixed effects models. The only exception is when the analysis is restricted to the observations for low income and lower middle income countries, in Model 3b in Table 3, with a tax co-efficient of 0.129, significant at the 1% level. Moreover, the tax coefficient increases when the analysis is restricted to the LICs and LMICs, increasing from 0.062 in Model 2a to 0.245 in Model 3a. In addition, although the tax coefficient becomes negative in the fixed models estimated for all countries, it remains positive when estimated only for LICs and LMICs in Models 3b and 6b. In regards to the other variables, we find some evidence of a positive, though weak, correlation between the voice and accountability measure and education expenditure (% of GDP). The coefficients for GDP per capita, primary enrolment rate, and population structure are generally insignificant or only significant at the 10% level in the fixed effects Model 2b.

Table 3: Regressions with education expenditure (% of GDP) as dependent variable[13]

VARIABLES	OLS Model 1a	OLS Model 2a	OLS Model 3a	FEs Model 1b	FEs Model 2b	FEs Model 3b
Ln GDP per capita	0.159	0.0807	-0.598	0.00383	-0.0508	0.0489
	(0.394)	(0.224)	(0.383)	(1.326)	(0.393)	(0.845)
Tax (% of GDP)	0.136***	0.0620***	0.245***	-0.0815	-0.0226	0.129***
	(0.0346)	(0.0174)	(0.0449)	(0.0616)	(0.0164)	(0.0449)
Population (< 15 years)	0.0297	0.0104	-0.0276	-0.196	-0.0647*	-0.0788
	(0.0355)	(0.0247)	(0.0406)	(0.122)	(0.0337)	(0.0687)
Primary enrolment	0.000201	0.00383	0.000148	-0.0263	0.0128*	0.00198
	(0.0111)	(0.00639)	(0.00594)	(0.0208)	(0.00699)	(0.00996)
Open Budget Index	0.00524			0.0181		
	(0.0104)			(0.0149)		
Voice & Accountability		0.451**	0.580**		0.500*	0.371
		(0.186)	(0.234)		(0.295)	(0.484)
Constant	-0.230	1.980	6.794	13.39	5.783	4.846
	(4.414)	(2.765)	(4.249)	(14.07)	(4.373)	(8.633)
Observations	119	374	127	119	374	127
R-squared	0.261	0.246	0.382	0.249	0.066	0.237
Number of countries	74	136	51	74	136	51
Country income classification	ALL	ALL	LICs & LMICs	ALL	ALL	LICs & LMICs

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

---

[13] Table A.1 in Annex 4 shows the results of the regression models when we control for total government expenditure (% of GDP) instead of tax (% of GDP)

Table 4: Regressions with education expenditure (% of total government expenditure) as dependent variable[14]

VARIABLES	OLS Model 4a	OLS Model 5a	OLS Model 6a	FEs Model 4b	FEs Model 5b	FEs Model 6b
Ln GDP per capita	0.0422	-0.329	-0.617	0.403	-0.0837	-1.245
	(1.038)	(0.587)	(1.046)	(3.435)	(1.383)	(3.093)
Tax (% of GDP)	0.254***	0.124**	0.578***	-0.240	-0.0467	0.145
	(0.0924)	(0.0531)	(0.122)	(0.160)	(0.0515)	(0.164)
Population (< 15 years)	0.262***	0.205***	0.164*	-0.0186	-0.0626	-0.274
	(0.0942)	(0.0578)	(0.0876)	(0.331)	(0.109)	(0.255)
Primary enrolment	0.00580	0.0341	0.0204	-0.102*	0.0213	0.000910
	(0.0343)	(0.0228)	(0.0230)	(0.0541)	(0.0226)	(0.0358)
Open Budget Index	0.0103			0.00815		
	(0.0289)			(0.0385)		
Voice & Accountability		0.374	0.657		-0.852	-2.662
		(0.623)	(0.758)		(1.030)	(1.887)
Constant	1.707	6.162	5.470	26.10	15.89	33.00
	(12.25)	(7.006)	(10.54)	(36.77)	(15.15)	(32.13)
Observations	116	345	118	116	345	118
R-squared	0.302	0.236	0.293	0.136	0.018	0.086
Number of countries	73	133	51	73	133	51
Country income classification	ALL	ALL	LICs & LMICs	ALL	ALL	LICs & LMICs

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.5.2 Government education expenditure by level.

Model: Table 5 extends some of the previous models, but uses the composition of education expenditure as the dependent variable. Model 7a refers to pre-primary level of education, Model 8a to primary education, Model 9a to secondary education, and Model 10a to tertiary education. Models 7b, 8b, 9b and 10b estimate the previous 4 models for LICs and LMICs only.

Results: We now turn to the results from cross-section regressions in Table 5 regarding spending on different levels of education. The first striking difference in comparison to the total education expenditure cross-section regressions is the absence of a statistically significant relationship between

[14] Table A.2 in Annex 4 shows the results of the regression models when we control for total government expenditure (% of GDP) instead of tax (% of GDP)

the tax to GDP ratio and education expenditure by level of education. Instead the main variable that has a statistically significant relationship with different levels of education is population age structure. Holding the other variables constant, countries with a large share of the population between the ages of 0 and 14 years are likely to spend less on pre-primary education and secondary education, but more on primary education. This correlation is statistically significant in most models at the 1% level. The relationship between the share of the population between 0 and 14 years of age and education spending at the tertiary level is also negative, though statistically insignificant in Models 13a and 14a. Notably, though of weak statistical significance, higher primary enrolment rates tend to be associated with higher levels of education spending at the primary level in Models 9a, and lower levels of spending at the secondary and tertiary levels in Models 11-14.

The fixed effects models in Table 6 also find similar correlations between the population structure and share of education expenditure- positive for primary level, but mostly negative for the other levels of education. However, this correlation loses statistical significance, remaining statistically significant for the primary level in Model 9b (at 5% level) and the tertiary level in Model 13b (at 1% level) when all country year observations are used regardless of income classification.

Table 5: Cross-section regression for Government education expenditure by level of education

VARIABLES	Pre-primary		Primary		Secondary		Tertiary	
	Model 7a	Model 8a	Model 9a	Model 10a	Model 11a	Model 12a	Model 13a	Model 14a
Ln GDP per capita	-1.335*	0.179	-0.335	1.125	0.131	-1.202	1.444	0.211
	(0.729)	(1.507)	(1.186)	(3.783)	(1.560)	(3.116)	(1.265)	(2.169)
Tax (% of GDP)	0.00370	-0.0293	-0.0596	0.0262	0.0130	-0.104	0.0349	0.211*
	(0.0409)	(0.0744)	(0.0721)	(0.126)	(0.0891)	(0.100)	(0.0759)	(0.111)
Population (<15 years)	-0.464***	-0.388***	0.955***	1.035***	-0.400***	-0.572**	-0.0895	-0.0917
	(0.0693)	(0.116)	(0.127)	(0.251)	(0.143)	(0.222)	(0.110)	(0.201)
Primary enrolment	-0.00360	-0.0303	0.138**	0.138	-0.0976	-0.126*	-0.0958**	-0.0775**
	(0.0227)	(0.0189)	(0.0668)	(0.0846)	(0.0602)	(0.0672)	(0.0416)	(0.0380)
Voice & Accountability	-1.182*	-0.149	1.424	0.280	1.376	2.532	-0.439	-1.866
	(0.626)	(1.174)	(1.377)	(3.098)	(1.719)	(3.079)	(0.998)	(1.957)
Constant	31.91***	20.41	-2.034	-18.67	54.01***	75.90**	18.69	24.33
	(8.413)	(16.75)	(16.26)	(39.42)	(17.02)	(31.31)	(14.29)	(24.57)
Observations	264	68	273	83	276	83	303	93
R-squared	0.395	0.536	0.630	0.397	0.340	0.212	0.146	0.096
Number of Countries	110	38	114	46	117	46	124	48
Country income classification	ALL	LICs & LMICs	ALL	LICs & LMICs	ALL	LICs & LMICs	ALL	LICs & LMICs

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Fixed-effects regression for Government education expenditure by level of education

