Relationship between Education and Economic Growth: A Case Study of Nigeria

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ABSTRACT

The discovery of oil has led many economies to rely heavily on the oil sector and neglect other sectors of the economy. Education is widely accepted to be among the leading instruments for stimulating economic growth, it plays a vital role in developing human capabilities. The main objective of this research is to investigate the relationship between education and economic growth in Nigeria using annual time series data from 1980-2015. This study uses an econometric model to examine the contributions of primary education, secondary education and tertiary education (proxied by school enrolments at various levels) and the government expenditure on education to economic growth of Nigeria (proxied by GDP per capita). This research paper employs a Johansen cointegration technique and the Vector Error Correction method (VECM) is employed test for long-run relationship among our variables of interest and the speed of adjustment among our variables is found to be 27.7% while the block exogeneity test is employed to test for causality.

Keywords: Education, Economic growth, VECM, GDP per capita, Block exogeneity.

ÖZ

Petrolün keşfi birçok ekonomiyi büyük ölüde petrol sektörüne güvenmesine ve ekonominin diğer sektörlerini ihmal etmesine neden oldu. Eğitim, ekonomik büyümeyi teşvik etmek için önde gelen araçlardan biri olarak kabul edilmektedir; insan kapasitesinin geliştirilmesinde hayati bir rol oynamaktadır. Bu araştırmanın temel amacı, 1980-2015 yılları arasındaki yıllık zaman serisi verilerini kullanarak Nijerya'daki eğitim ve ekonomik büyüme arasındaki ilişkiyi araştırmaktır. Bu çalışma, ilköğretim, ortaöğretim ve üçüncül eğitimin (çeşitli kademelerde okul kayıtlarıyla sağlanmaktadır) ve eğitimle ilgili hükümet harcamalarını Nijerya'nın ekonomik büyümesine (kişi başına GSYİH'nın öngörüsü) göre incelemek için bir ekonometrik model kullanmaktadır. Bu araştırma makalesinde, Johansen koentegrasyon tekniği kullanılmakta ve değişkenlerimiz arasındaki uzun dönemli ilişki için VECM (Vector Error Correction) yöntemi kullanılıyor ve değişkenlerimiz arasındaki uyum hızı% 27,7, blok ekzojenite testi ise nedensellik testi için istihdam edilmektedir.

Anahtar Kelimeler: Eğitim, ekonomik büyüme, VECM, kişi başına GSYİH'nın, blok ekzojenite

DEDICATION

This work is dedicated to the Family of Alhaji Bello Ado Madaka (Marafan Gumel)

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LIST OF ABBREVIATIONS

ADF	Augment Dickey Fuller
CBN	Central Bank of Nigeria
PP	Phillips Perron
ECT	Error Correction Term
GDP	Gross Domestic Product
GEP	Gross Enrolment Primary School
GES	Gross Enrolment Secondary School
GET	Gross Enrolment Tertiary Institution
IMF	International Monetary Fund
VECM	Vector Error Correction Model
WDI	World Bank Development Indicators

Chapter 1

INTRODUCTION

1.1 Content of the Study

Since the discovery of oil a lot of countries have relied heavily on the oil sector, Nigeria being one of the countries it was the crash of the oil market in the late seventies that prompted capital and social investment projects which takes the vast majority of 3rd and 4th advancement plans between 1975 to 1985 relinquished.

Education is believed to be among the leading instruments for stimulating economic growth, it plays a vital role in developing human capabilities. Education can be defined as the process of impacting or acquisition of knowledge or skills. Education increases the knowledge of workers through improving their skills and making them more experienced to handle new challenges they face, it reduces the unemployment level in a country and also increases earning potential of individuals also increases the productivity and efficiency of the country.

The Nigerian government understands the need to increase the economic growth rate of the various sectors of the economy and to diversify the economy so as to reduce the reliance on oil, but the efforts have been unsuccessful due the presence of corruption in the system, poor investment and the abundance of unskilled labor force. The education system is not very effective hence making the quality of education received by students very poor.

Now that we are in the knowledge age education has an important role in promoting economic growth in both developing and developed countries.

The study of the relationship between education and economic growth is not a new one, a major debate between economists has been how education affects economic growth. Some economists believe that various school attainment levels (primary school, secondary and tertiary) by individuals leads to economic growth, while some economists are of the belief that increased spending on education by the government stimulates economic growth.

The relationship between education and economic growth can be found in some economic models such as the Solow growth which is an exogenous growth model and it explains that some factors such labor, capital accumulation and increases in productivity are stimulators of economic growth. And we also have the Endogenous growth theory which has the major assumption that long run economic growth of a country depends on the government policies of that countries such as educational scholarships, subsidies for research and development or some programs which will provide incentive for innovation thereby stimulating economic growth.

