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Abstract

Using panel data of African countries from 1990 to 2002, this paper studies the relationship between government expenditure on education enrolments, with illustration from Nigeria and other SANE (South Africa, Algeria, Nigeria, and Egypt) countries at the primary and secondary school levels. The results show that government expenditure on education has a positive and significant direct impact on primary and secondary education enrolment rates. Among the SANE, Nigeria has the greatest positive influence on increasing both primary and secondary education enrolment rates. The paper also finds that other policy interventions, such as consolidating and sustaining democracy, accelerating national income, and international community fulfilling its aid promises to Africa, can also be helpful in moving African countries (including the SANE) toward the Millennium Development Goals (MDGs). As such, higher expenditure alone is not sufficient to achieve the MDGs or to attain higher quantum and quality of human capital.

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I. INTRODUCTION

There is increasing empirical evidence that education matters, not only for the personal development, health status, social inclusion and labour market prospects of individual learners, but also for the broader economic performance of countries (OECD/UIS, 2003; 2006). As the world has entered the age of the knowledge economy, education and human capital generally play a critical role in driving economic growth in both the world's most advanced economies and the emerging economies that are currently experiencing profound transformations and periods of rapid growth and development.

Indeed, the role of human capital in fostering economic development is well recognized in the literature. Thus, the justification for higher government expenditure on education is often based on its impact on (a) individuals' lifetime incomes (i.e., the social rate of return) (see, for example, World Bank, 1995; Psacharopoulos, 1985, 1994; Anyanwu, 1996, 1998a); (b) economic growth (Levine and Renelt, 1992; Mankiw et al., 1992; Anyanwu, 1998b; Barro and Sala-i-Martin, 1995; Barro, 1996a, b; Sala-i-Martin, 1997; Duflo, 2001; and Coulombe et al, 2004; and (c) fostering economic development and poverty reduction in general (Romer, 1986; Lucas, 1988; Squire, 1993; Ravallion and Chen, 1997; Sen, 1999; and Schultz, 1999. On education capital and growth, Bassanini and Scarpetta (2001), Bils and Klenow (2000), and Sianesi and Van Reenen (2003) estimate that an additional year of schooling raises the growth rate by 0.3 to 3 percentage points per year.

Measures of educational attainment reflect the knowledge and skills, or human capital, of the population. Recent research shows that the impact of human capital and education on economic growth in World Education Indicators (WEI) countries may be even stronger than in OECD countries (OECD/UIS, 2003). Overall, the WEI (OECD/UIS, 2003) study results indicate that for every single year that the average level of schooling of the adult population is raised there is a corresponding increase of 3.7 percent in long-term economic growth.

Education has also been found to play a crucial role in the adoption of new agricultural technologies (Foster and Rosenzweig, 1996). In addition, education is seen as a means to improve health and reduce fertility (Schultz, 1999 and 2002; Strauss and Thomas, 1995), being an intrinsic good in itself (Sen, 1999). Behrman (1999), and Glewwe (2002) provide recent reviews of the microeconomic literature on the impact of education on income and other outcomes in developing countries.

This support for education among economists is matched by equal or greater enthusiasm among development policymakers (UNDP, 1990; World Bank, 2001). One example demonstrating the focus policymakers have placed on education is that two of the eight Millennium Development Goals (MDGs) adopted at the United Nations Millennium Summit in September 2000 focus on education: first, for all children to complete primary school by 2015, and second, to achieve gender equality at all levels of education by 2015. The Millennium Declaration also stressed the special needs of Africa, and called upon

African governments to promote gender equality and the empowerment of women as effective ways to combat poverty, hunger and disease and to stimulate development that is truly sustainable and to develop and implement strategies that give young people everywhere a real chance to find decent and productive work. Further, they called on nations to support the consolidation of democracy in Africa and assist Africans in their struggle for lasting peace, poverty eradication and sustainable development, thereby bringing Africa into the mainstream of the world economy.

As Al-Samarrai (2006) had amplified, the World Education Forum restated these international commitments in its 2000 Dakar meeting and through the resulting Dakar Framework and the Education For All (EFA) goals went further and incorporated aspects of quality into the targets (). The mobilization of national resources to increase investment in basic education is seen as critical to achieving these goals. The central importance of resources is highlighted by bold claims asserting that lack of resources will not be a constraint to achieving good quality primary education for all. It is clear that the Dakar framework treats increasing resources as a key strategy for achieving primary education for all. But the relationship between resources and education outcomes is less clear. Some countries which allocate lower than the regional average proportions of gross domestic product (GDP) to primary and secondary education achieve good education outcomes; in other countries, higher than average spending results in poorer outcomes.

The African Union Assembly at its 7th Ordinary Session, July 2006, in Banjul, The Gambia, reiterated its commitment to the MDGs by recommending concrete measures for scaling up efforts to meet the goals. African Ministers of Finance, Economic Planning and Development as well as the key sector Ministries have consistently placed the MDGs at the center of their Conferences and Meetings, particularly since 2005, after the renewed commitment by African leaders to achieving the MDGs.

September 2007 marks the midpoint on the road to 2015, the date set by world leaders for achieving the Millennium Development Goals (MDGs). This moment affords a solemn reminder to African governments and their development partners that time is fast running out and that the period for international commitment to meet the MDGs through needed investments and policies will soon be past (AU, ECA, and AfDB, 2007).

A crucial issue in this regard is the role of public policy in helping countries meet the MDGs. In most countries, the public sector plays a dominant role in providing the educational and health services necessary to build human capital. As such, the impact of this spending on social indicators that might help countries meet the MDGs (via their salutary effects on economic growth) is of great interest. While positive externalities or market failures may justify the involvement of the public sector in these areas, this does not, in itself, indicate that higher spending *per se* is the most effective or the only policy intervention for helping meet the MDGs. The growing focus on the Millennium Development Goals (MDGs) has further highlighted the importance of making tangible progress in indicators of human capital measured on the basis of key education and health indicators.

