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A Dynamic Analysis of the Relationship between Human Development and Economic Growth in Nigeria

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Abstract

This study is an attempt to investigate the role of human development in terms of education and health on economic growth in Nigeria using annual data during the period 1995-2015. ADF, PP and Ng-Perron unit root tests are utilized to check the stochastic properties of the variables or otherwise. The unit root results reveal that the variables in the study are a mixture of I(0) and I(1), which necessitate the use of the ARDL model to analyse the relationship. The paper relies on the ARDL-ECM bounds testing approach to co-integration and granger causality to ascertain the long run relationship as well as speed of adjustment and direction of causality among the variables. Findings revealed the existence of a long run relationship between human development and economic growth in Nigeria and that education index and health index as measures of human development are found to have a short run and long run negative impact on the economic growth over the period. Also, the estimated models performed well as the speed of adjustment is quite fast for the expected negative sign. This is further confirmed by the results of Granger causality test which indicated the existence of unidirectional causality running from health index to economic growth, whereas no causal relationship exist between education index and economic growth. The paper recommends that government should formulate and implement effective economic policies related to the provision of education and health facilities to support the innovative technological progress which increases productivity and thus accelerates the economic growth. Also, policy makers should prioritize these sectors and devote attention to policy determinants of education and health as a mechanism for promoting economic growth in Nigeria. The Ministries of Education and Health must cooperate in promoting importance of health and spreading health care information to the people on priority basis.

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Background to the Study

Human Development (HD), being the ultimate objective of each and every human activity, plays a vital role in producing high skilled manpower that leads to economic growth and hence economic development. "Human development denotes both the processes of widening people's choices and level of their achieved wellbeing" (UNDP, 1990). Human development is the enlargement of people's choices to live more prosperous lives. Economists consider human development as one of the most important ingredients of economic growth (Afzalet el., 2009).Sustained economic growth accompanied with social development is one of the notable macroeconomic objectives of every country and in this regard human development is deemed as an essential ingredient.

The initial theory of human development dates back to pioneer work of Mincer (1958), Schultz (1961) and Becker (1962), who believe that human development is just like physical capital and one can invest in it by means of education, health and training which, in turn, will raise output and contribute to economic growth. Furthermore, proponents of endogenous growth theory lay emphasis on human capital formation and regard it a factor which explains difference in growth performance of under developed and developed nations (See, Asghar, Awan and Rehman, 2012; Romer, 1990; Lucas, 1988; Rebelo, 1991). Therefore, it can be concluded that human development has gained significant importance in growth theories. However, its measurement is not addressed properly in economic literature. Various researchers have utilized different proxies for human development, e.g. Mankiw et al. (1992) utilize secondary education enrolments. Barro and Lee (1993) and Bosworth et al. (1995) have used average years of schooling. The existing literature on human development reveals that while acknowledging the role of human development in economic growth macro-economists express human development solely in the form of education whereas micro-economists consider health as another important component of human development beside education. They believed that health plays significant role in the formation of human resources because in order to ensure growth in productivity, people need to be healthy or protected from sickness. It means health and education both are primary ingredients of human capital formation and development.

The government of Nigeria has failed to reap the maximum benefits from human capital development due to less emphasis and less budget allocation to social sector. Despite almost threefold increase in total expenditure of public sector since 1999 post military era, the government spending on health and education has remained low. In fact spending on health as a percentage of GDP has even declined over time as it was 0.98% of GDP in 1999 which declined to 0.92% of GDP in year 2014.The estimates of government education expenditure in Nigeria as a share of GDP and of total government expenditure can be compared to the situation in other sub-Saharan African countries. UNESCO's World Education Report 2000 presents the data for 19 countries across sub-Saharan Africa for 1996. The average share of GDP was 4.7%and of government expenditure was 19.6%. In both cases, the measures of educational expenditures for Nigeria (2.3% and 14.3% respectively) are relatively low. However, recent data shows that total expenditures on education by all governments combined were equal to 3.5% of GDP and 15.2% of total government expenditure. Education expenditures were equal to 15% of total federal expenditures and 21%, 27% and 29% of the total expenditures of the Northern, Eastern and Western regional governments respectively. In

terms of education spending Nigeria is one of the lowest in Africa and in terms of human development index by UNDP latest ranking of August 30, 2016 report, Nigeria ranked at 152nd position. Consequently, the country retained its 2014 status as there was no forward or backward shift from the computation. Nigeria's HDI value for 2014, according to UNDP's 2015 report, was 0.514 which put the country in the low human development category, positioning it at 152 of 188 countries, whereas Mauritius ranked at 63rd position, Tunisia ranked at 96th position; Botswana ranked at 106th position; Sao Tome and Principe ranked 143rd position; Kenya was placed at 145th position on the list of countries ranked low. The country of the region, that has the lowest was Niger, is considered to be low human developed nation and ranked at 188th.

