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INOSR ARTS AND HUMANITIES 5(1): 122-132, 2019.

International Network Organization for Scientific Research

The impact of human capital investment on education, health and economic growth in Nigeria (1981-2017)

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ABSTRACT

The quest to achieve sustainable economic growth and development remains a paramount objective of every country. A primary source required for achieving this objective is through increased domestic productivity. However, for this to occur, such country must be able to create sufficient domestic physical capital to stimulate such desired economic growth. In other words, fixed capital formation is a major contributor, catalyst and determinant of a country's economic growth. The results showed that except for capital stock, the other variables are statistically not significant. The result also shows that variable of focus, Human Capital Expenditure (HCXP) does not meet a priori criteria, since it is negative. The same goes with Capital Stock (KS), though statistically significant. The coefficient for Labour Force (LF) meets a priori expectation, since it is positive. On the basis of individual contribution of the variables, it is observed that one per cent increase in capital stock leads to a 0.0055% decline in economic growth.

Keywords:Human, capital investment, education, health and economy

INTRODUCTION

In many empirical studies, capital stock is usually proxied by Gross Fixed Capital Formation. According to [1, 2, 3], Gross Fixed Capital Formation (GFCF) refers to fixed assets accumulation such as land improvements, equipment, machinery, construction of roads and railways, building of schools, etcetera, required for augmenting a country's economic productivity. This definition reiterates and captures the predictions of Romer [4, 5, 6] Growth Models which stipulate that increased growth rates can be achieved by increasing capital accumulation. Also, the building of schools leads to improved educational enrolment rate which will enhance the quality of human capital. The improvement of human capital in this regard will ensure innovation, invention and enhancement of productivity in the economy [7, 8]. Likewise, the investment in machinery and equipment will also increase the efficiency of labour productivity [9, 10].

Over the past four decades, various studies have affirmed the role of investment in human capital on economic growth. Human capital as an economic term encompasses health, education and other human capacities that can raise productivity [11]. [12], posits that human capital is a very vital and valuable asset which needs to be mobilized. [13], notes that capital and natural resources are passive factors of production while human resources are active factors of production. Human capital constitutes the most valuable resource of a country; in its absence there will be the non-performance of physical capital (tools, machinery, and equipment) which will impede economic growth [14].

Health and education are two closely related human (resource) capital components that work together to make the individual more productive. One component cannot be considered more important than the other [15]. Health connotes the ability to lead a socially and economically productive life [15]. A healthy populace will be highly productive and the educated have the tendency to apply a degree of sophistication in the production process.

Research Questions

To what extent does human capital investmenton education and health impact on economic growth in Nigeria?

Objectives of the Study

To determine the impact of human capital investment on education and health on economic growth in Nigeria.

Hypothesis of the Study

Ho_1: Human capital investment in health and education has noimpact on economic growth in Nigeria.

Significance of the Study

A study of this nature is beneficial to a lot of stakeholders. The outcome of the study will serve as a way forward for policy makers to understand the urgent need for government in Nigeria to increase investment in health and education to increase the productivity of her citizens. Achieving this feat will ensure faster economic growth and development. It will enable policy makers understand the contributions of knowledge and skills as a means of overcoming poverty, hunger, and underdevelopment. This study will serve as reference materials for students and future researchers on this and related topic.

METHODOLOGY

Research Design

The study adopted Ex-Post Facto research design as it facilitated the use of time series data and adopted various econometric analyses to obtain data-driven and evidence-based findings for the study. The Augmented Dickey-Fuller (ADF) unit root test and Bound test cointegration are used to test for stationarity and long run relationship among the time series variables respectively. The Auto-Regressive Distributed Lagged (ARDL) model and Engle Granger models are used in testing the hypothesis. The research is designed to determine the impact of investments in human capital and electricity on economic growth in Nigeria from 1981-2017. Three models are formulated using proxies of Human Capital Development and Electricity variables as independent and Real GNP as dependent variables to test their impact on economic growth for the first two models and then Granger Causality to test the causality relationships amongst the variables for the third model.

