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## EDUCATION EXPENDITURE AND ECONOMIC GROWTH IN NIGERIA: CO-INTEGRATION AND ERROR CORRECTION TECHNIQUE

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### ABSTRACT

*This study uses co-integration and error correction technique to examine the impact of education expenditure on economic growth in Nigeria with the objective of finding the component of the expenditure that better enhances growth. The long run empirical results revealed that both capital and recurrent expenditures promote economic growth in Nigeria. In the short run analysis, capital expenditure on education significantly enhances economic growth while recurrent expenditure retards growth. School enrolment and population growth both promote economic growth in Nigeria. The ECM result also indicated a strong speed of adjustment to correct any deviation of GDP from the equilibrium position. It is recommended that government budgetary allocation to educational sector should be increased and measures to curb corruption and mismanagement of funds should be taken.*

### KEYWORDS

Education, Economic Growth, Expenditure, Productivity.

### INTRODUCTION

The impact of education on economic growth has been stressed in many literatures. Education contributes to economic growth by improving health, political stability and producing a literate, disciplined, flexible labor force with the result that improved technology is adopted thereby leading to increased productivity and outputs. Thus, countries today strive to improve the quality of education of their citizens through increased funding to the sector.

The Nigerian government realized the importance of education in the development process hence embarked on policies that encouraged people to attend schools. This is in recognition of the fact that growth and development can only occur when the citizens are empowered through qualitative education which would inculcate good moral behaviors, increase potentials for employment, improve productivity and income and reduce poverty. Budgetary allocations have been the main approach through which government finances education in Nigeria but the allocation to the sector as a percentage of total budget has been consistently low and this poor financing has been the major obstacle to the development of education (CBN, 2000). For example, education allocation as a percentage of total budgets ranged from 9.88% in 1986 to 3.3% in 1999 and public spending on education was only 0.9% of GNP in 2002 (World Bank, 2004). Furthermore, while university enrolment was growing, investment spending on education has not been encouraging. Also, the proportion of capital expenditure has been consistently lower than the proportion of recurrent expenditure. For example, capital expenditure as a percentage of total capital budgets ranged from as low as 1.71% in 1999 to 6.0% in 2007 and this has, according to Moja (2000), retarded progress in building new facilities with the result that congestion in classroom has been the phenomenon in all levels of education. Therefore, it is in line with this that this study empirically examined the impact of education expenditures on economic growth and the component of education expenditure that promotes growth in Nigeria.

### THEORETICAL FRAMEWORK

The theoretical basis of education on economic growth is rooted in the endogenous growth theory. Endogenous growth economists believe that improvements in productivity can be linked to a faster pace of innovation and extra investment in human capital. Endogenous growth theorists argued the need for government and private sector institutions and markets which nurture innovation, and provide incentives for individuals to be inventive. There is also a central role for knowledge as a determinant of economic growth. Endogenous growth theory predicts positive externalities and spillover effects from development of a high valued-added knowledge economy which is able to develop and maintain a competitive advantage in growth industries in the global economy.

The endogenous growth theory is an advancement over the conventional "neoclassical" growth theory as modeled by Robert Solow (1956) which holds the view that economic growth is a result of the accumulation of physical capital and an expansion of the labor force, in conjunction with an "exogenous" factor, technological progress, that makes physical capital and labor more productive. But according to the endogenous growth theorists, what increases the productivity is not an exogenous factor, but an "endogenous" one, which is assumed to be related to the knowledge and behavior of the people responsible for the accumulation of physical capital. Thus, human capital becomes an endogenous part of the growth process.

### REVIEW OF EMPIRICAL LITERETURES

There are a number of empirical studies on the impact of education on economic growth around the globe. For example, Ajetomobi and Ayanwale (2007) examining education expenditure trend, higher education student enrolment and linkage with economic growth using a regression analysis find that the coefficients of the explanatory variables except that of recurrent expenditure on education are positive but both expenditures have low influence of growth. He concluded that government funding is unstable and unpredictable, capital and recurrent funding since 1970 are only a small fraction of the nation's budget hence recommend more funding of educational sector.

