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Public Expenditure on Human Capital Development as a Strategy for Economic Growth in Nigeria: Application of Co Integration and Causality Test Analysis

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Abstract: *The study investigates the impact of human capital development on economic growth in Nigeria. The study examines the causal relationship between human capital development and economic growth in Nigeria for the period 1977-2012. The stationarity properties of the data and the order of integration of the data were tested using both the Augmented Dickey-Fuller (ADF) test and the Phillip-Perron (PP) test. The variables tested stationary at first differences. The Johansen approach of co-integration was applied to test for the long-run relationship among the variables. The result indicated three (3) co-integrating relations between the variables; the Granger-causality suggests that there is bidirectional causality running from economic growth to human capital development and from total expenditure on education to total expenditure on health in Nigeria. The study concludes that human capital development has an impact on economic growth in Nigeria. This implies that if funds channeled into education and health sectors are properly managed and utilized efficiently it would improve the educational and health sectors.*

Keywords: *Causality Analysis, Cointegration, Economic Growth, Human Capital Development.*

1. INTRODUCTION

Human capital development is a means of developing skills, knowledge, productivity and inventiveness of people through process of human capital formation. It is a people centered strategy of development which is recognized as an agent of national development in all countries of the world. Providing education and health services to people is one of the major ways of improving the quality of human resources. The theory of human capital development emphasizes how education and good health increases the productivity and efficiency of the people.

Education and health are fundamental to economic growth and development and are one of the key determinants of economic performance both at the micro and macro levels. This derives from the fact that education and health are both direct component of human well-being and a form of human capital that increases an individual's capabilities Bloom and Canning (2003). Grossman (1972) has equally demonstrated that education and health are forms of human capital. Schultz (1992) argued that population quality is the decisive factor of production and emphasized the intrinsic worth of investing in education and health.

Over the years, Nigeria government has neglected the serious decay in both infrastructure and human capital development which has caused the low productivity in the Nigerian economy for many decades. During the second development plan of Nigeria between 1970 – 1974, it was noted that the major constraint to the plan implementation was inadequate absorption capacity due to shortage of skilled manpower, serious neglect of government in funding of education and health sectors, political instability which cause frequent changes in education and health policies, low measure of budgetary allocation to human capital development and its relative indices and low quality of education and health services which is needed for human capital development.

Meeting the commendable United Nation health Millennium Development Goals (MDGs) of a reduction by two-thirds in the under-5 mortality ratio and a reduction by three-quarters in maternal mortality, and halting and beginning to reverse the spread of HIV/AIDS, malaria and other major diseases by 2015 will be completely elusive for Nigeria if sufficient attention is not paid to health expenditures. Similarly, eradicating illiteracy as one of the objectives of the (MDGs) will be a mirage if adequate attention is not given to educational expenditure by the federal government. It is against this backdrop that this paper investigates the impact of government Expenditure on Education and Health Services, and Economic Growth in Nigeria. Among other objectives, the paper focuses on government expenditure on the education and health sectors during the period under review with a view to ascertaining the relationship and causal direction between government expenditure on human capital development and economic growth in Nigeria. Specifically, the paper identifies the various arguments in the literature to determine which one is supported by data. The questions underlying the review are; what is the relationship between government expenditure on human capital development and economic growth in Nigeria? What is the direction of causality between government expenditure on human capital development and economic growth in Nigeria? The assumption is that education and health sector matters for economic growth in both short and long run.

2. Literature Review

The emergent evidence on the role and relevance of human capital investment through education and health in the development process of an economy for sustained growth and development is increasing in a frightening rate. Education and health at all levels have been identified to contribute to economic growth of any nation. It is pertinent to pinpoint that the significance of the educational system to any labour market would highly depend on its ability to produce a literate, disciplined, flexible labour force vis-àvis high quality education. Investing in health offers high return in terms of economic growth. This means that increasing expenditure on health services do not only have a large impact on poverty per naira spent, but also enhance growth in human productivity. This is because as more people get good health, they will carry out their duties for better productivity which will enhance economic growth.