With the introduction of the heavily Indebted Poor Countries (HIPC) Initiative in 1996 and its enhanced version in 1999, greater priority has been placed by aid providers on visibility and timely improving social sectors in recipient countries, while still emphasizing economic growth as indispensable for raising living standards across all income levels (Lopes, 2002). The reality of Africa (especially sub-Saharan Africa (SSA)) contributed to this new combined approach, since it is the region of the globe where economic growth and social conditions have improved the least in spite of all the international efforts on its behalf.

Against this background, public expenditure, being the most readily available policy instrument for provision of social services has come under increasing scrutiny in African countries. Both the introduction of Poverty Reduction Strategy papers (PRSPs) and the enhanced HIPC are partly meant to identify social priority areas to enable governments to better target and monitor their resources, especially external assistance funds made available explicitly for social purposes. These initiatives have been further boosted by the outcome of the G-8 Gleneagles meeting in 2005 and the subsequent introduction of the Multilateral Debt Relief Initiative (MDRI). Thus, increasingly, the focus of international development assistance to Africa has turned to improving social conditions in the continent. This has led to greater interest in government social expenditure policies and how they affect social priority areas.

The causal relationship between educational expenditures and school enrolment continues to attract the attention of many. However, despite decades of intensive study, there is no general consensus regarding the effectiveness of monetary educational inputs for student outcomes (see Anyanwu, 1998c for a review). In particular, papers that summarize the debate on the effects of public education expenditures often advocate conflicting views. For example, Card and Krueger (1996), Greenwald et al. (1996), and Krueger (2003) are in favour of the effectiveness of public education expenditures; Betts (1996), and Hanushek (1986, 1997, 2003), and Al-Samarrai (2003, 2006) cast doubt on the conclusion of these researchers, with the latter asserting that education expenditures negatively and significantly affect educational access and performance.

The aim of this paper is to explore whether differences in the resources allocated to education can explain differences in educational access across African countries. The paper attempts to shed light on the effectiveness of educational expenditures by examining the effect of public educational expenditures as a percentage of gross domestic product (GDP) on school enrolment. Specifically, we investigate the effects of the public education expenditures on primary and secondary education enrolment in Africa, with illustrations from Nigeria and other “Africa’s G-4” or the SANE (South Africa, Algeria, Nigeria, and Egypt) countries that have recently been designated African “growth poles” akin to what the BRIC (Brazil, Russia, India, and China) are to the developing world. In particular, Oshikoya (2007) and Kasekende et al. (2007) had observed that the SANE represent almost a fifth and a third of the African continent’s land mass and population, respectively, accounting for slightly more than half of the continent’s total GDP in both nominal and purchasing power parity terms. These countries, apart from being coastal states with large market size and blessed with huge natural resources, also share half of

Africa's exports, trade balance, foreign direct investment, and foreign reserves (see Tables 1 and 2). These factors qualify them as Africa's critical growth poles with the potential of spurring development within their immediate environments, and ultimately, all over Africa. These are happening at a time that President Umaru Musa Yar'Adua of Nigeria, on 18 July 2007, raised alarm that Nigeria's education sector was in danger and warned that unless urgent measures were taken by all stakeholders, the country's human capital need would not be met. Particularly, he called on the Parent-Teachers' Association (PTA) and indeed all Nigerians to join his administration in its efforts to address the problems of the sector; insisting that the educational sector is facing great challenges, considering the sheer number of children needing education, the inadequate resources available and the quality of education being offered (see Lohor, 2007).

The paper therefore seeks to contribute to the discussion on the role of government expenditure on education in Africa, with illustrations from Nigeria and other SANE economies, by analyzing linkages between such education expenditure and primary and secondary education enrolments and to draw some policy implications. For that purpose, a regional panel data set was put together for econometric testing, using public education expenditure as percent of GDP and gross primary and secondary education enrolment rates. On the basis of the evidence from these tests, conclusions are drawn on the relative relevance of public education expenditure for policy-making purposes.

The remainder of the paper is structured as follows. In Section II, a review of the existing literature is provided. In Section III, an explanation of the model and data is given. Section IV provides the empirical results. Section V concludes the paper with the policy implications.

Table 1: The Relative Importance of SANE Economies

	Indicators	SANE Economies					Rest of Africa		
		South Africa	Algeria	Nigeria	Egypt	SANE	Landlocked countries	Coastal countries	Total Africa
1.	Area (thousand km ²)	1,221	2,382	924	1,001	5,528	10,324	14,455	30,307
2.	Population (millions)	48	33	134	75	291	284	349	924
	Share of Africa (percent)	5	4	15	8	32	31	38	100
3.	Nominal GDP (US\$ billions)	262	128	120	104	613	95	385	1,093
	Share of Africa (percent)	24	12	11	10	56	9	35	100
4.	GDP (US\$ billions PPP)	605	256	186	327	1,373	326	905	2,605
	Share of Africa (percent)	23	10	7	13	53	13	35	100
5.	Annual GDP GROWTH RATE 1977-2006(percent)	3	4	4	5	4	3	5	4
6.	Investment ratio (gross capital formation, percent of GDP)	19	31	20	18	21	21	20	21
7.	Gross national savings (percent of GDP)	13	56	36	20	28	17	26	23
8.	Foreign reserves (US\$)	23	82	49	23	176	15	122	314
	Share of Africa (percent)	7	26	16	7	56	5	39	100
9.	Trade balance (US\$ billions)	4	40	33	-11	57	2	17	72
10.	Current account balance (US\$ billions)	14	31	19	2	38	3	24	35
11.	Share of African exports (percent)	16	16	16	5	52	6	42	100
12.	Share of African imports (percent)	23	8	10	10	50	9	41	100
13.	Export growth 1997-2006 (percent)	4	5	3	10	4	5	6	5
14.	Import growth 1997-2006 (percent)	7	12	6	7	6	5	7	9
15.	FDI (US\$) millions)	6,379	1,081	3,403	5,376	16,239	3,459	10,971	30,669
	Share of Africa (percent)	21	4	11	18	53	11	36	100

