Educational Expenditure and Economic Growth in Nigeria

Simeon Oludiran Akinleye[1] and Friday Osemenshan Anetor[2]
[1]*Department of Economics, University of Lagos, Akoka, Nigeria*
[2]*School of Management and Social Sciences, Pan-Atlantic University, Ibeju-Lekki*

Abstract

This study investigated the relationship between educational expenditure and the Nigerian economic growth, using annual time series data over the period 1981-2015. The study employed the impulse response function (IRF) and variance decomposition (VDC) of the vector error correction model (VECM) technique. The rationale for using the IRF was to determine the effect of shocks in educational expenditure, capital formation and labour force on growth, while VDC was adopted to measure the relative importance of shocks in educational expenditure, capital formation and labour force on growth of the Nigerian economy. The study found that economic growth responds positively to educational expenditure. The IRF, however, showed that economic growth responds negatively to gross capital formation. Also, IRF indicated that economic growth responds negatively to labour force; while VDC, on the other hand, revealed that educational expenditure accounts for the least variation in economic growth, despite its positive effect on growth. VDC also showed that labour force accounts for the greatest variation in economic growth. The study also applied Granger causality test to determine the cause-effect relationship between educational expenditure and growth and found that growth granger-causes education expenditure, while educational expenditure does not granger-cause growth, even though growth tend to responds positively to education expenditure. The implication of this finding is that educational expenditure does not cause growth of the Nigerian economy. As a result, the study recommends that the Nigerian government should increase its budgetary allocation to the education sector to improve the quality of education and the labour force thereby bringing about increased growth of the economy at large.

Keywords: Education, government expenditure, economic growth, Nigeria
JEL Classification: F43, H52

Introduction

The importance of education in a nation building cannot be over-emphasised. Education plays a significant role in contributing to sustainable economic growth and national development (Schultz, 1961; Barro, 2001). It also helps to improve the quality of human capital, which in turn results in increased productivity (Kaur, Baharom and Habibullah, 2014). Education is commonly considered as an important and powerful tool in enhancing economic growth, increasing per capita income, reducing poverty, empowering the people, improving health and flexibility in the environment and

creating competitiveness in an economy (Shah, 2011). According to Mekdad, Dahmani and Louaj (2014), it is considered a sustainable route to economic prosperity, a tool to combat unemployment and instil sound foundation of social equity, awareness and cultural vitality.

This underscores Nigerian government involvement in educational expenditure, management and control (Irughe, 2013). Government expenditure on education notwithstanding, the percentage of allocation to education in Nigeria is still low and falls below the threshold of 26 per cent recommended by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). For example, the average budgetary allocation to education between 1962 and 1968, which marked the era of the First National Development Plan, was 4 per cent (Matthew, 2017). Between 1970 and 1974, a period that formed the Second National Development Plan, the average budgetary allocation to education fell to 1.13 per cent following the end of the Civil War in 1970. The war made the federal government to focus more attention on national reconstruction and rehabilitation rather than education. The average budgetary allocation to education between 1975 and 1980, the period of the Second National Development Plan, was 6.08 per cent, while the allocation between 1981 and 1985 was 5.37 per cent. In the 1990s, particularly between 1995 and 1999, the budgetary allocation to education rose to an average of 11.68 per cent. As at 2006, the budgetary allocation to education was 11 per cent, while in 2015, this stood at 9.5 per cent.

The foregoing expenditure framework of the Nigerian government, which falls below the threshold of the expenditure required for education, underscores the fact that the education sector is under-funded and this has resulted in a number of challenges in the sector. These challenges include shortage of academic staff, especially in the critical areas of science and technology (National Bureau of Statistics, 2015); frequent strikes staged by students, faculty staff, and unions, shortages of classrooms, lack of qualified teachers, shortage of materials and human resources for education, and the brain drain from the education sector (Moja, 2000). These challenges facing the sector have affected the contribution of the sector to the gross domestic product (GDP). For example, the education sector accounted for 1.51 per cent of the national GDP in 2010, which was valued at N826.67 billion (CBN, 2015). The share of the sector increased to 1.89 per cent in 2011, but declined to 1.84 per cent in 2012. The share recovered and stood at 2.17 per cent in 2015.

