International Journal of Economics, Commerce and Management
United Kingdom Vol. III, Issue 7, July 2015
http://ijecm.co.uk/ ISSN 2348 0386

AN EMPIRICAL ANALYSIS OF GOVERNMENT EDUCATIONAL EXPENDITURE ON ENROLMENTS AT PRIMARY AND SECONDARY SCHOOL LEVELS IN AFRICA

Emmanuel Carsamer
Department of Economics, University of Education, Winneba, Ghana
carsamere@yahoo.com

Eric Ekyem
Eric Kyem, Department of Economics, University of Surrey, Guildford, United Kingdom
erickyem@yahoo.com

Abstract

This paper investigates how the level of Governments' educational expenditure affects school enrolment at primary and secondary level using a sample of 20 countries in developing Africa over a fifteen year period 1998-2012. We shed further light on the impact of government educational expenditure on school enrolments by examining the complex interaction between three key variables: per capita income, educational reforms and political stability. The core finding is that educational expenditure positively increases school enrolments at both primary and secondary school levels with stronger impact at the secondary level. The results also show that while political instabilities decrease school enrolment, educational reforms do otherwise. Our analysis identifies per capita income as a channel through which universal basic education can be achieved. The results are robust to an array of controls including alternative methodology, variable specifications and domestic regulatory environments that schools operate in.

Key words: Government educational expenditure, School enrolments, Political instabilities, Africa, Time effect model, Panel analysis

INTRODUCTION

The Nobel Laureate Amartya Sen once famously said, "…illiteracy and innumeracy are forms of insecurity in themselves. Not to be able to read or write or count or communicate is a tremendous deprivation." According to Sen (1999), schooling is desirable not only for individuals but for society as a whole. Education is the cornerstone of economic growth and social development. At the aggregate level, a better-educated workforce enhances a nation's stock of human capital, which is crucial for increased productivity and economic development (Barro, 1996; Romer, 1986; Lucas, 1988; Ravallion and Chen, 1997). From an economic standpoint, education is associated with high rates of return, both private and social especially in developing countries (Psacharopoulos and Patrinos, 2004).

It is no secret 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). Indeed, the role of human capital in fostering economic development is well recognized in the literature (World Bank, 2003; Anyanwu, 1996, 1998); economic growth (Levine and Renelt, 1992; Mankiw et al., 1992; Anyanwu, 1998; Barro and Sala-i-Martin, 1995; Barro, 1996, Sala-i-Martin, 1997; Duflo, 2001; and Coulombe et al, 2004) and fostering economic development and poverty reduction in general (Romer, 1986; Lucas, 1988; Squire, 1993; Ravallion and Chen, 1997; Sen, 1999; and Schultz, 2002. On educational 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 3 percentage points per year.

However, recent research shows that enrollment rate in Africa is poor and low economic growth in World Education Indicators (WEI) countries (OECD/UIS, 2003). Many researchers and policy makers have attributed the low education rates in Africa to inadequate supply of proper schooling facilities and unequal opportunity for education across countries (Al-Samarai, 2003; Deolalikar, 1997). Many schools across Africa find it hard to employ teachers due to the low pay and inadequate supply of qualified people. This is particularly true for schools in remote areas. Political conflict is another major issue that is believed to be hampering education in the continent. According to March 2011 report by UNESCO, armed conflict is the biggest threat to education in Africa because it leads to diversion of public funds to military spending. According to UNESCO's regional overview on sub-Saharan Africa, in the 2000, 52% of children were enrolled in primary schools, the lowest rate in the world and also reported marked gender inequalities in most parts of sub Sahara Africa. The USAID Centre reports that as of 2005, 40% of school going age children in Africa did not attend primary school and there are still 46 million school going age African children who have never stepped into a classroom (UNESCO-BREDA,

2005). The reports further specified that four out of 10 children did not complete primary school in 2002/2003.

However, the declaration of the Millennium Development Goals (MDGs) has led to mild increase in government educational expenditure. Specifically, between 1991 and 2000, public expenditure on education in Kenya accounted for 28.2 percent of total government expenditure and this has tripled adult literacy rates from 20 percent in 1963 to 76 percent in 1997(Bratsberg and Terrell, 2002). Government of Ghana has equally doubled her budget allocation from less than 10% to about 25% (GSS, 2013). Yet, enrollment rates in the region is still abysmally low to give assurance of promising future that can enhanced productivity, reduced poverty and income inequality, improved health and economic growth.

The paper attempts to shed light on the effectiveness of educational expenditure by examining the effect of public educational expenditure as a percentage of gross domestic products (GDP) on school enrolment. By analyzing linkages between educational expenditure and primary and secondary education enrolments, the paper contributes to the role of government expenditure on education in Africa. The interest is to estimate educational production function to help identify parsimonious factors that drive educational enrollment in Africa. Panel analysis can help deal with hetereogeneity and endogeneity of country specific characteristics of time series of group of countries. We estimate time effect model type of panel to take care of endogeneity in social production function.

LITERATURE REVIEW

Enrollment refers to the size or quantity of school attendance. Colclough et al. (2000), studying the reasons for low enrollment rates and gender gaps in schooling in Ethiopia and Guinea found poverty as a cause, but lower enrollment of girls is caused by adverse cultural practices. Recent study in Afghanistan on determinants of school enrollment in post-conflict period indicated that gender is the most influential factor and enrollment is negatively related to the Pashtun nomad tribe, single parenting and household without regular salary (Guimbert et al. (2008). Ainsworth et al. (2000) report the effect of adult mortality on primary school enrollment that the decline in primary school enrolment rates in Tanzania is strongly associated with adult mortality. They show that, despite wealth, households manage adult deaths by delaying the enrolment of young children in school. Handa (1999) points out that education of heads of households raise primary school enrollment. Aakvik *et al.* (2005) have analyzed the effect of family background such as family income and parental education on the educational attainment of persons born from 1967 to 1972 in Norway. Standard OLS regression indicated that they are important in educational attainment. For Netherlands, Huijsman et al. (1986) found that per capita income, future

earnings and financial aid has a positive effect on male enrollment, whereas tuition fees and foregone earnings exert a negative effect.

Amuedo-Dorantes et al. (2008) focus on the impact of out-migration and remittances on school attendance in Haiti. Results indicated that remittances impact positively on school attendance even for children that live in households affected by out-migration. Bredl (2011) uses a Cox proportional hazards model to disentangle effects of receiving remittances and out-migration of household members also confirmed the positive impact of remittances on school attendance.