Theoretical Framework

The framework of the study is based on the Cobb-Douglas production function. The Cobb-Douglas functional form of production is widely used to represent the relationship of an output to inputs. They considered a simplified view of the economy in which production output is determined by the amount of labour involved and amount of capital invested [16]. According to [17], the production function of Cobb-Douglas used to model production was of the form:

$$P(L,K) = bL^{\alpha}K^{\beta}$$

Where;

- P = total production (the monetary value of all goods produced in a year),
- L = labour input (the total number of person-hours worked in a year),
- K = capital input (the monetary worth of all machinery, equipment, and buildings),
- b = total factor productivity or technology,
- α and β are the output elasticities of labour and capital, respectively. These values are constants determined by available technology. The notation, α, may be used interchangeably as $1-\beta$.

Model Specification for Hypothesis One (Human Capital-Growth Nexus)

According to Romer (1986 and 1990), the economy-wide capital stock has a positive impact on the output. Therefore, concentrating on the issue of human capital, electricexpenditure and economic growth, this study adopts the endogenous

growth model. The general endogenous production function is taken as:

$Y = AK^{\alpha} L^{\beta}$,

Where:

Y = is output (Output within the context of this study)

A = is the total factor productivity which incorporates the human capital and electricity expenditure (technological advancement).

K is the capital stock

L is the labour.

Applying log function:

$$Y = \alpha_0 + \alpha_1 A + \alpha_2 K + \alpha_3 L$$

Spending more on human capital induces more literacy, better health and manpower skill, which leads to higher productivity and growth (Sahoo, et al., 2012). Since the objective of this study is to examine the effect of social infrastructure on economic growth we add human capital (HC) as an additional variable. Our production function is now;

$$Y=f\ (K, L, HC)$$

In this study,Human Capital(HC) is measured by education and health expenditure which is denoted by EDXP and HXP respectively. Capital will be measured by gross domestic capital formation (KS), labour will be measured by labour force (LF) and output is measured by RGNP. We now replace HC, K and L with their proxies;

$$RGNP=f(KS, LF, HCXP)$$

The infrastructure element will be incorporated later in the next model, by introduce electricity expenditure as an indicator of energy. Therefore,with EDXP and HXP representing HCXP, our final production function is;

$$RGNP=f\ (KS, LF, HCXP)$$

The long run expression of the model is given as:

$$RGNP_t = \beta_1 + \beta_2 KS_t + \beta_3 LF_t + \beta_4 HCXP_t + \mu_t$$

Where: RGNP = Real Gross National Product,

KS = Capital Stock (Gross Fixed Capital Formation)

LF= Labour Force (Primary school enrolment)

HCXP = Human Capital Expenditure (Total Expenditure On Health And Education By Federal Government)

t= Time Period

β_s = Regression Coefficients

Apriori expectations

The amount of capital stock, labour force, human capital variables are expected to have positive relationship with the Economic growth. The mathematical presentation is given as follows:

$f(\beta_2)>0$; $f(\beta_3)>0$; $f(\beta_4)>0$;

However, with the assumption of cointegration of the variables in Eqn. 3.7, the short run dynamics of the Auto-Regressive Distributed Lag (ARDL) model is therefore specified in equation 3.8 below;

$$RGNP_t = \propto_0 + \propto_{1i} \sum_{i=1}^{q} \Delta RGNP_{t-i} + \propto_{2i} \sum_{i=1}^{q} \Delta KS_{t-i} + \propto_{3i} \sum_{i=0}^{q} \Delta LF_{t-i} + \propto_{4i} \sum_{i=0}^{q} \Delta HCXP_{t-i} + \varphi ECM_{t-1} + \mu_t \quad (3.8)$$

Where:

φ = error correction coefficient that should be negative and lies between 0 and

Method of Data Evaluation

This present study used the Auto-Regressive Distributed Lag (ARDL) bound testing procedure to examine the cointegration (long-run) relationship between the dependent variables and the explanatory variables, as well as the

short-run dynamics. The use of the bounds technique is based on three validations. First [6] advocated the use of the ARDL model for the estimation of level relationships because the model suggests that once the order of the ARDL is determined the relationship can be estimated by OLS. Second, the bounds test allows a mixture of I(1) and I(0) variables as regressors. Third, this technique is suitable for small or finite sample size (Pesaran *et al.*, 2001).Before performing the ARDL model, we will test for the level of integration of all variables because if any variable is I(2) or above, ARDL approach will not be applicable(Ilyas, Hafiz,Afzal&Tahir, 2010).