It is pertinent to highlight that since the past decade human capital development is highly prioritized in Nigeria and the national education and health policies are aimed at improving these sectors and for achieving SDGs (Sustainable Development Goals) especially in health by 2030. The improvement in certain health indicators and in literacy rate have been observed during the past decade from the programme of MDGs (Millennium Development Goals) but overall it ranked poorly in this context. (Source; 2016 National Budget-Provisional).

Most of the empirical research conducted on the subject matter on Nigerian economy has defined human development in terms of education indicators or in terms of health indicators. These (indicators) alone according to Asghar, Awan and Rehman, (2012), fail to capture development and skills of the labor force; therefore, there is a need to conduct research on this aspect that uses much broader measure of human development in the context of Nigerian economy. Besides conflicting results from the previous studies, none of the studies estimate the magnitude of influence exerted by the identified variables. The present study is an attempt to use broader measure of human development as it uses education index and health index as proxies for human development. These indices are self-constructed and are based on methodology of UNDP (United Nations Development Program).

Some studies argue that human development have had impact on economic growth. For instance Judson (2002), Ranis, Stewart and Ramitez, (2000) among many others uphold that human development has a positive long run relationship on economic growth, whereas, Liu, Squire and Zou (1998) among others see otherwise relationship between human development and economic growth. Also, researches till today hold different opinions regarding the causal nexus between human development and economic growth. However, most of these studies present inconclusive and contradictory results over the relationship between human development and economic growth and as such more studies are needed in this area for Nigeria and this justify the need for this research.

It is in the light of these conflicting views on the dynamic impact and causality relationships, the possible long run relationship that may exist between human development and economic growth, and the recent improvement in bound test cointegration, ARDL-VECM model developed by Pesaran, Shin and Smith (2001)that has called for this study, and hence, the study aims to contribute in that way. Therefore, the objectives of this study is to empirically estimate the dynamic impact relationships between human development and economic

growth in Nigeria, to investigate the direction of causality between human development and economic growth in Nigeria and also to ascertain whether long run relationship exists between human development and economic growth in Nigeria.

The paper is organized into five sections given the introduction as section one. The rest of the paper is organized as follows: Section two presents the literature review and theoretical framework. In section three, the methodology adopted for this study is presented. Presentation of results is done in section four and conclusion is drawn in section five with policy implication.

Literature Review

Despite there being many factors that affect the growth rate of an economy, human development has been identified as the most prominent factor in recent decades by researchers. Recent decades have seen an explosion in research, both theoretical and empirical, that attempts to focus on the correlation between human development and economic growth. Thus, it is crucial that we review the related literature, if we are to understand the precise relationship between these two variables. This section briefly reviews the relevant empirical and theoretical studies, and then goes on to discuss the findings of existing empirical studies that pertain to the human development–economic growth nexus.

The linkages between economic growth and human development, have been studied and discussed by Narayan and Smyth (2004). A strong linkage was found between economic growth and human development (Ranis, Stewart and Ramitez, 2000). Judson (2002) states that even though conventional wisdom does support a positive correlation between output growth and human development, the empirical results are mixed, that the positive correlation between growth and human development has been found exceptionally rather than as a rule. So, examining the causality between human development and economic growth for Nigeria is the need of a day.

According to Taniguchi and Wang (2003), education and health both cause each other and thus contribute in economic growth. Weil (2001) findings related to health-growth nexus further strengthen the importance of health for economic growth. The study concludes that 17-20% of variations in income across countries is due to differences in health status. Agiomirgianakis et al. (2002) conduct panel study (consisting of 93 countries) on subject matter and find significant positive long-run impact of education (primary, secondary and tertiary) on economic growth. Bloom et al. (2004) try to investigate the impact of human capital on economic growth. By utilizing, 2SLS approach they find that schooling and life expectancy both positively contribute to economic growth. Improvements in health standards are associated with increase in output due to increased labor productivity and capital accumulation. Seebens and Wobst (2003); Moser and Eliot (2005) both have asserted that in the long-run education (human capital) increases substantially household income as well as economic growth. However, other studies including Bils and Klenow (2000), Easterly and Levine (2001), Temple (2001), Bosworth and Collins (2003) have failed to establish positive association between human capital (years of schooling) and economic growth.