Regarding work related to Haiti, Lunde (2008) uses qualitative method to analyze questions of educational decisions, and conclude that returns to education are realized most often after university degrees. The plausible reasons for this relate to unaffordability of final examinations, children fail due to low teaching quality, reduced tuition time, school facilities being poor and urban biase. Also, economically accessible schools are often too far away geographically. Bedi and Marshall (2002), estimated a model of school attendance for Honduras and show that opportunity costs played a role, but expected human capital benefits is a major factor. Additionally, the authors identify the supply side as an important factor limiting school attendance. Bedi et al. (2004) observed that policy changes that raise cost of schooling, account for erosion in educational participation in Africa. Access to education by women is one of the triggers of the "quiet revolution" and has characterized the US labor market for a while (Venkatanarayana, 2004). According to Guryan et al., (2008), the advantages of women enrollment include empowerment, a rise in female bargaining power within the family, increase attachment to the labor market and postponement of first birth away from teenage motherhood.

Since early 1990s, empirical studies of effectiveness of public spending on education in terms of enrolment rates and other educational outcomes have increased. Most of these studies have been on cross country with mixed results (Anand and Ravallion, 1993; Appleton *et.al*.1996; Filmer and Pritchett, 1997; Gupta *et.al*., 2002; Baldacci *et.al*., 2004). Studies on the impact of social spending on educational outcome using cross sectional data for developing countries found that social spending as essential determinant of education outcomes and has greater effect on social indicators like health expense (Bidani and Ravallion, 1997; Lopes, 2002; Psacharopoulos and Patrinos, 2002; Baldacci et al., 2003; Gupta et al., 2002). Also Gallagher (1993) observes that public spending has a positive impact on educational attainment after controlling for quality. In India, Kaur and Misra (2003) using a panel data analysis of social sector expenditure and school attainment indicators at state level, found public expenditure on education to be more productive and this relationship is stronger for relatively poorer states. Independent variables like income inequality, demographic factors, per capita income and

urbanization are some of the essential variables that turn to be crucial for public spending. Studies per pupil expenditure and the primary gross enrolment rate, have found negative and significant relationship between the variables as well as significant impact of total education expenditure as a proportion of GNP on gross enrollment (McMahon, 1999; Wössmann, 2001).

However, other studies found weak relationship between social outlays and educational indicators (Flug, Spilimbergo, and Wachtenheim, 1998). For instance, Anand and Ravallion (1993) found no significant relationship between educational outcomes and public spending on education. But the study did not capture per capita income as control variable. Colclough and Lewin, (1993) including income per capita as a control variable, found educational expenditure as a proportion of GNP not significant when entered separately. However, Baldacci et al. (2004) report that there is a lower educational outcome for given levels of public spending on education as a ratio of GDP in African countries. The Review of National Policies for Education in Latvia (OECD, 2001) found that inequity of student achievement by urbanization was one major factor influencing the quality of education and enrollment. In addition, Johansone (2008, 2009), Duru-Bellat, (2002) Johansone and Preuschoff (2008) assert that this has been a persistent trend, and the gap has kept increasing over time. The variations between the achievement levels by school community put children in rural communities at a distinct disadvantage. The implication of this phenomenon is upsurge in the enrollment rate in the urban centers of any country.

Educational systems in developing countries tend to be so severely under-resourced such that marginal increases in resource allocation are expected to have much larger impacts on education outcomes than in developed countries. Empirical evidence from Hanushek, (1995, 1996) supports the developing countries argument. Bloom, et al. (2006) opined that Sub-Saharan Africa has lagged behind other developing regions in terms of enrollment rates, gender equity, and budget allocation to higher education. There are still traces of inconsistent effects of increasing resources on educational achievement from the developing country literature. A cross country study by Al-Samarrai (2003) on Botswana, Malawi and Uganda, confirm negative weak link between public spending and primary school access. The inverse link is pinned on the educational policy changes over that period in Malawi and Uganda. Deolalikar (1997) had contrasting findings on household data for Kenya and reported positive and significant relationship between school spending and primary school enrolment. Venkatanarayana (2004) assert that adoption of Universal Primary Education by governments in Africa with strong commitment resulted in a large surge in primary school enrolment. Using Uganda, they observe that Universal Primary Education has increased enrollment from 2.7 million pupils in 1996 to 5.3 million in 1997 and to 7.1 million in 2005. Thus, educational reforms have the tendency to raise school enrollment.

Hussin, et al (2012) in their study of the impact of government educational expenditure on economic growth in Malaysia using vector auto regression method, revealed that GDP has a positive long run relationship with the fixed capital formation, labour force participation and government expenditure on education. Economic growth was found to be positively related to total investment in education and including three year lag of government expenditure to GDP did not change. The implication is that contribution of education to growth and development takes time and occurs through its ability to increase the productivity of an existing labour force (Landau, 1986).

Economic significance of education made UNESCO to recommend to both developed and developing economies to have 26 % of annual budget spend on education. However, a glance at budgetary allocation in African countries attests that Africa is not committed to the UNESCO recommendation since most countries spend less than recommended. Botswana spends 19.0 %; Swaziland, 24.6; Lesotho, 17.0; South Africa, 25.8; Cote d'Ivoire, 30.0; Burkina Faso, 16.8; Ghana, 17; Kenya, 23.0; Uganda, 27.0; Tunisia, 17.0; and, Morocco, 17.7% (UNESCO 2007). This means that there is tendency to have low school enrollment in Africa. Baldacci *et al*. (2004) confirmed UNESCO assertion of a positive relationship in the long-run between educational expenses and economic growth.

Pupil teacher ratio correlates positively with school attainment. Pupil-teacher ratio is made up of all teachers who spend all or part of their day as administrators, librarians, special education support staff, itinerant teachers, or other roles outside the classroom. How much is learned is determined by the number of students in a class in a number of different ways (Akerhielm, 1995). Smaller class size helps the teacher to choose different methods of teaching and assessment as well as being able to give feedback on students' assessment. From a psychological viewpoint what matters is the number of students who are physically present interacting among themselves and with the teacher (Akerhielm, 1995;Achilles, 1999). Large class size negatively affects educational outcomes, therefore, we preempt that large class size reduces school enrollment.

Primary and Secondary schools within urban areas are highly populated because of rural-urban migration. Developing countries, particularly low income countries, are characterized by high population density since few social facilitates are concentrated biasedly in urban centers. Normally, urban population lives in larger, denser and heterogeneous cities as opposed to small, more spacious and differentiated rural places. Densely populated urban people are likely to increase school enrollment mostly in public schools.