PRESENTATION AND ANALYSIS OF RESULTS

The results of the various tests specified in the previous chapter are presented here.

Unit Root Test of the Variables

The variables of interest were subjected to unit root test in order to ensure stationarity of the series. The unit root method adopted is Augmented Dickey-Fuller (ADF) unit root test.

Table 1: Result of ADF unit root test of the variables

Variables	**Level form**		**First difference**		**Decision on Stationarity**
	ADF t-statistic	5% critical value	**ADF t-statistic**	5% critical value	
RGNP	-3.347336	-2.945842	-	-	I(0)
KS	-2.058747	-2.951125	-10.43888	-2.951125	I(1)
LF	-6.773797	-2.945842	-	-	I(0)
HCXP	0.721426	-2.945842	-6.208766	-2.948404	I(1)
EEXP	-0.683430	-2.951125	-9.109653	-2.951125	I(1)

Source: Eviews 9 Output for the Result of ADF unit root test of the variables

Table 1 shows the result of ADF unit root test conducted. Based on the difference between the absolute value of the ADF t-statistic and the 5% critical values, it is seen that Electricity Expenditure (EEXP), Human Capital Expenditure (HCXP), and Capital Stock (KS) are integrated at first difference while Labour Force (LF) and Real Gross National Product (RGNP) are stationary at levels. As a result of a mixture of I(0) and I(1) variables, the bounds test method of cointegration seems the best to use in explaining a long-run relationship among the variables.

Estimation of Model for Objective I

Lag Length selection using Akaike Information Criterion

Using Akaike Information Criterion, ARDL presented the selected model shown in figure 1.

Figure 1: Graph of lag of ARDL lag length selection based on Akaike Information Criterion

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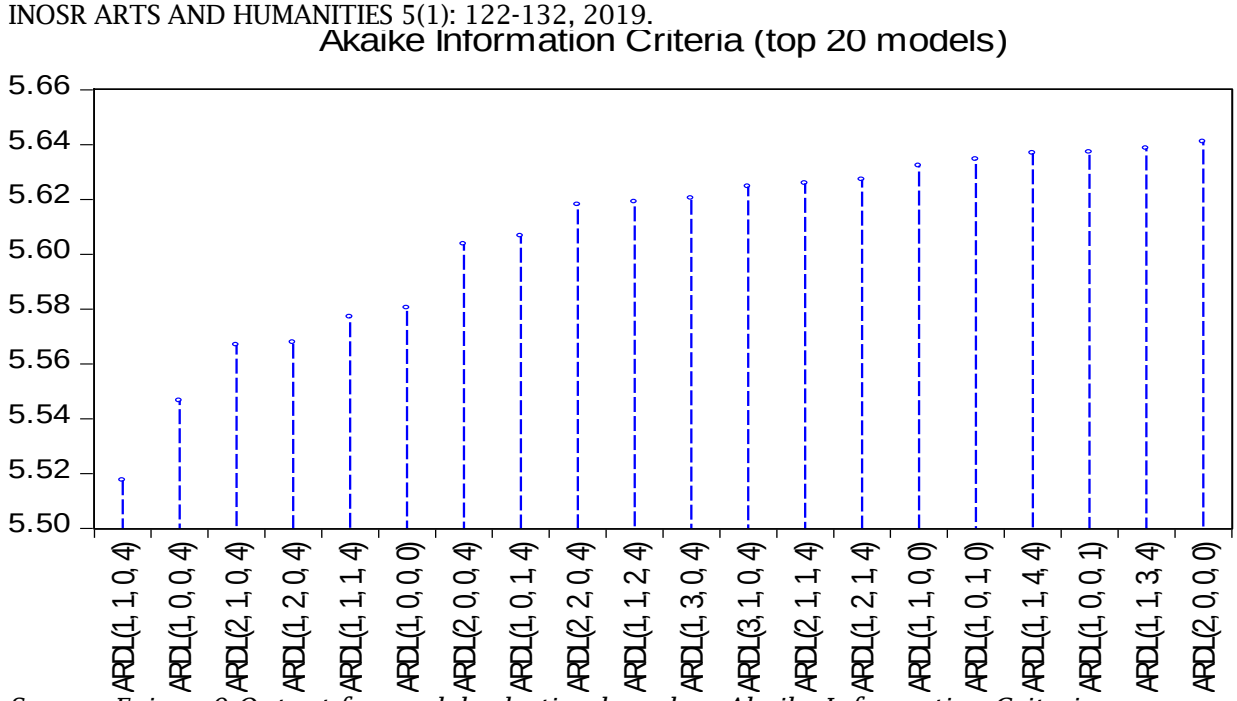