In case of Nigeria, most of the studies have used micro data on human development. These studies conclude that education brings significant positive returns for wage earners (for details see Lawal & Wahab, 2011; Babatunde & Adefabi, 2005;Adawo, 2011). Using macro data in a comparative analysis of Nigeria Kehinde et al. (2013) find overall significant and positive impact of human capital (school enrollment rates as a proxy) on economic growth during 1970-2010. They use higher secondary, secondary and primary enrolment rates for observing the role of education in economic growth. They employ cointegration on standard growth model augmented with variables of enrolment rates. The results of the study reveal that both primary, secondary and post-secondary enrolment rate have positive and significant impact on economic growth in Nigeria. Other studies include Jelilov, Aleshinloye & Onder (2016); Javed et al (2013); Mba, Mba, Ogbuagor & Ikpebu (2013); Asghar, Awan&Rehman (2012); Kodabakhshi (2011); Qadri & Waheed (2011); Afzalet al. (2009); Haldar&Mallik (2010); Abbas & Peck (2008); Narayan & Smith (2004) among others.

The methodologies used are mostly OLS, 2LS, conventional cointegration methods (such as, Johansen, Johansen and Juselius, Gregory and Hansen), error correction model and causality tests. A number of empirical studies have reported a strong and positive relationship between human capital and economic growth. However, the causality test results are mixed. While Asghar, Awan & Rehman (2012) documented a unidirectional causality running from human development to economic growth, opposite is the case in Narayan & Smith (2008) and Haroon (2001) where the causality runs from economic growth to human capital. Moreover, bidirectional causality is found in Al-Yousif (2008).

After reviewing empirical literature on the subject matter it is evident that in case of cross country studies empirical results remained inconclusive whereas in a single country analysis mostly studies support positive association between human development and economic growth. However, it is observed that different studies have used different proxies for human development and difference in measurement of human development 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 development and more recent studies lay emphasis on both health and education as a proxy for human development. The existing literature on Nigerian economy shows that appropriate proxies of human development are not used along with recent advances in dynamic modelling. There exists a gap in the literature regarding the role of human development on economic growth in Nigeria. The present study is an attempt to bridge this gap by analysing the causal relationship between human development and economic growth using recent advances in dynamic modelling and more appropriate proxies for human development. The results of this study may be helpful for policy makers in designing appropriate policies giving priority to the development of human capital development.

Theoretical studies identified a positive relationship between human development and economic growth (e.g., Lucas, 1988; Mankiw et al., 1992; Bergheim, 2005; Maritra and Mukhopadhyay, 2012). Maritra and Mukhopadhyay (2012) confirm that investing on education and health accumulates human capital and leads to innovative technological progress which increases productivity and thus accelerates the economic growth in the long run. Lucas (1988) suggests that public expenditure contributes positively to income growth in

the short run. Moreover, Qadri and Waheed (2011) illustrate that a healthier worker can contribute more in the production process than the unhealthy counterpart through many channels such as; healthier worker has higher physical and mental capabilities, vigor and stamina; healthier person can learn more than an unhealthier one from a given level of education. In this way, improvement in health increases output due to increased strength and also due to more learning from a given level of education. Nutrition has a strong line with productivity, output and economic growth. That is, a person who consumes nutritious food is likely to be more productive due to higher vigor and strength Taniguchi and Wang (2003).

Therefore, providing adequate nutrition is considered as an investment in human capital. Bergheim (2005) demonstrates that education is the most important determinant of human capital which affects the output through various channels: education raises knowledge which helps to produce more output in a shorter time and intuitionally it is known that an educated person could learn much faster, increase in the level of education leads towards better health due to an increase in the awareness of the benefits of healthy living which in turn increases output. Along with education, the role of experience is also very important in productivity growth. Experience generally reduces the chances of errors and increases the output during a given time period. Moreover, human capital is necessary for optimum utilization of physical capital i.e. increase in the stock of human capital in any economy attracts investment in physical capital which in turn increases output (Abbas, 2000). In addition, the basic production function expresses the importance of labor, capital and technology in determining economic growth. In this regard Karunathilaka (2008) states that "the contribution of labour to the expansion of output depends on the size of the labour force and its productivity. There is close and positive association between human capital and productivity". Hence, educated and trained labour, the human capital, enables efficient and optimal combination of labour and capital with a given state of technology.

Human Development and Economic Growth

Clearly, there exist strong connections between human development and economic growth. On the one hand, economic growth provides the resources to permit sustained improvements in human development. On the other, human development improvements raise the capacities of economic agents who make the critical contributions to economic growth. Each of these relationships has often been acknowledged separately—for example, the way in which economic growth affects human development forms part of the basic needs literature, while the impact of improved labour quality on economic growth has been widely explored in the human development literature. Yet, the two strands have seldom been combined within one dynamic analytical framework. It is important to understand the implications of this two-way linkage in terms of both analysis and policy. The two-way linkage can be explored analytically and through empirical investigation of the estimates and their links.