Source; Oshikoya (2007)

Table2: Economic indicators for the SANE and BRIC economies (2005)

Economies	Population (millions)	National GDP (US\$ billions)	GDP per capita (US\$)	FDI (US\$ millions)
Sane Economies				
South Africa	48	240	5,100	6,379
Algeria	33	102	3,086	1,081
Nigeria	134	99	678	3,403
Egypt	75	93	1,315	5,376
SANE total	290	534	10,178	16,239
SANE average per capita income			1,841	
BRIC ECONOMIES				
Brazil	184	792	4,315	15,066
Russia	143	763	5,348	14,600
India	1,094	775	714	6,598
China	1,308	2,225	1,703	72,406
BRIC total	2,729	4,555	12,080	108,270
BRIC average per capita income			1,669	

Source: Kasekende et al. (2007)

II. REVIEW OF THE LITERATURE

From the mid-1990s, a number of studies have investigated the effectiveness of public spending in education such as enrolment rates and other outcome indicators (Anand and Ravallion, 1993; Appleton *et.al.*1996; Filmer and Pritchett, 1997; Mingat and Tan, 1998; Gupta *et.al.*, 2002; Baldacci *et.al.*, 2004; among others). The results of these cross-country regressions are mixed. Based on cross-sectional data for developing countries, Baldacci et al. (2003) and Gupta et al. (2002) find that social spending is an important determinant of education outcomes. These studies find that the effect of social spending on education outcomes is stronger in cross-sectional samples than when the time dimension is also added. They also find that education spending has a greater effect on social indicators than health outlays. The positive effect of social spending on social indicators is also supported by Anand and Ravallion (1993), Psacharopoulos (1994), Hojman (1996), Bidani and Ravallion (1997), Lopes 2002), and Psacharopoulos and Patrinos (2002). However, after correcting for quality, Gallagher (1993) finds that public spending has a positive impact on educational attainment. A similar analysis at the state level in India has been carried out by Kaur and Misra (2003). For 15 non-special category states, their empirical findings from a panel data analysis of social sector expenditure and attainment indicates that public expenditure on education has been more productive as compared to health, and this relationship is stronger for relatively poorer states.

At the same time, a number of studies have found insignificant or very weak linkages between public education outlays and education indicators ((Noss (1991), Mingat and Tan (1992 and 1998), and Flug, Spilimbergo, and Wachtenheim (1998)). Other variables such as per capita income, urbanization, demographic profile as well as income inequality also turn out to be statistically significant in cross-country regressions. Anand and Ravallion's (1993) empirical results indicated that there was no significant relationship between education outcomes and public spending on education.

McMahon (1999) finds a negative and significant relationship between per pupil expenditures and the primary gross enrolment rate, and a positive and significant impact of total education expenditure as a proportion of GNP. The results of the McMahon study suggest that increasing primary education expenditure while holding per pupil expenditures constant, has a positive and significant impact on the primary gross enrolment rate. However, this study does not include income per capita as a separate explanatory variable, and it may be the case that these resource variables are proxying for income per capita. The Colclough with Lewin (1993) study includes an income per capita variable, and finds that expenditure as a proportion of GNP is not significant when entered separately. Wössmann (2001) reports that coefficients on per pupil expenditures are negative and statistically significant in his regressions although he does not report these results in his paper.

Thus, the relationship between educational outcomes and resources thus varies across studies, and where resources are statistically significant the direction of the relationship is often counter-intuitive. This cross-country evidence mirrors the micro-based evidence, particularly from the United States, which shows the lack of a systematic and consistent link between resources and achievement (Hanushek, 1996). It has been argued, however, that there may be a slightly stronger link between resources and achievement in developing countries, because education systems in developing countries tend to be so severely under-resourced compared to developed countries that marginal increases in resourcing are likely to have much larger impacts on education outcomes than in developed countries. Reviews of the micro-based literature do suggest that a greater proportion of studies in developing countries report a positive impact on education achievement than in developed countries (Hanushek, 1995, 1996).

Overall, however, the developing country literature still shows inconsistent effects of resources on achievement. The lack of low-income developing countries in cross-country test score studies means the evidence on the link between test scores and resources cannot currently be compared to the evidence from micro-based studies. Studies looking at educational access show a significant negative impact of resources per pupil on overall levels of access. However, studies that include the overall level of resources do not show a consistent significant impact of resources on the primary gross enrolment rate (Colclough and Lewin, 1993; McMahon, 1999). However, according to Baldacci et al. (2004) African countries tend to achieve lower education outcomes for given levels of spending measured by expenditure on education as a ratio of GDP.

In case studies of Botswana, Malawi and Uganda, by Al-Samarrai (2003), on the whole, confirm his cross-country findings that the link between public spending and primary school access is weak. In the country case studies, this was explained as follows. As a result per pupil expenditures declined at the same time that access was increasing. The negative relationship between access and spending apparent in Malawi and Uganda is partly due to the fact that the education service offered changed greatly over that period. Therefore, increasing access to the same type of schools and intensity of use cannot be achieved through reductions in per pupil spending. However, this contrasts the results of Deolalikar (1997) who used household data for Kenya and found positive and significant relationship between school spending and primary school enrolment.

III. THE MODEL AND DATA

3.1 The Model

The econometric approach is based on panel data regressions in equations for primary and secondary education enrolments. The specification is consistent with the literature and allows for the identification of the channels through which government expenditure and other policy interventions affect education enrolment over time.