Several empirical studies on the relationship between educational expenditure and economic growth have been carried out. The findings thereof are mixed and complex. For example, Al-Yousif (2008), Hussin et al. (2012), Idrees and Siddiqi (2013), Kaur, Baharom and Habibullah (2014), Mekdad, Dahmani and Louaj (2014), Owusu-Nantwi (2015) and Hanif and Arshed (2016) found a positive relationship between education expenditure and economic growth; other studies, such as Benhabib and Speigel (1994), Devarajan, Swaroop, and Zou (1996), Blis and Klenov (2000), and Irughe (2013) found

a negative or no significant relationship between expenditure on education and growth. In addition, some studies noted a unidirectional causality running from educational expenditure to economic growth (eg, Kaur, Baharom and Habibullah, 2014), while others found unidirectional causality running from economic growth to educational expenditure (eg, Ayuba, 2014; Owusu-Nantwi, 2015). Moreover, a few studies showed bidirectional causality between educational expenditure and economic growth (eg, Al-Yousif, 2008; Hussin, Muhammad, Hussin and Razak, 2012). It is against this backdrop that this study attempted to provide a lucid understanding of the complex relationship between educational expenditure and economic growth in Nigeria in the period 1981-2015.

The remaining parts of the paper are structured as follows: Section two is the review of literature on educational expenditure and growth, while section three presents the methodology and the model specifications of the study. Empirical findings are discussed in section four, while the conclusion and recommendations are presented in section five.

Review of Literature

Literature exists on government expenditure and economic growth in Nigeria. Hanif and Arshed (2016) investigated the relationship between school education and economic growth in the South Asian Association for Regional Cooperation (SAARC) countries, such as Pakistan, Bangladesh, Bhutan, Nepal, Maldives, Sri Lanka, India and Afghanistan from 1960 to 2013. Using the fully modified ordinary least square (FMOLS) method, the study found that education, particularly tertiary education, has significant impact on economic growth. But it failed to determine or test if the rate of growth in the selected countries influence the amount of expenditures earmarked for education.

Kaur, Baharom and Habibullah (2014) used OLS, dynamic ordinary least square (DOLS), and vector error correction model (VECM) to examine the relationship between education expenditure and economic growth in China and India, using annual time series data between 1970 and 2005. The findings revealed that there was a long-run relationship between educational expenditure and gross domestic product (GDP) for China, while in the case of India, educational expenditure granger-caused the GDP. The study measured economic growth as gross domestic product per capita and, thus, may not be used as a basis of comparison and policy formulation between the two countries, considering the divergence in the sizes of population. Also, Mekdad, Dahmani and Louaj (2014) investigated the relationship between public expenditure on education and economic growth in Algeria in the period 1974-2012 using the ordinary least square (OLS), Johansen cointegration test and cointegration test. The findings showed that public expenditure on education had a positive effect on economic growth of Algeria.

Employing the vector error correction model (VECM), Owusu-Nantwi (2015)

analysed the relationship between educational expenditure and Ghanaian economic growth over the period 1970-2012. The outcome of the study showed that a long-run relationship existed between public expenditure and economic growth in Ghana. The study further revealed that causality runs from economic growth to public expenditure on education. The study, however, did not take into cognizance the level of education (ie, primary, secondary and tertiary levels of education) that influences the nation's growth. In addition, the study failed to examine the extent or relative importance of shocks in educational expenditure, gross capital formation and labour participation rate in the national economic growth.

