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The Connection between Education and Sustainable Economic Growth in Nigeria¹

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This article considers the nexus between education and economic growth in Nigeria. Education here is seen as portraying one of the major components of human capital formation. Investment in the quantity of education, and more significantly in its quality is pivotal to achieving sustainable economic growth. Time-series data were collected from different sources for the period 1980-2015. Cointegration technique and error correction methodology were employed for the estimation of the chosen model. The empirical results reveal that educational investment impacts on economic growth in Nigeria in a direct and significant manner. Hence, amongst several recommendations, we propose that a forceful and pragmatic injection of funds by government at all levels into the different sectors of education is a key factor to increased and sustainable economic growth.

Keywords:

Budget allocation, Gross fixed capital formation, Educational enrolment, Economic growth.

1. Introduction

The notable role of education in governance and nation building is evident in advanced nations at various stages of their economic development. The importance of human capital and education in the economic growth of an economy has been emphasised in several works (Hanushek and Woessmann, 2007; Barro, 2013; Hanushek, 2013; Benos and Zotou, 2014; Asiedu, 2014). Studies have revealed the returns that accrue from the various forms of basic education, training, research, and capacity building; these have shown that without substantial investment in human capital, sustainable economic development will only be a mirage (Emediegwu and Monye-Emina, 2016). Invariably, no country can develop without serious and sound financial commitment to education. Michaelowa (2000) states that any form of investment in education turns out to be very profitable to households at the micro level and society at the macro level. He further argues that such investment impacts on the system both directly *via* increase in individuals' wages, and indirectly *via* increasing externalities associated with education.

Todaro and Smith (2012) opined that human capital development can be considered a necessary condition for development, and indeed the only vehicle that can lead any nation to economic progress and prosperity. Education transforms a society's army of human resources into human capital. This is accomplished by equipping them with the requisite knowledge, competencies, techniques, and skills. This transformation makes them more functional and productive, thereby contributing to the overall advancement of the society. Additionally, education is key to poverty mitigation and an instrument for promoting fairness, equity, and social justice.

Harbinson (1973) emphasised that the ultimate basis for the wealth of nations is human resources. Physical capital and natural endowments are regarded as passive agents of production; human resources are the active factors as well as the gravitational force that attracts and accumulates, explores and exploits all the other factors of production to bring about national development. Thus, a society that proves incapable of developing its citizens and making them functional in bringing about transformation in the economy will not be able to develop anything else in that economy.

The increasing evidence of the significant role and importance of education in capacity building and national development has made investment in the education sector crucial to lasting growth and development. In Nigeria, the average percentage of the annual federal government budgetary allocation to education for the period 2010 – 2015 is 7.52% (World Bank, 2015). This is significantly below the 26.0% recommended by the United Nations Educational Scientific and Cultural Organisation (UNESCO). Clearly, sustainable growth will not be realised because investment in education has not been given financial priority in the budgetary allocation of the government. For the same period (2010 – 2015), the average annual budgetary allocation expended on the education sectors for Ghana and Malawi are 28.07% and 24.67% respectively.

Several studies (Abiodun and Iyiola, 2011; Ehiogu, Okezie and Chinedu, 2013; Ifionu and Nteegah, 2013; Jaiyeoba, 2015) have assessed the impact of education on Nigeria's economy, but with data limited to 2012. Extending the time period, this article appraises the extent to which economic growth in Nigeria has been affected as a result of educational investment. Consequently, we will use the most current data on Nigeria's economy and education to ascertain if results obtained in previous studies are stable and robust over time. Additionally, we account for post-primary education which has been neglected in many Nigerian studies. The article is subdivided into six sections: Section 2 deals with stylised facts on education in Nigeria, while Section 3 presents the literature review; Section 4 consists of the theoretical framework and the model specification; data analysis and empirical results are considered in Section 5; Section 6 provides a summary and policy recommendations.