Education Enrolment Equation

This equation (in logarithmic form) examines the direct impact of education spending on education capital, as proxied by the composite primary and secondary school enrolment rates. Gross enrolment rates measure the number of primary and secondary school students as a proportion of the primary and secondary school-going age population.

$$Edu_{it} = \alpha_{it} + \beta_1 \ln(Edu\ exp_{it}) + \beta_2 \ln(Ethnicfrac_{it}) + \beta_3 \ln(Democ_{it}) + \beta_4 \ln(Urbanpop_{it}) + \beta_5 \ln(y_{it}) + u_{it} \dots(1)$$

where

Edu_{it} = education (primary or secondary) enrolment rate;

α_{it} = Regional/Country-specific effect;

$Edu\ exp_{it}$ = Government expenditure on education as percent of GDP;

$Ethnicfrac_{it}$ = Index of ethnolinguistic fractionalization;

$Democ_{it}$ = Democracy index;

$Urbanpop_{it}$ = Urban population, as a measure of urbanization;

y_{it} = GDP per capita in international dollars; and

u_{it} = Error term.

In accordance with the literature reviewed earlier, government expenditure on education as an indicator of the volume of resources flowing into education is expected to have positive effect on education enrolment. As Schuler and Weisbrod (2006) had stated, high

“ethnolinguistic fractionalization”, apart from increasing the likelihood of conflicts, reduces the provision of public goods (see also Matiszeski and Schneier, 2006; Campos and Kuzeyev, 2007). Filmer and Pritchett (1997) had incorporated it in explaining human capital outcomes. It is also argued that democratically-elected governments have a greater incentive than authoritarian regimes to provide their citizens with primary schooling. Recent evidence from 12 African countries shows a clear link between democracy and greater provision of primary education (see, Stasavage, 2005, 2007). Roberts (2003) has emphasized that geographical/demographic factors such as rural or urban location or percentage of population in these locations affect education enrolment (see also Schultz, 1993; Baldacci et al. (2004). In addition, households in urban areas are more likely to send their children to school because, among other reasons, access to education is typically better in urban areas (Gupta et al., 1999) just as the private cost of education (such as transportation costs) may be lower for urban households. On the other hand, per capita income, a proxy for national poverty or socio-economic status (standard of living), has been shown to be a crucial determinant of human capital outcomes (Baldacci et al., 2004; Roberts, 2003). Thus, Gupta et al. (1999) had stated that as household incomes rise, the relative cost of enrolling children into school is reduced, suggesting that increasing income would be associated with rising enrolments.

3.2 The Data

A panel dataset for African countries from 1990 to 2002 was compiled for the purposes of the paper (see Table 1 for a description of the data and Appendix II for the list of countries). All data series are annual data. Data on per capita GDP, school enrolments rates, government expenditure on education, and urban population are taken from the World Bank’s *World Development Indicators* (WDI) database and African Development Bank’s database; data on the index of ethnolinguistic fractionalization is taken from Easterly and Levine dataset; and data on index of democracy is taken from Polyarchy V2 of the International Peace Research Institute, Oslo.

In this paper, education capital is proxied by education indicators (primary and secondary education enrolment rates); and education expenditure data are expressed as a percent of GDP. We adopt a robust Ordinary Least Squares (ROLS) model as the baseline specification and provide results from fixed-effect estimator to control for measurement error and autocorrelation.

As Table 3 shows, many regions have made tremendous progress towards MDG 2, which is the achievement of universal primary education by 2015. At current rate, it is estimated that a good number of countries will achieve all the indicators and more countries will achieve at least the indicator of universal primary enrolment. Sub-Saharan Africa recorded significant progress in educating its children during the period, 1991 to 2005 (recording enrolment ratios of 71 in 1991 and 95 in 2005), but the rate of progress is not enough to achieve the goal of universal primary education by 2015. Indeed, it is the region that has the lowest enrolment ratio among the developing countries. The same is true for secondary school enrolment as shown in Table 4. In the same vein, all the SANE countries have made giant strides in primary and secondary education enrolment as

demonstrated in Table 5. In particular, Nigeria (alongside Algeria) made the greatest increase in primary education enrolment, having started from the lowest base. Algeria has fully achieved the goal of universal primary education, having achieved all the indicators. Egypt is on track to meet the indicator of universal primary enrolment. Though Nigeria has the lowest secondary education enrolment ratio among the SANE countries, it made the second highest progress after Algeria, again starting from not only a low base but also the lowest one. Nigeria, however, has a very long way to go to catching up with the other SANE countries in secondary education enrolment.

The mean primary and secondary education enrolment performance of individual African countries are presented in Figures 1 and 2, respectively. Figure 1 shows that sixteen countries averaged above 100 during the period, including two SANE countries – Algeria and South Africa. Egypt and Nigeria recorded averages of 96.4 and 92.9, respectively during the period. As Figure 2 shows, the other three SANE countries – Algeria, Egypt, and South Africa had average secondary education enrolment ratios above 60, Nigeria performed below 40 at 29.5. Summary descriptive statistics of the variables used in the empirical analyses are provided in Table 6. It shows that, on average, the SANE countries outperformed Africa as a whole and the rest of Africa (which excludes the SANE) in all the variables except on government expenditure on education where they are almost at par.

Before proceeding to the regression analyses, it is instructive to present bivariate relationships between key variables using simple scatter plots. Figures 4 and 5 show clear and unambiguously positive relationship between government expenditure on education and primary and secondary education enrolment ratios, respectively.

Table 3: Comparative Regional Gross Primary Education Enrolment Ratios, 1991-2005

Region	1991	1999	2005
World	99	100	107
Developed Countries	102	102	102
Eurasia CIS	97	100	111
Asia, CIS	90	99	102
Europe, CIS	101	101	120
Developing Countries	98	100	108
Latin America & the Caribbean	104	121	118
<i>Northern Africa</i>	89	101	105
<i>Sub-Saharan Africa</i>	71	79	95
Eastern Asia	124	116	112
South Asia	92	94	113
South-Eastern Asia	108	105	109
Western Asia	92	94	96
Oceania	81	85	83
Least Developed Countries	66	78	95
Landlocked Developing Countries	65	82	96
Small Island Developing States	85	104	103

Source: UNESCO Institute of Statistics (2007)

Table 4: Comparative Regional Gross Secondary Education Enrolment Ratios, 1991-2005