Al-Yousif (2008) examined the nature and direction of the relationship between education expenditure and economic growth in the six Gulf Cooperation Council (GCC) countries of Saudi Arabia, Kuwait, UAE, Oman, Bahrain and Qatar over the period 1977-2004. The study employed the Granger-causality test and the ECM technique and found that bidirectional relationship existed between expenditure on public education and economic growth. Idrees and Siddiqi (2013) studied the relationship between expenditure in public education and economic growth in both developed and developing countries over the period 1990-2006. The study employed the Pedroni residual-based panel test and the panel fully modified ordinary least squares (FMOLS) method to determine the existence of a long-run relationship and the impact on public educational expenditure on economic growth, respectively. The outcome revealed that a long-run relationship exists between public expenditure and economic growth. Also, the finding showed that public education has a significant and positive impact on economic growth. The study did not, however, determine whether the rate of economic growth influences the level of educational expenditure in both developed and developing countries.

Hussin, Muhammad, Hussin and Razak (2012) evaluated the relationship between educational expenditure and Malaysian economic growth between 1970 and 2010 using vector autoregression (VAR) and Granger-causality test. The study found that a long-run relationship exists between educational expenditure and growth. The finding also revealed that bidirectional causality exists between expenditure on education and economic growth in the short-run. It thus concluded that expenditure on education plays significant role in influencing the Malaysian economic growth.

Babatunde and Adefabi (2005) investigated the relationship between education and economic growth in Nigeria over the period 1970-2003. Using the Johansen cointegration techniques and vector error correction model (VECM), they found that a long-run relationship existed between education and economic growth. Also, Dauda (2009) employed the Johansen cointegration and error correction model (ECM) technique to investigate the relationship between investment in education and economic growth in Nigeria over the period 1977-2007. The outcome revealed a long-run relationship between investment in education and economic growth. The study thus concluded that policymakers should increase the investment in education to attain

accelerated growth. The findings did not, however, unveil whether there is a bidirectional relationship between the two variables. In other words, the study did not bring to bear the influence of economic growth on educational expenditure in Nigeria.

Using the vector error correction model (VECM), Ayuba (2014) analysed the relationship between public social expenditure (education and health) and economic growth in Nigeria between 1990 and 2009. The study revealed that there is a causality running from economic growth to education and health, thus validating the Wagner's law. The study concluded that public expenditure results in economic growth and, thus, recommended that there should be increased budgetary allocation to education and health.

On the contrary, other studies concluded that no significant relationship exists between public expenditure on education and economic growth. Irughe (2013) examined the impact of educational expenditure on the Nigerian economic growth over the period 1977-2009 employing the error correction model (ECM) technique and a geometric technique of analysis. The study found that educational expenditure has a significant and negative effect on economic growth. The study discovered that expenditure in education followed a dwindling pattern and, thus, recommended that there should be an upward review of public expenditure on education.

In the same vein, Devarajan, Swaroop and Zou (1996) examined the relationship between educational expenditure and growth in 43 developing countries over a 20-year period and found a negative correlation between education and growth. Benhabib and Speigel (1994) also concluded that there is weak evidence of a relationship between changes in educational attainment of the labour force and economic growth. In addition, Levine and Renelt (1992) revealed that government educational expenditures are not strongly correlated with economic growth rates. Likewise, Blis and Klenov (2000) investigated the impact of educational expenditure on economic growth in 52 countries over the period 1960-1990 and stated on the basis of their findings that it was too weak to conclude that education significantly contributes to economic growth.

The literature has shown that the relationship between expenditure on education and economic growth is mixed. While some studies, such as Babatunde and Adefabi (2005), Al-Yousif (2008), Dauda (2009), Hussin et al. (2012), Idrees and Siddiqi (2013), Ayuba (2014), Kaur, Baharom and Habibullah (2014), Mekdad, Dahmani and Louaj (2014),Owusu-Nantwi (2015) and Hanif and Arshed (2016) found a positive relationship between expenditure on education and economic growth; others, such as Benhabib and Speigel (1994), Devarajan, Swaroop, and Zou (1996), Blis and Klenov (2000) and Irughe (2013) found a negative or no significant relationship between expenditure on education and growth. It is in the light of this that the current study investigated the relationship between expenditure on education and economic growth in Nigeria. The outcome of the study will, no doubt, contribute to the existing literature and provide a lucid understanding of the relationship between educational expenditure

and economic growth in Nigeria.