2. Stylised Facts on Nigeria's Educational System

2.1 Educational Development in Nigeria

Nigeria's educational system can be divided into formal and informal education. Formal education consists of pre-primary (nursery), primary, post-primary (secondary) and tertiary education. Informal education consists of indigenous and traditional methods of knowledge transmission, and is prevalent in the rural areas. Soon after independence, Nigeria's educational system was patterned after that of her colonial masters, that is, a 6-5-2-3 system. This entails six years of primary, five years of post-primary, two years of higher secondary and three years of tertiary education respectively. The current educational system of the country is based on the 6-3-3-4 system – six years of primary education, three years of junior secondary education, three years of senior secondary education and four years of tertiary education. Preparatory to entering primary school, pre-primary school children can attend educational institutions such as day-care centres, play groups and nursery schools.

Acknowledging the significance of educating human capital to achieve lasting economic development, the Nigerian government, after Independence, embarked on strategies of expanding educational institutions at all levels. Hence, the number of universities in the country increased from five in 1970 to 24 in 1986. In 2005, the number of educational institutions – primary, secondary and tertiary – stood at 59,340, 12,610 and 365 respectively, a monumental rise from the meagre 1970 figures of 14,903, 1,378 and five respectively (see Table 1). As at May 2015, according to the National Universities Commission (NUC) there are 153 universities (40 federal, 44 state and 69 private). The table further shows that adult literacy rates improved between 1986 and 2005 from 49.8% to 62.5% before falling slightly to 61.34% in 2010, and further to 59.57% in 2015. The pupil per teacher ratio in primary schools also exhibited a similar trend. While it stood at 34 in 1970, it peaked at 52 in 1997, before declining to 38 in 2010, thereafter rising marginally to 40 in 2015 – the same exactly as ten years earlier, 2005. This portrays an undesirable trend when compared to the United Nation's recommendation of 25. In summary the nation has not done so well over the years in consideration.

Table 2 similarly shows that the enrolments figures have continued to increase across the various levels of educational institutions. Enrolments at all levels maintained a steady increase from 1970 to 2015, except in the case of primary enrolment, where there was a decline of approximately one million between 2005 and 2010. This could be attributed to the insurgency and terrorism that erupted within the country, especially in North Central, leading to closure of many primary schools.

Table 1: Indices of Educational Development in Nigeria, 1970-2015

S/N	Indices	1970	1986	1997	2005	2010	2015
1	Adult literacy rate (%)	N/A	49.8	57	62.0	61.34	59.57
2	No. of pupils per teacher (primary)	34	44	52	40	38	40
3	No. of pupils per teacher (secondary)	21	30	39	27	33.08	19.32
4	Percentage of females in educational institutions			43.5			
	i. Primary	N/A	N/A	41.9	53	46.6	48.6
	ii. Secondary	N/A	N/A	38.9	44	45.8	53.48
	iii. Tertiary	N/A	N/A		43	38.2	44.12
5	Number of education institutions						
	i. Primary ²	14,903	35,434	43,950	54,434	58,348	62,406
	ii. Secondary	1,378	5,731	7,310	12,611	N/A	N/A
	iii. Tertiary ³	5	24	137	199	365	378

Source: CBN (2008, 2013); NBS: National Literacy Survey (2010); World Bank (2015)

Table 2: Enrolment Figures at School (1970-2015)

Years	Primary	Secondary	Tertiary
1970	3,515,827	357,027	14,468
1986	12,914,870	3,094,349	135,783
1997	21,161,852	5,578,255	862,023
2005	22,115,432	6,534,000	930,000
2010	21,558,461	9,056,768	1,375,671
2015	23,129,927	12,500,000	1,391,527

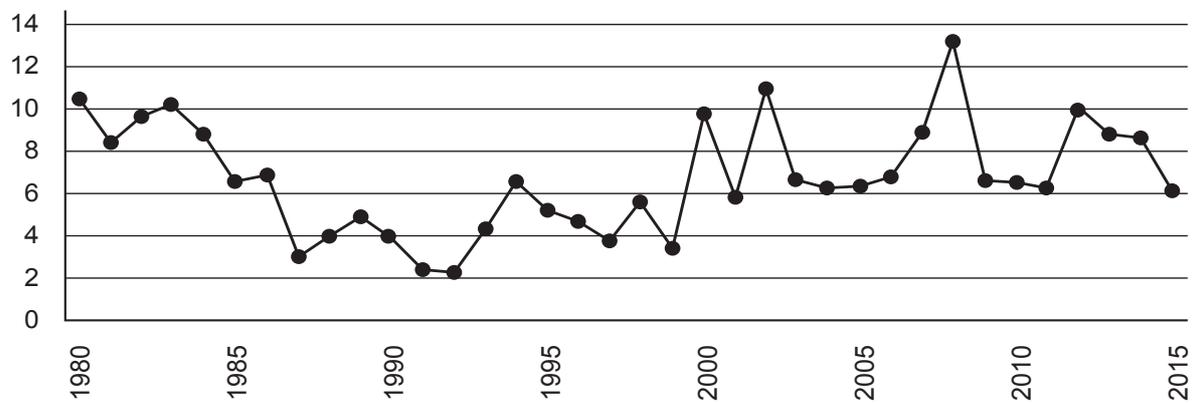
Source: CBN (2008, 2013); World Bank (2015)