Region	1991	1999	2005
World	NA	60	66
Developed Countries	93	100	102
Eurasia CIS	95	91	91
Asia, CIS	98	87	90
Europe, CIS	93	93	91
Developing Countries	NA	53	60
Latin America & the Caribbean	51	80	88
<i>Northern Africa</i>	59	70	78
<i>Sub-Saharan Africa</i>	NA	24	32
Eastern Asia	NA	64	75
South Asia	41	46	63
South-Eastern Asia	42	59	66
Western Asia	NA	60	69
Oceania	22	35	38
Least Developed Countries	NA	26	31
Landlocked Developing Countries	38	36	41
Small Island Developing States	51	56	63

NB: NA=Not Available

Source: UNESCO Institute of Statistics (2007)

Table 5: Comparative Gross Primary and Secondary Education Enrolment Ratios in the SANE Countries, 1991-2005

Country	Gross Primary Education Ratio		Gross Secondary Education Ratio	
	1991	2005	1991	2005
South Africa	109	106*	69	89*
Algeria	96	112	60	83
Nigeria	87	103	25	34
Egypt	92	101	71	86

NB: *=Figure is for 2002

Source: UNESCO Institute of Statistics (2007)

Figure 1: Scatter Plot of Mean Gross Primary Enrolment Rates in African Countries

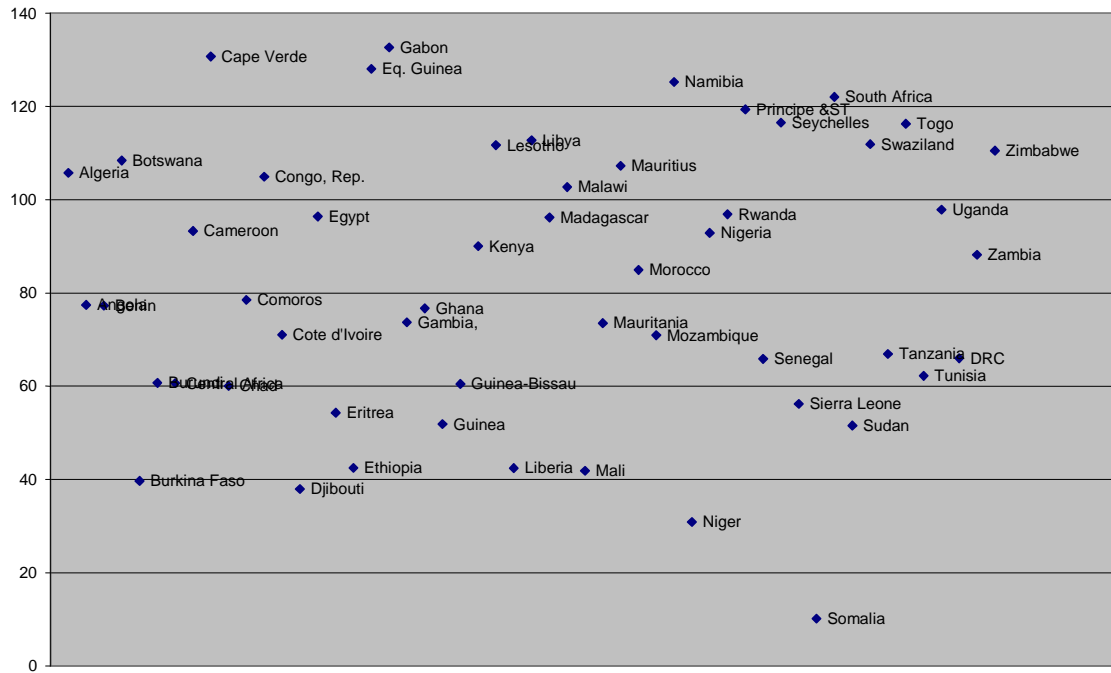


Figure 2: Scatter Plot of Mean Gross Secondary Enrolment Rates in African Countries

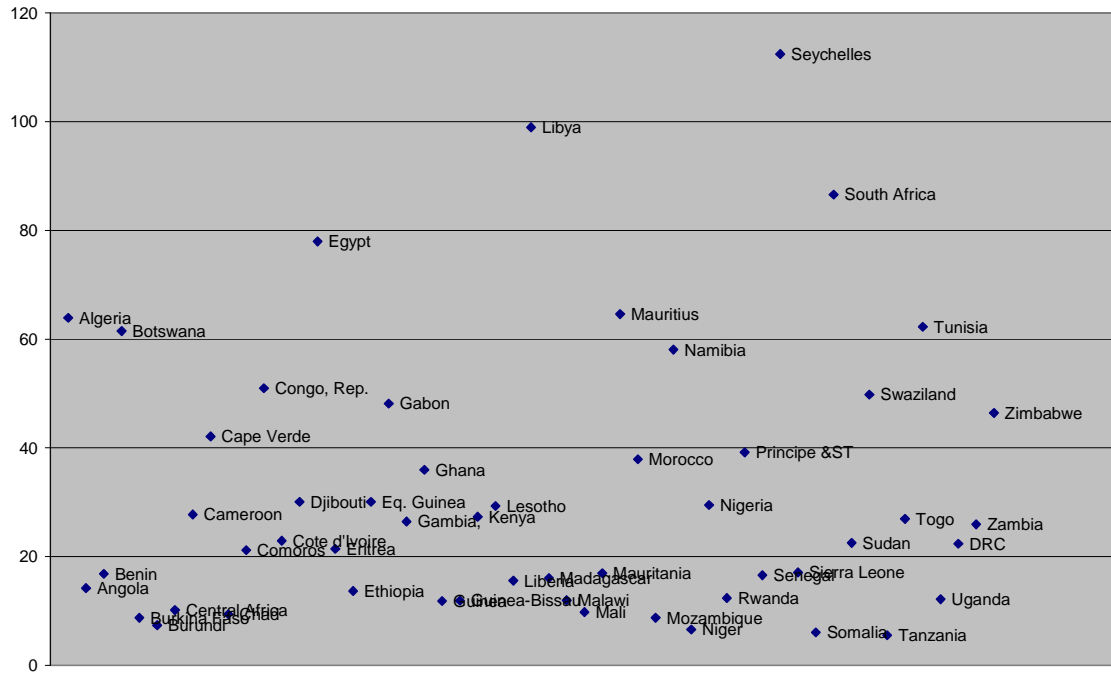


Figure 4: Scatter Plot of the Log of Mean Primary School Enrolment Rate and the Log of Mean Public Expenditure on Education-GDP Ratio in African Countries