Methodology and Data

Theoretical framework

The study is hinged on the Cobb-Douglas production function, which expresses output as a function of physical capital and labour. However, the Cobb-Douglas production function is modified to include human capital; hence, the model is expressed as:

$$Q(L,K) = AL^{a}K^{b}H^{\gamma} \quad (1)$$

Where:
Q = Output
L = Labour input
K = Physical capital input
A = Technology parameter
α, β and γ = Parameters to be estimated

Human capital can be defined as follows:

$$H = EL \quad (2)$$

Where E is the average level of education per worker and it is assumed that the average level of education per worker is directly proportional to the level of expenditure on education per worker (Irughe, 2013).

Substituting equation 2 for equation 1, the following is obtained:

$$Q = AL^{a}K^{b}E^{\gamma} \quad (3)$$

Theoretically, a positive relationship is expected between output, on the one hand, and labour, physical capital and expenditure on education, on the other.

Model specification

Following the framework of the study, the empirical model is, therefore, expressed as:

$$RGDP = f\,(GXE,\ GCF,\ POP) \quad (4)$$

The econometric form of equation 4 can be expressed as follows:

$$RGDP_t = b_0 + b_1 GXE_t + b_2 GCF_t + b_3 POP_t + \varepsilon_t \quad (5)$$

Where:

RGDP = Real gross domestic product
GXE = Government expenditure on education
GCF = Gross capital formation
POP = Population
β_0 = Intercept
$\beta_1 - \beta_3$ = Parameters
ε = Error term
t = Time

Vector autoregressive (VAR) model

The study employed VAR (VECM) to analyse the relationship between government expenditure on education and economic growth in Nigeria applying the impulse response function (IRF) and variance decomposition (VDC) of VAR. The justification for using IRF is to determine the effect of shocks in educational expenditure, capital formation and population (proxy by labour force) on growth. Also, VDC was adopted to measure the relative importance of shocks in educational expenditure, capital formation and labour force to growth of the Nigerian economy. The VAR (VECM) model employed for the study is expressed as follows:

$$\text{LogRGDP}_t = \alpha_1 + \sum_{j=1}^{n} \beta_j \text{LogRGDP}_{t-1} + \sum_{j=1}^{n} \theta_j \text{Log}GXE_{t-1} + \sum_{j=1}^{n} \varphi_j \text{Log}GCF_{t-1} + \sum_{j=1}^{n} \delta_j \text{Log}POP_{t-1} + \mu_{1t} \quad (6a)$$

$$\text{Log}GXE_t = \alpha_2 + \sum_{j=1}^{n} \theta_j \text{Log}GXE_{t-1} + \sum_{j=1}^{n} \beta_j \text{LogRGDP}_{t-1} + \sum_{j=1}^{n} \varphi_j \text{Log}GCF_{t-1} + \sum_{j=1}^{n} \delta_j \text{Log}POP_{t-1} + \mu_{2t} \quad (6b)$$

$$\text{Log}GCF_t = \alpha_3 + \sum_{j=1}^{n} \varphi_j \text{Log}GCF_{t-1} + \sum_{j=1}^{n} \beta_j \text{LogRGDP}_{t-1} + \sum_{j=1}^{n} \theta_j \text{Log}GXE_{t-1} + \sum_{j=1}^{n} \delta_j \text{Log}POP_{t-1} + \mu_{3t} \quad (6c)$$

$$\text{Log}POP_t = \alpha_4 + \sum_{j=1}^{n} \delta_j \text{Log}POP_{t-1} + \sum_{j=1}^{n} \beta_j \text{LogRGDP}_{t-1} + \sum_{j=1}^{n} \theta_j \text{Log}GXE_{t-1} + \sum_{j=1}^{n} \varphi_j \text{Log}GCF_{t-1} + \mu_{1t} \quad (6d)$$

Where:

RGDP = Real gross domestic product
GXE = Government expenditure on education
GCF = Gross capital formation
POP = Population
μ_s = Error terms
t = Time

Sources of data

The study employed annual time series data over the period 1981-2015. The macroeconomic variables used for the study, their definitions, as well as their sources are presented in table 1.