Political and social unrests such as wars are chief characteristics of sub-sahara Africa. Few examples could be made of Egypt, Libya, Sudan and Somalia. This consistent political

canker has adverse effect on school enrollment directly or indirectly. Destructive wars have adverse effect on school infrastructure, displaced families, jobs cut and reduction in population which have serious effect on enrollment. Therefore in this study, instability resulting from political unrest is captured as a dummy. This dummy takes on a value of one (1) in the year in which there is instability in the specific country and zero (0) if otherwise.

Governments in Africa have introduced different educational policies included but not limited to free compulsory universal basic education, free school uniforms and feeding programmes with the ultimate aim of promoting enrollment as well as improving human capital based. These policies seek to accelerate progress toward quality education and remove cost barriers to enable parents to enroll and maintain their children at school (Stasavage, 2007). The positive effects of these policies on enrollment can be disrupted by policy shift. The policy change or reform may come in different shades. For example, a change in the number of years in school, may affect enrollment, a change in examination structure, progression arrangements and others can all affect school enrollment. In this study the possible unexpected changes in educational policy are modeled as a dummy which takes on a value of one (1) in the year where there was a change in educational policy and zero (0) if otherwise.

RESEARCH METHODOLOGY

The Model Framework

Educational expenditure is assumed to be the only fiscal policy instrument. The model is a three-sector African economy consisting of household, firm, and government sectors. The household sector is divided into two sub-categories: one category supplies the factor of production to the business and government sectors, receive income in return, and then spend this on goods and services, while the other sub-group receives transfer income from the government. The leading sector in this economy is the household sector. Business firms are the private schools who employ labor and other factors of production to produce goods and services and then sell them to the household and government sectors. The government sector collects tax revenue from the household and business sectors and uses it for social production activities, namely: the road, schools and hospital.

The three sector national income identity for a closed economy is given by

$$Y = C_r + C_p + I \text{.....(1)}$$

where Y is the national income, C_p is the consumption of tax payers, C_r is the consumption of transfer income recipients, and I is the private gross domestic investment. The concept of

national income accounting of an economy measures the total monetary value of economic activities in a country.

Aggregate Consumption

The desired aggregate consumption of the tax payers is given as

$$C_r = C_{01} + c_1(\mathrm{Y}_1 - \mathrm{T}), \qquad 0 > c_1 < 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

where C_{01} is the autonomous consumption of income recipients, who will dispose off their assets to purchase goods and services, when their income is zero, c_1 the marginal propensity to consume , and Y_1 is their income. Thus, $(\mathrm{Y}_1 - \mathrm{T})$ is the disposable income after deducting tax payments and T is tax collection.

The desired consumption of the transfer income *recipients'* is

$$C_p = C_{0P} + c_p G_p + c_2 Y_2, \qquad 0 > \mathrm{c}_p < 1, \quad 0 < c_2 < 1 \ldots\ldots\ldots\ldots(3)$$

where C_{oF} is the autonomous consumption where the transfer income recipients consume goods and services from government when they have no income and do not receive transfer payment, c_p is the marginal propensity to consume of transfer payment recipients with respect to transfer income, G_p is the amount of government transfer payment expenses, c_2 is the marginal propensity to consume of transfer income recipients with respect to income Y_2.

The desired aggregate consumption of the households is the sum of equations (2) and (3) which is given by

$$\mathrm{C} = C_r + C_p \ldots\ldots\ldots\ldots\ldots\ldots(4)$$

Substituting (2) and (3) into (4), and rearranging we obtain

$$\mathrm{C} = C_{01} + C_{0P} + c_1(\mathrm{Y} - \mathrm{T}) + c_p G_p + c_2 Y_2 \ldots\ldots\ldots\ldots\ldots\ldots(5)$$

Since the tax payers can consume more at zero income in aggregate, we expect C_{01} to be higher than C_{0P} because transfer recipients rarely have wealth to dispose off in hard times.

The government tax revenue

The tax collection by government from the tax payers is

$$T = t(Y - C_E) + \alpha_0 W \text{.....(6)}$$

$$0 < t < 1$$

where T is the government revenue, t is the tax rate, C_E is tax exemptions, and W is the initial amount of asset holdings or wealth. We then substitute (6) into (5) to obtain households aggregate expenses

$$\mathrm{C} = C_{01} + C_{0P} + c_1[\mathrm{Y} - t(Y - C_E) + tW] + c_p G_p + c_2 Y_2 \text{.....(7)}$$

Aggregate Income-Expenditure Analysis

Using the aggregate Income-Expenditure approach of national income determination, the equilibrium income is determined when the aggregate income equals aggregate expenditure. Firms' investment expenses are assumed to be exogenous.

From (1)of the national income identity, substituting the aggregate private consumption (7) into it, and rearranging, to obtain

$$Y[1 - c_1[1 - t] - c_2 Y_2 = C_{01} + C_{0P} - c_1 C_E + c_1 tW + c_p G_p + \mathrm{I}_0 \text{.....(8)}$$

Assume that $c_1 = \alpha, \quad c_2 = \beta$. Simplifying and solving for Y yields

$$Y = \frac{1}{1 - \alpha(1-t) - \beta} C_{01} + C_{0P} - c_1 C_E + c_1 tW + c_p G_p + \mathrm{I}_0 \text{.....(9)}$$

Equation (9) suggests that national income is determined by the amount of government spending G_p, asset holdings, and investment. Given the values of the parameters and the exogenous variables in equation (9), we can then calculate the equilibrium national income.

Empirical Model Specification

The model used to estimate the impact of government educational expenditure on the rate of school enrolment is derived from Yusoff (2006). In this current study, the empirical model follows equation (9) generally, can be written as

$$Y = \delta_0 + \delta_1 GE_t + \delta_2 X_t + \varepsilon_t \text{.....(10)}$$

where Y is the primary and secondary schools enrolment rate, represented by the ratio of total enrolment in primary and secondary schools to the total population of the respective countries instead of real output, , GE is the ratio of educational sector expenditure to the real GDP, X are other variables such as number of teachers, ratio of urban population to total population and per capita income that influence enrollment rate, and $\delta_0, \delta_1, \delta_2$ are the parameters to be estimated, and ε_t is the disturbance term. All the variables are in logs. We expect the educational expenditure to be positively related to school enrollment; an increase in educational spending would raise infrastructure facilities. This study uses panel data to analyse the effect of educational expenditure on school enrollment since it has the ability to exploit the rich information inherent in the cross-section and time series analyses. It also takes into account the heterogeneity of individual cross-sectional units by allowing for individual-specific effects and gives more variability and degrees of freedom. We shall employ panel data with time effect model and therefore equation (10) is rewritten as

$$Y_{it} = \delta_0 + \delta_1 GE_{it} + \delta_2 X_{it} + \lambda_i + \varepsilon_{it} \text{.....(11)}$$

where *i* denotes the cross-section units represented by the twenty African countries selected, δ_0 is the overall intercept, and λ_i is the fixed effect. The fixed effects model (FEM) assumes that the slope coefficients δ_1 and δ_2 are constant for all cross-section units while the intercept varies over individual cross-section units but does not vary over time. The intercept, λ_i, takes into account of the heterogeneity influence from unobserved variables which may differ across the cross-section units.