Source: Eviews 9 Output for model selection based on Akaike Information Criteria

The Autoregressive Distributed Lag (ARDL) model selection is presented in figure 1 above. The result of the lag length selection that is best for the analysis after 20 evaluations is the selected ARDL model, 1,1,0,4: (RGNP -1, KS -1, LF -0, HCXP - 4,).

Cointegration and Bond Test Approach

The result of the unit root test presented in table 1 shows that some of the variables are I(1) and some I(0). This informs the use of bound test approach to cointegration proposed by Pesaran and Shin (1999). This result is presented in table 2. The null hypothesis associated with this test is that no long-run association exists and the decision is to reject the null hypothesis if the value of F-statistic from the bound test conducted is greater than the upper bound value of Pesaran test statistic.

Table 2: Result of bound test (cointegration of the variables)
Null hypothesis: No longrun relationship exists

Test Statistic	Value	K	Bound Test	
			Lower bound	**upper bound**
F-statistic	***5.270501***	***3***	***3.23***	***4.35***

Source: Eviews 9 Output for the Result of bound test (cointegration of the variables)

Table 2 shows that the value of F-statistic lies above the upper bound value of Paseran test statistic. This is an indication that the null hypothesis that there is no long-run association among the variables in the model is to be rejected. Therefore, there exists long-run association among the variables in the model for objective one.

Result of Model for Objective One

The Long-run Result

The existence of long-run association among the variables in the model allows us to estimate the long-run model and generate the error correction term which is used to examine short-run dynamics of the model. However, the result of long run estimation is given in table 3.

Table 3: Long-run ARDL Result Dependent Variable: RGNP

Long-run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
KS	-0.005517	0.002227	-2.477560	0.0210
LF	0.005057	0.005947	0.850375	0.4039
HCXP	-0.008148	0.005445	-1.496484	0.1481
C	3.886139	1.119487	3.471358	0.0021

Source: Eviews 9 Output for the Result of ADF unit root test of the variables

Table 3 shows the result of long-run estimation of the model for objective one. It could be observed that except for capital stock, the other variables are statistically not significant. The result also shows that our variable of focus, Human Capital Expenditure (HCXP) does not meet *a priori* criteria, since it is negative. The same goes with Capital Stock (KS), though statistically significant. The coefficient for Labour Force (LF) meets a priori expectation, since it is positive. On the basis of individual contribution of the variables, it is observed that one per cent increase in capital stock leads to a 0.0055% decline in economic growth. This did not occur as expected. It could be that domestic investment in the economy does not fetch the expected returns on investment. This explains why a lot of domestic firms have closed shops with many leaving the shores of this country. Indeed, it could be observed that Labour Force is positively related to economic growth. One per cent increase in labour force leads to 0.0051% increase in economic growth. As could be seen, this contribution of Labour Force to economic growth is not of high magnitude and it is statistically insignificant given the probability of the t-statistic. This outcome could be attributed to the quality of manpower involved in production in the country. The proxy for Human Capital Expenditure (HCXP) is not found significant in terms of its contribution to economic growth. Indeed, it was negatively related to economic growth. This implies that provisions for Human Capital are insignificant and not justifiably utilized for the actual purpose hence there may be wastages and leakages.

Result of Short-run Estimation

The short-run model explains the dynamics of the variables and the speed of adjustment of the model towards long run equilibrium. This model utilized information from the long-run model to explain what happens in the short-run adjustment. This is presented in table 4.