Lyakurwa (2007) reported that human capital development has the capacity to enlarge people’s choices and opportunities, improve healthy living through acquired skills and knowledge and eventually enhance growth in the nation’s gross domestic product through increased productivity. According to Lucas (1988), revealed that the growth rate of human capital is dependent on the amount of time an individual puts into acquiring skills. Bakare (2006), investigated the growth implications of human capital investment in Nigeria by using vector autoregression and Error corrections model. Findings from the study revealed that there is a significant functional and institutional relationship between the investments in human capital and economic growth in Nigeria such that 1% fall in human capital investment led to a 48.1% fall in the rate of growth in gross domestic output between 1970-2000 that was examined.

Babatunde and Afolabi (2005), measured the long run relationship between education and economic growth in Nigeria between 1970 and 2003 by applying Johansen Cointegration method correction model and vector error model. The findings reveal that there is a long run relationship between education and economic growth there by laying emphasis that a well educated labour force appears to significantly influence economic growth both as a factor in the production function and through total factor productivity.

Chete and Adeoye (2002), studied the empirical mechanics through which human capital influences economic growth in Nigeria. They attempted to achieve this objectives using vector Auto regression analysis and ordinary least square to capture these influences. They however concluded that there is an unanticipated positive impact of human capital on growth by the various Nigeria governments since the post- independence has appreciated by prodigious expansion of educational infrastructure across the country; but they are quick to point out that the real capital expenditure on education and health have been rather low. Yesufu (2000), examines the nexus between human capital investment and economic growth in Nigeria. Specifically the study investigated the causality between human capital investment and economic growth during the period 1975-2005 using co-integrated and Error Correction Mechanism (ECM) technique. The findings of the study revealed that there existed a directional causality between Human Capital Investment and Economic Growth in Nigeria. It is therefore recommended that government should increase its budgetary allocation to the education and health sectors coupled with concerted efforts of all the stakeholders: government at levels, nongovernmental organization and the organized private sector in improving educational and health facilities for sustainable economic growth.

After reviewing empirical literature on the subject matter, it is evident that in Nigeria analysis, most studies support positive association between human capital and economic growth. However, it is observed that different studies have used different proxies for human capital and difference in measurement of human capital; this may be a source of bias in their empirical results. Furthermore, it can be concluded that earlier studies have used education as a proxy for human capital and more recent studies lay emphasis on both health and education as a proxy for human capital. The existing literature on Nigeria economy shows that appropriate proxies of human capital are not used along with recent advances in dynamic modeling. There exists a gap in the literature regarding the role of human capital on economic growth in Nigeria. The present study is an attempt to bridge this gap by analyzing the causal relationship between human capital and economic growth using recent advances in dynamic modeling and the key contribution relative to the previous studies is the utilization of longer time series to capture the possible long run relationships and more appropriate proxies for human capital. The results of this study may be helpful for policy makers in designing appropriate policies giving priority to the development of human capital in the country.

3. METHODOLOGY

3.1. Data Sources, Description and Method of Analysis

This study employed secondary data obtained from the Central Bank of Nigeria Statistical Bulletin, The time series data covered the period 1977-2012. In an attempt to investigate the impact of the human capital development on economic growth, which has the ultimate aim of increasing the standard of living of the average Nigerian by improving their well-being, we applied co-integration, error correction modeling and other statistical and econometric tools to the data obtained. We indeed ascertained the link between human capital development and economic growth indices. Thus, the economic growth was proxied using the constant value of Gross Domestic Product (GDP) while the human capital development variables were proxied using the total expenditure on education (TEE), total expenditure on health (THE), total capital expenditure (TCE) and total recurrent expenditure (TRE). Since most of the time series data are non-stationary, we decided to carry out the unit root tests for stationarity. According to Granger and Newbold (1974), and Engle and Granger (1987), the application of OLS to non-stationary data would result in spurious regression. For valid estimation and inference to be made, a set of non-stationary variables must be cointegrated.