Table 1: Description and sources of data used in the study

Variable	*Definition and Measurement*	*Sources*
RGDP	Real Gross Domestic Product is the market value of economic output adjusted for inflation. It measures economic growth	CBN Statistical Bulletin, 2016
GXE	Government Expenditure on Education. It is the recurrent expenditures on education.	CBN Statistical Bulletin, 2016
GCF	Gross Capital Formation measures expenditure on fixed assets such as plant, machinery, construction of roads, hospital, railway etc	WDI, 2016
POP	Population between the ages 15 to 64 as a percentage of the total population. It is a proxy for labour force	WDI, 2016

Results and Discussion

Unit root test

Table 1 shows the outcome of the Augmented Dickey Fuller (ADF) and the Phillip-Peron (PP) test results. The ADF and PP results show that real gross domestic product (RGDP) is stationary at first difference and 5 per cent level of significance. The ADF and PP tests also reveal that government expenditure (GXE) becomes stationary at first difference and at 1 per cent level of significance. Also, gross capital formation (GCF) becomes stationary at first difference. However, population (POP), which is used to proxy labour force, becomes stationary at level using trend and intercept, but not stationary at intercept. At first difference, POP becomes stationary at first difference using intercept. PP, however, shows that the variable was not stationary. It can be concluded from the unit root tests that all the variables are integrated to the order of I(1), that is, the variables are stationary at first differences. Hence, the study proceeds to test if the variables are cointegrated.

Table 2: Unit root test results

Test	*Augmented Dickey Fuller*				*Phillip-Peron*			
Variable	*Level*		*First Difference*		*Level*		*First Difference*	
	Intercept	*Trend and Intercept*	*Intercept*	*Trend and Intercept*	*Intercept*	*Trend and Intercept*	*Intercept*	*Trend and Intercept*
Log(RGDP)	0.7244 (0.9909)	-2.2194 (0.4639)	-3.3787 (0.0191)**	-3.6029 (0.0450)**	1.7992 (0.9996)	-2.3113 (0.4169)	-3.2202 (0.0277)**	-3.4618 (0.0605)

Log(GXE)	-1.6371 (0.4518)	-3.4982 (0.0556)	-5.1210 (.0002)***	-5.4498 (.0006)***	-1.1156 (0.6982)	-3.4418 (0.0625)	-10.6280 (0.0000)***	-13.078 (.0000)***
Log(GCF)	-0.1789 (0.9315)	-1.6636 (0.7431)	-3.8023 (.0071)***	-3.4662 (0.0610)	-1.1926 (0.6662)	-3.2754 (0.0875)	-4.5546 (.0009)***	-4.9640 (0.0017)***
POP	-0.6307 (0.8481)	-15.1568 (.0000)***	-5.2476 (.0002)***	-3.3793 (0.0770)	-1.0474 (0.7247)	-1.9740 (0.5942)	-2.6086 (0.1014)	-2.5398 (0.3084)

Notes: ***Significance level at 1% level of confidence, ** Significance at 5% level of confidence

VAR lag selection criteria

Before the cointegration test, there is the need to determine the optimum lag using the criteria presented in table 3. The determination of the optimum lag will help estimate both cointegration and VAR (VECM). The outcome of the lag selection criteria, as depicted in table 3, reveals that the optimum lag is 2. This is because most of the lag selection criteria (ie, FPE, AIC and HQ) indicate the lag length to be 2. Hence, the lag length of 2 would be used to estimate the cointegration and VAR (VECM).

Table 3: VAR lag selection criteria

Lag Length Test	*Final Prediction Error (FPE)*	*Akaike Information Criterion (AIC)*	*Schwarz Information Criterion (SIC)*	*Hannan-Quinn Information Criterion (HQ)*
0	0.001438	4.806841	4.988236	4.867875
1	1.59e-07	-4.310687	-3.403712*	-4.005517
2	1.25e-07*	-4.599220*	-2.966667	-4.049916*

Cointegration test

Table 4 depicts the Johansen cointegration test results. The data consist of the trace and maximum eigenvalue tests. The tests determine the number of cointegration vectors. Both tests evaluated the null hypothesis that the number of cointegrating vectors is less than or equal to 0, 1, 2, or 3. For each case, the null hypothesis is tested against the alternative. For instance, if the value of the trace statistic of a cointegration vector exceeds the critical value at 5 per cent, the null hypothesis of no cointegration is rejected in favour of the alternative hypothesis. In the same vein, if the value of the maximum Eigen is greater than the critical value at 5 per cent, the null hypothesis of no cointegration is rejected in favour of the alternative hypothesis.