VARIABLES	Pre-primary		Primary		Secondary		Tertiary	
	Model 7b	Model 8b	Model 9b	Model 10b	Model 11b	Model 12b	Model 13b	Model 14b
Ln GDP per capita	0.879	1.193	0.783	-17.00*	-3.133	13.02	-0.251	5.180
	(1.213)	(2.234)	(3.215)	(9.488)	(3.158)	(8.446)	(1.960)	(5.707)
Tax (% of GDP)	-0.0140	0.0499	-0.148	-0.413	0.112	0.00146	0.0229	0.325
	(0.0420)	(0.147)	(0.1000)	(0.389)	(0.0986)	(0.349)	(0.0703)	(0.245)
Population (<15 years)	-0.107	-0.0416	0.705**	0.00227	-0.195	0.903	-0.721***	-0.136
	(0.124)	(0.178)	(0.278)	(0.833)	(0.284)	(0.797)	(0.192)	(0.504)
Primary enrolment	-0.0136	-0.00861	0.00621	0.0718	-0.0614	-0.0406	0.00212	0.0619
	(0.0271)	(0.0317)	(0.0601)	(0.131)	(0.0600)	(0.114)	(0.0416)	(0.0773)
Voice & Accountability	0.349	0.725	-5.056**	-0.961	2.939	-2.535	3.293**	2.446
	(0.967)	(1.301)	(2.251)	(5.506)	(2.220)	(5.034)	(1.544)	(3.201)
Constant	2.554	-3.437	12.50	175.9*	72.63**	-104.9	40.12*	-27.39
	(14.34)	(22.41)	(35.81)	(99.36)	(35.55)	(90.88)	(22.95)	(60.70)
Observations	264	68	273	83	276	83	303	93
R-squared	0.055	0.106	0.120	0.239	0.032	0.070	0.197	0.227
Number of countries	110	38	114	46	117	46	124	48
Country income classification	ALL	LICs & LMICs	ALL	LICs & LMICs	ALL	LICs & LMICs	ALL	LICs & LMICs

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.5.3 Source of government revenue.
Model: The final set of models in Tables 6-8 seek to provide insight into the relationship between education spending and different sources of government revenues: non-resource tax revenues, resource revenues, grants, as well as direct vs. indirect taxes.

Models in Table 6 regress education expenditure (% of GDP) on revenue variables. It starts with total government revenues and then progressively disaggregates. However, these models in Table 6 do not shed light on the question of whether governments who make greater use of direct taxes tend to spend more on education than would otherwise be expected. This is because it estimates the relationship between revenue types and public education expenditure, as shares of GDP, at all levels of public education expenditure. Thus to investigate whether higher levels of education expenditure are associated with different revenue sources, the regressions in Table 7 seek to answer whether countries that make relatively more use of direct taxes tend to spend more on public education than would be predicted by their total level of taxation, controlling for other country characteristics. Our variable of interest is the ratio of direct to indirect taxes. However, any association in these cross-section models may be driven by unobserved country characteristics. To alleviate this concern, we estimate fixed-effects regressions models in Table 8. These models exploit within-country variation to control for such characteristics, providing they are time-invariant. All models include robust standard errors clustered by country.

Results: The results in all columns in Table 6 reveal that a higher level of government revenues, regardless of source, is associated with higher levels of education spending (as % of GDP). Model 16 splits revenues into non-resource taxes, total resource revenues (including taxes on resource industries) and grants. The estimates suggest that increases in resource revenues are associated with a much smaller change in public education expenditure whilst a greater proportion of non-resource taxes appears to feed through into education. Note that total resource revenue data are only available for a small number of countries - Model 15 was estimated on data from 138 countries, Model 16 from 44 countries. Models 17 and 18 further disaggregate taxes into direct and indirect components. Model 17, which excludes the total resource revenue variable, and hence is estimated on more countries, finds that a higher proportion of indirect taxes are spent on education than direct. More important, the difference between the two coefficients is statistically significant at the 5 per cent level. However, in Model 18, which separates out resource revenues and grants, but is estimated on a smaller sample, the coefficients on direct and indirect taxes are statistically indistinguishable. Model 19 uses the same sample as Model 18 but estimates Model 17. The similarity in results for Models 18 and 19 suggests that the contrasting results between columns 3 and 4, regarding whether a higher proportion of revenues from indirect taxes are spent on education than from direct taxes, is explained by the sample and not the choice of controls.

Table 6: Public Education Expenditure regressions

VARIABLES	Model 15	Model 16	Model 17	Model 18	Model 19
		DV: Education expenditure (% of GDP)			
Total revenue	0.105***				
	(0.0144)				
Taxes (non-resource)		0.239***			
		(0.0282)			
Resource revenues		0.0931***		0.0934**	
		(0.0306)		(0.0347)	
Grants		0.0963***	0.181***	0.135***	0.134***
		(0.0221)	(0.0208)	(0.0368)	(0.0353)
Other revenues		0.107**	0.0802***	0.114*	0.0958***
		(0.0479)	(0.0212)	(0.0563)	(0.0264)
Direct taxes (non-resource)			0.0979***	0.252**	0.256**
			(0.0243)	(0.0988)	(0.0980)
Indirect taxes (non-resource)			0.193***	0.226***	0.226***
			(0.0473)	(0.0730)	(0.0735)
Constant	1.656***	-0.191	0.809*	-0.205	-0.202
	(0.346)	(0.382)	(0.433)	(0.450)	(0.444)
Observations	417	105	361	86	86
Number of Countries	138	44	127	40	40
R-squared	0.368	0.518	0.499	0.494	0.494

Moving on to table 7, our main variable of interest is the ratio of direct to indirect taxes. The first column of table 7 (Model 20) shows regressions of public education expenditure on total revenues, disaggregated into non-resource taxes, grants and other revenues. The residuals measure the extent to which governments are spending more or less than predicted on education, on the basis of these revenue variables. Model 21 then introduces non-revenue variables to explain this deviation from education spending as predicted by revenues. The results in all columns find a negative, but insignificant, correlation between the direct/indirect ratio and education expenditure. This does not change when we control for a set of country characteristics, of which the measures of government effectiveness and inequality are positively associated with higher than predicted education spending.

Table 7: Education Expenditure level regressions: cross-section

VARIABLES	DV: Education expenditure (% of GDP)			
	Model 20a	Model 21a	Model 22a	Model 23a
Taxes (non-resource)	0.139***	0.169***	0.163***	0.154***
	(0.00937)	(0.0261)	(0.0259)	(0.0241)
Grants	0.146***	0.150***	0.136***	0.0810*
	(0.0136)	(0.0353)	(0.0426)	(0.0467)
Other revenues	0.0695***	0.150***	0.161***	0.205***
	(0.00991)	(0.0352)	(0.0347)	(0.0403)
Mining share		-0.0313**	-0.0221	-0.0369*
		(0.0138)	(0.0135)	(0.0205)
Direct/Indirect ratio		-0.128	-0.143	-0.340
		(0.271)	(0.273)	(0.251)
Voice & accountability			0.168	-0.103
			(0.259)	(0.291)
Govt effectiveness			0.636**	0.856**
			(0.292)	(0.373)
Ln GDP per capita		-0.407***	-0.821***	-0.733***
		(0.154)	(0.206)	(0.225)
Gini				0.0372***
				(0.0129)
Constant	1.213***	4.071***	7.794***	5.687***
	(0.208)	(1.087)	(1.691)	(1.976)
Observations	396	261	260	179
Number of Countries	135	113	112	89
R-squared	0.454	0.522	0.547	0.512

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 reports estimates from fixed-effects regressions, in which the estimated coefficients on the direct to indirect tax ratio become positive, but remain statistically insignificant. On the other hand, the larger the share of mining in an economy is associated with a lower level of education expenditure, and is insignificant at the 1 and 5% level. Thus, although we find little or no evidence that countries which make relatively more use of direct taxes also tend to have higher levels of public education

expenditure, there appears to be some evidence of a negative correlation between of the size of an economy's mining sector and public education expenditure. In addition, the correlation between education expenditure and the measures of government effectiveness and inequality loses significance, while the measure of voice and accountability gains significance at the 1% level in Model 23b.

Table 8: Education Expenditure level regressions: fixed effects

VARIABLES	DV: Education expenditure (% of GDP)			
	Model 20b	Model 21b	Model 22b	Model 23b
Taxes (non-resource)	0.0526	0.0915	0.0956*	0.191*
	(0.0393)	(0.0578)	(0.0560)	(0.0964)
Grants	0.155	0.0501	0.0631	0.291
	(0.0970)	(0.207)	(0.183)	(0.184)
Other	-0.0255	-0.00358	0.0251	0.183**
	(0.0723)	(0.0606)	(0.0828)	(0.0803)
Mining		-0.0747**	-0.0756**	-0.0979*
		(0.0361)	(0.0345)	(0.0547)
Direct/indirect ratio		1.014	0.987	2.713
		(1.182)	(1.283)	(2.146)
Ln GDP per capita		-1.084	-1.242	-1.569
		(1.311)	(1.307)	(1.792)
Voice & Accountability			0.596	1.624***
			(0.724)	(0.474)
Govt effectiveness			-0.337	-0.955
			(1.219)	(1.008)
Gini				-0.0119
				(0.0600)
Constant	2.979***	11.27	12.39	11.72
	(0.665)	(10.89)	(10.65)	(12.93)
Observations	396	261	260	179
Number of Countries	135	113	112	89

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Regressions include country-specific linear time trends

3.6 Discussion of results

Our cross-section regressions support the hypothesis that government revenues have a strong and positive correlation with government's spending on education. This is similar to findings by Carter and Cobham (forthcoming) and Reeves (2014) for the health sector. This finding is unsurprising given that the level of government expenditure is likely to be determined by the level of its revenue, of which tax is generally the largest contributor. On the other hand, tax appears to have little relationship with the share of expenditure allocated to the different levels of education with demographic factors playing the more pivotal role instead.