This means that a linear combination of these variables that is stationary must exist. To determine if the time series data are stationary, we carried out unit root test, which resulted in linear combination of series called the cointegration equation. This, however, may be interpreted as a stable long-run (equilibrium) relationship among the non-stationary time series variable. It also ignores the short run dynamics that might cause the relationship not to hold in the short run.

3.2. Unit Root Test

Nelson and Plosser (1982), sparked the most important implication of the unit root.

Hypothesis and argued that almost all macroeconomic time series have a unit root. If a series is stationary (absence of unit root), the variance of the time series is not time dependent and has the tendency to return a long-run mean. Conversely, a series with a variance does depend on time, and fluctuates away from a long-run deterministic path. A non-stationary series endures a lasting effect from random shocks. The identification of the absence or presence of unit root helps us to recognize the features of the series.

The Augmented Dickey-Fuller (ADF) unit root test was employed to determine the order of integration of the series. The test is as follows:

$$\Delta X_t = \beta_0 + \alpha X_{t-1} + \sum_{i=1}^{k} \beta_i \, \Delta X_{t-i} + \varepsilon_t \tag{1}$$

where Δ is the first difference operator, β is the coefficient of the preceding observation, X_{t-1} is the immediate prior observation, ΔX_{t-i} is the differenced lagged term, k is the number of lags, β_i is the parameter to be determined and ε_t is the disturbance term.

The role of the lagged dependent variables in the augmented Dickey Fuller (ADF) regression equation (1) is to ensure that ε_t is white noise. Therefore, appropriate lag length k needed to be chosen. The optimal lag length (k) is determined by the Schwarz Information Criterion (SIC). Schwert (1987,

1989) the lag length was set equal to the integer portion of two values of ℓ, that is, ℓ_4=int{4(T/100)$^{1/4}$} and ℓ_{12}=int{4(T/100)$^{1/4}$}, and T is the number of observations. The null hypothesis, H_0: X_t is *I(1)*, that is, a unit root is rejected in favour of *I(0)*. If □ is found to be negative and statistically significantly different from zero. The computed *t*-statistic on parameter □ , is compared to the critical value tabulated in MacKinnon (1991). When k = 0, we have the standard Dickey-Fuller test.

The unit root tests for the first-difference of the variables is carried using the following regression equation

$$\Delta^2 X_t = \beta_0 + \alpha \Delta X_{t-1} + \sum_{i=1}^{k} \beta_i \Delta^2 X_{t-i} + \varepsilon_t \quad (2)$$

where the null hypothesis is H_0:X_t is *I(2)*, that is, two unit roots which is rejected in favour of *I(1)*. If α is found to be negative and statistically significantly different from zero.

3.3. The Phillips-Perron (PP) Test

Phillips and Perron (1988), propose an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the non-augmented DF test equation (1), and modifies the -ratio of the coefficient so that serial correlation does not affect the asymptotic distribution of the test statistic. Therefore, in order to avoid the autocorrelation in the error term, the Phillips-Perron (PP) test is applied. The PP test is based on the statistic:

$$\tilde{t}_\alpha = t_\alpha \left(\frac{\beta_0}{f_0}\right)^{\frac{1}{2}} - \frac{T(f_0 - \beta_0)\big(s_e(\hat{\alpha})\big)}{2 f_0^{1/2} s}$$

where α is the estimate, and t_α is the t-ratio of α, s_e is the coefficient of the standard error, and s is the standard error of the test regression. In addition, β_0 is a consistent estimate of the error variance in (1) calculated as (T-k)S^2/T, where k is the number of regressors. The remaining term, f_0, is an estimator of the residual spectrum at frequency zero. There are two choices to make when performing the PP test. First, you must choose whether to include a constant, a constant and a linear time trend, or neither, in the test regression. Second, you will have to choose a method for estimating.