Table 4: Cointegration test results

Model	*Null Hypothesis*	*Trace Statistic*	*Critical Value (5%)*	*Maximum Eigen*	*Critical Value (5%)*	*Results*
Lag Length:2	r	66.3601	47.8561	31.9802	27.5843	Trace test showed the presence of two cointegrating vectors while the Maximum Eigen showed one cointegrating vector.
	r	34.3798	29.7970	20.6094	21.1316	
	r	13.7703	15.4947	11.8712	14.2646	
	r	1.8990	3.8414	1.8990	3.8414	

For $r \leq 0$ and $r \leq 1$ under the trace statistic, the null hypothesis of no cointegration is rejected. This implies that there is presence of cointegration. Similarly, for $r \leq 0$ under the maximum Eigen, the null hypothesis of no cointegration is rejected. In essence, both the trace and maximum Eigen tests showed that long-run relationship exists between the variables. Hence, the vector error correction (VEC) becomes more appropriate to be used. However, it is important to state that the study focuses on the impulse response function and variance decomposition of VECM.

Impulse response function

Figures 2a, 2b and 2c depict the reactions of real gross domestic product (RGDP) due to shocks in government expenditure on education (GXE), gross capital formation (GCF), and population (POP), which proxy labour force, respectively. Figure 2a shows the response of RGDP to GXE. The IRF reveals that the RGDP responds positively to shock in GXE. In essence, government expenditure on education in Nigeria has positively contributed to the growth of the economy.

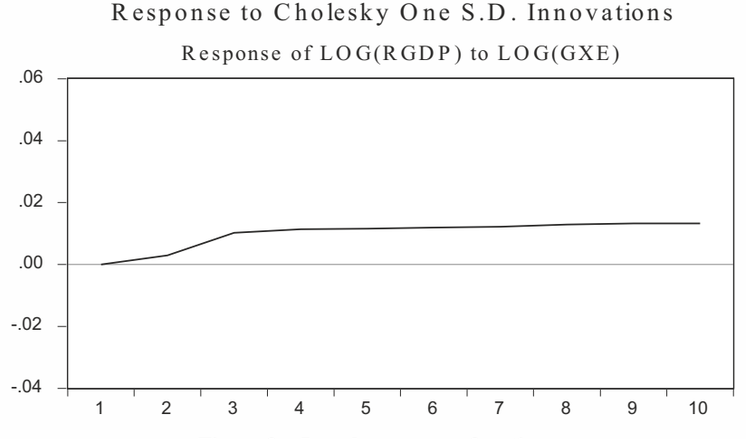

Figure 2a: Impulse response function

Source: Authors' computation using EViews 9

Figure 2b illustrates the reaction of RGDP due to shock or innovation in gross capital formation (GCF). The IRF shows that RGDP responds negatively to shock or innovation in GCF. This implies that gross capital formation, which connotes the government expenditures on fixed assets, such as roads, hospitals and other infrastructural facilities, has not yielded positive impact on the growth of the Nigerian economy. The possible reason for this is that the funds allocated to fixed assets are, in most cases, not actually expended on them, but are siphoned for personal use. Also, most capital projects are not often driven to the point of completion.