The lack of statistically significant relationship with GDP per capita in cross-section may be attributed to the fact that taxation and the government's fiscal space occupy a mediating position on the pathway linking GDP and education expenditure, i.e. as countries grow richer and their formal economies grow, their governments can collect more taxes to spend on areas such as education. Consequently, the effect of GDP disappears once tax revenue is controlled.

Evidence of links between transparency, and spending allocations is also weak and consistent with the findings of previous studies (Fukuda-Parr et al., 2011). More transparent countries do not, on the whole, spend a higher share of their budgets on education – the assumption being that transparency and accountability would incentivise countries to spend more on services that benefit large groups of the population. However, the lack of correlation between transparency and education spending does not conclusively refute it. As mentioned earlier, the current indices of budget transparency have limited time coverage and are not yet comprehensive, or detailed enough to be able to reveal stronger relationships. This relationship may only be revealed by testing change over a longer time period, and across a broader range of countries. The negative association between resource revenues and education spending in our third set of model may also suggest the need for transparency and accountability.

In regards to the two remaining factors considered, primary enrolment rates and population age structure, the lack of association with the former is likely to be the result of significant endogeneity bias. The share of population below 15 years of age, on the other hand, appears to have a statistically significant association with how public resources are distributed across the different levels of education.

Our final set of models confirms that there is a positive association between education expenditure and various sources of government revenues. However, we find no evidence that the greater use of direct taxes is associated with higher levels of public education spending. This is similar to the results of Carter and Cobham (forthcoming) for health, which also finds little evidence that greater reliance on direct taxes is associated with higher health spending. On the other hand, we do find some evidence that a reliance on greater natural resource revenues is associated with less education spending in proportion to the size of the economy. Ultimately, the estimates in Tables 6-8 may be misleading. This is because assuming that expenditure is a function of revenues (i.e. setting aside endogeneity concerns) the estimated coefficients should be interpreted as the predicted change in expenditure in response to one unit change in the revenue item, holding other sources of revenue constant. In reality, however, other revenue lines are not held constant. In fact, rising revenues from one source may lead the government to reduce taxes or borrow less which may in turn have

implications for the composition of government expenditure. Thus further investigation of the dynamics of the relationships between revenue, and education expenditure is recommended.

4. Reforming the budgeting system to improve allocation of resources

The results of the quantitative analysis reveal a strong statistical association between government revenue and government spending on education, particularly in cross-country regressions. That general trend still contains considerable variation, however. Although sustained economic growth in many of the world's poorest countries has increased the resources that governments can raise domestically, many of the countries furthest from the Education for All (EFA) goals do not devote their expected share of revenue to education. This section discusses the mechanisms that governments can use in principle to allocate more resources towards education.

As a starting point for all budget reforms that aim at allocations, it is important to keep in mind that across countries and over time, budget allocations are incremental. That is to say they do not change very much from year to year, and, crucially, changes are similar between expenditure categories – i.e. if portfolio A gets and annual increase of 3%, portfolio B is likely to increase by an amount close to 3% as well (Davis et al., 1966; Wildavsky and Caiden, 2004). This equilibrium gets interrupted rarely by more dramatic shifts, such as when major policy changes occur (Baumgartner et al. 2009, Baumgartner et al., 2014). The distribution of budgetary changes is therefore not normal, but leptokurtic – largely clustered around zero with fat tails on both ends. Explicitly or implicitly, budget reforms that seek to improve allocative efficiency aim to change this pattern of incrementalism and both reduce disruptive changes and facilitate more freedom to reallocate during normal years.

Empirically, the pattern of incremental allocations remains pervasive – reform efforts that successfully bend the power of incrementalism are rare (Baumgartner et al., 2014). This oft-overlooked empirical pattern is of critical importance for the education financing debate, as much as it matters for public finance management. The implication for education financing is that, absent any other factors, current spending levels on education (and correspondingly on other sectors) are largely set. Cross-country variations in education spending are themselves driven by structural factors, as well as path dependency, but changes to these levels will default to being incremental. The only strong association found in this paper (without making claims for causality in any given case) is with tax revenues overall, and in turn income levels.

A plausible argument can be made, therefore, that the best way to substantially increase education spending is to increase all spending, and in order to do that, to increase tax revenues, and in order to do that, increase incomes, and in order to do that, foster growth. Similar arguments can be, and have been, made about other sectors, such as health. But this is a long-term agenda at best, and not sufficient in the face of often quite reasonable demands that education and other social priorities in be budget be given a higher priority. Increasing the allocative efficiency of public spending, defined here as bringing the actual spending outturns closer in line with the political priorities of the government of the day, has long been a concern of public finance management. In the remainder of this section, we will discuss four mechanisms that have been used in various countries with the aim of improving allocative efficiency. They are, medium-term budgeting, performance budgeting, fiscal decentralization and hypothecation.

4.1 Medium-term expenditure frameworks

Introducing a medium-term perspective into the budget process has frequently been recommended as tool for shifting spending towards strategic priorities like education. Narrowly defined, a Medium Term Expenditure Framework (MTEF) is a comprehensive, government-wide spending plan that links policy priorities to expenditure allocations within a fiscal framework (linked to macroeconomic and revenue forecasts), usually over a three-year forward-planning horizon. Multiyear budget planning is the defining characteristic of MTEFs. By taking a strategic forward-looking approach to establishing priorities and allocating resources, MTEFs allow the level and composition of public expenditure to be driven by policy priorities and disciplined by budget realities. Thus, if education is underfunded because policy making, planning, and budgeting are disconnected, then a potential solution is an MTEF. In fact, in the 1990s the World Bank and bilateral aid agencies advocated MTEFs precisely because they saw MTEFs as a means to ensure that governments committed sufficient resources to poverty allocation and other development objectives. By 2008, more than two-thirds of all countries have adopted an MTEF with varying degrees of sophistication (Brumby and Hemming, 2013).

When implemented well, MTEFs are expected to offer the prospect of achieving not only allocative efficiency, but also the other two high-level objectives of public expenditure management: aggregate fiscal discipline and technical efficiency. It does this by specifying a clear resource constraint for the budget and by limiting policy initiatives that could later prove unaffordable based on the projected resource constraint in the coming years. MTEFs can also be an important tool for imposing discipline on the management of natural resource revenues. This is because the key features of MTEF- national and sector planning, an emphasis on realistic forecasting and formal constraints on spending- are critical to the effective use of resource revenue (Brumby and Hemming, 2013).

The reality, however, is that many countries with an MTEF do not base budget decisions on it. As a result, the MTEF has been criticized of imposed additional work on overworked country officials without effecting any real change in budgeting. Uganda is an exception as shown in Box 1 and shows that to be effective an MTEF must be designed to work seamlessly with the budget process (Brumby and Hemming, 2013). However, it is one thing to design an integrated MTEF and budget preparation process, but quite another to make it operational.

To make it work, two things are needed: political commitment to a new approach to budgeting, and the necessary skills to implement new responsibilities required by this new approach. The former has often proved difficult to secure given the vested interests that have resulted in spending rigidities, ever expanding budgets and rent seeking. Skill enhancement has also been slow to improve, especially at the level of spending agencies. The experience of Uganda, however, shows that once these conditions are satisfied it is possible to use an MTEF to improve the alignment of intersectoral budget allocations with strategic priorities.

Box 1: Uganda succeeds is improving resource allocations with an MTEF

Uganda was of the first countries to develop an MTEF in 1992. The motivation was to improve budgetary allocations within a hard budget constraint, while maintaining macroeconomic stability. The MTEF was developed gradually, starting with aggregate ceilings for broad economic categories of expenditure. Once macro-fiscal stabilization was achieved, the emphasis shifted to

poverty alleviate and development. The framework has aimed to provide transparent sector allocations aligned with national development priorities guided initially by the Poverty Eradication Action Plan and then by the National Development Plan.

The formulation of the MTEF became an integral part of the annual budget process. Ministry of Finance sets indicative ceilings for sector allocations and then sector working groups propose changes within these ceilings. More specifically, sector working groups review previous expenditure performance and discuss and build consensus on expenditure prioritization and resource allocation for sectors within the MTEF ceilings. Funding priorities that could not be accommodated within sector ceilings are discussed during the interministerial budget meetings. Ultimately, recommendations produced by these consultations are consolidated into a national budget framework paper, and eventually incorporated into the final MTEF published with the annual budget documentation.