Ishola and Felix (2006) analysing the approach for Optimizing National Growth through Human Resource Investment in Nigeria with the aim of finding out the relationship between human capital investment and national growth uses government spending on education and human capital relevant infrastructure, by the use of regression analysis incorporating human capital in the growth process. A negative relationship was discovered between human capital investment and growth of per capita income. The influence of income on human capital seems to be stronger than the influence of human capital on income. He therefore recommended that national government should spend more on education and development on human capital so as to optimize national growth.

Nijforti and Ohwofasa (2008) investigate the role of public sector in education and other community service and economic growth in Nigeria with the aim of determining the component of expenditure that enhance growth and those that do not. Regressions were carried along three phases: 1970-1985; 1986-2006 and 1970- 2006 and the results showed that expenditure on education, health and housing were mixed. In all phases, the impact on growth of government expenditure on social sector was more from health than educational subsector. On the contrary, the relationship between recurrent expenditure on education, housing and economic growth were negative and recommended that government should inject adequate funds to the social sector.

Aigbokhan (1996) investigate the role of public sector in economic growth in Nigeria between 1960-93, using regression of production function model developed by Ram (1986) and granger causality technique for the direct assessment of the relationship. He found that over eighty percent of the variation in the growth of GDP is explained by the growth in gross capital formation, labor, and government spending. The coefficient of both variables is properly signed but that of labor is not all that significant.

Psacharopoulos (1973), using the 1966 pretax survey data of the former Western Nigeria, estimated the private returns to be 30, 14 and 34 per cent for the primary, secondary and tertiary educational levels, respectively. The corresponding social rates of return are 23, 12.8 and 17 percent.

Psacharopoulos (1985) also computed the average social rate of return for Nigeria to be 23, 13.8, and 17 percent for primary, secondary and tertiary levels, accordingly. Both studies point to the fact that investment in education facilitates the growth process.

Similarly, using 1974/75 data from the former Mid-Western Nigeria, Akangbou (1973) calculated the crude private average rates of investment return on education (for secondary and postsecondary levels). The estimated crude private rates of returns were 13.4 percent for lower secondary school level, 11.9, 11.2 and 17.2 per cent for secondary technical, upper secondary and university level, respectively. When adjustment was made for wastages and ability, the values marginally declined. He also computed the crude social average returns to be 12.3, 11.0, 10.4 and 12.7 per cent for lower secondary school, secondary technical, upper secondary school and university levels, respectively. Separate returns were also computed for the adjusted wastages and ability. The general conclusion of his findings is that no matter the magnitude of monetary resources expended on education, the private and social returns are always profitable and justifiable. Thus, investment on education positively affects the economy.

Okedara (1978) study used a three-year experimental adult literacy programme of the University of Ibadan to generate the private and social benefits associated with formal and informal (adult literacy programme) primary education. He calculated the private rates of return on formal primary education. These values were obtained after accounting for economic growth. By implication, both formal and informal primary education does not only increase productivity through earnings, but also through increased capacity for future earning possibilities, which invariably translate into growth.

Mbanefer (1980) also carried out the cost-benefit analysis of university education in Nigeria. His conclusion was that investment in university education is always profitable when any discount rate between one and ten is used. If the net present value of a university education is adjusted profitable even when 10% discount rate is used, then university education boosts productivity.

Anyanwu (1997) using cross-sectional data from six Nigerian states: Anambra, Borno, Cross River, Ogun, Plateau and Sokoto; observed that good health status and educational attainment of Nigeria women positively influenced their income. The coefficients of primary, secondary and technical school attainment were statistically significant at 5 percent level while that of excellent health conditions was significant at 1 percent.