3.4. Cointegration Test

Engle-Granger two-step procedure is to apply the Johansen's (1991), cointegration test to determine whether the linear combination of the series possesses a long-run equilibrium relationship. The numbers of significant cointegrating vectors in non-stationary time series are tested by using the maximum likelihood based λ trace and λ max statistics introduced by Johansen and Juselius (1990). The advantage of this test is that, it is a superior test as it deals with two or more variables that may be more than one cointegrating vector in the system. However, the Johansen-Juselius technique is provided below. We begin by defining a *k*-lag vector autoregressive (VAR) representation

$$X_t = \alpha + \Pi_1 X_{t-1} + \Pi_2 X_{t-2} + \cdots + \Pi_n X_{t-n} + \varepsilon_t, \ (t = 1,2,\ldots, T) \quad (3)$$

where X_t is a $n \times 1$ vector of non-stationary *I(1)* variables, α is a $n \times 1$ vector of constant terms, $\Pi_1, \Pi_2 \ldots \Pi_n$ are $n \times$ k coefficient matrices and ε_t is a $n \times 1$ vector of white Gaussian noises with mean zero and finite variance. Equation (3) can be rewritten as:

$$\Delta X_t = \alpha + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \cdots + \Gamma_{n-1} \Delta X_{t-n+1} + \Pi_n X_{t-n} + \varepsilon_t, \quad (4)$$

Where Γ_j=$-J + \Pi_1 + \Pi_2 + \ldots + \Pi_j$ (j = 1,2,…, n−1) and Π is defined as

$$\Pi = -J + \Pi_1 + \Pi_2 + \ldots + \Pi_n \quad (5)$$

Johansen (1988), shows the coefficient matrix Π_n contains the essential information about the co integrating or equilibrium relationship between the variables in the data set. Specifically, the rank of the matrix Π_n indicates the number of co integrating relationships existing between the variables in X_t. In this study, for a two case variables, *Xt* = (Financial Deepening and Economic Growth) and so n=*2*. Therefore, then the hypothesis of cointegration between Financial Deepening and Economic Growth is equivalent to the hypothesis that the rank of Π_n=*1*. In other words, the rank *r* must be at most equal to $n-1$, so that $r\leq n-1$, and there are $n-r$ common stochastic trends. If the $r=0$, then there are no cointegrating vectors and there are n stochastic trends.

The Johansen-Juselius procedure begins with the following least square estimating regressions:

$$\Delta X_t = \alpha_1 + \sum_{j=1}^{n-1} \Gamma_j \Delta X_{t-j} + \varepsilon_{1t} \quad (6)$$

$$X_{t-n} = \alpha_2 + \sum_{j=1}^{n-1} \Gamma_j \Delta X_{t-j} + \varepsilon_{2t} \quad (7)$$

Define the product moment matrices of the residuals as $S_{ij} = T^{-1} \sum_{t=1}^{T} \bar{\varepsilon}_{it}\bar{\varepsilon}_{jt}$ (for $i, j=1, 2$), Johansen (1988), shows that the likelihood ratio test statistic for the hypothesis of at most r equilibrium relationships is given by

$$-2lnQ_r = -\sum_{i=r+1}^{n} ln(1-\lambda_i) \quad (8)$$

Where $\lambda_1 > \lambda_2 > \cdots \lambda_n$ are the eigenvalues that solve the following equation

$$|\lambda s_{22} - s_{21}s_{11}{}'s_{12}|=0 \quad (9)$$

The eigenvalue are also called the squared canonical correlations of ε_{2t} with respect to ε_{1t}. The limiting distribution of the $-2lnQ_r$ statistic is given in terms of a $n-r$ dimensional Brownian motion process, and the quantiles of the distribution are tabulated in Johansen and Juselius (1990) for $n-r=1,...,5$ and in Osterwald-Lenum (1992) for $n-r=1,...10$.