In the Ugandan case, there is some evidence that the MTEF has been associated with more reliable expenditure allocations for priority programmes, providing an incentive for better prioritization and planning of expenditure across sectors and programmes. The evidence is most pronounced in the case of education, which grew from 19.8% of total expenditures in 1994/95 to 26.9% in 1997/98 (actual outturns). The MTEF has also improved the predictability of the budget, allowing spending agencies to plan and manage their expenditures better.

Though originally resisted, the MTEF was reinforced by a political commitment to fiscal discipline. The political buy-in, particularly from the President, was central to its success. A critical mass of reform-minded politicians, technocrats and donors was further instrumental in sustaining this reform. Merging the finance and planning ministries also allowed for strong leadership and effective implementation of technical assistance to support this reform.

Adapted from World Bank (2013)

4.2 Performance budgeting

When properly designed and implemented, performance budgeting[15] can be an important instrument for improving expenditure prioritization. Originally introduced in the United States in the 1960s, versions of it exist today in a large number of developed and developing countries with over 80% of African countries introducing, or committed to introducing, some form of performance budgeting (CABRI, 2013a).

By using "formal" performance information[16] to link funding provided to public sector entities to results, this budgetary reform aims to introduce greater rationality into expenditure planning, with the goal of allocating limited funds more effectively to the areas where they will maximize social benefit. In doing so, performance budgeting can overcome the tendency for the "base" funding of established agencies and programs to be automatically renewed in each budget without evaluating whether government priorities have changed significantly. In contrast, a traditional line item budget that presents expenditures mainly by inputs or resources purchased by agencies is less useful for

---

[15] In this section we are referring specifically to programme-based budgeting, which is the most widespread and enduring form of performance budgeting.

[16] "Formal" performance information in this context refers to performance measures, measures of the costs to particular parties of outputs and outcomes, and assessments of the effectiveness and efficiency of expenditure obtained through the use of any of a range of analytic tools.

deciding expenditure priorities. Other advantages associated with performance budgeting include enhanced communication between budget actors, improved public management in terms of efficiency and effectiveness, and greater transparency and accountability.

However, there are several technical and political reasons why performance budgeting has not worked as intended. Firstly, this type of budgeting has a low probability of success if a country's budgeting system has major basic weaknesses such as failing to ensure that ministries stick to their budgets. These weaknesses should be addressed before a government can realistically adopt what is undeniably a more complex version of budgeting. Another critique is that it is not always possible in the public sector to clearly specify intended outcomes and their relationship with outputs and activities. Moreover, performance measures are inherently imperfect, and as a result there is a risk that targets linked to imperfect performance measures could potentially lead to significant adverse behavioral distortions (Smith, 1995). In terms of implementation, several developing countries have adopted unrealistic implementation schedules (as little as a year or two) for this far-reaching reform[17] (Robinson, 2013).

Finally, it is worth noting that the integration of the performance information into the budget documentation does not guarantee that it will be used in decision making. In fact, the impact of performance budgeting on budget outcomes in both OECD and African countries has been very limited to date (Blöndal and Curristine 2004; CABRI, 2013a). Performance budgeting cannot be expected to be a mechanistic, rational system that completely replaces the political process of making resource choices in complex environment of competing demands (Shah and Shen, 2007). Nonetheless it has the potential of facilitating informed political choices if done wisely.

For a developing country, one of the first questions to ask before adopting performance budgeting is whether it is ready for the introduction of such a system (Robinson, 2013). A recent stocktake of performance budgeting in Africa noted that 4 African countries were ready to implement performance budgeting reforms, 19 African countries were partly ready to begin reforms and 8 African countries were not ready to begin implementation (CABRI, 2013a). Mauritius is among the first category and has been widely perceived as having a functioning performance budgeting system due to a series of political and technical enabling factors (See Box 2). Another important lesson from recent reforms is the importance of keeping things simple and avoiding unnecessary or inappropriate techniques such as activity based accounting. Ultimately, the resource and capacity constraints faced by developing countries do not mean that they should abstain from performance budgeting altogether; instead it suggests the importance of getting the basics of an annual budgeting well first and proceeding with a moderate pace thereafter.

Box 2: Mauritius rapid progress in implementing performance budgeting
Compared to some African countries that embarked on performance budgeting reforms more than a decade ago (e.g. Burkina Faso, Mali and Namibia), Mauritius stands out as the only country where considerable progress was made on implementation in a relatively short space of time (CABRI, 2013a). In 2006, the Government of Mauritius decided to implement three-year performance based budgeting as part of the economic reform programme launched in 2005. The two main objectives of this budgeting reform was to improve transparency in the budget process and to shift

---

[17] Similar systems in OECD countries took decades to develop.

budget allocations to performing areas. Since 2008/09, Parliament has approved funds by programme.

The positive impact of this reform on budget preparation and execution process is evident in three areas. It fosters a stronger strategic orientation in the budgeting process with all ministries preparing three-year strategic plans. Budget submissions have also improved, supporting a shift in budget hearings from focusing only on line-items to including a focus on the determination of priorities and services to be delivered. Budgets are also now more transparent. Cabinet and Parliament have better information on the objectives and achievements of spending. Notwithstanding the progress made in these three areas, it is unclear whether these improvements in budget processes have translated into improved budget outcomes (CABRI, 2013b). Implementation is however still in its early stages.

Mauritius' tremendous progress in introducing a functioning performance budgeting system is a result of being able to meet important prerequisites associated with this reform, specifically continuous political support; a well-developed budgeting system prior to the start of reform; avoiding excessive sophistication and complexity in designing the reform; and investing in a massive training/sensitization exercise for civil servants (CABRI, 2013b). However, as noted above, to the extent that only budget processes (rather than results) have improved, the full benefits of performance budgeting have not yet been reaped in Mauritius. The government of Mauritius is therefore implementing new initiatives to consolidate and deepen the performance budgeting reform, with three key objectives: improving the integration of the planning and budgeting framework, enhancing performance information management and strengthening internal and external accountability.

4.3 Fiscal decentralization

Fiscal decentralization reforms have been widely promoted in developed and developing countries in the past three decades partly on the premise that it results in a more efficient allocation of public goods[18]. The rationale is that devolving some responsibilities for expenditures and/or revenues to lower levels of government, which have better information, enables them to tailor more closely their public spending decisions to the needs and preferences of their constituencies (Oates, 1993, 1999). As such fiscal decentralization has the potential to alter the composition of public expenditures.

Although the literature on the relationship between fiscal decentralization and the functional composition of public expenditures is slim, the evidence to date is suggestive of a relationship, particularly in regards to education. Using a sample of 59 developing and developed countries over a period of 30 years, Granado (2012) found that decentralization positively influences the share of government spending toward education (and health) while Faguet (2004) shows that decentralization in Bolivia increased public investment in education (see Box 3). In addition, the empirical evidence suggests that decentralization increased education expenditures in OECD countries (Busemeyer, 2007).

On why local governments in some developing countries have not become responsive under decentralization, several reasons have been cited, including mismatches in the devolution of expenditure and revenue functions, unfunded mandates, and weak local capacity to deliver services or absorb additional fiscal resources (see, for example, Bird and Vaillancourt, 1998). The most

---

[18] The expansion of democratic governance has also driven the wave of decentralization reforms.

frequently-cited problem is the lack of capacity at sub-national levels of government. In Uganda and Tanzania, the lower tiers of government lacked the ability to manage public finances and maintain proper accounting procedures. Since these were a requirement for transferring money to the lower tiers, they actually received less money than before decentralization (Ahamad et al., 2005). Weak accountability mechanisms in some cases have also led to perverse outcomes such as resource allocation inefficiencies, macroeconomic instability, rising regional inequalities, declining service levels, corruptions and elite capture (Tanzi, 2001; Bardhan et al., 2000).

Experience has shown that effective decentralization requires a combination of accountability mechanisms, along with administrative institutional capacities and clearly defined fiscal responsibilities. Such arrangements may encompass both specific rules (e.g. in the design of fiscal transfers) and provision for regular intergovernmental meetings and periodic reviews of intergovernmental arrangements. Detailed central control over local use of funds is seldom appropriate. Instead, what is critical is transparency and accountability to local constituencies supported by strengthened higher level monitoring and reporting of local fiscal performance. All of these results underline the fundamental point that it is not whether a country decentralizes, but how it decentralizes that matters. In some countries, for example, decentralization reforms have followed a "big bang" approach, legal reforms were quickly implemented to transfer roles, responsibilities and powers to newly devolved governments without effective accountability mechanisms, leading to adverse effects (e.g. Indonesia, Pakistan and Philippines). Unlocking the benefits of fiscal decentralization therefore requires proper sequencing and complementary adaptations in institutional arrangements.