Investigating the manpower development strategies and educational planning in Nigeria, Adamu (2002) argues that human capital formation transcends mere acquisition of intellectual ability through formal education system. It has to do with the transformation of the total man to enhance his productivity. He found that human capital investment is an indispensable component of the development process which serves as a force that can help tackle the inequities and poverty in any nation.

Bello (1995) analysing the components of government expenditure and growth in Nigeria using econometric model to evaluate both the aggregate and disaggregate functions of government expenditure at recurrent, capital and total expenditure in Nigeria between 1960-1985, with the objective of finding the expenditure that enhances growth, found that there is poor performance by the various government expenditure towards economic growth in the country for the period under review and conclude that this is a result of poor planning, allocation, mismanagement of resources and corruption in addition to the poor tax structures and political instability.

Ibrahim (2000) studying the federal government expenditure on education in Nigeria between 1962-1995 with the use of regression method argued that while recurrent expenditure dominates capital expenditure its coefficient showed a negative relationship with growth and recommend a boost in capital expenditure on education in the country.

In his study of public expenditure and economic growth in Nigeria, Ekpo (1996) found that government expenditure in infrastructure complemented and stimulate private initiatives. The result from regression shows that public sector investment in transport, communication and agriculture have positive impact on private investment and conclude that the public sector remain crucial in the development processes.

## METHODOLOGY

The data used in this research is secondary with a period starting from 1986 until 2008. Data was sourced from the Central Bank of Nigeria bulletin and statement of account for various years, National Bureau of Statistics, Federal Ministry of Education and World Bank. In order to achieve the desired objectives the study analyzed the inter-relationship between government expenditure and economic growth by using Johansen cointegration and error correction model because it has been used in a wide range of economic relationship with fairly satisfactory results and its mechanisms are simple to understand.

### MODEL SPECIFICATION

The implicit form of the model is given as:

$$\text{(Equation 1)} \quad y = \beta_0 + \beta_1 c + \beta_2 r + \beta_3 s + \beta_4 p \dots\dots\dots (1)$$

Where;

y = domestic output (GDP)

c = education expenditure on physical structures (CEXPEDU)

r = recurrent expenditure on education (REXPEDU)

s = school enrolment (SCHENROL)

p = population growth rate (POPUGR)

Expressing the model in a log form:

$$\text{(Equation 2)} \quad \log Y = \beta_0 + \beta_1 \log \text{CEXPEDU} + \beta_2 \log \text{REXPEDU} + \beta_3 \log \text{SCHENR} + \beta_4 \log \text{POPUGR} \dots\dots\dots (2)$$

Where;

$\log Y$  = log of Gross Domestic Product (GDP)

$\log \text{CEXPEDU}$  = log of Capital Expenditure on Education

$\log \text{REXPEDU}$  = log of Recurrent Expenditure on Education

$\log \text{SCHENR}$  = log of School Enrolment

$\log \text{POPUGR}$  = log of Population Growth Rate.

### PRIORI EXPECTATIONS

It is expected that a positive relationship exist between government expenditures on education and economic growth. The argument is that an educated labor force performs a major role in the determination of productivity level instead of entering the production function as a factor. The expenditure on education is assumed to influence the level of human capital which is expected to leads to an improvement in total factor productivity. In addition, higher level of human capital speeds up the level of adopting foreign technology which would increase production.

The coefficient  $\beta_1$ , and  $\beta_2$  are expected to be positive because the higher the expenditure on education the higher the productivity of labor and output.

The coefficient  $\beta_3$  is expected to be positively related to growth because the more the people enroll into schools the better they become educated which would result in the increase in efficient work force in the economy and thereby leading to overall expansion in output and economic growth.

The coefficient  $\beta_4$  is also expected to be positive. The argument here is that the higher the population growth the more the available labor in the economy and more production.