Estimation technique

As most time series data vary both over time and across countries, the study considered a pool panel estimation that takes time series properties of the data into consideration by considering the problem of stationarity in econometrics studies. According to Plosser and Nelson (1982),

most macroeconomic time series are not stationary at level. Therefore, prior to the estimation of equation (11), we first test the stationarity of the series. In this study, we use the ADF and Philip-Peron statistics because of their ppopularity where the null hypothesis is no unit root. The panel meththod is used after employing panel cointegration tests proposed by Kao (2000). This approach is residual-based, and the stationarity of the residual from the panel regression of the ADF test is an indication of the presence of panel cointegration.

Data Source

The data frequency is annual from 1998 to 2012 involving twenty (20) African countries. The countries are : Cote D'voire, Ghana, Guinea, Nigeria, Togo, Guinea Bissau, Kenya, The Gambia, Algeria, Ethiopia, Benin, Burkina Faso, Cape Verde, Liberia, Mali, Niger, Senegal, Sierra Leone and Mauritania. Table I shows the data description, proxy and data source. From the theoretical and empirical literature reviewed, variables identified as key to school enrollment, their availability and consistency over the period of the study was used to further narrow down on the number of countries and variables used.

Table 1: Data Description

Data Description	Proxy	Sources
Public Educational expenditure	Budget allocation to educational sector	World Bank WDI
Real GDP	Economic size of respective countries	World Bank WDI
Population	Total population in a country	World Bank WDI
Urbanisation	A town with population above 5000	World Bank WDI
GDP per capita	Standard of living	World Bank WDI
Number of teachers	Teachers in a school	World Bank WDI
Political satiability	Dummy variable (ps 1 if a country is a demoncratic)	Authors' construct
Educational reforms	Dummy variable (ER 1 if countries had reformed her educational sysytem for the past decade	Authors' construct

The problem of zeros in time series data which are well documented in the recent literature (Haveman and Hummels, 2004) was encountered. Most time series data such as urbanization and number of teachers matrixes were empty. Considering the small homogeneous countries we are dealing with, we can expect the problem to become more serious when using the log-linearized version of a model, which is the case of equations (10) and (11). Taking logarithms effectively drops such observations from the sample because log(0) is undefined. Using a portion of the available data, amounts to getting rid of potentially useful information, which may affect the results. Currently, the literature has been dealing with the zeros using Santos and

Tenreyro (2006) Poisson model but we adopt an ad hoc method used in the policy literature. Though it has no theoretical basis, it is considered best (Shepherd, 2008). This is done by adding a small, positive number to all variables to remove the zeros. For example, log(0) is undefined, but $\log(0+0.002)$ is not. Also, for all but very small numbers, $\log(x+0.0002) \approx \log(x)$, hence for this study, 0.0002 is added to all the variables. The log of school enrollment (primary and secondary) was used as the dependent variables in the study. In addition, to the variable of interest; public educational expenditure as independent variable, other independent variables were carefully chosen based on previous literature and availability of dataset for the selected period. These independent variables include GDP per capita income, urban population to GDP, the number of primary and secondary schools teachers and dummies for institutions as well as dummy for policy shift. The log of these variables was used in the models as specified in equations (12) and (13)

$$\ln(RP_{it}) = \beta_0 + \beta_1 \ln pub\exp/gdp_{it} + \beta_2 \ln urbpop_{it} + \beta_3 \ln gdppc_{it} + \beta_4 \ln primters + \beta_5 dum1 + \beta_6 dum2 + \varepsilon_{it} \ldots\ldots\ldots(12)$$

$$\ln(RS_{it}) = \beta_0 + \beta_1 \ln pub\exp/gdp_{it} + \beta_2 \ln urbpop_{it} + \beta_3 \ln gdppc_{it} + \beta_4 \ln set ers + \beta_5 dum1 + \beta_6 dum2 + \varepsilon_{it} \ldots\ldots\ldots(13)$$

EMPIRICAL RESULTS

The analysis follows normal econometric analysis which starts from stationarity test of the time series, using Augmented Dickey Fuller test for individual data series and pooled (panel) data sets. The augmented Dickey–Fuller (ADF) test and the Phillips–Perron (PP) test were used to conduct stationarity test for individual data series(see appendix).

Stationarity test of the logarithm of the variables using augmented Dickey Fuller and Philip Peron tests indicated that all the variables were stationary at 5% and 1% level of significant based on the MacKinnon (1996) critical values. For the panel unit root test, Levin *et al.* (2002) test was applied but the results are not reported for space reason.

Chow poolability test for the appropriateness of pooling the cross-section and efficiency was conducted as against individual models. The null hypothesis is expressed as follows:

$$H_0 : \rho_{ij} = \rho_i$$

Where i= 1,2, 3…..N cross section units and independent variables represented by j.

Equivalently *F*-distribution with *r* and *d* degree of freedom statistic is specified as:

$$F == \frac{e'e - \sum_{i}^{n} e_i' e_i \,/\, r}{\sum_{i}^{n} e_i' e_i \,/\, \mathrm{d}}$$

where $e'e$ is the sum of squared residuals (SSR). From the restricted (pooled) model, $\sum_{i}^{n} = e_i' e_i$ is the sum of the individual residual squares of the unrestricted model, $r = (N-1)(\mathrm{J}+1)$ is the the number of linearly independent restrictions and $d = N(\mathrm{T}-\mathrm{J}-1)$ the number of degrees of freedom for the unrestricted model. The null hypothesis is accepted when common parameters model can achieve efficiency gain over the individual models and when the *F*-critical value is greater than the *F*-statistic value. From the excel, the *F*-critical value can be obtained from the function "= inverse F probability distribution (FINV) (0.05, 117, 294)" = 1.280.