Box 3: Decentralization in Bolivia

The Bolivian decentralization reform was announced in 1994 and was largely politically motivated. After decades of dictatorship and neglect of the poorest regions, a need emerged to reorganise government and to recast the relationship between citizens and the state so as to regain the state's legitimacy in the voters' eyes. With the passage of the Popular Participation Law of 1994, public spending and tax collection responsibilities were transferred to the municipalities, and a revenue-sharing regime was also established. It brought about an enormous change in resource flows and political power (Faguet, 2004). For example, prior to decentralization, the three largest and richest districts received more than 85% of the shared revenue, while more than 300 of the remaining municipalities received less than 15%. After the decentralization, these figures changed to 27% and 73%, respectively (Faguet, 2004).

On the expenditure side, decentralization also seems to have changed the sectoral uses of investment and its distribution across space in Bolivia. In the years leading up to reform, central government invested mostly in transport, energy and multi-sectoral projects, which together accounted for 65% of public investment during 1991-93. After decentralization, local governments invested most heavily in education, urban development, and water and sanitation, together accounting for 79% of municipal investment. This lack of overlap of the top three sectors between the levels of government implies that they have very different investment priorities. The evidence for Bolivia further suggests that public investment in education became more responsive to real local needs, rising disproportionately in areas with the worst education indicators (Faguet, 2004).

Nonetheless, Bolivia's decentralization system was plagued by several weaknesses. In particular, changes in financing arrangements for subnational governments were not initially accompanied by a redefinition of spending responsibilities across government levels. Over time, this imbalance severely eroded the flexibility in budget management of the central government and weakened incentives for fiscal discipline (Fedelino, 2010). Heavy reliance on central transfers also undermined subnational incentives to raise revenue through better tax administration. Excessive earmarking of these transfers provided incentives for non-transparent accounting and inefficient spending. Significant overlaps in spending responsibilities in health and education further created inefficiencies and reduced accountability. Recognising these weaknesses, the government formulated a road map for fiscal decentralization with the Law on Autonomies and Decentralization approved in July 2010. Its provisions aim at a sustainable management of local public finances, and reaffirm the need to avoid an increase in consolidated public spending as a result of decentralization.

Although decentralization can lead to a better match between local preferences and budgetary allocations, Bolivia's experience demonstrates the importance of establishing the right timelines and sequencing for the reforms sought. Decentralization is not a one-off policy change; it is an on-going process where the end point of accountable and efficient local governments may well take many decades to achieve.

4.4 Hypothecation/earmarking

In contrast to the previous three mechanisms, earmarking of revenues for specific purposes makes little sense from a budgeting point of view since it potentially induces budgetary rigidity and inefficiency. Nonetheless, by dedicating the revenue from a specific tax to a particular expenditure, earmarking has emerged as a popular mechanism for allocating tax revenues to priority sectors such as education and health. In many developing countries the weak link between tax collection and public service delivery means that there is a tendency to treat the revenue and expenditure sides of the public finance equation as two separate silos. By explicitly joining these silos and fostering dialogues on how taxes should be spent, earmarking is one potential strategy that developing countries can use to increase accountability, trust, tax morale, tax revenues, and ultimately spending in critical areas. Education is especially suited to earmarking as it is an issue that affects a huge number of voters directly and speaks to universal experience, providing more and better schooling has therefore emerged as a priority for political leaders in multiple contexts.

An additional advantage associated with hypothecation includes protecting resources. In countries where education spending is low or subject to erratic bureaucratic decisions, hypothecation might be able to ring-fence resources from competing political interests and can thus ensure a minimum levels of funding for certain expenditures.

Despite these advantages, there are four risks associated with hypothecation: the actual content and implementation of the legal commitments; the impact on the budget process, the risk of fungibility and the quality of oversight. The first risk is that governments may promise to earmark taxes but fail to follow through in practice, which can in turn undermine the tax bargain if citizens' agreed to the tax because of earmarking. The second risk stems from earmarking reducing budgetary flexibility and undermining the budget process as whole. This situation can lead to wasteful and inefficient expenditures if the link between the amount of revenue earmarked to an activity and the actual needs in the area is tenuous. A third concern is that hypothecation may have the opposite effect as intended,

with earmarked funds substituting for existing resources which are shifted elsewhere. In such cases, total funding for earmarked activities might increase by far less that the amount earmarked. All three risks raise the importance of oversight to monitor fungibility, corruption and waste.

Current examples of earmarking in the education sector include India's tax for education and Ghana's GET Fund (see Box 4). Although current examples of earmarking provide no conclusive evidence for or against earmarking, several lessons have emerged that this practice is likely to be successful when it is (i) substantive and specific, guaranteeing actual increases in spending in the designated area; (ii) transparent and easy to monitor; (iii) only a moderate share of the total budget, in order to protect fiscal flexibility and (iv) subject to periodic reviews to assess its continued relevance. Further evidence also suggests that earmarking works better at local government level, where the correspondence between beneficiaries and taxpayers is closer and users can more easily express their preferences by voting. Assuming that these conditions are met, earmarking may be a viable mechanism for increasing government's funding of education in countries where there is urgent need.

Box 4: Ghana devotes a large of its own public spending to education

Established in 2001, Ghana's Education Trust Fund (GET Fund) seeks to deliver State finance to support the delivery of education at all levels. Although the preponderance of evidence indicates that the decision to earmarks funds was a purely a political strategy to reduce public opposition to increased taxes (Prichard, 2015), it has been accompanied by a significant expansion in the government expenditure on education.

Figure 14: Increase in Ghana's expenditure on education
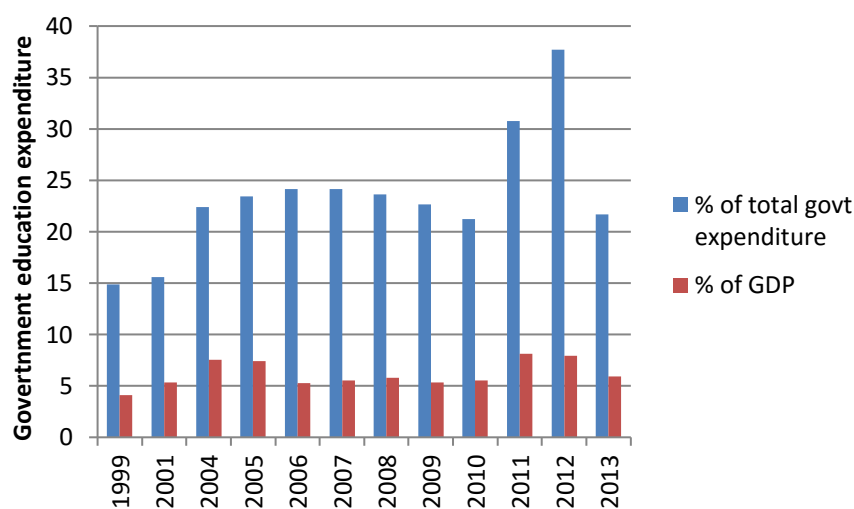
Source: UIS, 2016
Note: Missing years due to gaps in data.

Notably, education funding has expanded more than the amount of the revenues earmarked from the GET Fund. In fact, between 1999 and 2012, public spending on education more than doubled as share of GDP and total government expenditure, reaching 8% and 38% respectively (see Figure 14). However, there is some evidence that earmarked funds were not used for their prescribed purpose: funding non-wage expenditure such infrastructure and scholarships. The share of non-wage expenditure in the core education budgets has actually fallen in later years (Lawson et al.,

---

2007). In addition, despite the Fund being managed by appointed Board of Directors and audited by the Auditor General, it has been beset by detailed accusations that funds are being used beyond the originally prescribed purposes, and that it has suffered from significant corruption (Prichard, 2015).

5. Conclusion and Recommendations

While a majority of governments, particularly in LICs, have given more financial priority to education over the last 15 years, many still allocate very low shares of their GDP and total government expenditure to it. Moreover, while increasing tax revenues are generally associated with greater spending on education, we find little or no evidence that countries which make relatively more use of direct taxes also tend to have higher levels of public education expenditure. Conversely, there appears to be some evidence of a negative correlation between of the size of an economy's mining sector and public education expenditure.   Finally, government spending on education has little correlation with most of the economic, demographic, social and governance-related variables outlined in the literature.

Although our results may be the result of limitations in our empirical strategy, it can also reflect the reality of how allocation decisions are made. Firstly, the allocation of scarce public resource is inevitably political. It is politicians who interpret the relative needs of society, who outline policy preferences to address them and who make electoral promises about how public services will be delivered and which services will expand or contract under their stewardship. Secondly, budgeting tends to be incremental. Annual budgets typically start with the previous year's budget and modify it in an incremental manner, making it difficult to reprioritize policies and spending on an annual basis. As a result, spending patterns become entrenched, even in the face of changing priorities.