The summary of federal government expenditure on education between 1980 and 2015 as depicted in Figure 1 shows that in 1980, 10.35% of the federal government's total expenditure was allocated to education. It, however, fluctuated between 1985 and 2008. In 2008, 13% of total expenditure was expended on education. Thereafter, the allocation declined steadily before picking up again in 2012 with 10% before hitting an all-time low of 6.08% in 2015. This is well below the minimum measure of 26% of annual budget advocated by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). These

figures reveal that insufficient investment in the educational system remains a key challenge that could stifle meaningful sustainable development in Nigeria.

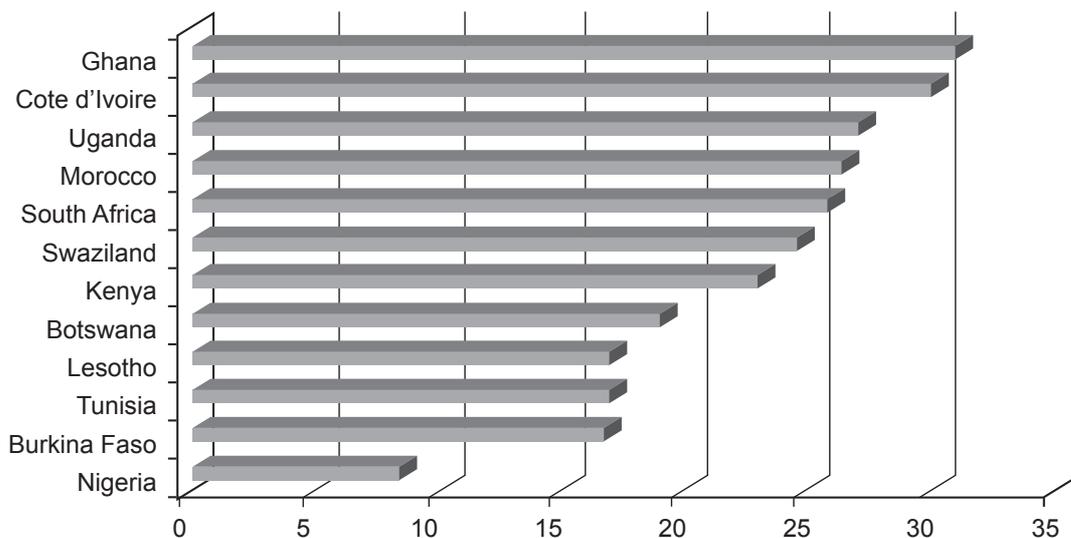
Figure 2 further compares a 16-year (2000-2015) average of budgetary allocation to the education sector for 12 African countries as sampled by the World Bank (2015). While Nigeria is at the bottom of the ladder with an average of 6.0% allocation to education, nations such as Ghana top the chart with 31% allocation, followed by Cote d'Ivoire and Uganda with allocations of 30% and 27% respectively. These countries generate less income than Nigeria. Education should be given high priority in budgetary allocation since it produces effective and efficient manpower for all sectors of the economy.