The descriptive statistics of the variables is presented in table 2. The per capita income has the highest mean with secondary school enrollment having the lowest. The mean of primary and secondary school teachers are moderately high but secondary school teachers had the highest standard deviation showing high fluctuation of secondary school teachers. The implication is that attrition rate among secondary school teachers may be high because of poor remuneration for teachers in Africa.

Table 2: Descriptive Statistics of Variables

Variable	Observation	Mean	Std Deviation	Min	Max
Per capita income	300	62.31921	0.78801	4.702986	4.300084
educational expenditure /GDP	300	2.82,4337	0.33232	1.702342	8.594895
number of primary school teachers	300	10.37028	1.29309	7.98956	3.652297
number of secondary school teachers	300	9.693959	1.37203	7.21891	13.48682
primary school enrolment	300	4.49101	0.27945	3.412174	12.63886
secondary school enrolment	300	3.461399	0.55372	1.927484	4.975882
urban population	300	3.546424	0.43068	2.64413	4.641449
Political instability	300	0.136667	0.34407	0	1
Educational Reforms	300	0.5	0.21831	0	1

Educational expenditure is a ratio of educational section allocation to gross domestic product

Urban population is the ratio of urban population to total national population

All the variables are in logarithms

Table 3 shows the poolability test results and all the computed *F*-statistics values are between 0.878 to 1.235 and are less than *F*-critical value of 1.280 which means pooling the cross-section in each case improves efficiency. The Kao (1999) panel cointegration test is performed after proving efficiency from pooling the cross-section and results is reported in Table 4.

Table 3: Poolability efficiency Test

Countries	**SRR(Individual)**	**SRR(Pooled)**	F-Statisitics
Algeria	129.663	164.037	1.213
Benin	109.979	201.702	1.235
Burkina Faso,	103.754	139.809	1.112
Cape Verde	148.773	207.132	0.985
Cote D'voire	130.935	195.617	1.231
Ethiopia	144.487	205.97	0.878
Ghana	130.935	205.97	1.324
Guinea	144.487	207.132	1.065
Guinea Bissau	103.13	195.617	0.956
Kenya	139.965	203.945	1.103
Liberia	143.548	194.862	0.897
Mali	137.619	181.421	1.002
Mauritania	128.56	191.882	1.234
Niger	136.435	191.882	1.156
Nigeria	139.0344	203.5019	0.991
Senegal	131.4212	194.2069	1.226
Sierra Leone	134.096	195.4747	0.978
The Gambia	123.897	187.823	0.999
Togo	128.322	192.346	1.0206

From Table 4 indicate that we fail to accept the null hypothesis of no cointegration at five per cent significance level in all cases, implying the existence of a long-run relationship among the variables under consideration for each country. Having established cointegration in all cases, we proceed to estimate the time effect model to examine empirically the impact of educational expenditure on school enrollment. The random effect regression type is employed due to the Hausman test result to indicate that the constants for each section are random parameter (Quantitative Micro Software (QMS, 2009). Under the random model, the intercepts for each cross sectional unit are assumed to rise from a common intercept plus a random variable ε_{it} that varies across section but is constant over time. The results of the time effect model are presented in Table 5.

Table 4: Kao Panel Cointegration Test

Country	ADF t stats	Probability
Algeria	-1.878***	0.024
Benin	-3.701***	0.012
Burkina Faso,	-3.765***	0.002
Cape Verde	-2.543**	0.045
Cote D'voire	-2.864**	0.051
Ethiopia	-3.578***	0.002
Ghana	-3.647***	0.000
Guinea	-2.278*	0.061
Guinea Bissau	-3.517***	0.000
Kenya	-3.068***	0.001
Liberia	-2.917***	0.005
Mali	-3.729**	0.057
Mauritania	-2.695***	0.004
Niger	-3.979***	0.000
Nigeria	-2.852***	0.002
Senegal	-3.976***	0.031
Sierra Leone	-2.786**	0.055
The Gambia	-3.478***	0.001
Togo	-2.956***	0.002

Note: *, ** & *** are significant at 10%, 5% & 1% Respectively.

Regression results

The results of the estimated regressions are summarized in Table V below. Each column reports different regressions and each row reports a different coefficient estimate and standard errors in parenthesis. Columns one and three reports enrollment without per capita income while columns two and four represent enrollment with per capita income when we want to check endogeneity problem. The results of primary school enrollment are presented in columns one and two. The coefficient (0.289) on educational expenditure is positive and statistically significantly different from zero at the 1% level. According to this estimate, increasing educational expenditure by $10 every year, school enrolment would respond by about 29%. For instance, if school enrolment stands at 10,000 in 2012, it means that it would be 12890 $(0.289x10000)$ in the 2013.

The country effect indicates that Benin, Mali, Burkina Faso, Ethiopia, Algeria and Cote D'voire, are negatively related to primary educational production. The signs of Burkina Faso and Algeria changed as per capita income is included in the model. This means that these countries (Benin, Sierra Leone and Cote D'voire) have worse primary education than the reference

country, Ghana while those having positive signs also indicate that they (Gambia, Guinea, Sierra Leone and Malawi) are better than Ghana in educational production. Those that are inversely related to primary school production, only Ethiopia, Algeria, Cote D'voire and Guinea Bissau are statistically significant. The estimated coefficients for Ethiopia and Cote D'Voire are 0.272 and 0.161 respectively. Thus, these countries fall behind Ghana in educational production by 27 and 16 percent each. However Malawi, Sierra Leone and Guinea are relatively better than Ghana in educational production by 0.254, 0.270 and 0.427 respectively and are statistically different from zero at one percent level of significant. Therefore, these countries are better in educational production than the reference countries.

Table 5: Time effect model

VARIABLE	Primary enrolment	Primary enrolment	Secondary enrolment	Secondary enrolment
educational expenditure	0.289***	0.108*	0.802***	0.371***
	(0.049)	(0.046)	(0.104)	(0.084)
Per capita income		0.203***		0.487***
		(0.021)		(0.042)
Urbanpop	0.051	0.053	0.035	0.039
	(0.073)	(0.056)	(0.133)	(0.097)
Teachers	0.083	0.019	0.169	0.018
	(0.071)	(0.056)	(0.128)	(0.094)
dum2003	-0.032	0.011	-0.081	0.024
	(0.049)	(0.039)	(0.107)	(0.085)
dum2006	0.025	0.018	0.058	0.043
	(0.042)	(0.029)	(0.104)	(0.078)
dum2009	0.065*	0.025	0.098	0.004
	(0.037)	(0.029)	(0.107)	(0.071)
dum2010	0.078*	0.027	0.144	0.022
	(0.038)	(0.032)	(0.103)	(0.071)
ETHIOPIA	-0.272***	-0.306***	-0.366*	-0.447***
	(0.082)	(0.049)	(0.198)	(0.107)
GAMBIA	0.059	0.140***	-0.125*	0.067
	(0.037)	(0.035)	(0.072)	(0.072)
GUIENEA	0.427***	0.576***	0.035	0.390***
	(0.040)	(0.061)	(0.079)	(0.106)
SIRRA_LOENE	0.270***	0.377***	0.146	0.404***
	(0.045)	(0.039)	(0.095)	(0.072)
MALAWI	0.254***	0.325***	0.107	0.277***
	(0.037)	(0.038)	(0.074)	(0.072)
MALI	-0.066	-0.042	-0.322***	-0.263***
	(0.055)	(0.065)	(0.082)	(0.079)

Table 5….