Recognition this inertia and the constraints it imposes on a country's developmental process, the Public Financial Management (PFM) community has formulated a range of tools that can potentially improve the process through which resources are allocated amongst competing priorities. This includes fiscal decentralization, performance budgeting and medium-term expenditure frameworks. While these reforms are based on a clear and sound theory of change, decades of experience show that they often fail to deliver the anticipated results. This is largely because of the absence of the necessary technical and political enabling factors. Thus in designing reforms to improve the allocation of government expenditure to priority sectors such as education, we recommend the following:

i. Get the basics right first- The importance of a properly functioning basic budgeting system cannot be overstated.   Before embarking on more complex budgeting reforms such as performance budgeting, a country should operate a reliable budget for inputs, provide relevant information on available resources, and establish a timely budget preparation process that involves all stakeholders (Welham et al., 2013). Incorrect, incomplete and/or untimely fiscal and financial information will make it difficult to develop an effective budget policy and make sensible allocation decisions even if there is political will to do so. In addition, a budget preparation process that effectively engages spending agencies at a technical and political level increases the chances that the right information will be fed into decision-making procedures and thereby inform an efficient allocation. If a country is

unable to get these basics right, it is highly unlikely to succeed in implementing more ambitious reforms.

ii. Take small steps and start simple- Reform is messy in practice and abrupt big bang approaches can disrupt the budget system and undermine the delivery of public services. Excessive sophistication and complexity should also be avoided, especially in low income and/or capacity constrained environments. For example, instead of measuring the entire results chains, a country moving towards performance-based budgeting should perhaps focus on output indicators in the initial phase, as outcome indicators are generally more difficult to formulate and monitor. Piloting reforms in specific sectors is another option.

iii. Adopt a long-term time horizon and do proper planning- As shown by the two country examples, performance budgeting and fiscal decentralization are likely to take many years to implement in full. Due to the complexity of technical and political decisions they involve, these reforms will take time, possible decades before they have the desired impact. Given this long-term horizon, proper plans formulated during a pre-design stage can be beneficial. Simple reform plans, which are not prescriptive, can help set out the objectives and the direction of travel, but they should not be overly not prescriptive (Williamson, 2015). Reform plans can also be used as tools for seeking higher level authorization for ongoing reform processes.

iv. Use political gambits within reason- Out of all the mechanisms considered for altering the composition of government expenditure, earmarking is perhaps the least technically demanding and most capable of producing results in the short term. However, for earmarking to be effective, the government must ensure that the following conditions are met by the earmarked tax: substantive and specific; transparent and easy to monitor; only a moderate share of the total budget, and subject to periodic reviews to assess its continued relevance.

v. Invest in transparency and accountability- Although our data shows a weak relationship between measures of budget transparency and government's spending on education, all of the abovementioned mechanisms and the budgeting process in general are more likely to produce socially desirable outcomes if they are underpinned by transparency and accountability structures. These structures can discourage political actors from violating the rules, and include parliamentary oversight, active civil society, independent courts, and a free press. An area of particular weakness is the oversight of budget performance by the legislature. This should be enhanced through an active post-budget examination of external audit reports. However, in some African countries (e.g. Republic of Congo, Liberia and Tunisia), the Supreme Audit Institution's (SAI) reports are never made public (CABRI, 2013a).

vii. Balancing allocative efficiency with fiscal discipline- The budget process is generally evaluated against three objectives: fiscal discipline, allocative efficiency, and operational efficiency. By focusing on shifting resources from old priorities to new ones, or from less to more productive uses in correspondence with the government's objectives, this report essentially focused on improving allocative efficiency. However, this is only one objective and is often not the most important one for the finance ministry. Reforms that increase government spending on education but potentially undermine fiscal discipline are unlikely to be financially sustainable. Moreover, this threat of fiscal imbalance may undermine the finance ministry's buy-in into these reforms. At the same time, it is

worth noting Improving spending efficiencies could help improve educational outcomes without additional financial burden on government budget

viii. Develop a deeper understanding of political calculations and motivation surrounding budget allocation process- A number of the country case studies also underline the need for political leadership. Undoubtedly, strong political leadership will facilitate change in almost any setting, yet it is often absent, indifferent or short-lived. Where this does not exist, governments should not simply abandon reform processes. In these circumstances, politically-astute technocrats should take centre stage as instrumental agents in the reform process (Hedger et al., 2007). At the same time, it is difficult to drive reform from the top down. For reforms with major political implications, potential champions or leaders of reform cannot reform alone, and will need to build coalitions of support (Williamson, 2015). A minister or top-level bureaucrat needs to identify and work through mid-level bureaucrats and other colleagues, if he or she is to effect change.

References

Arze del Granado, Martinez-Vazquez, J. and McNab, R. 2005. "Fiscal decentralization and the functional composition of public expenditures." International Studies Program Working Paper Series, at AYSPS, GSU.

Bardhan, P., & Mookherjee, D. (2000). "Capture and governance at local and national levels." American Economic Review Papers and Proceedings, 90: 135-139.

Baumgartner, F.R. et al. 2014. "Punctuated equilibrium theory: Explaining stability and change in public policy" in C.M. Weible and P.A. Sabatier (eds.), Theories of the Policy Process (3rd ed.). Boulder, CO: Westview Press, pp. 59-103.

Baumgartner, F.R. et al. 2009. "Punctuated equilibrium in comparative perspective." American Journal of Political Science, 53 (3): 603-620.

Bird, Richard M., and Francois Vaillancourt, eds. 1998. Fiscal Decentralization in Developing Countries. Cambridge: Cambridge University Press.

Blöndal, Jón R. and Teresa Curristine. 2004. "Budgeting in Chile." OECD Journal of Budgeting, 4:2, pp. 7-45.

Brumby, J. 2007. Improving Allocative Efficiency. Performance Budgeting. M. Robinson. Washington, D.C., International Monetary Fund: 144-166.

Busemeyer, M. R. 2007. Determinants of public education spending in 21 OECD democracies, 1980–2001. Journal of European Public Policy, 14(4), 582–610.

CABRI. 2013a. Performance and programme-based budgeting in Africa: A status report.

CABRI. 2013b. The programme-based budgeting reform in Mauritius Preconditions, achievements and challenges ahead. Briefing Paper.

Carter, P and A. Cobham. (forthcoming). Are Taxes good for health? UNU-Wider.

CIDA. 2012. Civil Society Organizations: Building More Inclusive Partnerships in Aid Effective Approaches to Education. Quebec, Canada, Canadian International Development Agency. (Aid Effectiveness and Quality Education.)

Davis, Otto A., M. A. H. Dempster, and Aaron Wildavsky. 1966. "A Theory of the Budget Process." American Political Science Review 60:529–547.

Edwards, R. B. 2016. Mining away the Preston curve. World Development 78, 22 – 36.

Faguet, J. P. 2004. "Does decentralization increase government responsiveness to local needs? Evidence from Bolivia", Journal of Public Economics, Vol. 88 No. 4, pp. 867-893.

Fedelino, A. 2010. Making Fiscal Decentralization Work. Occasional Paper No. 271.

Fukada-Parr, S., P. Guyer, and T. Lawson-Remer. 2011. Does Budget Transparency Lead to Stronger Human Development Outcomes and Commitments to Economic and Social Rights? IBP Working Paper No 4.

Global Campaign for Education. 2012a. Civil Society Education Fund Closing Report. Johannesburg, South Africa, Global Campaign for Education.

Global Campaign for Education. 2012b. Gender Discrimination in Education: The Violation of Rights of Women and Girls. Johannesburg, South Africa, Global Campaign for Education.

Granado, A., F. J., et al. (2012). Decentralized Governance and Preferences for Public Goods. https://mpra.ub.uni-muenchen.de/42459/1/Decentralized_Governance_and_Preferences_for_Public_Goods_manuscript _.pdf

Hauk, William R., J. and R. Wacziarg (2009). A Monte Carlo study of growth regressions. Journal of Economic Growth 14(2), 103–147.

Hedger, E. and Z. Kizilbash. 2007. Reforming public financial management when the politics aren't right: A proposal. ODI.

IFPRI. 2015. Statistics of public expenditure for Economic Development (SPEED).

Kraan, D.-J. and J. Kelly. 2004. Reallocation: The Role of Budget Institutions. Paris, OECD Publishing.

Lawson, Andrew; Boadi, Gyimah; Ghartey, Ato; Ghartey, Adom; Killick, Tony; Agha, Zaniab Kizilbash and Williamson, Tim (2007) Joint Evaluation of Multi- Donor Budget Support to: Evaluation Results and Recommendations on Future Design and Management of Ghana MDBS, Accra: Ghana Centre for Democratic Development.

Ossowski, R. 2013. Managing Non-renewable Resource Revenues. In Handbook of Public Financial Management, eds. Richard Allen, Richard Hemming and Barry Potter. Basingstoke: Palgrave Macmillan,XX-XX.

Pesaran, H., R. Smith, and K. S. Im (1996). Dynamic linear models for heterogenous panels. In L. Matyas and P. Sevestre (Eds.), The Econometrics of Panel Data: Handbook of Theory and Applications. Dordrecht: Kluwer Academic Publishers.