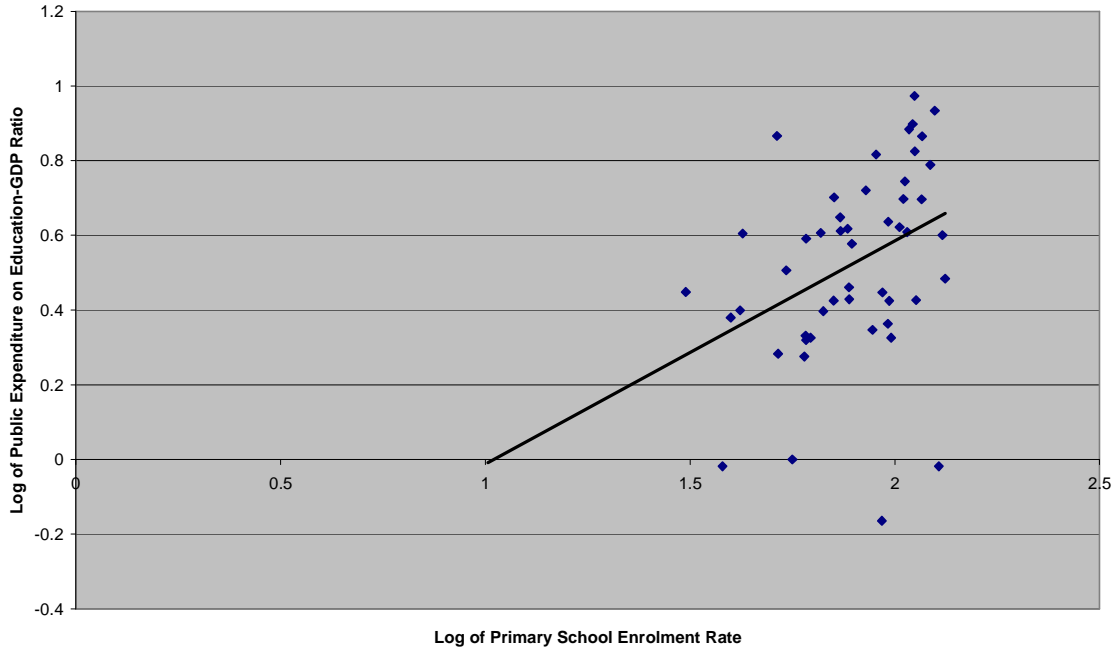


Table 5: Scatter Plot of the Log of the Mean of Secondary School Enrolment Rate and the Log of the Mean of Public Expenditure on Education-GDP Ratio in African Countries

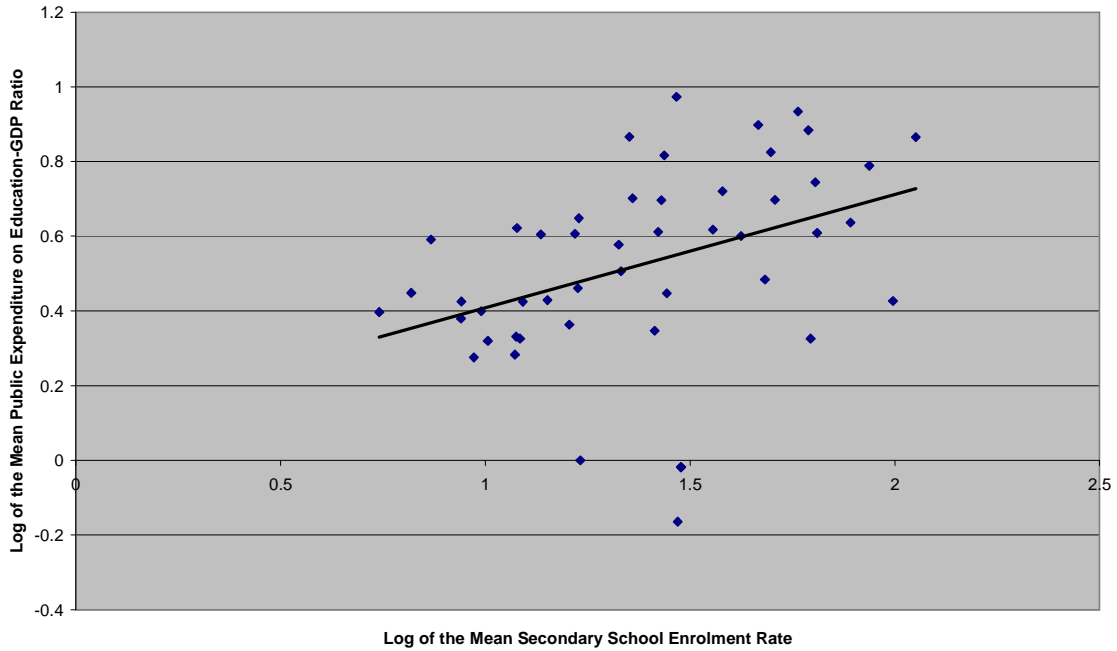


Table 6: Variable Names and Descriptive Statistics

Variable	Africa		SANE		The Rest of Africa	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Primary Education Enrolment Ratio	80.99	30.02	105.51	12.97	78.97	30.15
Secondary Education Enrolment Ratio	30.82	24.28	67.72	20.60	27.53	21.75
Government Expenditure on Education-GDP Ratio	4.40	2.33	4.37	2.15	4.40	2.35
Ethnic Fractionalization	63.43	25.43	55.50	35.12	64.26	24.07
Democracy Index	5.15	5.80	7.37	6.52	4.92	5.68
Urban Population	37.16	17.65	47.97	6.85	36.26	17.97
Gross Domestic Product Per Capita at International Dollars	956.43	1375.25	1706.92	1375.58	892.45	1357.26

Source: Authors' estimations.