## EMPIRICAL RESULTS

TABLE 1: AUGMENTED DICKEY-FULLER TEST OF UNIT ROOT

Variable	Critical value	ADF stat	Order I	%
Log GDP	-4.4691	-4.785438	I(1)	1
LogCEXEDU	-4.4691	-4.502235	I(1)	1
Log REXEDU	-4.4691	-6.316701	I(1)	1
LogTEXEDU	-4.4691	-4.841828	I(1)	1
LogSCHENR	-4.4691	-4.612252	I(1)	1
LogPOPUGR	-4.4691	-8.447494	I(1)	1

Source: Researcher Computation with Eviews software 5.1

From table 1 above, If the calculated value of the ADF statistics is less than the tabulated or critical value, we do not reject the null hypothesis in which case the variable is stationary. On the other hand if the calculated value of ADF statistics is greater than the tabulated or critical value we reject the null hypothesis in which case the variable is non stationary. Thus all the variables included in the model are stationary after taking the first difference.

TABLE 2: JOHANSEN COINTEGRATION TEST

EigenValue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE (s)
0.692137	91.04772	68.52	76.07	None **
0.493039	47.45800	47.21	54.46	At most 1 *
0.270887	22.32314	29.68	35.65	At most 2
0.216066	10.63385	15.41	20.04	At most 3
0.043018	1.626932	3.76	6.65	At most 4

Source: Researcher Computation with Eviews software 5.1

From table 2 above, Johansen procedure to test whether the variables that are non stationary have any long run equilibrium relationship or not was carried out and the long run test show that we reject the null hypothesis of no cointegration and accept the alternative hypothesis of there is at most 2 cointegration between the variables. Johansen procedure is then used to obtain the long run coefficient of the model.

TABLE 3: NORMALIZED COINTEGRATING COEFFICIENTS

One cointegration equation		Likelihood 152.1976		
loggdp	Logcexpedu	Logrexpedu	Logschenrol	Logpopugr
1.0000	0.5230***	0.4462***	0.2545***	0.1102**
(0.000)	(0.1756)	(0.1432)	(0.0157)	(0.0430)
	(-2.978)	(-3.116)	(16.210)	(2.563)

Source: Researcher Computation with Eviews software 5.1

Note: \*\*\* denote significance at 1 percent. \*\* denote significance at 5 percent

Table 3 is then used to derive the co-integrating equation with log of GDP as the dependent variable while logs of Capital Expenditure on Education, Recurrent Expenditure on Education, School Enrolment and Population Growth Rate as the independent variables, as follows:

## LONG RUN ANALYSIS

$$\text{Equation 3} \log \text{GDP} = 4.362 + 0.523 \log \text{cexpedu} + 0.446 \log \text{rexpedu} + 0.254 \log \text{schenrol} + 0.110 \log \text{popugr} \dots$$

(3)

Then looking at the numerical values of the coefficients and their respective signs, the above equation is saying that a 10 percent permanent increase in capital expenditure on education will lead to an increase in GDP by 5.23 percent and the coefficient is statistically significant at 1 percent. Similarly, a 10 percent permanent increase in recurrent expenditure on education will cause an increase in GDP by 4.46 and the coefficient is also significant. The positive signs of the coefficients of capital and recurrent expenditures are consistent with the theory. But a 10 percent permanent increase in the level of total school enrolment will lead to a 2.54 percent increase in GDP and the coefficient is highly significant at 1 percent. A 10 percent permanent increase in the level of population growth rate will cause GDP to increase by 1.10 percent and the coefficient is statistically significant at 5 percent.