Prichard, W. 2015. Taxation, Responsive and Accountability in Sub-Saharan Africa: The Dynamics of Tax Bargaining

Prichard, W. (2010) Taxation and state building: towards a governance-focused tax reform agenda. IDS working paper 341, Brighton: Institute of Development Studies.

Robinson, M. 2013. Performance Budgeting. In Handbook of Public Financial Management, eds. Richard Allen, Richard Hemming and Barry Potter. Basingstoke: Palgrave Macmillan,XX-XX.

Shah, A. and C. Shen. 2007. A Primer on Performance Budgeting. In Budgeting and Budgetary Institutions, ed. Anwar Shah. Washington: World Bank.

Stasavage, D. 2003. Democracy and Education Spending: Has Africa's Move to Multiparty Elections Made a Difference for Policy?

Steer, L. and K. Smith. 2015. Financing education: Opportunities for global action. Brookings Institute.

Shah, A. and C. Shen. 2007. A Primer on Performance Budgeting. Budgeting and Budgetary Institutions. A. Shah. Washington, D.C., World Bank 137-176.

Tanzi, V. 2001. Pitfalls on the Road to Fiscal Decentralization. Carnegie Working Paper No. 19. http://carnegieendowment.org/files/19Tanzi.pdf

UNESCO. 2015. Education for All: Achievements and Challenges 2000-2015. EFA Global Monitoring Report.

Welham, B, E. Hedger and P. Krause. 2013. Linking PFM dimensions to development priorities. Working Paper 380. Overseas Development Institute.

Wildavsky, A.B. and N. Caiden. 2004. The New Politics of the Budgetary Process. New York, Pearson/Longman.

Williamson, T. 2015. Change in challenging contexts: How does it happen? Overseas Development Institute.

World Bank. 2013. Beyond the Annual Budget: Global Experience with Medium-Term Expenditure Frameworks.

World Bank. 2010. The Education System in Malawi. Washington, DC, World Bank. Working Paper, 182.

Appendix

Annex 1: Public expenditure on education based on 2015 income classification for all years

Figure A.1: Public expenditure on education (% of GDP), 2000-2012 based on 2015 income classification
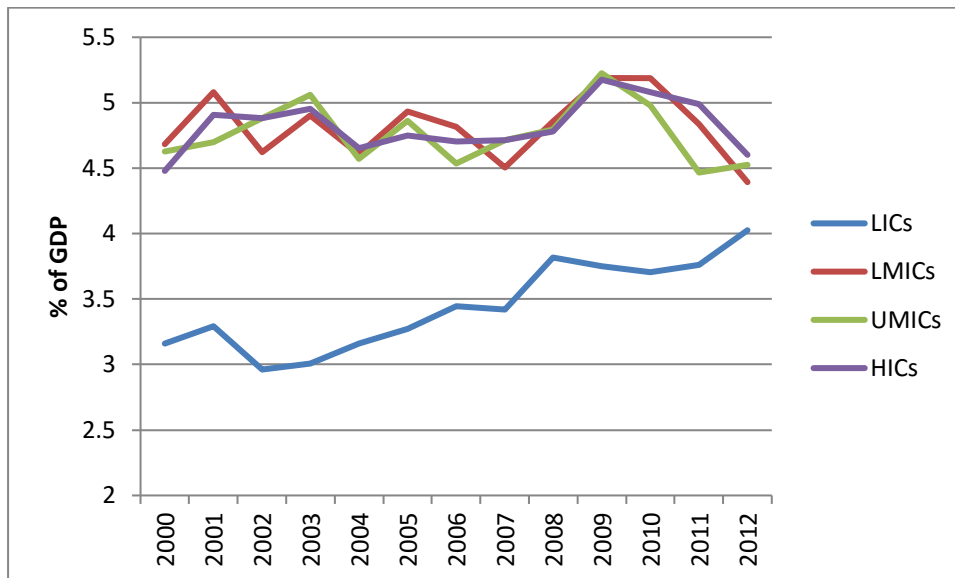
Source: WDI, 2016

Figure A.2: Public expenditure on education (% of total government expenditure), 2000-2012 based on 2015 income classification
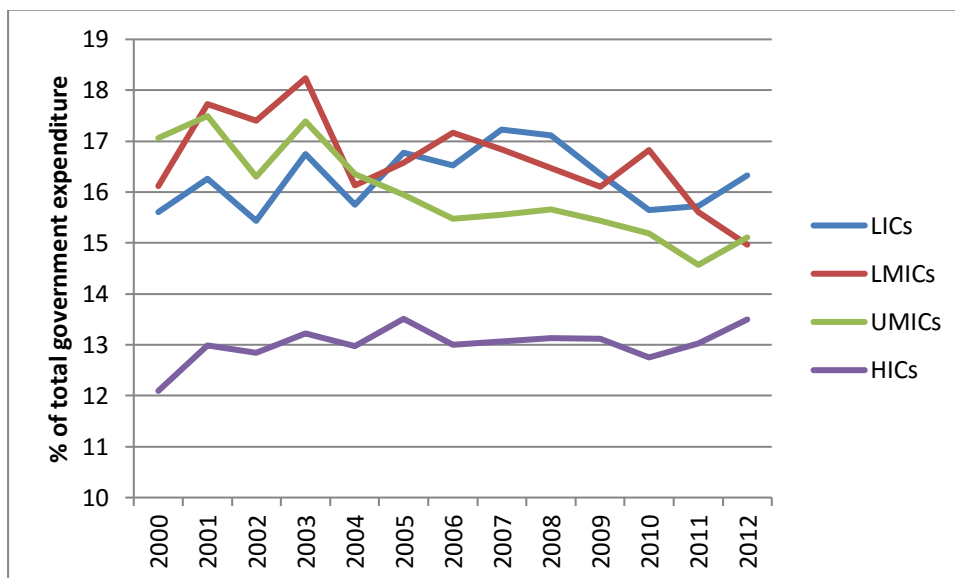
Source: WDI, 2016

Figure A.3: Breakdown of public expenditure by level of education in 2000, 2005 and 2012 based on 2015 income classification

Source: UNESCO Institute for Statistics

Annex 2: Definitions and Sources of Variables

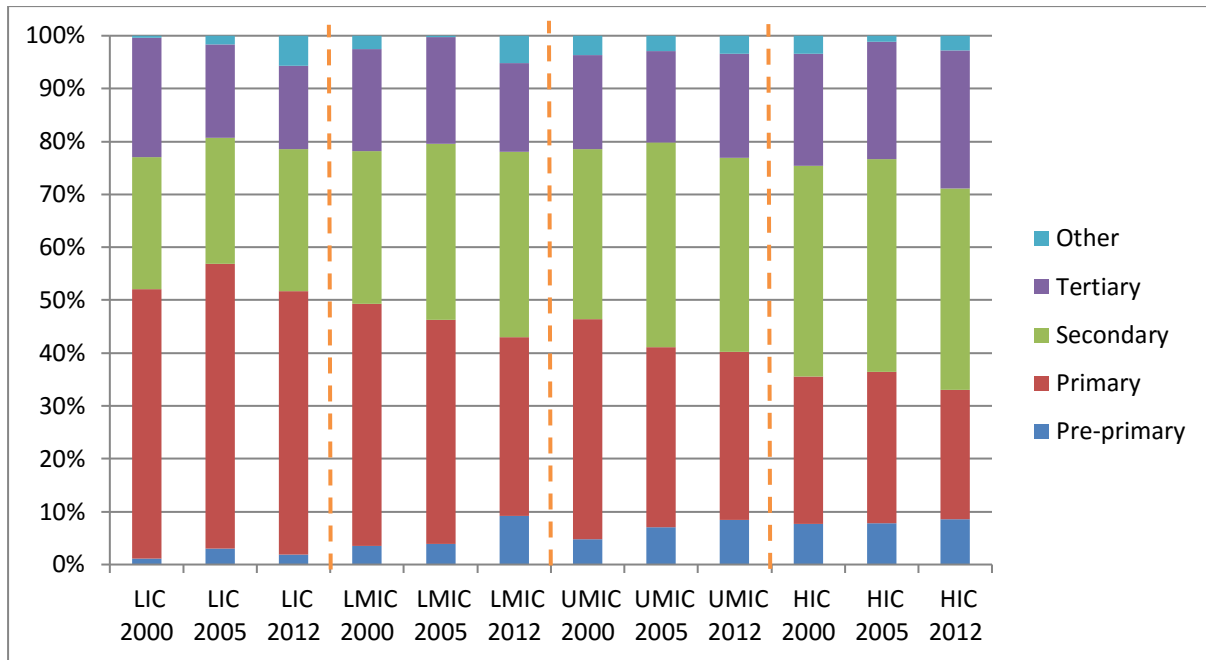| Variable	Description	Source
ECONOMIC AND PUBLIC FINANCE		
GDP per capita, PPP (constant 2011 international $)	GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates.	World Development Indicators, 2016
General government expenditure (% of GDP)		International Monetary Fund, World Economic Outlook Database, April 2016
Government education expenditure (% of GDP)	General government expenditure on education (current, capital, and transfers) is expressed as a percentage of GDP. It includes expenditure funded by transfers from international sources to government.	World Development Indicators, 2016
Government education expenditure (% of total government expenditure)	General government expenditure on education (current, capital, and transfers) is expressed as a percentage of total general government expenditure on all sectors (including health, education, social services, etc.). It includes expenditure funded by transfers from international sources to government.	World Development Indicators, 2016
Expenditure on pre-primary as % of government expenditure on education	Expenditure on education by level of education, expressed as a percentage of total general government expenditure on education.	UNESCO Institute for Statistics
Expenditure on primary as % of government expenditure on education	Expenditure on education by level of education, expressed as a percentage of total general government expenditure on education.	UNESCO Institute for Statistics
Expenditure on secondary as % of government expenditure on education	Expenditure on education by level of education, expressed as a percentage of total general government expenditure on education.	UNESCO Institute for Statistics
Expenditure on tertiary as % of government expenditure on education	Expenditure on education by level of education, expressed as a percentage of total general government expenditure on education.	UNESCO Institute for Statistics
Tax revenue (% of GDP)	Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are	World Development Indicators, 2016