Figure 1: Proportion of Total Expenditure Allocated to Education (1980-2015)



Sources: CBN (2008, 2015)

Figure 2: Average Budgetary Allocation to Education of some Selected African Countries (2000-2015)



Source: World Bank (2015)

2.2 Problems Besetting Nigeria's Educational Sector

Ifionu and Nteegah (2013) posited that inadequate funding, amongst other factors contributed to the failure of government initiatives aimed at improving educational provision. The oil windfalls of the early 1970s endowed the country with abundant financial resources. This accounted for the sudden rise in the number of educational facilities, especially the primary schools. However, the decline of the economy as a result of the price crash in world oil market in the 1980s, and the attendant adoption of the Structural Adjustment Programme (SAP) proposed and supported by both the International Monetary Fund (IMF) and the World Bank has crippled the supply of finance available for education purposes (Omojimito, 2010; Emediegwu and Okeke, 2017). Since the change from the military regime to democracy in 1999, successive governments always underscore the need to invest substantially in education, but do nothing substantive about it (Abiodun and Iyiola, 2011).

Essential economic theory suggests that it is necessary first to understand the cost and benefit analysis of education to an economy before fashioning realistic policies in line with sustainable development in the context of the global economy. This is exactly the case of Malaysia. The government of Malaysia allocates over 20% of its total expenditure to its educational sector, and the result has been tremendous technological development (HDR, UNDP 2003). Its reform of the educational sector, by way of funding, helped stimulate other aspects of the economy for development. The 6.06% allocation to education in Nigeria's 2015 appropriation budget has left one in doubt as to how Nigeria can attain the goal of Vision 20:2020 of becoming among the 20 most industrialised nations of the world.

The experience of Nigeria since independence in 1960 has been that of increasing rates of unemployment, both in terms of quantity and quality. This, according to Awopegba (2003), can be attributed to discrepancies in the production of high-level manpower and levels of employment. There has been a wasteful imbalance within the educational system; excessive demand for education (perhaps as an end in itself); increasing cost versus decreasing revenue from education; some non-financial bottlenecks; inadequate job opportunities for tertiary level graduates; and the provision of education which is not labour market oriented. All these buttress the fact that education is yet to produce the desired results of improving the human resource stock of the nation.

It is worth noting that Awopegba (2003) stresses that investment in people *via* education will not automatically translate to national development in any country if it is not complemented by sound economic policies. In other words, the economic framework within the nation must ensure a market which supports

trade and investment; a good incentive structure; effective social sector policies; and efficient and functioning capital and labour markets.

3. Empirical Literature Review

Education has become one of the most important investments towards national growth and development (Denison, 1966; Bowman, 1980; Barro, 2000, 2013). This is particularly so because of its impact on health, life expectancy, and wealth formation abilities. The 1996 World Bank Annual Report states that education has contributed to more than doubling household incomes in developing countries. In some countries, incomes have grown by a factor of even five or ten. The increase in life expectancy has been from 40 years to 63 years in the last four decades, while infant mortality rate has dropped by two-thirds.

In his pioneering empirical work, Barro (1991) investigated the nexus between educational spending and economic growth. His results showed that a positive relationship exists between per capita output growth rate and school enrolment level. He further argued that by increasing the human capital development investment rate, the development gap between the developing and developed countries can be closed.

In a later study, Barro and Lee (1993) constructed average years of schooling for adults using census and enrolment figures. Analysing 129 countries, they reported a significant and positive relationship between average years of secondary schooling for males and economic growth. (The relationship for females was negative, but insignificant.)

In their work, Baldacci, et al (2004) sampled 120 developing economies from 1975 to 2000 using a recursive system of equations to analyse the direct and indirect channels linking public education spending, human capital, and economic growth. Their result indicates that public investment in education positively and significantly influences education accumulation, thereby leading to higher economic growth.

Francis and Iyare (2006) used time-series data from 1964 to 1998, and the twin methods of cointegration and vector error correction to find out if there is a causal relationship between education and growth in three Caribbean nations (Barbados, Jamaica, and Trinidad and Tobago). They found no positive and significant relationship between education and growth for Barbados and Jamaica, either in the short or long run. However, education in Jamaica led to higher growth only in the short run.

Employing a computable general equilibrium (CGE) method, Jung and Thorbecke (2001) studied the effect of public education expenditure on human capital, growth and poverty in Tanzania and Zambia. Their simulation results show a positive and significant relationship between the two variables.