Lucas endogenous theory of growth will serve as the foundation of this work. Lucas (1988) presents a growth model in which output is generated via a production function of the form

$$Y = AK^{\alpha}(uhL)^{1-\alpha}h_a$$

Where Y is the level of output produced;
A is the technical coefficient and K is the input of physical capital. The variable u is the proportion of total labour time spent working, and h is what Lucas calls the stock of 'human capital. h_a is the average human capital level and $0 < \alpha < 1$

Methodology
In this research, a dynamic analysis of the relationship between human development and economic growth in Nigeria was analysed using a data over the period of 1995-2015. This was accomplished by utilizing the econometrics technique of ADF, PP, ARDL-VECM bound cointegration test and Pair wise Granger Causality. The Central Bank of Nigeria (CBN) publishes annual figures for GDP, World Development Indicators (WDI), and UNESCO Institute for statistics (UIS).

Data Description
Data Set and Model Specification
According to the World Bank classification, all developing countries are classified based on level of GDP per capita, which has a threshold between $1,035 and $12,615. For the purpose of this study, GDP (annual growth rate) was used as the dependent variable and as a proxy for economic growth. GDP growth rate annually was used as a proxy for economic growth because it shows the monetary value of goods and services excluding inflation. Also, education index based on years of schooling and adult literacy index, while health index based on life expectancy. In order to investigate empirical association between human development and economic growth, the following model adopted from Asghar, Awan and Rehman (2012) will be estimated:

$$lPCY_t = \beta_o + \beta_1 EI + \beta_2 HI + \epsilon_t \quad \ldots\ldots(1)$$

Where:
Where $lPCY_t$ = log of real growth domestic product as a proxy for economic growth
Ei_{1t} = Education Index based on years of schooling (first proxy for human capital)
HI_{2t} = Health index (second proxy for human capital).

Education index reflects composite measure of knowledge and it has been taken as an important ingredient of human capital along with health index. Both self-constructed indices are based on UNDP methodology given in 1999-2000. The following formula has been used for constructing both education and health indices:

$$(1)\ \text{Education Index} = [\tfrac{2}{3} * \text{ALI}] + [\tfrac{1}{3} * \text{GEI}]$$

$$\text{Where: ALI} = \frac{ALR-0}{100-0} \quad \text{and} \quad \text{GEI} = \frac{CGER-0}{100-0}$$

ALI = Adult literacy index, ALR = Adult literacy rate, GEI = Gross enrolment index, CGER = Combined gross enrolment rates.

Education index is constructed by adding together adult literacy index (ALI) with two-third weightage and combined primary, secondary and tertiary gross enrolment index (GEI) with one-third weightage.

(2) Health Index $= \frac{LE-25}{85-25}$ where: LE = Life Expectancy.

Since values of these indices lie between -0 and +1 and they are unit free, we are unable to take log of these indices. So we have used semi-log model in our study.

Estimation Procedure and Robustness Test

The analysis begins with ascertaining the order of integration of the variables. The procedure adopted in this study involves the use of the Augmented Dickey Fuller Test (1979) ADF Test and Phillips-Perron (1988) PP Test. The null hypothesis of both the ADF and PP tests are non-stationarity, thus failure with respect to rejection implies unit root in the series. Following these unit root tests, the Autoregressive Distributed Lag (ARDL) bound cointegration Models as well as Error Correction Model is employed to examine the presence of any long-run association among the variables. To account for the sensitivity of results using this approach to cointegration to the automatic choice of lag length, the Schwarz Information Criterion (SIC) is used. Since it has been discovered there is co integration among the variables which suggests that there must be Granger causality in at least one direction, however, it does not indicate the direction of causality among the variables. Therefore, the Pair-wise Granger causality test has been applied to test for causality between human development and economic growth.

The analysis of the data has been done using the EVIEWS 9 econometric package.

Econometric Methodology

ADF and Phillip-Perron Unit Root Tests

For this purpose, the study uses the conventional Augmented Dicky-Fuller (ADF) and Phillip-Perronunit root tests as a tool for identifying stationarity (or non stationarity) of a variable by running OLS regression of levels variables on their lag values.