IV. EMPIRICAL RESULTS

The results of the education equations are presented in Tables 7 (primary education enrolment) and 8 (secondary education enrolment). The results from alternative specifications (used for the robustness tests) are also reported in the tables. In most cases the coefficients are statistically significant, and all equations have a good fit. Among the most salient results from the model are the following:

In both the primary and secondary education enrolments in Africa, the share of government education expenditure in GDP is statistically significant at a level of 1 percent. A 10 percent increase in government education expenditure increases primary education enrolment in Africa by 21 to 28 percent while increasing secondary education enrolment by 33 to 42 percent. The primary education results are consistent with those of Baldacci et al. (2004) while those for secondary education are consistent with those of Gupta et al. (1999) though the coefficient estimates of the latter were much larger for 50 developing and transition countries.

The coefficient on the dummy variable for SANE and each country of the SANE represents the impact on education enrolment of unobservable SANE/country-specific factors with reference to the reference group. In both the primary and secondary education enrolments, the dummy variables for the SANE and Nigeria are strongly positive. In other words, if all the explanatory variables of the model had exactly the same levels in all the countries, primary education enrolment would be some 15 to 17 percent and 63 to 68 percent higher in the SANE and Nigeria, respectively. The increase in South Africa would be about 12 percent and almost none in Egypt and Algeria. In the same vein, if all the explanatory variables of the model had exactly the same levels in all the countries, secondary education enrolment would be some 57 to 58 percent and 121 to 130 percent higher in the SANE and Nigeria, respectively. The increase would be 31 percent in Algeria, 30 to 31 percent in South Africa, and 70 to 72 percent in Egypt. Overall, Nigeria stands to have the greatest positive increase in primary and secondary

education enrolments, given its current relatively lower level vis-à-vis the other SANE countries.

Other results are equally interesting. For example, ethnolinguistic fractionalization has a significant negative effect on both primary and secondary school enrolment in Africa. Democracy matters for primary education enrolment in Africa. Democracy is robustly and positively correlated with primary education enrolment. It is also correlated with secondary education enrolment when the Nigerian or the individual SANE countries' dummies are included in the estimation. The important role of democracy, particularly for primary education enrolment, — which has not always been incorporated in previous research — could help explain why some earlier studies have found a generally weak relationship between education expenditure and education enrolment. Consistent with Gupta et al. (1999) and Baldacci et al. (2004), urban population is important in explaining both primary and secondary education enrolment in the African continent. Per capita income matters for primary education enrolment when the Nigerian dummy is included in the model. However, consistent with Gupta et al. (1999), Roberts (2003), Baldacci et al. (2004), and Al-Samarrai (2006), per capita income has strong positive impact on secondary education enrolment and indeed, the coefficient increase when the Nigerian dummy is included separately in the equation. For example, a 10 percent increase in per capita income would result in between 27 and 41 percent increase in secondary education enrolment.

V. CONCLUSIONS AND POLICY IMPLICATIONS

Though greater government expenditure on primary and secondary education is being advocated by many, little empirical evidence exists on the beneficial impact of such expenditure on education attainment. Using a panel data for African countries, this paper provides support for the proposition that the government expenditure on education matters for education attainment. The evidence is even stronger for secondary education.

The results therefore show that indicators selected to monitor the MDG and EFA goals have close, consistent relationship to levels of government expenditure across Africa and the SANE countries, including Nigeria. Indeed, the model presented and estimated in this paper improves upon previous studies at the macro level in terms of including a richer palette of explanatory variables within an estimation strategy that explicitly takes into account unobservable Nigeria and other SANE counties-specific factors. Thus, a number of policy interventions could be effective in moving African and especially the SANE countries toward the MDGs and EFA goals. Therefore, the results support the view that education expenditure can be more effective in African countries in achieving the MDGs and EFA goals. Thus, increases in expenditure suggested by the magnitude of the estimated coefficients would be greatly helpful in moving African countries toward the MDG target for education, although not necessarily sufficient to achieve it in all regions.

Table 7: Regression Results for Gross Primary Education Enrolment

Variable	Robust OLS ^{1, 2, 3}			Fixed-Effects ^{2, 3}		
	(1)	(2)	(3)	(4)	(5)	(6)
Government Expenditure on Education (% of GDP)	0.21*** (6.24)	0.27*** (6.25)	0.27*** (6.24)	0.22*** (5.41)	0.28*** (6.54)	0.28*** (6.42)
Ethnic Fractionalization	-0.06** (-3.08)	-0.08*** (-4.76)	-0.09*** (-3.61)	-0.05** (-2.15)	-0.08** (-3.35)	-0.08** (-2.84)
Democracy Index	0.15*** (8.29)	0.15*** (8.30)	0.15*** (7.71)	0.15*** (6.76)	0.15*** (6.88)	0.14*** (6.43)
Urban Population	0.22*** (3.74)	0.18** (3.06)	0.20** (3.23)	0.22** (3.39)	0.17** (2.63)	0.19** (2.82)
GDP Per Capita	0.03 (1.09)	0.07** (2.51)	0.05 (1.61)	0.03 (0.73)	0.07** (2.07)	0.05 (1.21)
SANE	0.15** (2.67)			Reference Group		
Rest of Africa	Reference Group			-0.17** (-2.53)		
South Africa			0.12* (1.68)			0.13 (1.18)
Algeria			-0.003 (-0.05)			0.02 (0.12)
Nigeria		0.63*** (8.11)	0.62*** (8.01)		0.68*** (4.12)	0.66*** (4.00)
Egypt			-0.02 (-0.33)			-0.004 (-0.03)
Constant	3.07*** (19.39)	3.00*** (20.38)	3.09*** (18.63)	3.24*** (15.83)	3.00*** (17.49)	3.10*** (15.71)
R-Squared	0.52	0.55	0.55	0.52	0.55	0.56
Number of observations	168	168	168	168	168	168
F-Statistic	39.40***	43.54***	29.43***	27.68***	31.24***	20.76***
P-value for Sargan's misspecification test				0.37	0.42	0.42

Notes:

¹ Robust standard errors, adjusted for heteroscedasticity, are used.² T-statistics are reported in brackets.³ *** denotes statistical significance at the 1 percent level, ** at the 5 percent level, * at the 10 percent level using two-tailed tests.