A lot of studies have been executed in order to examine the relationship between education and economic growth, most of the papers we reviewed do not take specific countries separately instead they take a cross section of some countries by using panel data analysis and the most recent literature on education and economic growth in Nigeria as we found out does not use data beyond 2007: they include Adam Smith (1937), Marshall (1930) Schultz (1961), Crowder (1996), Ranis and Stewart (2001), Babatunde and Adefabi (2005), Abbas (2007), and Bhamani (2007).

The marginal contribution of this paper is to expand the research to 2015 using the time series econometrics and it is expected that the findings of this study will provide policy framework.

1.2 Aim of the Study

One of the problems of Nigeria is a very high illiteracy rate, with the abundance of unskilled workers and the use of archaic capitals and method of production which leads to low levels of marginal productivity which implies low real income, hence low savings which leads to low investments and all these factors causes a low rate of capital formation.

It has been debated by many economists over a long period of time about the contribution of education to the economic growth in both developing and developed countries. The idea behind the debate is that some economists assume that if public expenditure on education is increased and schools are expanded, salaries of teachers increase etc. will automatically improve the quality of education and hence stimulate economic growth. While another group of economists are of the belief that a very high quality education will stimulate increase in productivity of individuals which will stimulate economic growth. Hence this study intends to focus on how education impact economic growth in Nigeria and also it seeks to investigate if there exist any short run and long run dynamic relationship among variables investigated in the research and by extension if education is a key driver of economic growth in Nigeria. The study is aimed at providing answers to the following questions:

What is the relationship between education and economic growth in both short run and long run in Nigeria?

Is education an important factor in economic growth in Nigeria?

1.3 Organizational Structure

This work is made up of five chapters. The first chapter encompasses of: introduction, research background, aim of the study, organizational structure and the Nigerian education profile and historical background of education in Nigeria.

The second chapter is the literature review: which includes the definition of Economic growth and the theoretical and empirical framework.

The third chapter includes the data specification, data collection and research methodology.

The fourth chapter includes the analysis of data, interpretation of outcomes and the presentation and discussion of findings.

The final chapter comprises of the summary of results, conclusion and policy recommendation from the research

1.4 Nigerian Education Profile and Historical Background

The current Nigerian education system is based on the National Policy on Education (NPE) (1977) which was later revised in 1981 and 1990. The need to revise and update the National policy on education was acknowledged by the government so that the needs of the new democracy at the time was met.

The Nigerian educational system is organized into the 6-3-3-4 system which when broken down means 6years of basic education (primary school), the primary education which is the initial stage of education with the objective of creating, establishing and offering opportunities to children at an early age. 3years of junior

secondary school (JSS), and 3 years of senior secondary school (SSS), the aims secondary school education are mainly two which are: to develop students to graduate from the secondary school with adequate skills to be able to be part of the labor force and to be ready to pursue higher education. The main aim of dividing the secondary school education into the JSS and the SSS was to create an exit point upon the completion of the junior education, after the JSS placement is done based on the Junior secondary school certificate examination results, some students are placed to the SSS, some are placed in to technical collages, some are placed into vocational training centers or apprenticeships. 4 years of University/college of education or polytechnic.

The local, state and federal government have the responsibility of running the educational institutions through the federal and state ministries of education with support from the communities and private organizations and also some commissions established by the government to take responsibilities of the various educational sub-sectors we have there are: National mass literacy adult and non-formal Education commission (NMEC), National Primary Education Commission (NPEC) National universities Commission(NUC), National secondary Education Commission (NSEC) etc.

In the late seventies and early eighties, the Nigerian education witnessed a rapid growth in size but not in the quality of the education provided, this was as a result of some problems faced with executing the needed policies necessary to expand the educational system, poor outlining and execution, allocation of inadequate financial

resources, inefficient data and monitoring systems all contribute to the obstacles which led to the speedy and unbalanced growth.

The policy makers are more interested in expanding the system which is not met with increased funding to ensure that quality is maintained, rather than providing access to the much needed access to quality education due to the political pressure they are faced with.

Because of the greater need and access to education from the society coupled with few schools, politicians are under immense pressure to satisfy their constituencies as a result a number of political decisions were made in some areas such as: merit as criterion when seeking for admission was lowered to 12% into secondary schools owned by the federal government, and 40% for federal higher institutions and some other criterion such as quotas for number of students to be admitted into state and federal institutions from the various zones of the country.