Equation (8) is usually referred to as the trace test statistic which is rewritten as follows:

$$L_{trace} = -T \sum_{i=r+1}^{p} ln(1-\lambda_i) \quad (10)$$

Where $\lambda_{r-1,\dots}\lambda_p$ are the $n-r$ smallest squared canonical correlation or eigenvalue. The null hypothesis is at most r cointegrating vectors. The other test for cointegration is the maximal eigenvalue test based on the following statistic

$$L_{max} = -T.\, ln(1-\lambda_{r+1}) \quad (11)$$

Where λ_{r+1} is the $(r+t)^{th}$ largest squared canonical correlation or eigenvalue. The null hypothesis is r cointegrating vectors, against the alternative of $r+1$ cointegrating vectors.

3.5. Toda-Yamamoto Causality Test

Toda and Yamamoto (1995), proposed causality test which is robust for cointegration and stationarity properties.They levied criticism on VECM based causality test that its results may not be correct because preliminary tests biases of cointegration and first difference stationarity can be a possible source of wrong inferences regarding causality. Following system of equations is proposed to check causality inferences under Toda-Yamamoto causality test and SUR (seemingly unrelated regression) technique is utilized to estimate the model because due to SUR estimation wald test experiences efficiency (Rambaldi and Doran 1996).

$$\mathrm{GDP_t} = \alpha_1 + \sum_{i=1}^{k+d_{max}} \beta_{1i}\,\mathrm{GDP_{t-i}} + \sum_{i=1}^{k+d_{max}} \delta_{1i}\,\mathrm{TEE_{t-i}} + \sum_{i=1}^{k+d_{max}} \lambda_{1i}\,\mathrm{TEH_{t-i}} + \sum_{i=1}^{k+d_{max}} \varphi_{1i}\,\mathrm{TCE_{t-i}} + \sum_{i=1}^{k+d_{max}} \mu_{1i}\,\mathrm{TRE_{t-i}} + \varepsilon_{1t} \quad (12)$$

$$\mathrm{TEE_t} = \alpha_2 + \sum_{i=1}^{k+d_{max}} \beta_{2i}\,\mathrm{GDP_{t-i}} + \sum_{i=1}^{k+d_{max}} \delta_{2i}\,\mathrm{TEE_{t-i}} + \sum_{i=1}^{k+d_{max}} \lambda_{2i}\,\mathrm{TEH_{t-i}} + \sum_{i=1}^{k+d_{max}} \varphi_{2i}\,\mathrm{TCE_{t-i}} + \sum_{i=1}^{k+d_{max}} \mu_{2i}\,\mathrm{TRE_{t-i}} + \varepsilon_{2t} \quad (13)$$

$$\mathrm{TEH_t} = \alpha_3 + \sum_{i=1}^{k+d_{max}} \beta_{3i}\,\mathrm{GDP_{t-i}} + \sum_{i=1}^{k+d_{max}} \delta_{3i}\,\mathrm{TEE_{t-i}} + \sum_{i=1}^{k+d_{max}} \lambda_{3i}\,\mathrm{TEH_{t-i}} + \sum_{i=1}^{k+d_{max}} \varphi_{3i}\,\mathrm{TCE_{t-i}} + \sum_{i=1}^{k+d_{max}} \mu_{3i}\,\mathrm{TRE_{t-i}} + \varepsilon_{3t} \quad (14)$$

$$\mathrm{TRE}_t = \alpha_4 + \sum_{i=1}^{k+d_{max}} \beta_{4i}\,\mathrm{GDP}_{t-i} + \sum_{i=1}^{k+d_{max}} \delta_{4i}\,\mathrm{TEE}_{t-i} + \sum_{i=1}^{k+d_{max}} \lambda_{4i}\,\mathrm{TEH}_{t-i} + \sum_{i=1}^{k+d_{max}} \varphi_{4i}\,\mathrm{TCE}_{t-i} + \sum_{i=1}^{k+d_{max}} \mu_{4i}\,\mathrm{TRE}_{t-i} + \varepsilon_{4t} \quad (15)$$

In order to check that human capital development does not granger cause economic growth in first equation, null hypothesis will be: $\delta_{1i} = 0\ \forall_i \leq k$. If null hypothesis is rejected then we can infer that human capital development granger causes economic growth. In a similar fashion all other possible causations can be checked.