BENNI	-0.059	-0.007	-0.082	0.044
	(0.038)	(0.047)	(0.075)	(0.095)
BURKINA FASO	0.001	-0.009	0.413***	0.389***
	(0.044)	(0.033)	(0.078)	(0.079)
CAPE VERDE	0.083*	0.134***	0.168*	0.290***
	(0.041)	(0.032)	(0.096)	(0.064)
COTE D'VOIRE	-0.161***	-0.277***	-0.196***	-0.473***
	(0.030)	(0.024)	(0.061)	(0.052)
GUINEA BISSAU	-0.082*	-0.040	0.034	0.133*
	(0.048)	(0.04)	(0.083)	(0.080)
ALGERIA	-0.084*	0.081*	-0.354***	0.043
	(0.037)	(0.037)	(0.061)	(0.075)
Constant	3.677***	2.88***	1.271***	-0.627*
	(0.148)	0.155	(0.301)	(0.309)
R-Squared	0.44	0.65	0.34	0.64

Note: ***, ** and * denotes significant at 1%, 5% and 10% level of confidence. In the parentheses are the standard errors of the regression. The estimated coefficient divide by standard error gives t statistic

The parsimony of the estimated regression in column two did change when per capita income is included in the model. The estimated regression coefficient of variation moved from 0.44 to high level of 0.65 indicating that per capita income accounts for a large amount of variation in school enrollment as high GDP leads to high budget allocation to education sector.

The coefficient of educational expenditure changed significantly and also became insignificant when per capita income is included. The coefficient changed from 0.289 to 0.108. Controlling for income appears to have a significant effect on the explanatory power of the variable of interest-educational expenditure. The inclusion of per capita income reduced its effect and the level of significant also changed from 1% level of sureness to 10% level. The change implicitly exhibits the endogeneity problem between education expenditure and per capita income.

Also, another interesting thing is that some of the time and country effects are now statistically insignificant. For instance, we cannot say much about the difference between Mali, Benin, Burkina Faso and Ghana as a reference country but Cote D'voire is still relatively poor in terms of social production. This trend implies that Cote D'voire's political crisis in the millennium affected educational production adversely.

Columns three and four illustrate secondary school educational production. The coefficient of variation changed from about thirty four percent (34%) to almost sixty-four percent (64%) and the coefficient of educational expenditure was statistically significant with and without per capita income at 1% level of confidence. However, the estimated coefficient of educational

expenditure changed greatly from 0.802 to 0.371. This implies that the effect of educational expenditure is higher in secondary school than primary school.

The positive relationship between educational expenditure and school enrolment in Africa is not mirage as the findings of this study is in line with works of Psacharopoulos and Patrinos, 2004; Lunde, 2008; Hussin et. al., 2012; Gupta,et al, 2002; Baldacci et al, 2004, who found significant positive correlation between the two variables. A study in Kenya by Bedi et al (2004) though had positive sign but insignificant.

CONCLUSION

The study employed panel data analysis to investigate the impact of educational expenditure on school enrollment in the economic development of Africa. The findings are that increment in educational expenditure positively increases school enrolments at both primary and secondary school levels and also controlling for per capita income reduces the explanatory power of educational expenditure for primary school enrolment but it strengthens secondary school enrolment. While political instability has a negative toll on enrollment educational reforms affect it positively.

On policy implication, African governments should enhance budget allocation to education, as well as increasing infrastructural facilities in order to promote school enrollment. It should not be a mere budget increment but institute policies to control budget allocation and its distribution in order to enhance infrastructural development to improve enrollment.

The results therefore, require the authorities of international organizations to stimulate African leaders to try and speed up institutions to help build strong political based solely on democracy where every citizen can have a say and participate in what goes on in their countries.

Besides the international organizations effort, African Union and other regional blocs should pursue policies to help improve educational infrastructure and enrollment such as institution of scholarship for needed but brilliant children to encourage them to go to school.

The results are robust to an array of controls including alternative methodology, variable specifications and domestic regulatory environments, future studies could consider these issues.

REFERENCES

Aakvik, A., Salvanes, K. G., and Vaage, K., (2005). Educational Attainment and Family Background. *German Economic Review*, Volume 6(3), pp 87-109

Achilles, C. (1999) Let's Put Kids First, Finally: Getting Class Size Right. Thousand Oaks, CA: Corwin Press.

Ainsworth, M. Beegle, K. and Koda, G. (2000). The Impact of Adult Mortality on Primary School Enrolment in Northwestern Tanzania, *Manuscript*"

Al-Samarrai, S (2003), Financing Primary Education for all: Public Expenditure and Education Outcomes in Africa, Institute of Development Studies, University of Sussex, United Kingdom, August.

Akerhielm, K. (1995). Does Class Size Matter? *Economics of Education Review, 14,* 229–241

Amuedo-Dorantes, C., A. G., and Pozo, S., (2008). Migration, Remittances and Children's Schooling in Haiti. *Technical report,* IZA Discussion Paper no. 3657.

Anand, S. and Ravallion, M., (1993) Human Development in Poor Countries: On the Role of Public Services, *Journal of Economic Perspectives* Vol.7(1), pp. 135-50.

Anyanwu, J. C. (1998) Education and Economic Growth in Nigeria, 1980 - 1994, *The Indian Journal of Economics,* Vol. LXXVII(310), pp. 409 - 421.

Anyanwu, J. C. (1996) Empirical Evidence on the Relationship between Human Capital the Income of Nigerian Women, *Journal of Economic Management,* Vol.3(1), pp 45- 67.

Appleton, S., Hoddinot, J., and Mackinnon, J., (1996), Education and Health in Sub- Saharan Africa, *Journal of International Development*, 8: 307-339.