In his Granger Causality analysis, Omojimate (2010) used Nigerian data from 1980 to 2005 to show that public spending on education Granger-cause economic growth but the reverse is not the case. He further proved that there exists a bidirectional causality between recurrent education expenditure and economic growth. However, there was no evidence of causality between capital education expenditure on economic growth, primary school enrolment and economic growth.

Using time-series Nigerian data from 1981 to 2011, Ejiogu, Okezie and Chinedu (2013) employed the VAR model to show that educational investment is positively related to GDP. They further used the Granger causality strategy as a robustness check, and proved that while GDP Granger-causes educational expenditure, no reverse causality exists from educational spending to GDP.

Prior studies on the impact of education on Nigeria's economic growth use data up to 2012. By extending the time period we intend to appraise the extent to which economic growth in Nigeria has been affected as a result of the educational investment. Consequently, we will use the most current data on Nigeria's economy and education to ascertain if results obtained in previous studies are stable and robust over time.

4. Methodology and Model Specification

4.1 Methodology

This study uses regression analysis to establish and quantify the relationship between economic growth and education. We tested for stationarity to ensure non-spuriousness of results, and thereafter employed cointegration to capture long-run or equilibrium relationships between (cointegrating) variables. Finally, we utilised error correction mechanism to reconcile the short-run behaviour of economic variables with the long-run behaviour.

4.2 Model Specification

$$RGDP = F(BAE, GFCF, PEE, PPEE) \quad (1)$$

Linearising equation (1) gives,

$$RGDP = \alpha_0 + \alpha_1 BAE + \alpha_2 GFCF + \alpha_3 PEE + \alpha_4 PPEE + U \quad (2)$$

Where:

RGDP = Real growth rate of the Gross Domestic Product

BAE = Budget allocation to education

GFCF = Gross fixed capital formation

PEE = Primary educational enrolment

PPEE = Post-primary educational enrolment

U = error term

Economic growth performance is proxied by real gross domestic product (RGDP) while budgetary allocation to education acts as a proxy for investment in education. Enrolment figures into primary and post-primary schools are used as proxy for educational enrolment. The choice of these proxies is founded on economic literature (Omojimate, 2010; Ifionu and Alwell, 2013; Benos and Zotou, 2014)⁴. The variables were examined in natural logarithmic forms in order to achieve the property of linearity. Equation (2) above is therefore re-specified as follow:

$$\ln rgdp = \alpha_0 + \alpha_1 \ln bae + \alpha_2 \ln gfcf + \alpha_3 \ln pee + \alpha_4 \ln ppee + U \quad (3)$$

The *a priori* expectations are $\alpha_1, \dots, \alpha_4 > 0$. This means that budget allocation to education, gross fixed capital formation, and educational enrolment which is proxied by the enrolment figures of primary and post-primary education have positive relationship with economic growth.

To estimate the short-run relationship that exists among the variables, if there is any, the corresponding error correction equation is evaluated as:

$$\begin{aligned} \Delta \ln rgdp = & \alpha_0 + \sum_{i=1}^P \alpha_1 \Delta \ln rgdp_{t-i} + \sum_{i=1}^P \alpha_2 \Delta \ln bae_{t-i} + \sum_{i=1}^P \alpha_3 \Delta \ln gfcf_{t-i} + \\ & \sum_{i=1}^P \alpha_4 \Delta \ln pee_{t-i} + \sum_{i=1}^P \alpha_5 \Delta \ln ppee_{t-i} + \phi ECM_{t-i} + U_t \end{aligned} \quad (4)$$

Where:

ECM = Error correction term

This is to allow sufficient data points for the econometric analysis. The data were collected from several sources: Social Statistics of National Bureau of Statistics (NBS), various issues of Central Bank of Nigeria (CBN) - Statistical Bulletin, and World Bank data bank

5. Analysis of Results and Findings

5.1 Empirical Results

Unit root tests, using Augmented Dickey-Fuller (ADF) test, were conducted on the natural logarithms of all the variables. This is to determine the level of stationarity of the variables. The results of the Augmented Dickey-Fuller (ADF) test for unit root are as presented in Table 3.