Consider a variable Y that has unit root represented by a first-order autoregressive AR (1):

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{j-1}^{p} y_j + \Delta Y_{t-j} + \varepsilon_t \quad \text{.....(2)}$$

$$\Delta Y_t = \alpha + \beta T + \gamma y_{t-1} + \varepsilon_t \quad \text{.....(3)}$$

Where α and β are parameters, ε_t is assumed to be a white noise, ΔY_{t-j} expresses the first difference of the variable with p lag, $\Delta Y_t = Y_t - Y_{t-1.}$ Y is a stationary series if $-1 < p < 1$. If p =1, y is a non-stationary series; if the process is started at some point, the variance of y increases steadily with time and goes to infinity. If the absolute value of p is greater than one, the series is explosive. Therefore, the hypothesis of a stationary series can be evaluated by testing whether the absolute value of p is strictly less than one. If the series is correlated at higher order lags, the assumption of the white noise disturbance is violated.

Cointegration – ARDL-Bounds Testing Procedure

In this regard, by applying the model suggested by Pesaran et al. (2001) the recently developed Autoregressive Distributed Lag (ARDL)-Bounds testing approach is used to examine the long-run relationship betweeneducation index, health index and economic growth. The ARDL modelling approach was originally introduced by Pesaran and Shin (1999) and later extended by Pesaran et al. (2001).

$$\Delta LGDP_t = \alpha_o + \alpha_1 LGDPt_{-i} + \alpha_2 EINXt_{-i} + \alpha_3 HINX_{t-i} + \sum b_1 \Delta LGDP_{t-1} + \sum b_2 \Delta EINX_{t-1} + \sum b_3 \Delta HINX_{t-i} + \psi ECM_{t-1+} \varepsilon t_1 \ldots\ldots\ldots\ldots (4)$$

In the above equation, LGDP= natural logarithm value of real growth domestic product as a proxy for economic growth; EINX= Education Index; HINX= Health index; μ= represents the white noise error term; Δ represents the first difference operator. The parameters b's are the short-run coefficients and α's are the corresponding long-run multipliers of the underlying ARDL model.

The bounds testing procedure is based on the joint F-statistic (or Wald statistic) for cointegration analysis. The asymptotic distribution of the F- statistic is non-standard under the null hypothesis of no cointegration between examined variables. Pesaran et al. (2001) report two sets of critical values for a given significance level. One set of critical values assumes that all variables included in the ARDL model are I(0), while the other is calculated on the assumption that the variables are I(1). If the computed test statistic exceeds the upper critical bounds value, then the Ho hypothesis is rejected. If the F-statistic falls into the bounds then the cointegration test becomes inconclusive. If the F-statistic is lower than the lower bounds value, then the null hypothesis of no cointegration cannot be rejected (Pesaran et al. (2001).

Granger Non-Causality Test

The causal relationship between Human development and economic growth has been examined using Granger causality test. In a causality test, the direction of causality is reported in four different ways; when causality runs for example from LGDP to HUD meaning that LGDP Granger cause HUD, It could also be the case where HUD Granger cause LGDP when causality runs from HUD to LGDP. In contrary, LGDP and HUD may cause each other or is the reverse the case. This is done using the following VAR system of equations as follows:

$$LGDP_t = \alpha_o + \sum \alpha 1 LGDP_{t-1} + \sum \alpha 2 LGDP_{t-1} + \sum \delta 1 HUDt_{-1} + \sum \delta 2 HUD_{t-1} + \mu 2_t \ldots\ldots\ldots (5)$$

$$HUDt = \alpha_o + \sum \delta \beta 1 HUDt_{-1} + \sum \delta \beta 2 HUD_{t-1} + \sum \gamma 1 LGDP_{t-1} + \sum \gamma 2 LGDP_{t-1} + \mu 2_t \ldots (6)$$

Where: α_o = constant parameter, α = vector of the parameters of the lagged values of the natural logarithms value of real growth domestic product as a proxy for economic growth, δ=vector of the parameters of HUD, β= vector of the parameters of the lagged values of HUD, γ= vector of the parameters of the lagged values of the natural logarithms value of real growth domestic product as a proxy for economic growth.

Empirical Results and Discussion

Unit root Results

Before performing the Bounds test, it is essential to check for the stationarity of the data series to be used. The test is conducted using three different unit root models. That is, the Augmented Dickey Fuller (ADF), Philips-Perron (PP) and the Ng-Perron models. The essence of using the three test is for confirmatory testing and the result of the unit root test is shown in table 1aand 1bbelow:

Table 1a: Results of ADF and PP Unit Root Tests 1995 - 2015.