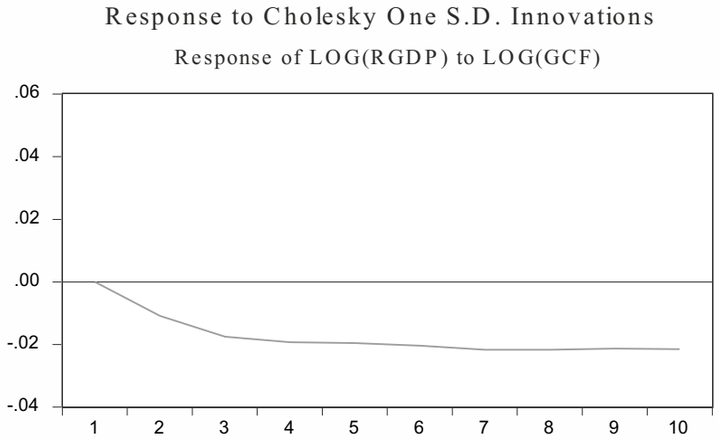

Figure 2b: Impulse response function

Source: Authors' computation Using EViews 9

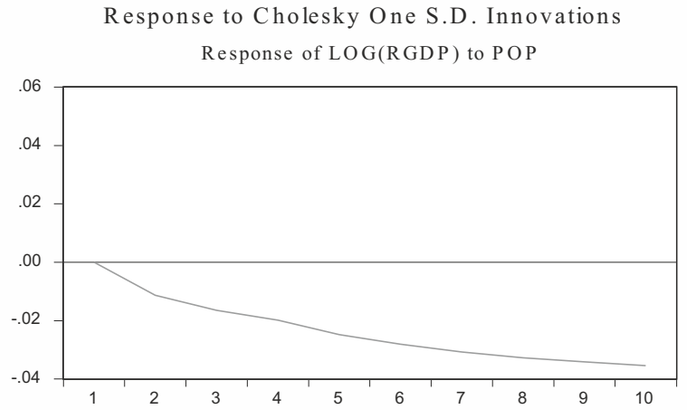

Figure 2c: Impulse response function

Source: Authors' computation using EViews 9

Figure 2c represents the response of RGDP to shock in POP. The IRF graph indicates that RGDP reacts negatively to POP, implying that the population, which ranges between 15 and 64, used to capture labour force of the country, is not positively impacting on the growth of the Nigerian economy. This presupposes that the labour force has not engendered growth and can be adduced to the increasing rate of unemployment in the country, couple with the increasing rate of brain drain.

Variance decomposition

The variance decomposition (VDC) separates the variation in an endogenous variable into component shocks to VAR. Hence, VDC provides information on the relative importance of each random innovation in affecting the variables in VAR (Anetor et al., 2016). Table 5 shows the variance decomposition of RGDP for 10 periods. It can be noted in the 10th period that GXE accounts for 3% variation in RGDP, GCF accounts for 9% variation, while POP accounts for 17% variation in RGDP. This outcome presupposes that the labour force, proxied by the population (of people ranging between 15 and 64 years old), exerts more impact on the growth of the Nigerian economy. This is followed by gross capital formation, while the least is government expenditure on education. This implies that even though government expenditure on education has positive impact on growth, as shown by IRF, it only accounts for the least impact on growth.

Table 5: Variance decomposition

Period	*S.E.*	*LOG(RGDP)*	*LOG(GXE)*	*LOG(GCF)*	*POP*
1	0.032430	100.0000	0.000000	0.000000	0.000000
2	0.055732	91.80990	0.271025	3.771893	4.147186
3	0.076858	84.12433	1.890991	7.201910	6.782767
4	0.096798	80.43492	2.571078	8.489645	8.504359
5	0.115275	77.68207	2.816103	8.854759	10.64707
6	0.132902	75.55505	2.920300	9.024177	12.50047
7	0.149652	73.73027	2.961103	9.221763	14.08686
8	0.165566	72.29878	3.027252	9.255262	15.41870
9	0.180748	71.25053	3.075334	9.159115	16.51502
10	0.195063	70.33998	3.101785	9.081152	17.47708

VECM Granger causality

Table 6 depicts the vector error correction model (VECM) Granger causality test. The test was conducted to ascertain the existence of causal relationship between the endogenous variables under study. The result shows that there is a unidirectional causal relationship running from RGDP to GXE. This implies that economic growth has a causal effect on government expenditure on education and this tends to lend credence to the Wagner's law that 'as the economy develops overtime, the activities and function of

government increase'. The results also indicate that there is a unidirectional causal relationship running from RGDP to POP, inferring that economic growth has a causal effect on the labour force.