Baldacci, E., Guin-Sui, M. T., and Mello, L., (2003) More on the Effectiveness of Public Spending on Health Care and Education: A Covariance Structure Model", *Journal of International Development*, Vol. 15, pp. 709–25.

Baldacci, E., Clements, B., Gupta, S., and Cui. Q. (2004). Social Spending, Human Capital, and Growth in Developing Countries: Implications for Achieving the MDGs. *International Monetary Fund Working Paper 04/217.* Washington, DC: IMF.

Bedi, A. S., P. K. Kimalu, D. K. Manda, and N. Nafula (2004). The Decline in Primary School Enrolment in Kenya. *Journal of African Economics* Vol.13 (1), pp.1–43.

Bedi, A. S. and Marshall, J. H. (2002) Primary school attendance in Honduras. *Journal of Development Economics* 69, 129–153.

Bidani, B., and Ravallion, M., (1997) Decomposing Social Indicators Using Distributional Data, *Journal of Econometrics*, Vol.77(1), pp. 125–39.

Bils, Mark, and Peter J. Klenow (2000), "Does Schooling Cause Growth?", *American Economic Review*, Vol. 90, No. 5, pp. 1160–83.

Barro, Robert J. (1996) Determinants of Economic Growth: A Cross-Country Empirical Study, NBER Working Paper No. 5968 (Cambridge, Massachusetts: National Bureau of Economic Research).

Barro, R., and Sala-i-Martin, X., (1995), *Economic Growth* (McGraw-Hill).

Bassanini, A., and Scarpetta, S., (2001) Does Human Capital Matter for Growth in OECD Countries? Evidence from Pooled Mean-Group Estimates", OECD Economics

Bloom, D., Canning, D., and K. Chan. (2006) Higher Education and Economic Development in Africa. *Cambridge, MA, US: Harvard University Press*.

Bratsberg, B. and D. Terrell (2002) School Quality and Returns to Education of U.S. Immigrants, *Economic Inquiry* Vol. 40(2), 177–198**.**

Bredl, S., (2011) Migration, Remittances, and Educational Outcomes: the Case of Haitiǁ. *International Journal of Educational Development* (31): pp.162-16

Colclough C. and Lewin K. (1993) Educating All The Children: Strategies For Primary Schooling in the South. Department of Education, SA

Coulombe, S., Tremblay, J., and Marchand S., (2004) Literacy Scores, Human Capital and Growth Across Fourteen OECD Countries, International Adult Literacy Survey, Monograph Series (Ottawa: Statistics Canada).

Colclough, C., Rose, P., and Tembon, M (2000). Gender Inequalities in Primary Schooling – The Roles of Poverty and Adverse Cultural Practice. *International Journal of Educational Development* Vol. 20, pp. 5–27.

Deolalikar, A. B (1997), The Determinants of Primary School Enrolment and Household Expenditure in Kenya: Do They Vary by Income?

Duflo, Esther (2001), "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment", *American Economic Review*, 91(4): 795-814.

Duru-Bellat, M. (2002). Social Inequalities at School. Paris: Presses Universitaire de France.

Flug, K., A. Spilimbergo, and E. Wachtenheim (1998), "Investment in Education: Do Economic Volatility and Credit Constraints Matter?", *Journal of Development Economics*, Vol. 55, pp. 465–81.

Filmer, Deon, and Lant Pritchett (1997), "Child Mortality and Public Spending on Health: How Much Does Money Matter?", World Bank Policy Research Working Paper No. 1864 (Washington: World Bank).

Gallagher, M (1993), "A Public Choice Theory and Budgets: Implications for Education in Less developed Countries", Comparative Education Review, Vol. 37, no.2, may, 90-106.

Ghana Statistical Service, (2013) Annual Report

Guimbert, S., K. Miwa, and D. T. Nguyen (2008). Back to School in Afghanistan: Determinants of School Enrollment. *International Journal of Educational Development* 28, 419–434.

Guryan, J., Hurst, E., and Kearney, M. (2008) Parental Education and Parental Time with Children, *Journal of Economic Perspectives*, *22*, 23–46.

Gupta, Sanjeev, Marijn Verhoeven, and Erwin Tiongson (2002), The Effectiveness of Government Spending on Education and Health Care in Developing and Transition

Economies", *European Journal of Political Economy*, Vol. 18, No. 4, pp. 717–37.

Handa, S. (1999) Raising Primary School Enrollment in Development Countries: the Relative Importance of Supply and Demand. FCND Discussion Paper No. 76, *International Food Policy Research Institute*, 2033 K Street, N.W. Washington, DC 20006, USA.

Huijsman, R., Kloek, T., Kodde, D. A. and Ritzen, J. M. M. (1986) An Empirical Analysis of College Enrollment in the Netherlands, *De Economist* 134(2), 181.190.

Hanushek E.A. (1995) Interpreting Recent Research On Schooling In Developing Countries, *World Bank Research Observer*, Vol 10(2), pp. 34-56

Hanushek EA. (1996) School Resources and Student Performance. Does Money Matter? The Effect of School Resources on Student Achievement and Adult Success, Burtless G. Washington, DC: Brookings Institution Press: 296

Haveman, J. and Hummels, D. (2004) Alternative Hypothesis and the Volume of Trade: the Gravity Equation and the Extent of Specialization, *Canadian Journal of Economics*, Vol. 37(1), pp. 199-218.

Hussin M. Y.M., Muhammad F and Razak AA (2012). Education Expenditure and Economic Growth: A Causal Analysis for Malaysia. J. Econ. Sustainable Dev. 3:7.

Johansone, I. (2009). Managing Primary Education in Latvia to Assure Quality and Achievement *Equity*. *Dissertation for the degree of Doctor in Management: Educational Management,* University of Latvia.

Johansone, I.,and Preuschoff, A.C. (2008). Quality of Education in Rural and Urban Areas of Latvia: Results of the IEA PIRLS 2006 Study. Latvijas Universitātes Raksti. Izglītības vadība. Vol. 749. Rīga: LU Akadēmiskais apgāds.

Kaur, B. and S. Misra (2003), Social Sector Expenditure and Attainments: An Analysis of Indian States, Reserve Bank of India Occasional Papers. Summer-Monsoon, 24 (1-2), pp. 105-43.

Kao, C. and Chiang, M.-H. (2000), On the estimation and inference of a cointegrated regression in panel data", *Advances in Econometrics*, Vol. 15, pp. 179-222.

Lopes, P. S (2002), A Comparative Analysis of Government Social Spending: Indicators And Their Correlation With Social Outcomes In Sub-Saharan Africa, IMF Working Papers, WP/02/176, October.