Variables	Levels/ First Difference	ADF test statistic		PP test statistic	
		Without trend	With trend	Without trend	With trend
LGDP	Level	-1.49	0.06	-5.33*	-7.22*
EINX	Level	-2.05	-0.95	-2.48	-0.83
HINX	Level	-4.04*	-2.63	0.50	-2.48
	First Diff	-19.84*	-20.47*	-17.09*	-19.73*
ΔEINX	First Diff	-3.32**	-3.75**	-3.33**	-4.80*
ΔHINX	First Diff	-12.12*	11.43*	-11.50*	-10.34*
Mac-Kinnon Critical Values					
1%		-3.83	-4.53	-3.81	-4.50
5%		-3.03	-3.67	-3.02	-3.66
10%		-2.66	-3.28	-2.65	-3.27

Note:* indicates level of significance at 1%, ** at 5% and * at 10%. Whereas Δ is used as difference operator**.

Table 1b: Ng-Perron Test Results 1995-2015

Variable	MZα		MZt		MSB		MPT	
	Deterministic terms		Deterministic terms		Deterministic terms		Deterministic terms	
	C	c, t	c	c, t	c	c, t	c	c, t
Ng-Perron in Levels								
LGDP	4.99	10.00	5.74*	9.31*	1.15*	0.93*	15 9.16*	41 1.57*
EINX	-0.87	-2.94	-0.44	-0.97	0.51*	0.33*	16.46*	24.85*
HINX	0.55	-7.95	0.41	-1.98	0.73*	0.24*	36.84*	11.46*

Ng-Perron in First Differences								
ΔLGDP	12.40**	7.99	29.07*	8.82*	2.34*	1.10*	1179.75*	504.46*
ΔEINX	-8.90**	-24.36*	-22.08**	-3.48*	0.23*	0.14*	2.83*	3.74
ΔHINX	-3.07	0.06	-1.21	0.03	0.39**	0.62**	7.91*	85.93*
Critical Values[a]								
1%	-13.80	-23.80	-22.58	-3.42	0.17	0.14	1.78	4.03
5%	-8.10	-17.30	-13.98	-2.91	0.23	0.16	3.17	5.48
10%	-5.70	-14.20	-13.62	-2.62	0.27	0.18	4.45	6.67

Note: * indicates level of significance at 1%, ** at 5% and *** at 10%.
a → Asymptotic critical values taken from Ng-Perron (2001, Table 1).
c → denotes constant and c, t → denotes constant and trend.
MZα → Modified Philips-Peron test.
MZt → Modified PP t-test.
MSB → Modified Sargan-Bhargava test.
MPT → Modified Point Optimal test.

The results of unit root tests on the variables at their level and first difference values has been conducted., the degree of integration is confirmed through ADF, PP and Ng-Perron tests. The results of these tests are reported in Tables 1a and 1b. The results of ADF and PP show that

education index is non-stationary at level values, while economic growth and health index were found to be stationary at 1% critical level. Similarly, Ng-Perron test reports that the three variables were also found to be a mixture of I(1) and I(0) in MZα, MZt, MSB and MPT. However, the stationarity property is found after taking the first difference of the variables at 1% critical level I(1). Keeping in view that Ng-Perron test is more powerful and appropriate for small sample data set,As stated earlier, it is necessary to first perform unit root tests on the variables in order to ensure that none of the variables is integrated of order two I(2) or beyond, therefore, ARDL bound cointegration analysis is justified. According to Kubalu, Mustapha & Muhammad (2016), in presence of I(2) variables the computed F-statistics of the bounds test are rendered invalid because they are based on the assumption that the variables are I(0) or I(1) or mutually cointegrated.

Cointegration Analysis of Human Development/Economic Growth

Having established the unit root properties of the variables, the combination of non-stationary variables could however be stationary if these series share a common long-run equilibrium relationship. In this case, these variables are said to be cointegrated. Thus, given the time series characteristics of the variables, this study further investigates employing automatic inbuilt Asymptotic critical values of F-statistics test, 10%, 5%, 2.5% and 1% in E-view 9by comparing asymptotic lower critical bound I(0) and upper critical bound I(1) values using ARDL methodology proposed by Pesaran et al. (2001). Hence, the result of the Bound F-Test for co-integration (that is the existence of a long term linear relation) is established in the table 2 below:

Table 2 Bounds F-Test for Cointegration 1995-2015.

Variables	**Function**	**F-Statistic**
LGDP	Flgdp(LGDP|EINX,HINX)	7.145886*
Asymptotic critical value		
Significance	I(0) Bound	I(1) Bound
10%	2.63	3.35
5%	3.1	3.87
2.5%	3.55	4.38
1%	4.13	5

Source: Researcher's computation using EVIEWS 9 software.