Some malpractices began to manifest such as bribing some officials in order to gain admission, nepotism in favor of less qualified candidates and corruption. Politics became a part of the system rather than the quality of education. In an effort to reform the education system by the government two studies were conducted, the government collaborated and conducted the first study with United Nations Children's Education Fund (UNICEF) between 1991 and 1992 "A situation analysis policy study (SAPA)" with the aim of analyzing factors that hinder access to education and factors that affect quality of education. While the second study was conducted in 1977 with the aim of examining the learning achievements of the

Nigerian school children at level four. It was concluded from the study that children lacked numeracy and literacy competencies.

In 1992 a compulsory nine-year schooling program was introduced by the government which covers primary and junior secondary school education with the aim of ensuring that children/students remain in school long for the minimum duration of acquiring basic life skills.

Table 1: General Information about the Nigerian Economy

GDP per capita	$2,177.99 (2016) world bank
GDP	$405.1 billion (2016) world bank
Currency	Naira
GDP growth rate	-1.5% annual change (2016)
Gross national income	$1.068 trillion PPP (2016) world bank
Inflation (CPI)	9% (May 2015)
Unemployment	13.9% (Q3 2016)
Exports	$93.01 billion (2014 Est)
Imports	$52.79 billion (2014 Est)
FDI stock	$1.1 trillion (2014)
Gross external debts	$9.7 billion (2015)
Labor force	74 million (Q2 2015)

Source: Wikipedia

Chapter 2

REVIEW OF THE LITERATURE

2.1 Introduction

The Education and economic growth nexus has attracted attention recently from researchers such as Katircioglu (2010), Katircioglu et al., (2010, 2014,) Ozsagir et al. (2010), Kreishan and Al-Hawarin (2011), Vural and Gulcan (2008), Bulut and Sayin (2010), Misra (2009). Various techniques have been used to test for the relationship some economists used the OLS method, others employed the Cobb-Douglas production function, while some used the time series econometrics. Some economists hypothesized that school attainments by individuals positively affects economic growth, while some economists stressed that in order to stimulate economic growth governments need to increase its expenditure on education

2.2 Theoretical Framework

Theories of Economic Growth

The Solow's Growth Theory

The Solow's model can also be referred to as the Solow-swan model was introduced by Solow and Swan in 1956. It is a neo-classical and exogenous model of economic growth. It explains the relationship between investment, population growth and economic growth. The Solow model used a Cobb-Douglas production function and revealed that higher investments increases capital accumulation and hence more output and faster growth. While a speedy population growth affects economic growth

negatively because countries with a very high population growth must try to maintain a balanced capital-labor ratio constant. The Solow model explains that in the long run economic growth can only be achieved through technological progress.

The Keynesian Theory

The Keynesian economies consists of several theories about how economic output is being influenced by total spending in an economy especially in the short run. The basic theory was developed by Keynes (1963) after the great depression. He argued that the economy is not always at full potential, it may be below or above the potential. Keynes believed that expenditure by the government positively affects economic growth, hence an increase in government investment in infrastructure and monetary policy (lowering interest's rates) will most likely increase employment and investment through the multiplier effect on aggregate demand.

Human capital Investment Theory

This theory was developed by Becker in 1975. He explained that they exist various relationships between income expenditure and human capital development according to him individuals who are high earners tend to spend very high on education because they can afford a high quality education. While those individuals with a low-level income might be inclined to look for part time employment, while still studying so as to support their families which may be affecting their academic performance negatively, or they may remain in school for as long as they will attain the minimum requirement for finding employment so as to be able to earn income to support themselves and their families.

The Endogenous Growth Theory

The major contribution of the endogenous growth theory on other previous growth models is that in the endogenous growth models it is assumed that technological progress is the main stimulator of economic growth. The main rationale behind the endogenous growth theory is the belief that economic growth comes from within and not from external sources. And it also assumed that investment in human capital is a significant contributor to economic growth. Among the core assumptions of the endogenous growth theory is that the long-run economic growth of a country strongly depends on government policies such as scholarships for education, subsidies for research and development etc. or some other programs that provide incentive for education and innovation thereby increasing economic growth.

2.3 Empirical Literature Review

The study of the relationship between education and economic growth has a long history the following are some of the studies:

Omojimite Ben (2010) examined the relationship between education and economic growth using public spending on education (recurrent expenditure on education and capital expenditure on education) Primary school enrolment from 1980 to 2005 using time series econometrics his findings revealed that primary school enrollment and capital expenditure on education have no causal relationship with growth but public expenditure on education granger causes economic growth in a unidirectional relationship, while there exist a bi-directional granger causality relationship between pubic recurrent expenditures on education and economic growth.