Table 3: Results of Augmented Dickey-Fuller (ADF) Test for Unit Root

Variables	ADF Lag	ADF Test Statistics	95% ADF Critical Level	Remark
Lnrgdp	4	-1.4714	-3.6119	Non stationary
Lnbae	1	-2.8046	-3.6119	Non stationary
Lngfcf	3	-3.8046	-3.6119	Stationary
Lnpee	4	-3.3656	-3.6119	Non stationary
Lnppee	3	-2.8277	-3.6119	Non stationary
Δ lnrgdp	1	-3.1076	-2.9907	Stationary
Δ lnbae	1	-3.8883	-2.9798	Stationary
Δ lnpee	1	-5.1198	-2.9970	Stationary
Δ lnppee	1	-3.9306	-2.9970	Stationary

Source: Authors' Computation

From the unit root test in Table 3, we observe that only gross fixed capital formation (GFCF) is stationary at level. The remaining variables, however, become stationary at their first differences, since the ADF test statistic of each is greater than the 95% critical value of the ADF statistic in absolute values. Thus, the last four variables are integrated of order one, that is, $I(1)$. This realisation leads us to draw the hypothesis that the series are cointegrated. This resolution emanates from the Engel and Granger (1987) postulation that "if two or more variables have unit roots, a linear combination of such variables would ensure that the resultant residuals would be integrated of order zero, that is, stationary at level". To verify this Engel and Granger (1987) postulation, we conducted an OLS regression of \ln RGDP on all the explanatory variables and the residuals were extracted and tested for stationarity at level using the ADF test.

Table 4: Unit Root Test for Residuals

Variables	ADF Lag	ADF Test Statistics	95% ADF Critical Level	Remark
RES	1	-3.6939	-2.9907	Stationary

Source: Authors' Computation

Table 4 confirms the above postulation as the unit root test conducted on the residuals shows that they are stationary at level. This reasoning stems

from the fact that the ADF test statistic of the residuals is greater than its value at 95% critical value. In all, we safely conclude that all the variables are cointegrated, implying the existence of a long-run relationship among them. Given the cointegration character of the variables, the short-run adjustment dynamics can be represented by an error correction model. From the over parameterized model, we use the Akaike Information Criterion to select the best fitting equation, which *ipso facto* yields the required parsimonious model. The estimated equation is represented in Table 5.

Table 5: Error Correction Representation for the Selected ARDL Model ARDL (2,2,1,1,0) Selected based on Akaike Information Criterion

Dependent Variable	Explanatory Variables	Coefficient	Standard Error	T- Ratio
Dlnrgdp	Dlnbae	0.060184	0.023402	2.5718
	Dlngcfc	0.05373	0.034392	1.5629
	Dlnpee	0.063477	0.13052	0.43633
	Dlnppee	-0.3394	0.12388	-2.6956
	ecm(-1)	-0.22732	0.97671	-2.3274

R-Squared = 0.75545

R-Bar-Squared = 0,60260

F-stat (7,19) = 7.0607

DW-statistic= 1.8996

Source: Authors' Computation

5.2 Analysis of Results

An examination of the econometric results shows that the overall fit is satisfactory with an R-squared of 0.76 and an R-bar-squared of 0.60. R-bar-squared of 60% indicates that 60% variance in the dependent variable is explained by the independent variables taken together. The remaining 40% can be attributed to the white noise (disturbance term).

The F-statistic of 7.0607 is significant at 1% level of significance since it is greater than $F(0.01) = 3.71$. Therefore, the alternative hypothesis (H_1) that the overall model and its related R^2 are statistically and significantly different from zero is accepted. This means that the independent variables simultaneously explain the variation in the dependent variable.

The DW statistic measures for the presence of autocorrelation in the model. However, it is noticed that the model is fairly free from autocorrelation since the DW statistic observed in the model is 1.90, which is approximately 2. This means that the model is reliable in explaining the economic growth of Nigeria.

From the Akaike Information Criterion based parsimonious error correction model reported in Table 5, it is observed that post-primary education enrolment (PPEE) is not well behaved since its coefficient has a negative sign which goes against theoretical expectation. This anomaly, according to Abiodun and Iyola (2011), may be attributed to the reasoning that the enrolment at this educational level has not fully attained the stage where it can positively affect economic growth. This may be as a result of truancy on the part of teachers – especially in the public schools; poor learning infrastructures; and lack of policies and programmes geared towards revamping the subsector.