***indicates the level of significance at 1%, ** 2.5%, ***5% and ****10%**

The results of the bounds test for cointegration alongside with critical values are reported in Table 2. The bounds test indicates that cointegration is only present when natural logarithm of economic growth proxy with GDP is the dependent variable and the long run forcing variables are education index and health index proxy with human development. This is

because the computed F-statistics F_{LGDP}(LGDP|EINX,HINX) is 7.145886, which is higher than the upper bound critical value at 1% significance level, suggesting the rejection of the null hypothesis that there is no long run relationship between human development and economic growth.

Analysis of long run impact of human development on economic growth (GDP)
This table presents the long run coefficients/multipliers of human development on GDP.

Table 3 Results of Estimated long-run Coefficients Using ARDL Approach.

Regressor	Coefficient	Std Error	T-Ratio	P-Value
Dependent variable; LGDP				
EINX	-0.067110	0.476474	-0.140846	0.8903
HINX	-0.364658	0.303424	-1.201810	0.2526

Source: Researcher's Computation using EVIEWS 9 software.

***indicates the level of significance at 1%, **5% and ***10%**
Having determined the existence of a long run equilibrium when economic growth proxy with GDP serves as dependent variable, the long run coefficients are estimated using the associated ARDL and ECM. The ARDL model is estimated by automatic selection of maximum lag length of 4 and using Akaike information criteria in selecting the optimum lag order for the model. The specification finally selected is ARDL (2, 1, 1), the derived long run elasticity's are presented in Table 3. The long run impact of education indexon economic growth is around -0.067110 and statistically insignificant, meaning that a decrease in education index will decrease 6.7% in economic growth. The long run impact ofhealth indexon economic growth is -0.364658 and isalso statistically insignificant. Therefore, decrease in health index will decrease economic growth to Nigeria by 36%.

Analysis of the short run Dynamics of Human Development on Economic Growth

Table 4 Error Correction Representation for the Selected ARDL Model. Cointegrating Form

Regressor	Coefficient	Std Error	T-Ratio	P-Value
Δ(LGDP(-1))	-0.654086	0.370508	-1.765379	0.1029
Δ(EINX)	-0.299308	0.861233	-0.347534	0.7342
Δ(HINX)	-0.791936	0.231960	-3.414105	0.0051
CointEq(-1)	-0.517544	0.076530	-6.762667	0.0011*
ARDL Model Econometric Creteria: R2 = 88, Adjusted R2 = 85, DW = 1.73, F-Stat = 29.45 [0.000001]				

Source: Researcher's computation using EVIEWS 9 software.

***indicates the level of significance at 1%, **5% and ***10%.**

From table 4, all the independent variables have negative signs, which indicate that human development have a negative relationship with economic growth in the short run in Nigeria. The result above revealed that all the variables except for health index were statistically insignificant. Its impacts are around 29% for education index and 79% for health index, which shows between -0.299308 for education index and -0.791936 for health index. The implication of this is that less human development in Nigerian economy adversely affected economic growth. The short run dynamics of the relationship between human development and economic growth in Nigeria is captured by the coefficient of the lagged error correction term which is found to be negative relationship. The result indicated that about 52% of the deviations from the long run equilibrium relationship between human development and economic growth is corrected each year until the variables converge back to equilibrium. Although the negative coefficient of the error correction term further supports the existence of long run relationship between human development and economic growth, the speed of adjustment of the system towards long-run equilibrium is very high. This is an indication that improvements in human development may take less periods of time to lead to greater economic growth in Nigeria. As wrongly argued by Bleakley (2006), maximum gains to economic growth from improvements in health may only be achieved after very long periods of time. This is not to be expected because economic growth also occurs as a result improvements in education and health.

The error correction term ECM(-1) estimated -0.517 (0.0011) is highly significant, is well specified and has the correct sign, and imply a fairly high speed of adjustment to equilibrium after a shock. Meaning that about 52 percent departure from long run equilibrium is corrected in the short run. The negative sign in the ECM(-1) confirms the existence of co-integrating relationship. Approximately 52% of disequilibria from the previous year's shock converge back to the long run equilibrium in the current year. The R^2 (coefficient of determination) shows that 88% of the total variation in the dependent variable (economic growth) can be

explained by the explanatory variables and this slide drops to about 85% after adjusting for degree of freedom which is still significant. The Durbin-Watson statistic of 1.73 shows the absence of serial autocorrelation meaning that there is independence of observation in the error terms. The F-statistic reported in the lower panel of the table gives the goodness of fit of the model. TheF- statistic is approximately 29.45 with a Probability of 0.000001. The significance of this value implies that the data used in the estimation fitted well into the regression equation, hence the model is adequate in explaining the impact relationship of human development on economic growth in Nigeria. That is the independent variables jointly have a significant influence on the dependent variable.