Johnson (2011) employed the OLS technique to analyze the relationship between total government on health and education, enrolment to primary, secondary and

tertiary schools as a proxy for human capital his results revealed that there exists a strong relationship between human capital development and economic growth.

Tariq Saiful Islam et al (2007) employed the time series technique to test the relationship between expenditure on education, capital and labor of Bangladesh of the period 1976 to 2003 and their results revealed that there exists a bi-directional causality relationship between education and economic growth in Bangladesh.

Babatunde and Adefabi (2005) employed johansen cointegretion technique and the Vector Error Correction Model with physical capital, human capital and labor from 1970 to 2003, to test for the long-run relationship between education and economic growth in Nigeria and their results confirmed that there exists a long run relationship between education and economic growth in Nigeria and an educated labor force significantly stimulates economic growth.

Babar Aziz et al (2008) employed the Cobb-Douglas production function with the variables: Enrolment in higher education, higher education expenditure, employment rate, labor force, labor force participation rate and per capita income from 1972 to 2008 in order to examine the impact of higher education on economic growth of Pakistan and his findings confirmed that higher education is an important tool for stimulating economic growth in Pakistan.

Omotour (2004) employed the OLS technique to analyze the effect of federal government expenditure on education and he found out that the main determinant of the expenditure on education is government.

Abhijeet (2010) employed the time series econometrics on expenditure on education and GDP for a period of 1951 to 2009 to examine whether government expenditure on education does promote economic growth in India and it was revealed that the level of government spending on education is affected by economic growth and investment in education also affects economic growth.

Patricia and Izuchukwu (2013) examined the effects of government expenditure and economic growth in Nigeria applying the time series techniques on public expenditure and real GDP from the period of 1977 to 2012 and their results affirmed that education and economic growth in Nigeria have a strong and positive relationship.

Torruam et al (2004) examined the relationship between public expenditure on tertiary education and economic growth in Nigeria and they found tertiary education in Nigeria positively stimulates economic growth of Nigeria.

Dauda (2009) used the annual time series data of the period 1977 to 2007 and employed the Johansen cointegration technique and error correction methodology to test the relationship between investment in education and economic growth in Nigeria and her results reaffirmed that there exists a long run relationship between economic growth and investment in education in Nigeria.

Obi et al (2016) in their study on government education spending and education outcome in Nigeria employed the Augmented Dickey Fuller and the OLS technique on Primary school enrolment, public educational expenditure as a percentage of GDP, public health spending as a percentage of GDP, urban population as a measure

of urbanization from 1970 to 2013 and their results suggested that there exist a positive and statistical relationship between education outcome and public education spending but public health expenditure and urban growth while have a positive effect on education outcome are not significant in determining education outcome.

Zhang and Zhuang (2011) investigated the composition of human capital and economic growth of china employing the Generalized methods of moments (GMM) their findings indicated that tertiary education plays a more important role than primary and secondary education in china.

Chapter 3

DATA AND METHODOLOGY

Our empirical analysis spans the period of 1980 – 2015. The data sources are the World Bank Development Indicators (WDI), the Central Bank of Nigeria (CBN) and the International Monetary Fund (IMF) development indicators. It is very normal for the macroeconomic and financial time series to display trend and seasonality. The implication of regressing series that are nonstationary on each other is bound to produce a spurious regression In order to avoid spurious regression, we applied the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Subsequently, for testing the long-run relationship among the variables included in our model, we used the Johansen cointegration test. The following chapter contains the test results. Following the preliminary tests, we proceed to the vector error correction model (VECM) in order to find out the short-run dynamics of the variables and the long-run speed of adjustment at which the variables correct their short-run disequilibriums and approach their long-run equilibrium. The variables under consideration in this study are the real gross domestic product (RGDP) per capita, used as the dependent variable measuring the economic growth, gross primary, secondary and tertiary school enrollments (as separate variables), government expenditure on education as a percentage of government expenditure and oil rent, used as the independent variables. Oil rent is the control variable of our analysis.

3.1 Model Specification and Variables

As mentioned earlier, in order to analyze the relationship between education and Nigerian economic growth, we have constructed a model containing four explanatory variables (gross primary school enrollment, gross secondary school enrollment, gross tertiary enrollment, government expenditure on education as a percentage of GDP) and one control variable (oil rent). The selection of the variables is based on our review of the related literature and economic intuition. The functional form of our empirical model, which measures the economic growth as a function of the explanatory variables mentioned earlier, is as follows:

GDP = f (GEP, GES, GET, EXP, RENT)

Econometrics form of our function is:

$$LNGDP_t = \beta_0 + \beta_1 lnGEP + \beta_2 ln\text{GES} + \beta_3 lnGET + \beta_4 lnEXP + \beta_5 lnRENT + \varepsilon_t$$

(Eq. 1)

Where the expected signs of the coefficients β_1, β_2, β_3, β_4 and β_5 are positive, and:

GDP = Gross domestic product;

GEP = Gross enrollment primary school;

GES = Gross enrollment secondary school;

GET = Gross enrollment tertiary school;

EXP = Real Government expenditure on education as a percentage of government expenditures;

RENT= Oil rent.