3.6. Model Specification

In an attempt to determine the impact of human capital development and Economic Growth in Nigeria, we develop an empirical model to ascertain the relationship that exists between the variables. Generally, specification of economic model is based on economic theory and on the available data relating to the human capital being studied. The study has employed and modified the model formulated in the works of Lucas (1988), Mankiw et al (1992), Gemmell (1996) and Ncube (1999). The formulation below was employed by these scholars.

$\mathrm{In\ RGDPGR}_t = \alpha_0 + \alpha_1, \mathrm{In\ I}_t + \alpha_2\ \mathrm{InEMP}_t + \alpha_3\ \mathrm{InH}_t + u_t$

$\alpha_1, \alpha_2, \alpha_3 > 0$

Where, RGDPGR is the growth rate of real gross domestic product, I is investment to GDP ratio, EMP is employment rate, H is human capital proxied by total capital expenditure on health and education, In stands for logarithm transformation. Intuitively, all the three explanatory variables are expected to have positive effects on the growth level. The model of economic analysis in this study will therefore follow the conventional method, and this, is in reference to the variables of interest in the model above.

GDP = F (TEE, THE, TCE, TRE, U) (16)

This equation is broken down to:

$\mathrm{GDP} = \alpha_0 + \delta_1 \mathrm{TEE} + \mathrm{U}$ (17)

$\mathrm{GDP} = \alpha_0 + \delta_1\ \mathrm{THE} + \mathrm{U}$ (18)

$\mathrm{GDP} = \alpha_0 + \delta_1\ \mathrm{TCE} + \mathrm{U}$ (19)

$\mathrm{GDP} = \alpha_0 + \delta_1\ \mathrm{TRE} + \mathrm{U}$ (20)

Where, GDP = gross domestic product (i.e. dependent variable)

TEE = Total expenditure on education (i.e. independent variable)

THE = Total expenditure on health (i.e. independent variable)

TCE = Total capital expenditure (i.e. independent variable)

TRE = Total recurrent expenditure (i.e. independent variable)

U = disturbance term

4. Discussion of Results

4.1. Tests for Stationarity

The results regarding the order of integration of the series have been determined by Augmented Dickey Fuller (ADF) test. The Augmented Dickey-Fuller (ADF) test for unit roots was conducted for all the time series employed for the study. The calculated t-values from ADF tests on each variable in levels and in first differences are reported in Table 1.

Table 1. *Augmented dickey fuller (adf)*

Variables	Level	First Difference
GDP	3.4478	-5.5985
TRE	1.4383	-3.6102
TCE	1.2265	-6.7169
THE	1.7126	-6.0785
TEE	1.4853	-6.2724

Note: Critical values in levels and first difference at 5% ie -2.98 and -2.95 respectively.

The test for the null of stationarity of the series has been determined by Phillips Perron. The results are tabulated in Table 2.

Table 2. *Phillips perron (pp)*

Variables	Level	First Difference
GDP	-2.1051	-6.1412
TRE	-2.0566	-7.2681
TCE	-2.6734	-6.7169
THE	-1.8316	-3.7620
TEE	-0.9226	-6.2724

Note: Critical values in levels and first difference at 5% ie -2.95 and -2.98 respectively.

Before we proceed, it is imperative to first test whether the variables are stationary and to determine their orders of integration. The Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests were used to determined the existence of unit root in each of the time series. The results of both the ADF and PP tests are reported in Table1and Table 2 respectively. The results in Table 1 and Table 2 shows that all the variables are non-stationary in their levels. However, with their first differences, all the variables become stationary, that is, they are I(1) since the ADF and PP value of each of these variables are less than the 5% critical value. With these results, all variables are regressed at their stationary level.

4.2. Johansen Cointegration Based Trace Test

After confirming that the variables are all I (1), we proceed to examine the issue of cointegration among the variables. When a cointegration relationship is present, it means that human capital development and economic growth, share a common trend and long-run equilibrium. We started the cointegration analysis by employing the Johansen cointegration test.