Table 4 Result of Short-run Estimation

Dependent Variable: ΔRGNP

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(KS)	-0.002420	0.001052	-2.299716	0.0309
D(LF)	0.003840	0.004608	0.833316	0.4132
D(HCXP)	0.008913	0.011605	0.768049	0.4503
D(HCXP(-1))	-0.070764	0.032030	-2.209271	0.0374
D(HCXP(-2))	0.001294	0.041293	0.031342	0.9753
D(HCXP(-3))	0.078018	0.035215	2.215471	0.0369
CointEq(-1)	-0.759367	0.173484	-4.377154	0.0002

R-squared	0.441719	Mean dependent var	5.046970
Adjusted R-squared	0.223262	S.D. dependent var	3.832994
S.E. of regression	3.378123	Akaike info criterion	5.517565
Sum squared resid	262.4694	Schwarz criterion	5.971052
Log likelihood	-81.03982	Hannan-Quinn criter.	5.670149
F-statistic	8.021991	Durbin-Watson stat	1.872318
Prob(F-statistic)	0.033600		

Source: Eviews 9 Output for the result of the short run model

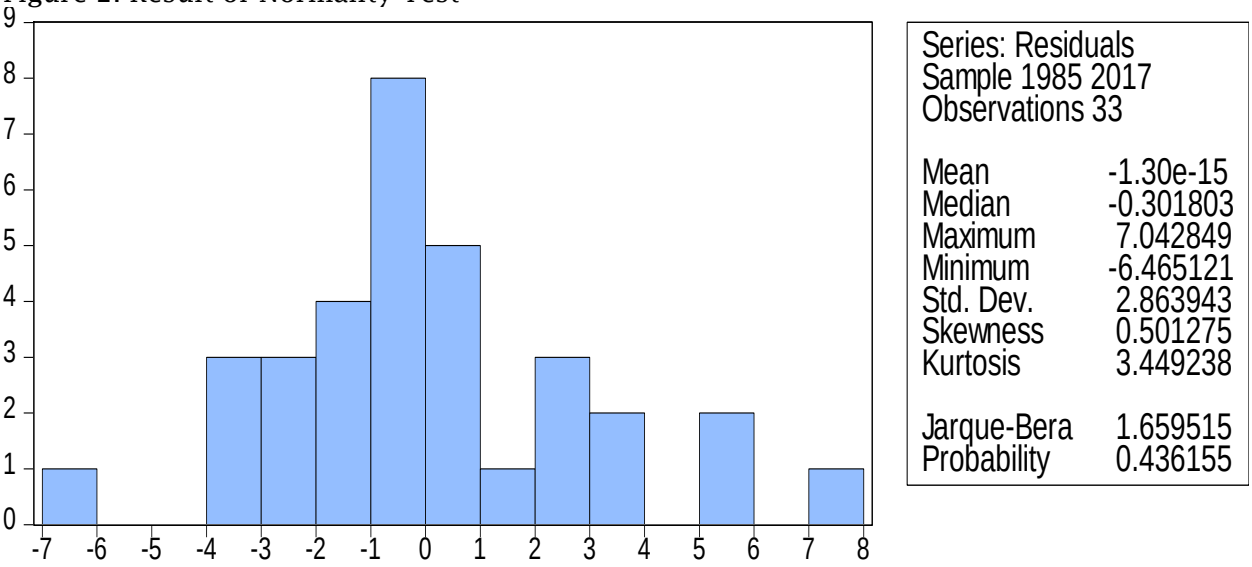
Table 4 shows the result of the short run dynamics of the impact of Human Capital Expenditure on Real Gross National Product in Nigeria. It is seen that Human Capital Expenditure or investment and Labour Force coefficients meets theoretical expectations by being positive. Just like in Table 3, Capital Stock is still negative and statistically significant in their current years. On the basis of the contribution of each of the variables, the study finds that one per cent increase in capital stock leads to a 0.0024% decrease in economic growth. This is an indication that changes in domestic capital stock or investments have not been beneficial to economic growth. Labour Force is found to contribute positively to economic growth, but not statistically significant and its contribution is of low magnitude. One per cent increase in Labour Force leads to a 0.004% increase in economic growth. Moreover, the result indicates that our variable of focus, Human Capital Expenditure or Investment is positively related to economic growth, but not significantly. One per cent increase in Human Capital Expenditure leads to 0.009 per cent increase in economic growth, but not significantly in the current year. However, in the year after the first, the relationship between the two variables becomes negative. This answer corroborates the result of the long run estimation in Table 3.Finally, on the basis of the goodness of fit of the entire model, the study found that the value of R-squared (0.4417) shows that the variables in the model explained about 44 percent variations in the Real Gross NationalProduct. Although the value of Durbin-Watson statistic was 1.872, the evidence from Serial Correlation test conducted showed that even though the model shows sign of autocorrelation, it is free from serial correlation which is the most important assumption in this test. Also, the probability value of F-statistic (0.033600) shows that the model is robust and fit for this analysis. The overall regression plane is statistically significant. Lastly, the error correction term which measures the speed of adjustment of the short-run model toward long-run equilibrium was found to be negative as expected and statistically significant. This means that in one year, about 75.9% of the fluctuations in the short-run would be corrected towards long-run equilibrium.

Diagnostic Test for the short run model for objective one

Normality Test

Normality test is essential to ascertain the distribution of the data set in the model. The null hypothesis for this test is that the variables are normally distributed. This is to be rejected if the probability of Jarque-Bera is less than 0.05. Figure 2 shows the result of normality test.

Figure 2: Result of Normality Test



It could be seen figure 2 that the condition for normal distribution of the time series data is satisfied since the probability of the null hypothesis is greater than 0.05.Therefore, this test is satisfied.

Serial correlation LM test of the selected ARDL Model

Serial correlation test was conducted using the Breusch-Pagan Serial correlation LM test. The null hypothesis of this test is that there is no serial correlation in the residual of the model and the decision rule is to reject the null if the probability Chi-Square is less than 0.05 for 5% level.

Table 5: Result of Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.044818	Prob. F(2,21)	0.9563
Obs*R-squared	0.140259	Prob. Chi-Square(2)	0.9323

Source: Eviews 9 Output for Breusch-Godfrey

Serial Correlation LM Test for model one

From table 5 above, it can be seen that the probability Chi-Square (*0.9323*) is greater than 0.05 at 5% significant level. In that we cannot reject the null hypothesis that there is no serial correlation in the residual of the short-run model and conclude that the residual in our short-run ARDL model is not serially correlated.

Heteroscedasticity Test

This test was conducted using the Breusch-Pagan LM test. See table 6. Heteroscedasticity test follows the F-distribution with degree of freedom given as F (9,23). The null hypothesis is that the error term is homoscedastic and we are to reject the null hypothesis if the probability of the Obs*R-square is less than 0.05. Otherwise, we do not the null hypothesis.

Table 6: Heteroscedasticity Test for model one (objective one)

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.787994	Prob. F(9,23)	0.6300
Obs*R-squared	7.777305	Prob. Chi-Square(9)	0.5567
Scaled explained SS	4.626558	Prob. Chi-Square(9)	0.8656

Source: Eviews 9 Output for Heteroscedasticity Test for model one

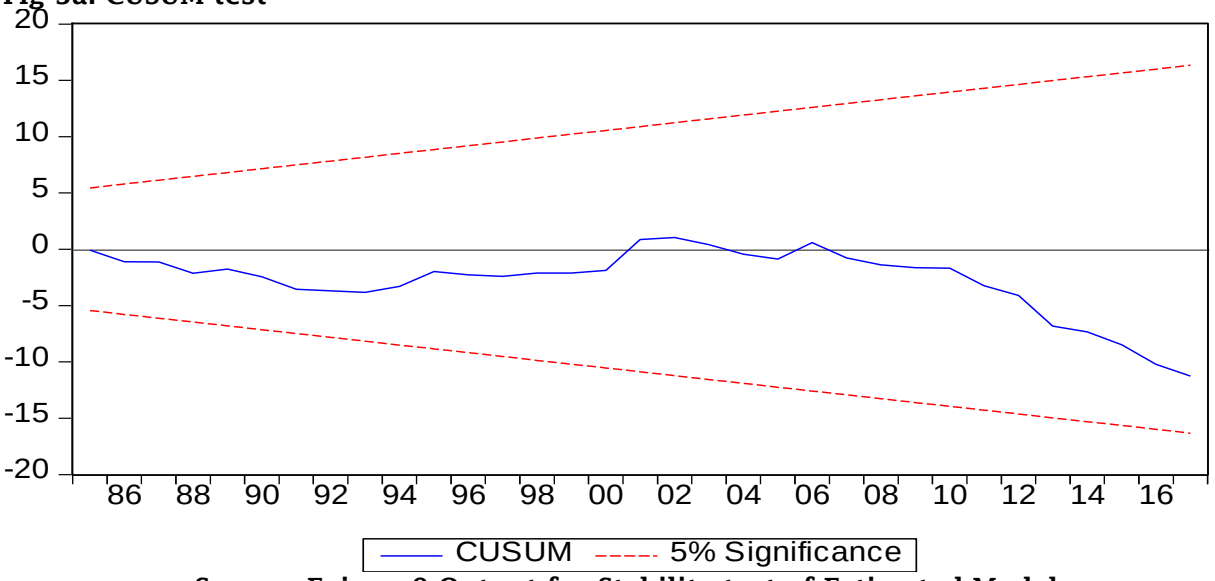
The result of table 6 shows that the probability of the Obs*R-square (0.5567) is greater than 0.05. In that, we do not reject the null hypothesis of homoscedasticity or constant variance of the residual.

Stability Diagnostic Test

Stability of the short run model was tested using CUSUM test and CUSUM of Squares test. The idea behind this test is to reject the hypothesis of model stability if the blue line lies outside the dotted red lines otherwise, the model is said to be stable. The result of this test is presented in figure 3.

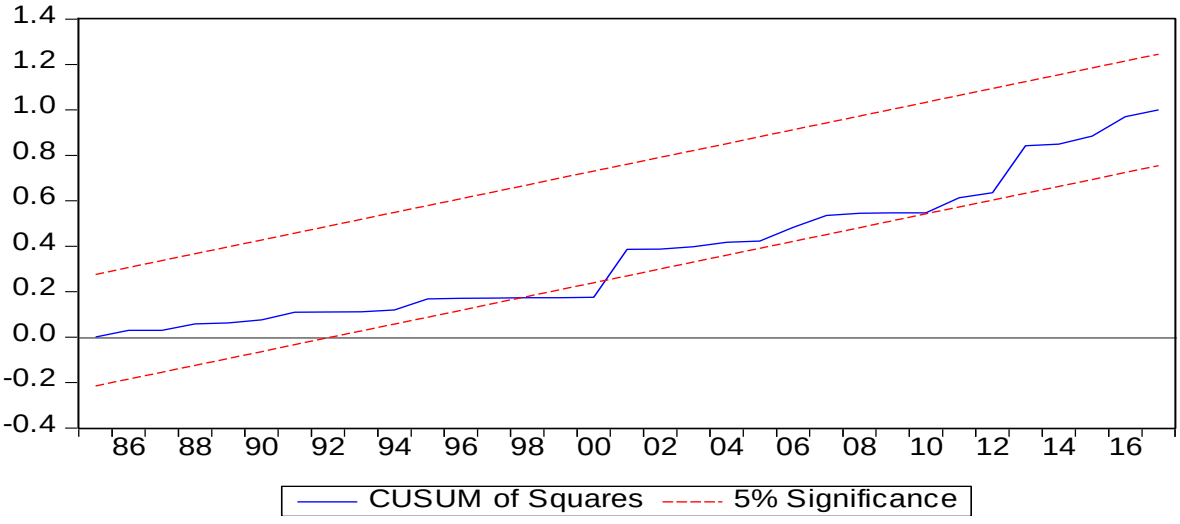
Figure 3: CUSUM and CUSUM square test of the short run model for objective one

Fig 3a: CUSUM test



Source: Eviews 9 Output for Stability test of Estimated Model

Fig 3b: CUSUM of squares test



Source: Eviews 9 Output for Stability test of Estimated Model

The result of the CUSUM and CUSUM square test shows that the blue lines lies inside the dotted red line which indicates that the model is dynamically stable.

CONCLUSION AND RECOMMENDATIONS

From the study, it is found that investment in human capital does not have significant impact on economic growth in the short-run (*p(t)=0.4503*). Investment in human capital does not have significant impact on economic growth in the long-run (*p(t)=0.1481*).

CONCLUSION

From the days of Adam Smith, economic theories have always emphasized the role of investment as a determinant of economic growth. What has preoccupied the minds of economists all over the world is the identification of those unique and specific factors that account for growth, not only in developed, but developing and third world countries.Investments in human capital and infrastructure have been identified as factors that account for economic growth in many studies. Investment in human capital has negative and no significant effect on economic growth in the long-run. In the short-run, human capital investment has a positive, but no significant impact on economic growth in Nigeria.

RECOMMENDATIONS

In view of the findings in this study, the researcher makes the following recommendations:

i. The government should adequately increase investments in human capital development through expansion in education and health expenditures to reverse the observed negative relationship which indicates0.0018% decline in economic growth for a 1% increase in human capital. This may be due to inadequate funding, misappropriation of public fund. There is urgent need for serious monitoring, transparencyand accountability of funds in this sector so as to reverse the negative trend observed in this study. Therefore, there is need to review the existing funding pattern upwards to meet international prescriptions by organization like UNESCO and African Union. This study prescribes for an upward review of budget of government expenditure on education from the current 7% to 20% (UNESCO) and that of health from 6% to 15%(African Union) in the next five years to achieve significant and desired economic growth.

REFERENCES

1. Adawo, M. A. (2011). Has education (human capital) Contributed to the Economic growth of Nigeria?*Journal of Economics and International Finance* 3(1); 46-58.
2. Adebiyi, M. A. (2006) Public education expenditure and defence Spending in Nigeria: An empirical investigation.*Journal of Science and Technology Education Research* 2(3)62-74
3. Adegbamide, A. (2007), “Obansanjo’s Legacies”, The News, .28 (21) 68-70.
4. Adeyemi, B. (2007), “Eight years of Obasanjo: Foundation laid for Industrial Revival”, *The Guardian,* 54.
5. Dauda, R. S. (2011). Health as a Component of Human Capital Formation: Does it Matter for the Growth of the Nigerian Economy?*Canadian Social Science*7(4);207-218.

6. Dornbusch,& Fischer, S. (1994), Macroeconomics 6th edition)", New York, McGraw-Hill Publishing Company
7. Dees, G. D &Picken, J.C(2000). '*Beyond Productivity: How Leading Companies achieve Superior Performance by Leveraging their Human Capital*', American Management Association, New York, America.
8. Igun, S. E.(2006).' *Human capital for Nigerian Libraries in the 21st Century*', Library Philosophy and Practice (e-Journal) 8(2).
9. Imoro B. and Owusu A. (2012), "Causes and Effects of Frequent and Unannounced Electricity Blackouts on the Operations of Micro and Small Scale Industries in Kumasi", *Journal of Sustainable Development* 5(2)
10. Jaiyeoba, S.V (2015). Human Capital Investment and Economic Growth in Nigeria. *An International Multidisciplinary Journal, Ethiopia 9(1),*:30-46.
11. Jhingan, M.L. (2005). *The Economics of Development and Planning* . Delhi: Vrinda Publications (P) Ltd
12. Lassana, C. and Abdoulaye, S. (2013), "Electric Power Outages and the Productivity of Small and Medium Enterprises in Senegal", Investment Climate and Business Environment Research Fund (ICBE-RF) Research Report No. 77/13
13. Lawanson, O. I. (2009). Human Capital Investment and Economic Development in Nigeria: The Role of Education and Health. *Oxford Business & Economics Conference Programme.*
14. Oladeji, A. O. (2015). Impact of Human Capital Development on Economic Growth in Nigeria. *International Journal of Recent Research in Commerce Economics and Management*2(2); 151-164.
15. Oloyede, B. M. (2015).Impact of Human Capital Development on Economic Growth in Nigeria: An Unpublished B.sc research project submitted to the department of College Of Management and Social Sciences, Samuel Adeboyega University, Ogwa, Edo State.
16. Oluwatoyin, M. A (2011). Human Capital Investment and Economic Growth in Nigeria: The Role of Education and Health. *Knowledge Management,Information Management,Learning Management,14; 266-277.*
17. Sylwester, K. (2000). Income inequality, education expenditures and growth. *Journal of Development Economics*, 63(2)379-398.