3.2 Stationarity Test

Time series data are mostly nonstationary meaning that its mean, variance and autocorrelation are nonconstant over time, i.e. time variant. Thus, using such data produce spurious regression as well as misleading policy implications. Therefore we

need to verify the data asymptotic properties and order of integration of the series under consideration. There are various methods on testing for stationarity of time series, among which are the ADF and the PP tests. On the other hand, less formal method such as the graphical analysis via series plot to give a glimpse of the variables through correlogram is also widely used in the econometrics literature. However, the need to apply the aforementioned is key for precision.

Augmented Dickey-Fuller (ADF) Test

This test was developed by Dickey and Fuller (1979) it is the modified version of Dickey-Fuller stationarity test. It was expanded in1984 to test for basic auto-regressive unit root and to solve for more complex models with unknown orders. The ADF test was designed primarily to test for unit root, it can be conducted with trend only, with trend and intercept and without both trend and intercept. The null hypothesis H_0 = series non stationary while the alternative H_1 = series are stationary. Below is the equation for a unit root test :

$$\Delta Y_t = \beta_1 + \beta_2 t + \gamma Y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad \text{(Eq.2)}$$

$$\text{With } \alpha_i = -\sum_{k=i+1}^{p} \phi k \quad \delta = \left(\sum_{i=1}^{p} \phi_i \right) - 1 \qquad \text{(Eq.3)}$$

Here ε_t represents white noise

Phillips –Perron Test

Statisticians Peter C.B Phillips and Pierre Peron developed this test in 1988. The PP test can be used as an alternative for the ADF test. However, both test exhibits

similar traits but their distinction is in the way they deal with serial correlation and heteroscedasticity in the error term. The PP test ignores any serial correlation. Where he null hypothesis H_0 = not stationary, while the alternative H_1 = no unit root or stationary. If we fail to reject H_0 at levels the first difference of the data should be taken so that it will be stationary. One major advantage of the PP test over the ADF is that you don't need to specify a lag length below is the equation for the PP test: The statistical formulation of the PP formulae is given as:

$$\omega_k = \frac{1}{T}\sum_{s=k+1}^{N} \gamma_t \gamma_{t-s} \qquad \text{(Eq.4)}$$

$$\omega_0 = \left[(T-N)/N\right] s^2 \text{ Where } s^2 = \frac{\sum_{p=1}^{p} \lambda_t^2}{T-N}$$

$$\gamma = \omega_0 + 2\sum_{k=i+1}^{r}\left(1-\frac{k}{n+1}\right)\omega_k$$

3.3 Cointegration Test

A cointegration test is used to test the long-run relationship among variables included in a model. Engel and Granger (1987) suggested a cointegration test, there exists several different cointegration tests such as stock and Watson (1988) and the Banerjee et al. (1998) But in this research paper we employ the Johansen and Juselius (J & J) test because it has some properties we desire among which include it treats all variables as endogenous variables. The Johansen test can be referred to as the maximum eigenvalue test and the trace test. The Johansen test are two which are (1) the maximum eigenvalue test and (2) the trace test .it basically tests if the rank of the matrix is zero The null hypothesis H_0 = series are cointegrated and the null can be rejected where the trace statistic is greater than its critical value, while the alternative H_1 = series are not cointegrated or there exists no cointegration vector. The equation is given as:

$$\Delta Y_t = \Gamma_1 \Delta X_{t-1} + ... + \Gamma_{K-1} \Delta X_{t-K+1} + \Pi X_{t-K} + \mu + \varepsilon_t \quad \text{(Eq.5)}$$

$$\lambda_{trace} = -T \sum Ln(1 - \lambda_i) \quad \text{(Eq.6)}$$

3.4 Error Correction Model

Following the preliminary analyses of unit root and cointegration tests, we have estimated a VECM. The merit of VECM is that it accounts for disequilibrium in the system of equation via the error correction mechanism.