Lucas, Robert E. Jr. (1988) On the Mechanic of Economic Development, *Journal of Monetary Economics*, Vol. 22, pp. 3–42.

Levine, Ross, and David Renelt (1992) A Sensitivity Analysis of Cross-Country Growth Regressions, *American Economic Review*, Vol. 82(4), pp. 942–63.

Levin, A., Lin, C.-F. and Chu, C.-S.J. (2002) Unit Root Test in Panel Data: Asymptotic and Finite Sample Properties, *Journal of Econometrics*, Vol. 108(1) , pp. 1-25.

Landau D (1986). Government and Economic Growth in Less Developed Countries: An Empirical study, *Economic Development and Cultural Change*. Vol. 35, pp. 35-75

Lunde, H. (2008). Youth and Education in Haiti: Disincentives,Vulnerabilities and Constraints. *Technical report,* Fafo Paper no. 2008: 26.

McMahon W (1999), Education and Development: Measuring the Social Benefits, Oxford University Press

Mankiw, G. N., Romer, D., and Weil, D N. (1992) A Contribution to the Empirics of Economic Growth, *Quarterly Journal of Economics*, Vol. 107, pp 407–37.

Nelson. CR. and CL Plosser. (1982), Trends and Random Walks in Macroeconomic Time Series: Some Evidence and Implications, Journal of Monetary Economics 10. 139-162.

OECD/UIS (2003), Financing Education – Investments and Returns, Analysis of the World Education Indicators 2002 Edition.

Psacharopoulos, G., and Patrinos, H. A. (2002) Returns to Investment in Education: A Further Update", World Bank Policy Research Paper No. 2881 (Washington: World Bank).

Psacharopoulos, G. and Patrinos H. A. (2004) Returns to Investment in Education: A Further Update'. *Education Economics* Vol. 12(2), pp. 111–134.

QMS (2009), *EViews User Guide II*, Quantitative Micro Software (QMS), Irvine, CA.

Ravallion, M., and Chen, S., (1997) What Can New Survey Data Tell Us About Recent Changes in Distribution and Poverty? *World Bank Economic Review*, Vol. 11(2) , pp. 357–82.

Romer, P. (1986) Increasing Returns and Long-Run Growth, *Journal of Political Economy*, Vol. 94(5) pp. 1002–37

Santos, S.J. and Tenreyro, S. (2006) The log of gravity, *Review of Economics and Statistics*, Vol. 88, pp. 641-658.

Sala-i-Martin, X., (1997) I Just Ran Two Million Regressions, *American Economic Review*, Vol. 87, pp. 178–83.

Sen, A., (1999), *Development as Freedom*. Oxford: Oxford University Press.

Shepherd, B. (2008) Behind the Border Gravity Modeling, Asia-Pacific Research and Training Network on Trade (ARTNeT), Bangkok.

Schultz, T. Paul (2002) Why Governments Should Invest More to Educate Girls, *World Development*, 30: 207-225.

Sianesi, Barbara, and John Michael Van Reenen (2003) The Returns to Education: Macroeconomics, *Journal of Economic Surveys*, Vol. 17, pp. 157–200.

Squire, Lyn (1993) Fighting Poverty *American Economic Review*, Papers and Proceedings, Vol. 83(2), pp. 377–82.

Stasavage, D (2007) Linking Primary education and Democracy in Africa. id21 education highlights, IDS, Brighton, UK, March.

UNESCO(2007) Global Monitoring Report for Education for All, Strong Foundations: Early Childhood Care and Education. Paris, France: UNESCO.

United Nations Educational, Scientific and Cultural Organization (2005). Livre de référence sur l'éducation en matière de population en Afrique. Volume 1. Dakar: UNESCO/BREDA.

Venkatanarayana, M. (2004) Educational Deprivation of Children in Andhra Pradesh: Levels and Trends, Disparities And Associate Factors, Working Paper 362, Centre for Development Studies. Available on line at: www.cds.edu (accessed December 2013).

Wössmann L. (2001), New Evidence On the Missing Resource-Performance Link in Education. Kiel Working Paper 1051, Kiel: Kiel Institute of World Economics

OECD (2001). *Education for All. 2001 Assessment: Statistical Document*. Paris: UNESCO/International Consultative Forum on Education for All.

World Bank. (2003). *Mozambique Public Expenditure Review, Phase 2: Sectoral Expenditures.* Washington, DC: World Bank

Yusoff, Mohammed B. (2006). Fiscal Policy in an Islamic Economy and the Role of *Zakat*, *IIUM Journal of Economics and Management*, Vol. 14, No. 2: 117 - 145.

APPENDIX

ADF Unit Root Test

At Level with intercept and trend			At First difference with intercept and trend	
Variable	**t stat**	**p-Value**	**t stat**	**p-Value**
GE	-1.438	0.593	-4.29[c]	0.0024
Y	-2.657	0.875	-8.713[c]	0.008
Prim Teachers	-2.897	0.876	-8.765[a]	0.060
Sec. Teachers	-1.987	0.984	-5.745[c]	0.005
Prim Enrollment	-2.453	0.453	-6.754[c]	0.003
Sec. Enrollment	-1.967	0.487	-6.974[a]	0.070
Urbanpop	-2.97[a]	0.057	-4.634[c]	0.005

Note: a p<0.10, b p<0.05, c p<0.01, where Y=per capita income, GE= governemnt educational expenditure ,PT= primary school teachers, ST= secondary school teachers, PE=primary enrollment, SE= secondary school enrollment & urbanpop = urban population to total population

Philip Peron Unit Root Test

At Level with intercept and trend			At First difference with intercept and trend	
Variable	**Adj. t stat**	**p-Value**	**Adj. t stat**	**p-Value**
GE	-1.427	0.5544	-4.23[c]	0.0028
Y	-0.073	0.9432	-9.439[c]	0.000
Prim Teachers	-2.97[a]	0.0564	-10.032[c]	0.000
Sec. Teachers	-1.879	0.984	-9.657[a]	0.087
Prim Enrollment	-2.531	0.4537	-10.43[a]	0.057
Sec. Enrollment	-1.897	0.765	-8.076[c]	0.006
Urbanpop	-2.781	0.456	-10.76[b]	0.045

Note: [a]p<0.10, [b]p<0.05, [c] p<0.01. where Y=per capita income, GE =government educationa expenditure , PT=primary school teachers, ST= secondary school teachers, PE= primary enrolment, SE =secondary school enrollment & urban population to total population.