Table 3. *Johansen cointegration based trace test*

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.930529	165.2788	69.81889	0.0000
At most 1 *	0.630852	77.27305	47.85613	0.0000
At most 2 *	0.548429	44.38666	29.79707	0.0006
At most 3	0.396841	13.15093	15.49471	0.0194
At most 4	0.043479	1.466949	3.841466	0.2258

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

** denotes rejection of the hypothesis at the 0.05 level*

***MacKinnon-Haug-Michelis (1999) p-values*

Table 3 shows the result of the cointegration test. From the result, the trace statistic indicates 3 cointegration at 5 percent level of significance, suggesting that there is cointegrating relationship between GDP and the different measures of human capital development.

4.3. Error Correction Model (ECM)

Table 4. *Error correction model (ecm)*

Variables	Coefficient	Std. Error	t-Statistic	P value
C	57.98012	13.17446	3.146572	0.0005
TRE (-1)	-0.004600	0.002200	-2.097270	0.0012
TCE (-2)	-0.003874	0.001856	-2.030041	0.0522
THE (-1)	0.062409	0.036822	1.593856	0.0045
EDU(-1)	-0.066705	0.0247634	-2.586521	0.0140
ECM1	-0.482955	0.188562	-2.332201	0.0230

R-squared	0.589560	Mean dependent var	4.815990
Adjusted R-squared	0.361547	S.D. dependent var	18.62344
S.E. of regression	14.88073	Akaike info criterion	8.519708
Sum squared resid	3985.852	Schwarz criterion	9.038338
Log likelihood	-112.5358	F-statistic	2.585600
Durbin-Watson stat	1.960831	Prob(F-statistic)	0.038196

The empirical evidence presented in Table 4 reveals that in the long run total expenditure on education is negatively and significantly affects GDP, as more people become idle due to incessant strike by Academic Staff Union of Universities (ASUU) and National Union of Teachers (NUT) or other factors then these people would definitely have negative impacts on economic growth. The public health expenditure is having positive but insignificant impact on GDP.

The estimation results reveal that the explanatory variables jointly account for approximately 57.98 percentage changes in economic growth. The Durbin Watson statistic (1.96) rules out auto-correlation. The estimation results show that the variables total capital expenditure (TCE), total recurrent expenditure (TRE), total expenditure on education (TEE), and total expenditure on health (THE), are statistically significant in explaining changes in economic growth. For instance, 1 percentage increase in total capital expenditure in the previous two year causes economic growth to decline by 0.004 percentage. Similarly, a 1 percentage increase in total recurrent expenditure in the previous one year leads to 0.005 percentage decrease in economic growth. These findings are in line with the one reported by Laudau (1986), Barro R, (1991), Engen and Skinner (1992), and Folster and Henrekson (2001) that government expenditure may slowdown economic growth. The negative impact of total capital and recurrent expenditures may not be unconnected with mismanagement and diversion of public funds by government officials and political appointees.

The estimation shows that a 1 percentage increase in government expenditure on education in the previous one year causes economic growth to decline by approximately 0.07 percentage. This is not surprising because funds meant for the development of the education sector have not been properly utilized and in most cases embezzled, thus precipitating the incessant strike by Academic Staff Union of Universities (ASUU) and National Union of Teachers (NUT). This result confirms the poor allocation and utilization of public health and education expenditure in Nigeria. Moreover, the estimation results indicate that a 1 percentage increase in expenditure on health in the previous one year leads to approximately 0.06 percentage increase in economic growth. Thus, increases in government expenditure on health raise the health status and productivity of the people, thereby promoting economic growth. Lastly, the error correction has been found to be significant and correctly signed, implying that a long run equilibrium or relationship exists between the variables. Therefore, the ECM is able to correct any deviations in the relationship between real GDP growth rate and the explanatory variables. This is an indication that there exist long run relationship between GDP growth rate and the explanatory variables and its takes more years to attain equilibrium.