The error correction term simply illustrates how fast the variables converge to their long-run equilibrium. For the error correction system to be useful we need the error correction term (ECT) to be statistically significant. It shows the speed at which the variables converge to their log-run equilibrium. A simple equation for the ECM is as follows:

$$\Delta Y_t = \lambda(\Delta X_t) + \gamma(Y_{t-1} - \theta X_{t-1}) + \varepsilon_t \quad \text{(Eq.7)}$$

$$ECT \approx (Y_t - \theta X_{t-1}). \quad \text{(Eq. 8)}$$

Chapter 4

RESULTS AND DISCUSSIONS

This chapter contains the interpretation of the empirical results of our analysis. Before presenting our empirical analyses, we look at the descriptive statistics of our variables. Table 1 below contains these statistics.

Table 2: Descriptive Statistics

	GDP	GEP	GES	GET	RENT	EXE
Mean	8,705,536	9,390,833	3,003,278	6,111,111	2,441,667	58324.69
Median	4,110,750	9,345,500	2,696,500	4,000,000	2,500,000	61185
Maximum	3,203,240	11036	5,570,000	1,000,000	5,400,000	95807
Minimum	1,530,800	7,846,000	1,360,000	2,000,000	3,000,000	26952
Std. Dev.	9,025,531	8,103,703	9,265,283	3,293,090	1,056,781	19563.69
Skewness	1,491,152	0.269248	0.934891	0.241338	0.512322	-0.077821
Kurtosis	3,785,198	2,451,824	3,372,911	1,194,404	3,464,260	1,796,662
Jarque-Bera	1,426,601	0.885713	5,452,719	5,239,730	1,898,150	2,208,368
Probability	0.000798	0.642199	0.065457	0.072813	0.387099	0.331481
Sum	31339.93	338070	108118	2,200,000	8,790,000	2099689
Sum Sq. Dev.	28,511,074	22,984,503	30,045,913	3,795,556	3,908,750	1.34E+10
Observations	36	36	36	36	36	36

Table 2 below displays the unit root test results, showing that all the variables are I (1) at 5% level of significance.

Table 3: ADF and PP Unit Root Tests

ADF(0)	GDP	GEP	GES	GET	EXE	OIL RENT
INTERCEPT	0.339794	-2.507189	-1.353573	-0.779053	-1.1716	-0.707806
TREND AND INTERCEPT	-1.582398	-2.50336	-2.165643	-1.546545	-1.767982	-1.823754
NONE	1.039616	-0.125788	0.968414	1.108908	-0.962165	-0.649351
PP (0)						
INTERCEPT	0.222675	-2.65941	-1.311902	-0.954461	-1.607165	-2.489791
TREND AND INTERCEPT	-1.526039	-2.671942	-2.19506	-2.721267	-2.893129	-3.008165
NONE	0.957655	-0.125788	-1.120683	0.804148	-0.962298	-1.30126
ADF(I)						
INTERCEPT	-5.448981**	-5.613436**	-6.751531**	-9.759760**	-8.974732**	-7.847333**
TREND AND INTERCEPT	-6.487153**	-5.539883**	-6.645610**	-9.608129**	-8.838926**	-8.264214**
NONE	-5.289160**	-5.701184**	-6.468159**	-9.346280**	-9.035850**	-7.928202**
PP(I)						
INTERCEPT	-5.592523**	-5.5613436**	-6.764345**	-9.349301**	-8.804158**	-8.527933**
TREND AND INTERCEPT	-6.485528**	-5.538010**	-6.657639**	-9.209528**	-8.683472**	-14.52605**
NONE	-5.465893**	-5.701184**	-6.477165**	-8.748228**	-8.838507**	-7.996926**

Cointergration Test

After taking the first difference in the previous ADF and PP tests all our series became stationary. As the next step, we tested the long-run relationship among our variables using the Johansen cointegration test. Table 3 below contains our test results.

Table 3: Multi-variate Johansen Cointegration Result

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.710514	111.9618	95.75366	0.0024
At most 1	0.569661	69.81368	69.81889	0.0500
At most 2	0.431356	41.14552	47.85613	0.1841
At most 3	0.364474	21.95251	29.79707	0.3011
At most 4	0.163274	6.540235	15.49471	0.6316
At most 5	0.014002	0.479430	3.841466	0.4887
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

The results indicate the existence of one cointegration vector in the model, indicating that there exists a long-run relationship among our variables.