Analysis of Causal Nexus of (HUD) and Economic Growth

Granger causality had therefore been employed in 'first difference' on the dependent variable (LGDP) and the independent variables (HUD). The next step of our analysis is to test for causality between economic growth and human development in Nigeria for which they are related in the long run.

Table 5 Results of Granger Causality Tests

Pairwise Granger Causality Tests
Date: 10/12/16 Time: 13:18
Sample: 1995 2015
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
EINX does not Granger Cause LRGDP	19	0.05424	0.9474
LRGDP does not Granger Cause EINX		0.67471	0.5251
HINX does not Granger Cause LRGDP	19	4.97827	0.0233
LRGDP does not Granger Cause HINX		1.28833	0.2912
HINX does not Granger Cause EINX	19	0.91023	0.4250
EINX does not Granger Cause HINX		1.85842	0.1924

F0.05 = 2.76 Source: Researcher's *Computation 2016 using EVIEWS 9 software*

From the result of the Granger causality test in table 5.At lag 2, the result indicates that there is no causality relationship between economic growth and education index. Therefore, the result accepts the null hypothesis that education index does not granger cause economic growth in Nigeria. This finding is in contrast with Asghar, Awan & Rehman (2012) and Al-Yousif (2008).However, unidirectional causality relationship runs from health index to economic growth. Therefore, the result rejects the null hypothesis that health index does not granger cause economic growth in Nigeria. This finding is in contrast with Narayan & Smith (2008) and Haroon (2001).

Conclusion and Recommendation

The main objective of the study is to empirically estimate the dynamic impact relationships, to investigate the direction of causality between human development and economic growth in Nigeria and also to ascertain whether long run relationship exists between human development and economic growth in Nigeria using annual time series data over the period of 1995 to 2015.An ARDL-VECM bound cointegration testing procedure that allows testing for a level relationship irrespective of the order of integration of the underlying series has been applied on the data. The results of this study are found with the past empirical research conducted on subject matter in the context of other economy. It supports significant negative impact of human development on economic growth by confirming direct negative relationship between economic growth and measures of human development. The existence of stable long-run relationship between economic growth and both measures of human development is confirmed through bounds F-test. This result indicate that human development can be treated as a long run forcing variable explaining economic growth. This is in contrast to the theoretical arguments that education index and health index leads to the gains in productivity and innovative technological progress which increases productivity and thus accelerates the economic growth in Nigeria. This is contrary to study submitted by Asghar, Awan & Rehman (see Asghar, Awan & Rehman, 2012; Judson, 2002; Ranis, Stewart and Ramitez, 2000). Again, this is contrary to studies found in the literature for Nigerian economy such as (see Lawal & Wahab, 2011; Babatunde & Adefabi, 2005; Adawo, 2011) suggests that human development deepen economic growth only if the government policy framework of human capital development is given more attention. Also, this human development (HUD) depreciation has a negative impact relationship on economic growth which is not consistent to a priori expectation.

However, this study is consistence to the work of (Liu, Squire and Zou, 1998; Bils and Klenow, 2000; Easterly and Levine, 2001; Temple, 2001; Bosworth and Collins, 2003).However, this result is not surprising for the case of Nigeria mainly because of less budgetary allocation in both education and health sectors, poor quality infrastructure couple with little equipment's in hospitals and various levels of schools. Thus, the long run negative impact of human development on economic growth in Nigeria is most likely to be the consequences of increase in population with little enrolment in school accompanied by increase in unemployment and prevalence of diseases. For instance, illiteracy and illness may reduce the productivity of the affected individuals and consequently reduce economic growth. Granger causality test confirms the existence of one unidirectional causalities, i.e. health index to economic growth.

The study therefore recommends that, since the results of the estimate have important implications and lesson particularly for policy makers for achieving rapid economic growth, it is indispensable to give much emphasis to human development. Giving the existence of the significant long-run relationship between human development and economic growth, the study suggests that there is need for government 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 othersectors. Government should further formulate and implement effective economic policies related to the provision of education and health facilities to the people to support the innovative technological progress which increases productivity and thus accelerates the economic growth. The fact that national policies and reform programs

influence the behaviour of education and health outcomes, this study recommends that policy makers should prioritize these sectors and devote attention to policy determinants of education and health as a mechanism for promoting economic growth in Nigeria. The Ministries of Education and Health bothat federal and state must cooperate in promoting importance of health and spreading health care information to the people on priority basis.

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