## SHORT-RUN ANALYSIS: AN ERROR CORRECTION MODEL

The short-run effect of capital expenditure, recurrent expenditure on education, school enrolment and technological advancement on GDP in Nigeria are examined. According to Engle and Granger (1987) cointegrated variables must have an ECM representation. The major advantage of the ECM representation is that it avoids the problem of spurious correlation between dependent and explanatory variables, and makes use of any short-and long-run information in the data. Hence, the motive of the analysis is to discover whether the short-run dynamics are influenced by the estimated long-run equilibrium conditions, that is, the cointegrating vectors

TABLE 4: SHORT-RUN VECTOR ERROR CORRECTION MODEL (VECM) RESULTS

Variable	Coefficient	Std Error	t-stat	Probability
ecm (-1)	-0.48	0.104	-4.615	0.001
dlogcexedu(-1)	0.37***	0.101	3.663	0.002
dlogrexedu(-1)	-0.09	0.070	-1.286	0.189
dlogschenro(-1)	0.40***	0.065	6.154	0.001
dlogpopugr(-1)	0.35***	0.100	3.500	0.002
R <sup>2</sup>	0.86	D.W statistics	1.893	
Adj R <sup>2</sup>	0.84	F-statistics	519.703	0.000

Source: Researcher Computation with Eviews software 5.1

Note: \*\*\* denote significance at 1 percent

The results from table 4 above shows that in the short run, a unit increase in capital expenditure on education will cause GDP to increase by 0.37 percent all things been equal and the coefficient of capital expenditure is statistically significant at 1 percent. A unit increase in recurrent expenditure on education reduces GDP by 0.07 percent but the coefficient is not statistically significant even at 10 percent. This is consistent with the findings of Njiforti 2008 arguing that recurrent expenditure on education is mostly diverted through ghost workers at lower level of education in Nigeria. A unit increase in the level of school enrolment will increase GDP by 2.40 percent and the coefficient of school enrolment is statistically significant at 1 percent. Similarly, a unit increase in the level of population growth rate will increase GDP by 0.35 percent all things been equal and the coefficient is significant at 1 percent.

The coefficient of error correction term is a crucial parameter in the estimation of the short-run dynamic model which measure the speed of adjustment of GDP to its equilibrium level. The result indicates that the parameter of the error-correction terms in the model is statistically significant and correctly signed confirming that GDP in Nigeria has automatic adjustment mechanism and the respond to deviation from equilibrium in a balancing manner.

## DIAGNOSTIC TESTS

In order to test for the statistical significance of the coefficients the calculated t statistics is compared with the tabulated t values. If the calculated t statistics is greater than the tabulated t value at a chosen level the null hypothesis is rejected leading to a conclusion that the coefficient is statistically significant and vice-

versa. Thus the null hypothesis is rejected leading to a conclusion that the coefficients are statistically significant with the exception of that of recurrent expenditure.

It can also be observed that the values of  $R^2$  is very high about 0.86 which shows that all the explanatory variables included in the model do explained the changes in GDP. In other words 86 percent variation in GDP is explained by the explanatory variables in the models. From the results F calculated is 519.703 which is very high and this shows that the variables in the model combined are significant in explaining economic growth in Nigeria. The Durbin-Watson statistics is used to test for the presence of autocorrelation and from the result it is given as 1.89 which is close to 2 and this shows the absence of autocorrelation in the models.

Normality test is also conducted and based on the probability value of 0.559510 and Jarque-Bera test value of 1.161389 we reject the null hypothesis and accept the alternative hypothesis leading to a conclusion that the data is normally distributed.

The test for heteroskedasticity shows that the calculated F value of 27373.52 is greater than the tabulated F-value at 5% and 25 degree of freedom, thus the null hypothesis is accepted and the alternative hypothesis is rejected leading to a conclusion that there is absence of heteroskedasticity

## CONCLUSION

Capital expenditure on education enhances growth in Nigeria than recurrent expenditure on education and generally the expenditure is very low which does not conform to 26 percent of total budget as recommended by UNESCO. Much of the increase in education expenditure has been from the recurrent side which could easily be diverted and this explain why the state of infrastructure in the institution of learning is so poor in the country and the lack of incentive for academic staff to commit their time to research and development. Capital expenditure is very low compared to recurrent spending and this explained the limited and low growth of structures in the institutions of learning with the result that there is over crowding of students in classes. To promote growth, therefore, government should increase spending on education at all level and sincerely fight corruption in the public sector.

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