VECM

Our VECM estimation results are as in Table 4 below:

Table 4: Vector error correction Model

Vector Error Correction Estimates						
Cointegrating Eq:	CointEq1					
LNGDP(-1)	1.000000					
LNGEP(-1)	0.619799					
	(0.88345)					
	[0.70157]					
LNGES(-1)	-2.595362					
	(0.40887)					
	[-6.34771]					
LNGET(-1)	-0.314355					
	(0.18952)					

	[-1.65870]					
LNEXE(-1)	-0.074108					
	(0.12593)					
	[-0.58849]					
LNRENT(-1)	0.275810					
	(0.21553)					
	[1.27966]					
C	-0.704381					
Error Correction:	D(LNGDPC)	D(LNGEP)	D(LNGES)	D(LNGET)	D(LNEXP01)	D(LNRENT)
CointEq1	-0.27683	0.063789	0.138452	0.009514	-0.106813	0.042677
	(0.08287)	(0.02685)	(0.04042)	(0.09210)	(0.11859)	(0.16833)
	[-3.34051]	[2.37548]	[3.42510]	[0.10329]	[-0.90071]	[0.25354]
D(LNGDP(-1))	0.207841	0.006970	-0.030327	-0.112748	0.179425	-0.220457
	(0.14677)	(0.04756)	(0.07159)	(0.16312)	(0.21002)	(0.29811)
	[1.41612]	[0.14655]	[-0.42362]	[-0.69122]	[0.85431]	[-0.73951]
D(LNGEP(-1))	-0.387192	-0.08431	0.013224	0.273030	1.336559	-2.137718
	(0.62333)	(0.20198)	(0.30405)	(0.69276)	(0.89199)	(1.26611)
	[-0.62116]	[-0.41742]	[0.04349]	[0.39412]	[1.49841]	[-1.68841]
D(LNGES(-1))	0.168805	-0.039462	-0.154921	0.381651	1.327861	0.433295
	(0.29063)	(0.09418)	(0.14177)	(0.32301)	(0.41590)	(0.59033)
	[0.58082]	[-0.41903]	[-1.09280]	[1.18156]	[3.19277]	[0.73398]
D(LNGET(-1))	-0.095469	0.041292	-0.003894	-0.495433	-0.093054	0.298490
	(0.16086)	(0.05212)	(0.07846)	(0.17877)	(0.23019)	(0.32673)
	[-0.59350]	[0.79219]	[-0.04963]	[-2.77126]	[-0.40425]	[0.91356]
D(LNEXE01(-1))	0.511260	-0.040907	0.113116	-0.06362	-0.37115	-0.284286
	(0.14491)	(0.04696)	(0.07068)	(0.16105)	(0.20737)	(0.29434)
	[3.52813]	[-0.87118]	[1.60030]	[-0.39503]	[-1.78984]	[-0.96584]
D(LNRENT(-1))	-0.034634	0.010581	0.065345	-0.140634	0.010184	-0.042131
	(0.09989)	(0.03237)	(0.04872)	(0.11102)	(0.14294)	(0.20289)
	[-0.34672]	[0.32689]	[1.34114]	[-1.26680]	[0.07125]	[-0.20765]

C	0.044410	-0.00497	0.040893	0.050620	-0.142808	-0.083896
	(0.03670)	(0.01189)	(0.01790)	(0.04079)	(0.05252)	(0.07455)
	[1.21000]	[-0.41786]	[2.28418]	[1.24096]	[-2.71904]	[-1.12536]
R-squared	0.542714	0.216079	0.452348	0.340544	0.427936	0.166617
Adj. R-squared	0.419599	0.005023	0.304903	0.162998	0.273919	-0.057756
Sum sq. resids	0.975597	0.102437	0.232124	1.205037	1.997780	4.025078
S.E. equation	0.193708	0.062768	0.094487	0.215285	0.277196	0.393460
F-statistic	4.408176	1.023799	3.067916	1.918062	2.778498	0.742589
Log likelihood	12.12422	50.43887	36.53245	8.533541	-0.060404	-11.96903
Akaike AIC	-0.242601	-2.496404	-1.678379	-0.031385	0.474141	1.174649
Schwarz SC	0.116542	-2.13726	-1.319236	0.327759	0.833285	1.533793
Mean dependent	0.034880	-0.002775	0.027718	0.042298	-0.084678	-0.05103
S.D. dependent	0.254264	0.062927	0.113331	0.235315	0.325308	0.382567
Determinant resid covariance (dof adj.)		4.61E-10				
Determinant resid covariance		9.22E-11				
Log likelihood		103.3647				
Akaike information criterion		-2.903804				
Schwarz criterion		-0.479584				

The estimation results also show that the speed at which the variables adjust to their long-run equilibrium as 27.7%. The ECT is statistically significant at 1%, demonstrating that the short-run dynamics of GEP, GES, GET, EXE and GDP will converge to their long-run equilibrium by 27.7% per annum by the contributions of GEP, GES, GET and EXE as explanatory variables. This is a significantly low rate of annual adjustment among the variables. The coefficient of determination represents 54% of the variations in GDP is explained by that in GEP, GES, GET, EXE and RENT. Additionally, the F-statistic portrays the overall significance of the model.