4.4. Toda Yamamoto Causality Test

Granger (1988) pointed out that the existence of cointegrating relation means at least one direction of causation for maintaining the presence of long-run relationship. The direction of causation helps the policy makers in formulating effective policies for the country. For this reason the present study uses Toda Yamamoto Causality test for observing the causal relationship between the dependent and independent variables and the results are presented in Table 5 below.

Table 5. *Granger causality results*

Null Hypothesis:	Obs	F-Statistic	Prob.
TCE does not Granger Cause GDP	34	0.04809	0.8279
GDP does not Granger Cause TCE		1.95338	0.1721
TEE does not Granger Cause GDP	34	0.25074	0.6201
GDP does not Granger Cause TEE		1.12080	0.7305
THE does not Granger Cause GDP	34	0.04669	0.8303
GDP does not Granger Cause THE		11.7797	0.0017
TRE does not Granger Cause GDP	34	1.41603	0.2431
GDP does not Granger Cause TRE		3.35458	0.0766
TEE does not Granger Cause TCE	34	0.80198	0.3774
TCE does not Granger Cause TEE		1.87203	0.1811
THE does not Granger Cause TCE	34	0.45886	0.5032
TCE does not Granger Cause THE		14.3587	0.0007
TRE does not Granger Cause TCE	34	1.03256	0.3174
TCE does not Granger Cause TRE		0.18213	0.6725

THE does not Granger Cause TEE	34	0.07492	0.7861
TEE does not Granger Cause THE		8.75724	0.0059
TRE does not Granger Cause TEE	34	4.79713	0.0362
TEE does not Granger Cause TRE		0.25759	0.6154
TRE does not Granger Cause THE	34	0.6512	0.0012
THE does not Granger Cause TRE		1.40529	0.2448

Table 5 presents statistic of modified wald test along with probabilities and critical values of Chi-square. Selection of optimal lag length of the model was based on Schwartz Baysian criterion and maximal order of integration was confirmed through Ng-Perron test. Since k = 1 and dmax = 1 therefore VAR was estimated with 2 lags by SUR estimation method. But wald test was applied only on first “k” coefficients in the model to check linear restrictions on the parameters.

The results of Table 5 indicate that there exists a bidirectional causal relationship and total capital expenditure, total recurrent expenditure, total expenditure on education and total expenditure on health GDP and from total expenditure on education to total expenditure on health. Hence, it can be concluded that education and economic growth both affect health. The possible rationale behind this causal relationship may be that education reduces fertility; increases awareness related to health care facilities thus improves health whereas economic growth is associated with access to better health care facilities. The low P values suggested we can reject null hypothesis. Hence we found unidirectional causality running from economic growth to government expenditure for Nigeria.

4.5. Economic Implication

In order to achieve maximum economic growth, government expenditure on education and health needs to be better prioritized. Investing in education and health offers high return in terms of economic growth. This means that increasing in expenditure on education and health services do not only have a large impact on poverty per naira spent, but also produce greatest growth in human productivity. This is because as more people get good education and health, they will increase their productivity at work which will enhance economic growth. This implies that shifting resources from low-productivity sectors, such as general administration to education and health, will generate economic growth in the country.

5. Conclusion and Recommendation

In this paper, we analyzed the impact of human capital development and economic growth in Nigeria. Using the recently developed series of human capital, this paper examined the causal relationship between human capital development and economic growth for Nigeria over the period 1977-2012 using a multivariate approach. The results from the Granger causality test show that there is bidirectional causality running from human capital to GDP. Keeping in view the significant long-run relationship between human capital and economic growth, the study recommends that for achieving considerable and sustained economic growth there is a need to increase investment in education and health sectors. More funds as percentage of GDP may be allocated to education and health sectors in line with other sectors. This implies that improvements in institutional quality might produce a double dividend. Therefore, It should however be noted that investment in human capital should not be left to the government alone, the private sector of the economy should be actively involved in investment of human capital if the Nigerian economy is to realize its objective of been one of the leading economies by the year 2020.

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