Total expenditure on education (BAE), gross fixed capital formation (GFCF), and primary school enrolment (PEE) are well behaved because their coefficients meet their theoretical expectation. Table 5 shows the coefficient of each of the independent variables. A 10% increase in post-primary education enrolment will translate to a 3.34% decrease in real gross domestic product. A 100% increase in total expenditure on education will lead to a 6.1% rise in real GDP. A 5.4% rise in real GDP will result from a 100% increase in gross fixed capital formation while a 100% increase in primary school enrolment will yield a 6.3% increase in real GDP.

Furthermore, a careful look at the t-statistics of the independent variables reveals their levels of significance respectively. Total expenditure on education and post-primary education enrolment are significant at 99% confidence level while gross fixed domestic product is significant at 90% confidence level. However, primary education enrolment is not significant both at 95% and 90% confidence level.

The speed of adjustment from short-run to long-run equilibrium is shown by the coefficient of the error correction model $ecm(-1)$. From Table 5, the $ecm(-1)$ has a coefficient of -0.22732 and its t-value of -2.3274 is significant at 95% confidence level. Also since the $ecm(-1)$ has a negative sign, it therefore shows that it will rightly correct any deviation from long-run equilibrium

6. Summary and Policy Recommendations

The main arguments advanced in this paper can now be summarised with concluding remarks. The paper has endeavoured to investigate the nexus between education and economic growth. This was made possible by employing a range of econometric tools such as the Augmented Dickey Fuller (ADF) test for unit root tests, cointegration tests, and error correction mechanism (ECM). Results from the study show that educational investment in Nigeria is well below the recommendation of the United Nations' 26% budgetary allocation to education.

Empirical results show that there exists a long-run relationship among gross fixed capital formation, investment in education, and economic growth

in Nigeria. All the variables of interest, with the exception of the post-primary education enrolment, appear with the expected positive signs. Moreover, with the exclusion of primary school enrolment, all other variables are significant in economic growth.

Based on the empirical evidence of the study, it is found that total expenditure on education contributes positively to economic growth in Nigeria, with a strong and statistically significant impact. The implication of this is that if Nigeria is to join the comity of nations that have achieved sustainable economic growth, it is of unqualified necessity to invest substantially in education. We therefore recommend that government should increase the budgetary allocation to the education sector to at least the standardised United Nations' 26% even if there has to be a trade-off with other types of investment. Secondly, education should be prioritised in the nation's developmental strategies, though more emphasis should be placed on basics, that is, primary and post-primary education. This will drive the economy to the path of productivity and efficiency, thus leading to sustainable growth. It is important to state at this point that we could not control for tertiary education in our analysis as we were unable to get complete data for the sample period. Hence, we do not rule out the possibility that the results of our analysis may change if tertiary education is controlled for.

Thirdly, an enabling environment in all educational institutions has to be created by the government. This can be realised if there exists Public-Private Partnership (PPP) where the government and the private sector make concerted efforts to mobilise resources to furnish educational institutions at all levels and provide them with adequate and appropriate facilities, laboratories equipment, libraries, computers, and modern instructional materials. This will invariably improve the quality and quantity of education and thereby boost labour productivity and human capital development, as well as guarantee lasting growth and development.

One of the aims of economists is to comprehend the factors that contribute – as well as those that do not contribute – to a country's economic growth. This is, partly, because a developing economy has the propensity to engender prosperity, progress, and well-being for its citizens while simultaneously laying the bedrock for a more equitable circulation of the dividends of growth. If, as revealed by studies, increase in the quantity and quality of education translates to accelerated economic growth, then investing in education would pay off in the long-run. Moreover, the dividends accruing from such investment could also be significant in alleviating poverty. Such premise could be pivotal in gaining political support for educational investment and guaranteeing its continuity.

Endnotes

- ¹ We are grateful to the two anonymous reviewers for their insightful comments on an earlier draft of this paper.
- ² The figures show only public primary schools.
- ³ Only those accredited by the Joint Admission Matriculation Board (JAMB) are counted and they include universities, polytechnics and colleges of education/agriculture.
- ⁴ Due to limitation of data, we could not use tertiary enrolment data. We acknowledge that this additional control can alter our results

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