Causality test

Table 5: Granger Causality under Block Exogeneity Approach

VAR Granger Causality/Block Exogeneity Wald Tests			
Included observations: 35			
Dependent variable: LNGDP			
Excluded	Chi-sq	df	Prob.
LNGEP	1.156807	1	0.2821
LNGES	0.001213	1	0.9722
LNGET	7.541384	1	0.0060*
LNEXE	0.302077	1	0.5826
LNRENT	0.085108	1	0.7705
All	14.48266	5	0.0128
Dependent variable: LNGEP			
Excluded	Chi-sq	df	Prob.
LNGDP	7.301736	1	0.0069*
LNGES	6.537089	1	0.0106**
LNGET	0.426309	1	0.5138
LNEXE	1.200515	1	0.2732
LNRENT	0.008709	1	0.9256
All	13.68986	5	0.0177
Dependent variable: LNGES			
Excluded	Chi-sq	df	Prob.
LNGDP	8.034867	1	0.0046*
LNGEP	2.623892	1	0.1053
LNGET	2.674336	1	0.1020
LNEXE	0.011184	1	0.9158
LNRENT	0.722775	1	0.3952
All	18.87801	5	0.0020
Dependent variable: LNGET			
Excluded	Chi-sq	df	Prob.
LNGDP	0.987070	1	0.3205
LNGEP	3.009118	1	0.0828***
LNGES	0.026157	1	0.8715
LNEXE	3.822590	1	0.0506***
LNRENT	0.041528	1	0.8385
All	6.359104	5	0.2728
Dependent variable: LNEXE			
Excluded	Chi-sq	df	Prob.
LNGDP	3.118818	1	0.0774***
LNGEP	4.045421	1	0.0443**

LNGES	0.420823	1	0.5165
LNGET	0.933364	1	0.3340
LNRENT	3.086630	1	0.0789***
All	9.534426	5	0.0896
Dependent variable: LNRENT			
Excluded	Chi-sq	df	Prob.
LNGDP	11.99774	1	0.0005*
LNGEP	1.235297	1	0.2664
LNGES	0.024428	1	0.8758
LNGET	1.668783	1	0.1964
LNEXE	1.048009	1	0.3060
All	13.97363	5	0.0158

*Represents rejection at 1% level of significance, ** represents rejection at 5% level of significance, *** represents rejection at 10% level of significance

It is established that regular regression does not depict causality. Results in Table 5 shows that there is a single causality running from GET to GDP which means GET is an important predictor of GDP, from GDP to GEP which means GDP is an important predictor of GEP, from GES to GEP, from GDP to GES, from GEP to GET, from EXE to GET which means EXE has useful information in predicting GET. They are all to the fact that the null of no causality was rejected at different levels of significance in Table 5. We were not able to observe any Bi-directional causality between the variables.

Chapter 5

CONCLUSION AND POLICY RECOMMENDATION

In this paper the relationship between education and the Nigerian economic growth is examined, the research inquires if there exist a long-run relationship among the explanatory variables included in the model. The research uses a yearly time series dataset for 35 years (1980 – 2015).

ADF and PP unit root techniques were employed to test the stationarity of the data included in the model and the results shows that all series are non-stationary at levels, hence we proceeded to take the first difference of the series and the null hypothesis was rejected at 5% level of significance. We proceeded to the Johansen cointegration technique which demonstrates the presence of one (1) cointegrating vector in the model, which implies that they exist a long run relationship among the variables under consideration. The VECM test was conducted and the ECT which is the speed of adjustment of our data to their long-run values was found to be 27.7% which further reaffirms that there exist a clear and significant long-run relationship between education enrolments into various levels, government expenditure on education and economic growth of Nigeria. The block exogeneity results shows that there is a single causality running from GET to GDP which means GET is an important predictor of GDP, from GDP to GEP which means GDP is an important predictor of GEP, from GES to GEP, from GDP to GES, from GEP to GET, from EXE to GET which means EXE has useful information in predicting GET

5.1 Policy Recommendation

One of the basic features of Nigerian economy is that it is a mono-product economy which mainly relies on the oil sector and as such efforts need to be made both by the government and private sectors in making policies to diverse and broaden the Nigerian economy. It was found in this research that investment in education is positively related to economic growth and also statistically significant which shows that if Nigeria is to increase its economic growth investment in education needs to be increased. The study therefore recommends the following:

The study therefore recommends that government should increase its expenditure on education and they should implement the minimum United Nations recommendation of 26 percent budgetary allocation to education. Private individuals and donor agencies like the World Bank, UNDP, UNESCO, etc. should also be encouraged to inject funds into the educational sector especially, the tertiary institutions.

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