Variable	Description	Source
	excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue.	
Non-Resource tax including social contributions	Total non-resource tax revenue, including social contributions. Calculated as "Taxes including social contributions" minus "resource taxes"	ICTD Government Revenue Dataset
Total Resource Revenue	Total natural resource revenues, including natural resource revenues reported as "tax revenue" or "non-tax revenue". Natural resources are here defined as natural resources that include a significant component of economic rent, primarily from oil and mining activities.	ICTD Government Revenue Dataset
Mining share	Instrument the contribution of mining to value-added in 2005 with national per capita fossil fuel reserves	Edwards (2006)
Grants	Total grants received by the government	ICTD Government Revenue Dataset
SOCIAL		
Birth rate, crude (per 1,000 people)	Crude birth rate indicates the number of live births per 1,000 midyear population.	World Development Indicators, 2016
Population ages 0-14 (% of total)	Population between the ages 0 to 14 as a percentage of the total population. Population is based on the de facto definition of population.	World Development Indicators, 2016
School enrollment, primary (% gross)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to primary level of education shown.	World Development Indicators, 2016
GOVERNANCE-RELATED		
Open Budget Index (OBI)	Assesses the content and timely release of eight key budget documents that all countries should issue at different points in the budget process, according to international standards on public financial management developed by the IMF, the Organization for Economic Cooperation and Development (OECD), and the World Bank	International Budget Partnership Open Budget Survey
Voice & Accountability	Voice and accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	World Development Indicators, 2016

Annex 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Government education expenditure (% of GDP)	1,913	4.56	1.89	0.00	15.62
Government education expenditure (% of total government expenditure)	1,599	15.01	4.99	3.22	44.80
Pre-primary (% of education expenditure)	1,058	6.75	4.92	0.01	28.09
Primary (% of education expenditure)	1,145	34.88	12.60	0.69	74.36
Secondary (% of education expenditure)	1,130	35.42	9.66	7.45	67.86
Tertiary (% of education expenditure)	1,271	20.19	7.91	1.10	68.14
Total government expenditure (% of GDP)	3,315	31.18	13.42	0	176.84
GDP per capita	3,700	15,700	18,966	247	136,135
Tax (% of GDP)	1,935	17.00	8.32	0.02	65.90
Non-resource tax (% of GDP)	3,156	19.48	11.07	0.30	62.83
Resource revenue (% of GDP)	786	13.49	14.09	0.01	70.98
Mining share	2621	7.26	14.21	0	91.95
Grants (% of GDP)	2,454	3.17	7.44	0.00	150.54
Open Budget Index	338	42.38	24.21	0.00	93.16
Voice & Accountability	3,214	-0.03	1.00	-2.28	1.83
Primary Gross Enrolment	2,931	101.52	15.92	21.12	165.19
Population <15 years	3,881	30.91	10.73	11.76	50.41

Annex 4: Controlling for total government expenditure (% of GDP)

As discussed in Section 3.4, for reasons of possible multicollinearity, we do not control for both tax and government expenditure in the same regression models in Tables 3 and 4. Tables A.1 and A.2 below therefore report the results of the modified regression models in Tables 3 and 4, in which we include government expenditure, and not tax (% of GDP). Like tax (% of GDP), we find a positive and statistically significant association (at the 1% level) between education expenditure (% of GDP) and total government expenditure (% of GDP) in Table A.1. Moreover, the size of the co-efficient also increases when we restrict the observations to the sample of countries which are LICs and LMICs in Models 3c and 3d. On average, countries which have more public resources relative to the size of the economy appear to spend more on education (% of GDP).

Table A.1: Regressions with education expenditure (% of GDP) as dependent variable

VARIABLES	OLS Model 1c	OLS Model 2c	OLS Model 3c	Fes Model 1d	Fes Model 2d	FEs Model 3d
Ln GDP per capita	0.208	-0.145	0.0641	0.224	-0.0731	0.0719
	(0.255)	(0.159)	(0.278)	(1.198)	(0.338)	(0.700)
Govt expenditure (% of GDP)	0.0921***	0.0750***	0.141***	0.0580	0.0562***	0.143***
	(0.0200)	(0.0128)	(0.0240)	(0.0385)	(0.00985)	(0.0248)
Population (<15 years)	0.0561*	0.0324*	0.0330	-0.138	-0.0278	0.0112
	(0.0305)	(0.0194)	(0.0288)	(0.109)	(0.0278)	(0.0543)
Primary enrolment	0.0151	0.00746	0.00409	-0.0174	0.0185***	0.00918
	(0.0107)	(0.00756)	(0.00699)	(0.0173)	(0.00530)	(0.00774)
Open Budget Index	0.00459			0.00609		
	(0.00793)			(0.0134)		
Voice & Accountability		0.487***	0.441		0.282	0.0916
		(0.156)	(0.270)		(0.249)	(0.393)
Constant	-3.551	1.739	-1.187	6.510	2.383	-1.121
	(3.506)	(1.966)	(3.314)	(12.41)	(3.686)	(7.061)
Observations	140	506	208	140	506	208
R-squared	0.259	0.279	0.393	0.228	0.164	0.281
Number of countries	87	162	68	87	162	68
Country income classification	ALL	ALL	LICs & LMICs	ALL	ALL	LICs& LMICs

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

On the other hand, comparing the results in Table 3 and Table A.2, there are some important differences worth noting when education expenditure (% of total government expenditure) is the dependent variable. Firstly, unlike the OLS estimates in table 4, which found a positively, statistically significant correlation between this measure of education expenditure and the tax variable, the OLS estimate of the association between education expenditure and government expenditure is negative and statistically significant in Models 4c and 5c. This may suggest as the size of a country's budget increases, education expenditure becomes less of a priority relative to other sectors. The FEs estimates also remain negative but are also statistically insignificant in Models 4d, 5d and 6d.

Table A.2: Regressions with education expenditure (% of total government expenditure) as dependent variable

VARIABLES	OLS Model 4c	OLS Model 5c	OLS Model 6c	FEs Model 4d	FEs Model 5d	FEs Model 6d
Ln GDP per capita	1.151	-0.231	0.903	3.547	-0.541	0.592
	(0.816)	(0.490)	(0.871)	(3.356)	(1.185)	(2.516)
Govt expenditure (% of GDP)	-0.112**	-0.129***	0.00396	-0.161	-0.0616	-0.0306
	(0.0522)	(0.0340)	(0.0594)	(0.109)	(0.0415)	(0.0891)
Population (<15 years)	0.198**	0.123**	0.137	0.140	0.0204	0.126
	(0.0954)	(0.0580)	(0.0856)	(0.317)	(0.0967)	(0.204)
Primary enrolment	0.0165	0.0198	0.0112	-0.0590	0.0420**	0.0353
	(0.0351)	(0.0254)	(0.0262)	(0.0487)	(0.0183)	(0.0282)
Open Budget Index	0.00717			0.0393		
	(0.0257)			(0.0375)		
Voice & Accountability		1.258***	0.879		0.713	0.678
		(0.475)	(0.825)		(0.859)	(1.419)
Constant	0.110	15.02**	3.070	-11.41	16.60	4.312
	(10.88)	(6.065)	(9.385)	(34.93)	(12.93)	(25.50)
Observations	137	468	198	137	468	198
R-squared	0.181	0.192	0.041	0.114	0.025	0.019
Number of countries	86	159	67	86	159	67
Country income classification	ALL	ALL	LICs & LMICs	ALL	ALL	LICs & LMICs

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

the
Education
Commission

The International
Commission
on Financing Global
Education Opportunity

educationcommission.org