Table 6: VECM Granger causality

Dependent Variables	*Probability Values*				*Direction of Causality*
	LOG(RGDP)	*LOG(GXE)*	*LOG(GCF)*	*POP*	
LOG(RGDP)	-	0.2696	0.7620	0.1870	
LOG(GXE)	0.0222	-	0.4672	0.5801	LOG(RGDP) ? LOG(GXE)
LOG(GCF)	0.3771	0.3378	-	0.5426	
POP	0.0426	0.4706	0.2012	-	LOG(RGDP) ? POP

Source: Authors' computation using E Views 9

Inverse roots of AR

Figure 3 shows the inverse roots of AR. The graph helps ascertain if the estimated impulse response function and variance decomposition of VAR (VECM) are stable. These are said to be stable if none of the polynomial roots are found outside the circle. A cursory look at figure 3 reveals that none of the polynomial roots are outside the circle, meaning that the estimated impulse response function and variance decomposition of VECM are stable and can be used as basis for decision making.

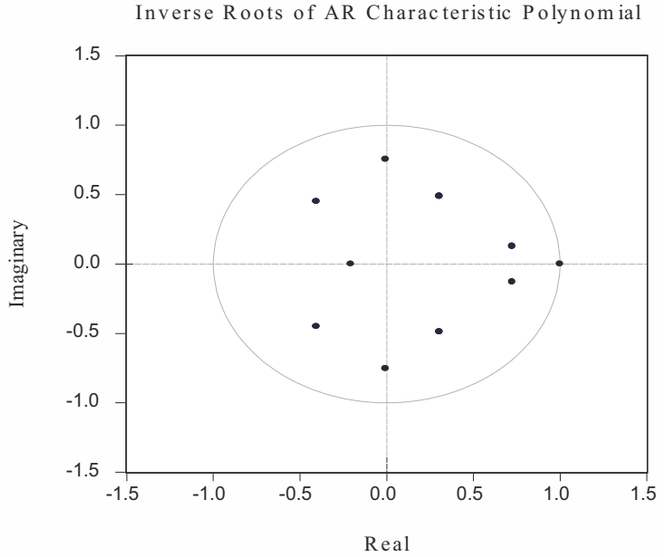

Figure 3: Inverse roots of AR

Source: Authors' computation using eView 9

Conclusion and Recommendations

The study investigated the relationship between educational expenditure and the Nigerian economic growth using annual time series data over the period 1981-2015. Employing the impulse response function (IRF) and variance decomposition (VDC) of the vector error correction model (VECM), the study found from IRF that economic growth responds positively to shock in government expenditure on education. This infers that government expenditure on education has positive impact on growth in the period under study. The IRF, however, showed that economic growth responds negatively to gross capital formation, implying that government expenditures on long-term projects, such as roads, hospitals and other infrastructural facilities have not yielded positive impact on the growth of the Nigerian economy. This could be due to the fact that the funds allocated to fixed assets are not often expended on such fixed assets, but are siphoned for personal use. Also, most capital projects are not often driven to the point of completion.

The IRF further indicated that economic growth responds negatively to labour force. This could be due to the increasing rates of underemployment and unemployment in the country. Thus, from the variance decomposition (VDC), it can be concluded that despite that government expenditure on education produces positive impact on economic growth, it accounts for the least variation in growth. The VDC also shows that labour force accounts for the highest variation in economic growth. The Granger causality test revealed that increase in real GDP causes government expenditure on education to increase. In other words, the study found that the size of expenditure on education affects economic growth, in support of the Wagner's law. However, the study found that government expenditure on education does not cause economic growth.

Consequence upon the findings of the study, it is crucial for the Nigerian government to increase its budgetary allocation to the education sector to improve the quality of education and the labour force, thereby bringing about increased growth of the economy at large.

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