Source: Authors' estimations.

Table 8: Regression Results for Gross Secondary Education Enrolment

Variable	Robust OLS ^{1, 2, 3}			Fixed-Effects ^{2, 3}		
	(1)	(2)	(3)	(4)	(5)	(6)
Government Expenditure on Education (% of GDP)	0.33*** (6.24)	0.43*** (8.05)	0.41*** (7.55)	0.34*** (5.98)	0.44*** (6.90)	0.42*** (6.95)
Ethnic Fractionalization	-0.09** (-3.20)	-0.16*** (-4.00)	-0.06 (-1.46)	-0.09** (-2.46)	-0.16*** (-4.52)	-0.07 (-1.56)
Democracy Index	0.04 (1.57)	0.05** (2.12)	0.05* (1.74)	0.04 (1.46)	0.05* (1.68)	0.05 (1.63)
Urban Population	0.46*** (5.05)	0.37** (3.43)	0.38*** (3.98)	0.49*** (5.46)	0.38*** (4.14)	0.39*** (4.26)
GDP Per Capita	0.29*** (6.01)	0.41*** (8.36)	0.36*** (7.02)	0.27*** (5.41)	0.40*** (8.03)	0.35*** (6.25)
SANE	Reference Group			0.57*** (6.30)		
Rest of Africa	-0.58*** (-7.70)			Reference Group		
South Africa			0.30*** (4.08)			0.31** (2.12)
Algeria			0.31*** (6.48)			0.26 (1.51)
Nigeria		1.30*** (10.82)	1.22*** (10.54)		1.29*** (5.54)	1.21*** (5.55)
Egypt			0.72*** (5.75)			0.70*** (4.00)
Constant	0.11 (0.48)	-0.75** (-2.58)	-0.81** (-3.02)	-0.49* (-1.95)	-0.76** (-3.03)	-0.80** (-2.86)
R-Squared	0.81	0.80	0.83	0.81	0.80	0.83
Number of observations	153	153	153	153	153	153
F-Statistic	196.59***	118.90***	345.26***	95.54***	89.49***	70.66***
P-value for Sargan's misspecification test				0.55	0.61	0.49

Notes:

¹ Robust standard errors, adjusted for heteroscedasticity, are used.² T-statistics are reported in brackets.³ *** denotes statistical significance at the 1 percent level, ** at the 5 percent level, * at the 10 percent level using two-tailed tests.

Source: Authors' estimations.

Relative to the significant cost of raising expenditure, the strong effects of education expenditure on education attainment also confirm the important role of reforms aimed at improving the efficiency and targeting of education outlays. If budgetary allocations for primary and secondary education are to boost economic growth and promote the well-being of the poor, policymakers in African countries, including the Nigeria and other SANE countries need to pay attention to absolute expenditures within the education sector. Those absolute expenditures – both their size and efficiency – are an important vehicle for promoting equity and furthering second-generation reforms. The finding that the absolute education expenditure is paramount in determining education outcomes also has major implications for international assistance policy for African countries. This is an opportunity for the international community, especially the G-8 countries to fulfil their promise of scaling up aid to African countries in accordance to the agreements of Monterrey of 2002 and Gleneagles of 2005, all of which had been re-affirmed in subsequent similar fora.

However, African countries unable to match increases in participation with increases in resources will be faced with difficult choices over the adjustment of the educational services provided. With increased participation in education drawing on new client groups, and a wider range of choices concerning what, when, how and where to learn, and with added demographic pressure, existing financing mechanisms may not be adequate. In particular, government resources alone may not suffice to pay both for the expansion of education systems and for improvements in educational quality. These governments would need to forge new partnerships with the providers and beneficiaries of education in order to mobilize the necessary resources, to encourage efficiency and to introduce flexibility in order to permit everyone to pursue the pathways and learning opportunities which best meet their needs. For example, non-public institutions, such as private businesses, can provide resources to educational institutions either through partnership arrangements or through more general support for the education system.

This paper also finds that democracy matters for primary and secondary education enrolment. Thus, there is the need for African countries to consolidate and sustain the wave of democracy sweeping the continent while making efforts to resolve existing conflicts in the continent. This is particularly important given the strong negative effects of ethnolinguistic fractionalization, a war/conflict breeder, on both primary and secondary education enrolments. Indeed, strengthening democracy can have a strong payoff for education enrolment and hence no less important than increasing spending.

In addition, it remains essential for the international community to meet its promises to double official development assistance to Africa and to make such aid effective and predictable in the context of both the Monterrey Consensus and the Paris Declaration on Aid Effectiveness. While several African countries have benefited from debt relief especially in the framework of the Highly Indebted Poor Countries initiatives it must also be acknowledged that aid to Africa actually fell in 2005 and 2006, if debt relief is taken out of the equation. On aid, the priority is to meet the long-standing commitment by developed countries to contribute 0.7 percent of Gross National Income (GNI) to Official Development Aid, (ODA) alongside a big improvement in the quality of aid. This should

include untying and simplifying aid procedures and putting an end to policy “conditionalities”. This is necessary since, for Africa, the attainment of the MDGs is a minimum prerequisite for poverty reduction and sustainable development. They provide the foundation for meeting the much higher hopes and ambitions of the African continent. But with our development partners’ assistance this would be near impossible.

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APPENDIX

List of Countries Included in the Sample used in the Estimations

The countries included in the estimations are Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Republic of Congo, Côte d’Ivoire, Djibouti, Egypt, Eritrea, Ethiopia, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe.