To What Extent Does Human Capital Development Impact Economic Growth? Empirical Evidence From Nigeria.

Attahir Babaji Abubakar (✉ attahirbabaji@gmail.com)
  University of Aberdeen Business School   https://orcid.org/0000-0002-5238-3694
Ahmad Sani Bala
  Sharda University
Abdullahi Aliyu Musa
  Sharda University

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By

Attahir Babaji Abubakar[*1,2] , Ahmad Sani Bala[3] , Abdullahi Aliyu Musa[3]

[1]University of Aberdeen Business School, Aberdeen- United Kingdom.
[2]Department of Economics, Ahmadu Bello University, Zaria- Nigeria.
[3]Department of Economics, Sharda University India.
*Corresponding Author: attahirbabaji@gmail.com

Abstract

This study examined the effect of human capital development on the economic growth of Nigeria. In achieving this, the human capital variables of education and health care were included in the study. The study employed the Autoregressuve and Distributive Lag (ARDL) model to annual series covering the period 1983 to 2018 for analysis. The findings of the study revealed the presence of a long-run association among the study variables. Further, it was discovered that in both the short and long run, both components of human capital development produce a positive effect on economic growth, although the effect of education appeared to be larger. The study emphasized the need for policymakers to enhance both access to and quality of health care and education with a view to stimulating the economic growth of Nigeria.

1.0   Introduction

Human capital development has remained a key concern for achieving the growth and development of both developed and developing countries, this is due to the role it plays in achieving sustainable development of a country as well as its contribution towards enhancing productivity. As pointed out by Eigbiremolen and Uchechi (2014), human capital is termed as the capability and skills possessed by the human resources; on the other hand, human capital development is the acquisition of additional individuals that possess the experience, know-how and ability to contribute to the growth and development of a nation's economy. In the production process, human capital refers to the contribution of both skilled and unskilled labor being a factor of the factor of production.

Human capital development has gained global recognition as being an important contributor to the economic growth and development of nations (Oluwatobi and Ogunrinola, 2011). The major concern of the United Nations at present is the sustainable development goals (SDGs) which are made up of seventeen 17 goals that are expected to be met by countries come 2030. It calls for urgent cooperation by countries via forming a global partnership aimed at achieving these goals (UN 2015). The SDGs framework underscores the importance of improving education and healthcare coupled with economic progress to end poverty and hunger as part of its goals. The United Nations sees education and health as being instrumental in achieving economic prosperity. Also, the variables can be seen as instruments of economic development because both variables form part of human capital (Paul and Akindele, 2016).

From the theoretical point of view, the human capital version of the Solow model propounded by Makiw, Romer, and Weil (1992) provides a theoretical underpinning for understanding the contribution of human capital development in advancing economic growth. Similarly, the

Human Capital Theory sees education being one of the components of human capital as having a positive effect on productivity and earnings both at the level of individuals and that of the economy at large- therefore, human capital improvement is instrumental to achieving macroeconomic progress (Tan, 2014).

Given the foregoing, this paper examines the role of human capital development on the economic growth of Nigeria. Unlike other studies that investigated the nexus between human capital and economic growth in the case of Nigeria (such as Omojimite, 2011; Musbau and Rasak, 2005) which focused on just one measure of human capital, our study employed both measures of human capital i.e. both education and health care. Also, as opposed to using education expenditure as a measure of education, we used school enrollment because it is our view that education expenditure does not necessarily translate to access to education. Besides, considering corruption and other leakages, it is our expectation that education expenditure is not a better proxy for education than school enrollment. The study also utilizes recent data for analysis.

2.0   Literature Review

From a theoretical point of view, the Human Capital Theory (HCT) propounded by Becker (1964) and built on by Rosen (1976) underscores the importance of human capital in enhancing the economic growth of nations and individual wellbeing. The theory has as its foundation the tenet that individuals pursue their development not only for present gains but also for anticipated future wellbeing (Blaug, 1976). The drive for personal development boosts the productivity of individuals thereby enhancing economic growth. As noted by Tan (2014), human capital constitutes not only education (or skills), it also includes health care. The development of both aspects positively affects productivity and by extension economic growth of countries. This is largely because healthy individuals are expected to be more productive. Also, The Mankiw,

Romer, and Weil (1992) augmented Solow model offers further insight into the impact of human capital enhancement on economic growth. The model extends the Solow framework that focuses on exogenous technical progress to include an aspect of human capital as the determining factor of long-run economic growth. The proponents of this theory argued that a combination of physical and human resources further propels production, thus underlining the importance of the expansion of human capital in accelerating economic growth.

From an empirical standpoint, studies such as Adeyemi and Ogunsola (2019) in their study analyzed the effect of human capital development on the economic growth of the Nigerian economy by utilizing time-series data spanning 1980 to 2013. The study used the ARDL model to assess the relationship between the variables investigated. The findings of the study showed the absence of a significant impact on economic growth by human capital. Also, Oluwadamilola, Akinyemi, and Adediran (2018) investigated the relationship between human capital and sustainable economic growth of Nigeria. Utilizing series covering the period 1981-2015, the study employed the VECM model for analysis. Results obtained from the estimations carried out showed human capital as being instrumental in achieving sustainable growth and development. Further, Ogunniyi (2017) examines the effect of human capital development on Nigeria's economic growth by employing the ARDL model to series from 1981 to 2014. The findings of the study revealed that in the long run, while education expenditure hurts economic growth, government expenditure on health was found to produce a positive effect on the economic growth of Nigeria.

In the same vein, Onyeagu and Okeiyika (2013) investigated the influence of human capital development on Nigeria's economic growth. The study utilized the multiple OLS regression model for analysis. The result of the study showed a negative effect of an increase in human

capital on the economic growth of Nigeria. Similarly, Miyanda and Venkatesh (2017) analyzed the effect of human capital on the Zambian economy by employing the VECM model for analysis. The result of the study showed that the human capital variables of education and healthcare influence a significant positive impact on economic growth. Further, it was discovered that the impact of health was higher than that of education.

Simeon-Oke (2012) explored the effect of human capital development on productivity in Nigeria. The study utilized an annual series covering the period 1978 to 2008 for analysis. The result of the study showed the presence of a long-run association between human capital and productivity. Further, the effect of education on the expansion of the economy was found to be positive while that of expenditure on health was negative. In investigating the effect of human capital on the economic growth of the Nigerian economy, Adeniyi and John (2016) used the ARDL model to analyze annual series covering the period 1980 to 2013. The result of the analysis showed the presence of a cointegrating relationship among the study variables. Specifically, school enrollment as well as expenditure on health were found to exert a negative effect on the economic growth of Nigeria.

Jerry, Rahmah, and Shaari (2010) in their investigation of the impact of human capital on Nigeria's economic growth employed the Vector Error Correction Model (VECM) for analysis. The findings of the study revealed the presence of an enhancing impact of human capital development on the economic growth of Nigeria. In the same vein, Paul and Akindele (2016) analyzed the role of human capital on Nigeria's economic growth by employing the Autoregressive and Distributed Lag Model (ARDL) for analysis. The study utilized annual series for the period 1980 through 2013. The findings of the study showed school enrollment and life expectancy as having a depressing impact on economic growth. Also, Musbau and Rasak (2005)

examined the effect of human capital on the economic growth of Nigeria by adopting the Vector

Error Correction Model (VECM) for analysis. Utilizing only education as the human capital

variable, the estimation result revealed that an increase in education positively impacts economic

growth in Nigeria.

3.0   Trend Analysis
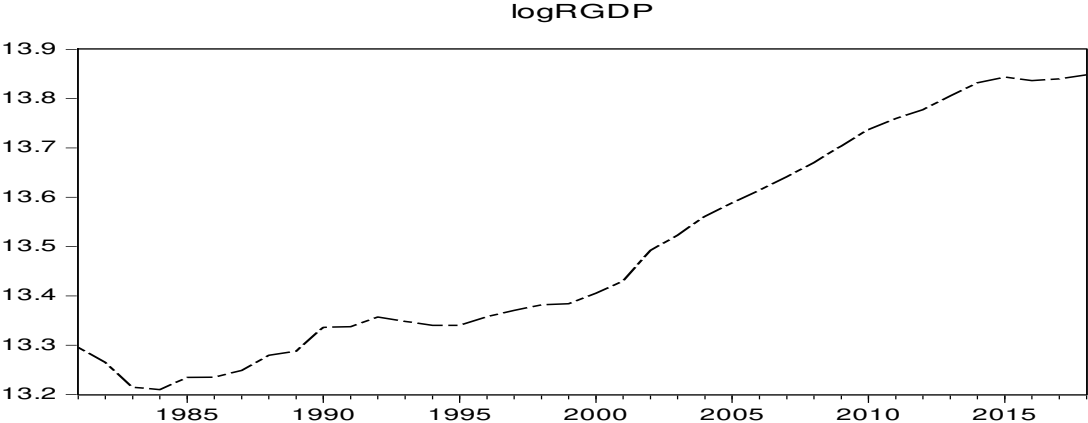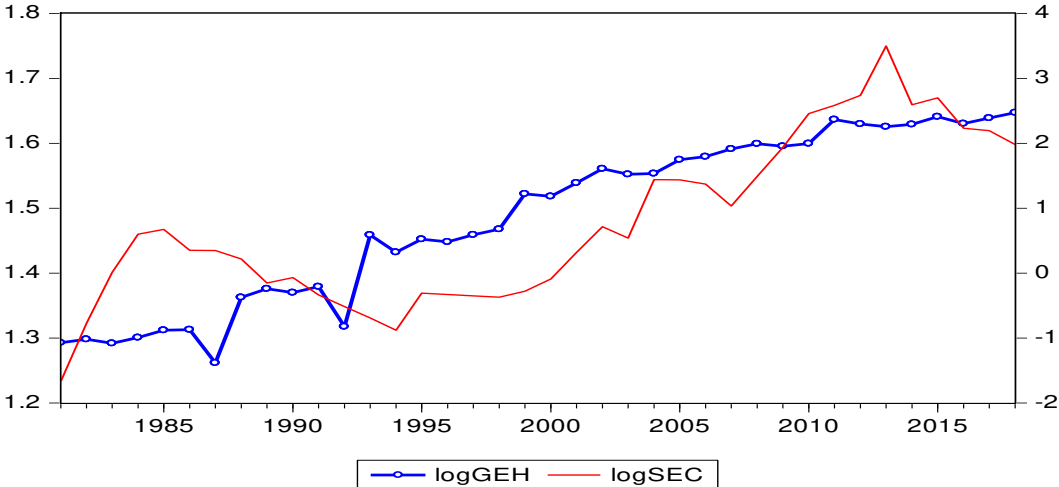
Panel 1: Trend Plot of Selected Variables

Panel 1 depicts the time plot of real GDP, health expenditure, and secondary school enrollment

ratio. From the plot, real GDP was found to have a progressive increase all through the period

included in the study, although a steeper increase in its value was witnessed from the year 2000

through 2014. This period coincides with the return of the country to a democratic rule which saw economic reform on a massive level. In the years 2015 and 2016, a slight decline in the real GDP was noticed, this coincides with the recent oil-price-fall-induced recession the country faced. The secondary school enrollment ratio was found to fluctuate over the period 1981 to 2018. Initially, the figure increased up to 1985 beyond which a decline was witnessed through to the year 1995. From the year 1995 and beyond, the value had a progressive increase, reaching its zenith around the year 2012. From the year 2012 up to the year 2018, a decline in the secondary school enrollment ratio was witnessed. Government expenditure on health was found to be almost flat from the year 1981 through 1986, which is followed by a dip witnessed in the year 1987. From the year 1987 and beyond lasting up to the year 2018, there was a progressive increase in this expenditure although a short-lived decrease occurred around 1993 after which the positive trajectory continued afterward. From the year 2010 through 2018, government health expenditure was increasing at a slower rate compared to the period before 2010.

4.0   Model specification and Methodology

Going by the multiple studies that investigated the nexus between human capital development and economic growth, the theoretical relationship between the variables can be captured through the framework of the human capital augmented Solow model propounded by Mankiw, Romer, and Weil (1992). The basic tenet of this model is that the development of a worker's quality i.e. improvement in human capital is instrumental to economic growth. This also conforms to the principle of the human capital theory which asserts that improvement in the training (education) and health condition of workers leads to greater productivity (see Olaniyan and Okemakinde, 2008).

The Mankiw-Romer-Weil model serves as the framework of this analysis due to its underpinning of appreciating the role of human capital development on economic growth. The model is specified as:

$$Y = AK^{\beta}L^{\alpha}H^{1-\alpha-\beta} \qquad\qquad eq1$$

Where: Y represents output level, K refers to the stock of physical capital; H denotes human capital; L represents labor force; A represents total factor productivity; β, α, and (1-β-α) are their respective elasticity.

Taking the log transformation of eq 1 yields:

$$logY = A\ logK^{\beta}\ logL^{\alpha}\ logH^{1-\alpha-\beta} \qquad\qquad eq2$$

The econometric form of the model can be depicted as:

$$logY = A + \beta logK + \alpha logL + \delta logH + U \qquad eq3$$

To frame the model to suit the Nigerian context by accounting for other control variables, the empirical model is specified as:

$$RGDP = f(PGR, GEH, GFCF, SEC, HFCE)$$

$$logRGDP = \beta_0 + \beta_1 PGR + \beta_2 logGEH + \beta_3 logGFCF + \beta_4 logSEC + \beta_5 logHFCE + U \qquad eq4$$

Where RGDP= Real Gross Domestic Product.

PGR=Population Growth Rate.

GEH= Government Expenditure on Health (proxy for healthcare)

GFCF= Gross Fixed Capital Formation (proxy for physical capital)

SEC= Secondary School Enrolment Ratio (proxy for education)

HHFCE= Household Final Consumption Expenditure (control variable)

β_0= Intercept.

$\beta_1\ to\ \beta_5$ = Coefficients to be estimated.

U= Error term.

The data utilized for this study was sourced from the World Bank's World Development Indicators database, covering the period 1983 to 2018. All variables except for population growth were converted to their logarithmic form before being employed for analysis.

4.1 ARDL Model Specification

We followed Khan et al (2005) and Abubakar and Shehu (2015) in specifying the ARDL equation, this takes the form of:

$$\Delta logRGDP = \beta_0 + \beta_1 logRGDP_{t-1} + \beta_2 PGR_{t-1} + \beta_3 logGeH_{t-1} + \beta_4 logGFCF_{t-1} + \beta_5 logSEC_{t-1}$$

$$+ \beta_6 logHFCE_{t-1} + \sum_{i=1}^{q} \beta_i \Delta logRGDP_{t-i} + \sum_{j=0}^{p} \beta_j \Delta PGR_{t-j} \sum_{l=o}^{p} \beta_l \Delta logGeH_{t-l}$$

$$+ \sum_{k=0}^{p} \beta_k \Delta logGFCF_{t-k} + \sum_{m=0}^{p} \beta_m \Delta logSEC_{t-m} + \sum_{n=0}^{p} \beta_n \Delta logHFCE_{t-n} + \varepsilon_t \ldots\ldots\ldots eq5$$

At the outset, we estimated equation 5 using OLS regression, this is followed by the bound test to co-integration which is conducted to examine whether a long-run association exists among the study variables. The bound test is run by testing the null hypothesis of $\beta_1 = \cdots = \beta_5 = 0$ against the alternative hypothesis of $\beta_1 \neq \cdots \neq \beta_5 \neq 0$. The decision rule of rejecting or not rejecting the null hypothesis depends on the value of the computed f-statistic and critical upper bound statistic. If the computed f-statistic exceeds the upper bound statistic, the null hypothesis of no co-integration is rejected and vice versa.

The long-run specification of the ARDL model is given as:

$$logRGDP = \beta_0 + \sum_{i=1}^{q} \beta_i logRGDP_{t-1} + \sum_{j=0}^{p1} \beta_j PGR_{t-j} \sum_{l=0}^{p2} \beta_l logGeH_{t-l} + \sum_{k=0}^{p3} \beta_k logGFCF_{t-k}$$

$$+ \sum_{m=0}^{p4} \beta_m logSEC_{t-m} + \sum_{n=0}^{p5} \beta_n logHFCE_{t-n} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots eq6$$

The short-run Error Correction Model (ECM) is specified as:

$$\Delta logRGDP = \beta_0 + \sum_{i=1}^{q} \beta_i \Delta logRGDP_{t-1} + \sum_{j=0}^{p1} \beta_j \Delta PGR_{t-j} \sum_{l=0}^{p2} \beta_l \Delta logGeH_{t-l} + \sum_{k=0}^{p3} \beta_k \Delta logGFCF_{t-k}$$

$$+ \sum_{m=0}^{p4} \beta_m \Delta logSEC_{t-m} + \sum_{n=0}^{p5} \beta_n \Delta logHFCE_{t-n} + \pi ECT_{t-1} + \varepsilon_t \dots\dots\dots\dots. eq7$$

Where ECT is the error correction term (first lag of the residual of eq6) and π is the speed of adjustment which captures period it takes the economy to revert to long-run equilibrium following shocks to the economy.

5.0   Result and discussion

Under this section, the results of the estimated models and tests are presented and discussed.

5.1   Stationarity Test

The study employed the Augmented Dickey Fuller (ADF) test for unit root to investigate the order of integration of the variables. The test has the null hypothesis of the existence of unit root i.e. the series are non-stationary. The result of the stationary test is presented in Table 1.

Table 1 Stationarity Test Result

	Level				First difference				
	Without trend		**With trend**		**Without trend**		**With trend**		
Variables	ADF	Critical value	ADF	Critical value	ADF	Critical value	ADF	Critical value	Order of integration
logRGDP	-0.278	-2.951	-1.769	-3.558	-3.354	-2.951	-3.001	-3.548	I(1)
logGEH	-2.740	-2.972	0.036	-3.553	-0.049	-2.972	-5.293	-3.553	I(1)
logGFCF	-2.361	-2.949	-6.640	-3.544					I(0)
logHFCE	-1.135	-2.943	-3.641	-3.537					I(0)
logSEC	-1.734	-2.943	-1.772	-3.537	-5.534	-2.946	-5.451	-3.540	I(1)
PGR	-5.453	-2.968	-4.472	-3.574					I(0)

Under table 1, the decision rule of rejecting the null hypothesis of the presence of unit root (non-stationary) is if the computed ADF statistic is greater than the ADF critical value. The result obtained shows that real gross domestic product, secondary school enrolment ratio, government

expenditure on health to be integrated of order one (I(1)). On the other hand, gross fixed capital formation, household final consumption expenditure, and population growth rate were found to be stationary at level i.e. integrated of order zero (I(1)). Since the variables investigated are integrated of mixed order, the appropriate model to employ for analysis is the Autoregressive and Distributed Lag Model (see Yusuf et al, 2020; Pesaran et al., 1999).

5.2 Co-integration Test Result

Table 2 Bound Test Result

F-statistic	11.03	
Critical Values	Lower Bound	Upper Bound
1%	3.90	5.42
5%	2.80	4.01

The ARDL bound test to cointegration was employed to examine whether the variables have a long-run association. The result is reported in table 2. From the result, the f-statistic (11.03) is greater than the upper bound critical value (3.38), implying the rejection of the null hypothesis of no co-integration thereby leading to the conclusion that the variables are co-integrated i.e. they have a long-run association. Since the presence of long-run association among the study variables is established, we can go ahead to estimate the coefficients of the long-run relationship and the short-run error correction model. The estimation results are presented in Tables 3 and 4 respectively.

5.3 Long Run Model Result

Table 3 Long Run Model Estimates (ARDL 2, 0, 0, 3, 3, 1)

Variables	Coefficient	Std. Error
Log_Capital	0.042	0.261
Population Growth	0.707**	0.273
Log_Sec Enrol	0.424**	0.195
Log_Govt. Health Exp	0.081***	0.017
Log_Household Cons. Exp	0.390**	0.187
Intercept	9.345**	3.401

*,**,*** indicates statistical sig at 10%, 5% and 1% resp.

Table 3 presents the result of the long-run model derived from the ARDL model whose optimal lags were selected based on the Akaike Information Criteria (AIC). From the result, it can be noticed that physical capital was found to exert a positive effect on economic growth. Though statistically insignificant, the coefficient of the variable indicates that a 1% increase in capital leads to about 0.04% percent increase in economic growth. This finding is in line with Adeniyi and John (2016). A positive effect of physical on economic growth signifies that the more capital investment there is in an economy be it by the private or public sector, the higher the productivity of the economy. This is largely because capital is one of the key factors of production.

Further, secondary school enrolment being one of the key variables of interest in this study was found to positively impact economic growth. The coefficient of the variable points to the fact that a 1% increase in secondary school enrolment influences about 0.42% increase in economic growth. This finding is in tandem with those of Adeniyi and John (2016), Miyanda and Venkatesh (2017), Paul and Akindele (2010). This finding brings to the fore the fact that an increase in access to education by the population, particularly at the secondary school level where necessary life-skills are taught goes a long way in enhancing the economic growth of Nigeria. Education does not only increase the skills and productivity of individuals, but it also enhances their efficiency and employability. It is expected that an individual that has undergone some form of training or skill acquisition is more productive than those who do not, as a result, an overall expansion of growth at the macro level is expected following an increase in production that comes about due to an increase in education. Aside from forming part of labour force to be tapped from, educated individuals stand the chance of venturing into entrepreneurship thereby contributing to economic growth.

Similarly, government expenditure on health was found to positively influence economic growth. The coefficient points to the fact that a 1% increase in government health expenditure increases economic growth by about 0.081%. This finding is in line with that of Miyanda and Venkatesh (2017). This second component of human capital underscores the positive effect of human capital development on economic growth. One possible explanation for this finding is the expectation that an increase in public health expenditure is expected to increase both access to and quality of healthcare. This in turn is expected to enhance the health condition of labour and by extension their productivity. The sun effect of this is an expansion of economic growth.

The effect of population growth on economic growth was also positive. The coefficient indicates that a 1% point increase in the population growth will lead to about 0.71% increase in the economic growth of Nigeria. This finding underscores the importance of population on economic growth. This can be looked at from two perspectives. The first is that population growth expands the available market in the economy thereby expanding the demand for goods and services and by extension production of such commodities. Similarly, population growth increases the pool of labor that can be tapped from for production, this positively influences economic growth because labour is termed as one of the key factors of production.

In addition, household consumption expenditure was found to exert a significant positive effect on economic growth. The coefficient indicates that a 1% increase in household consumption expenditure influences about 0.389% increase in economic growth. The rationale behind this finding is that an increase in expenditure by individuals increases the demand for goods and services and by extension their production. This is premised upon the Keynesian argument that demand for goods and services leads to an increase in output aimed at matching the increase in demand.

5.4   Short-Run Model Result

Table 4 Short Run Error Correction Model (ECM)

Variables	Coefficient	Std. Error
Log_Capital	0.144***	0.026
Log_Capital$_{t-1}$	0.053*	0.027
Log_Capital $_{t-2}$	0.097***	0.022
Population Growth	0.158*	0.077
Log_Sec Enrol	0.114***	0.034
Log_Govt. Health Exp	0.010**	0.004
Log_Household Cons. Exp	0.194***	0.022
Log_Household Cons. Exp $_{t-1}$	0.102***	0.028
Log_Household Cons. Exp $_{t-2}$	0.056**	0.024
ECT	-0.221***	0.021
Adj. R-Squared	0.73	

*,**,*** indicates statistical sig at 10%, 5% and 1% resp.

Table 4 presents the result of the estimated short-run relationship between the variables. From the result, all the explanatory variables were found to produce a significant positive effect on economic growth at different levels of statistical significance. It should be noted that although physical capital was insignificant in its effect in the long-run model, the effect is significant in the short run. The coefficients of the human capital variables just like in the long run were found to be positively related to economic growth, although the short-run coefficients appeared to be smaller than their long-run counterpart.

The error correction term (ECT) determines the speed at which the economy adjusts to its long-run equilibrium following a shock in the economy, with its negative coefficient suggesting convergence (Narayan, 2005). The coefficient -0.21 indicates that about 21% of reversion towards long-run equilibrium is completed in a year. The R-squared coefficient measures the goodness of fit of the model. Its coefficient of 0.73 signifies that about 73 percent variation in the dependent variable (economic growth) is influenced by the independent variables included in the model.

5.5   Diagnostics test

We subjected the estimated ARDL model to some diagnostic tests to determine the robustness of the model. To achieve this, the Breusch-Godfrey heteroskedasticity, LM Serial Correlation, Jarque-Bera Normality, and CUSUM plot stability tests were employed. The results of these tests (except for the CUSUM plot which is presented in the appendix) are presented in Table 5.

Table 5 Diagnostic Test Results

Test	Statistic	Prob.
LM Serial Correlation	1.42	0.49
BP Heteroskedasticity	17.54	0.23
Jarque-Bera Normality	0.52	0.77

From the result presented in Table 5, the test statistic for investigating serial correlation and its corresponding probability value indicated that the null hypothesis that there is no serial correlation cannot be rejected. Similarly, the heteroskedasticity test statistic signifies that the null hypothesis of no heteroskedasticity cannot be rejected. The coefficient of the Jarque-Bera statistic indicates that the null hypothesis of normally distributed errors cannot be rejected. Lastly, the CUSUM and CUSUM sum of squares plot (Panel 2 in appendix) show that the estimated model is stable because the plot falls within the bounds. Taking into account the results, we could conclude that our model is acceptable because it meets the post estimation test criteria.

6.0   Conclusion and Recommendation

This study investigated the effect of human capital development on the economic growth of Nigeria. Specifically, the effect of both education and health care components were examined. From the result obtained from the estimated ARDL model, education and health care were found to positively impact economic growth in both the long and short run. Further, the coefficient of

the long-run effect of both variables appeared to be greater than its short-run effect. Between the variables, education was found to influence a greater effect on economic growth than healthcare. These findings underscore the importance of the development of the human capital of a nation in achieving economic growth. Consequently, this study recommends the need for concerted efforts by the government and other stakeholders in increasing both access to and quality of both education and health care due to its influence on the economic prosperity of Nigeria.

Declarations:

- Availability of data and materials: Data used for the study is available on request.
- Competing interests: Authors declare no competing interest.
- Funding: No funding was received for the study.
- Authors' contributions: AA: Conceptualisation, methodology, data analysis and discussion, general review. AB: Literature review, Model formulation, Trend analysis. AM: Introduction, Data collection and Conclusion.
- Acknowledgements: Not applicable.

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Appendix
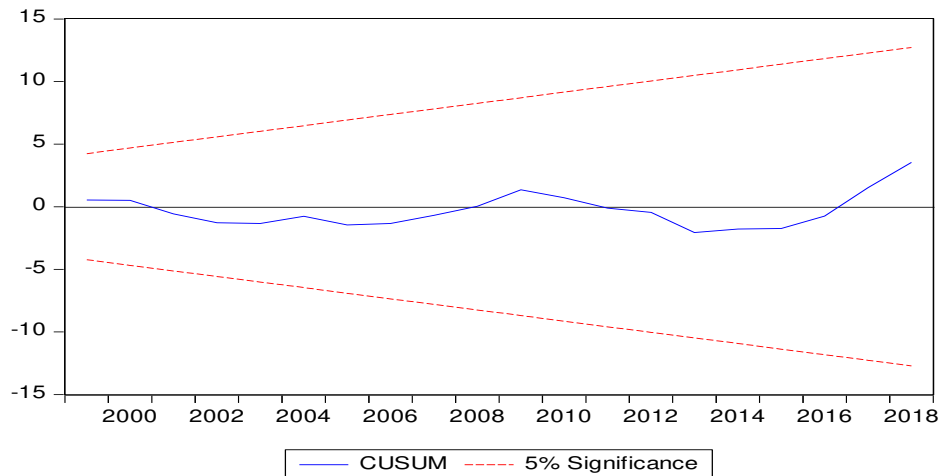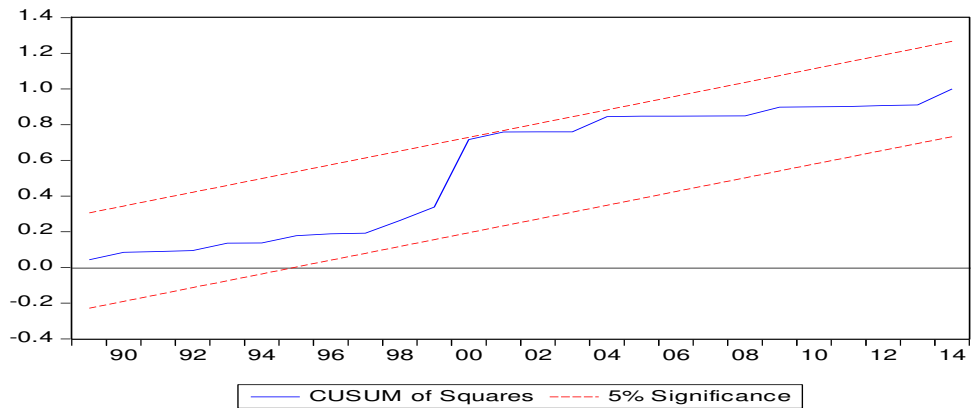
Panel 2: CUSUM and CUSUM Sum of Squares Plot