Human Capital-Growth nexus: the role of Government Spending on Education and Health in Nigeria

Ibrahim, Taofik

Ahmadu Bello university Zaria, Kaduna State, Nigeria

13 August 2016

Human Capital-Growth Nexus: The role of Government Spending on Education and Health in Nigeria

Taofik .M. IBRAHIM
Department of Economics,
Ahmadu Bello University, Zaria,
Kaduna State, Nigeria
Email: imohfik@gmail.com

ABSTRACT

The link between economic development and human capital investment cannot be overemphasized. The 2015 Human Development Index (HDI) placed Nigeria in the 154th position out of 169 countries. Public spending on education and health care, being major determinants of human capital are generally low in Nigeria. Illustratively, the 2015 total national budgetary share to education and health was 6.36% and 7.01%, respectively (See, Budget Office of the Federation, 2015). The outcome of inadequate education and health spending has persistently lowered the standard of the sectors in the country. The foregoing suggests that human capital in Nigeria is severely under-developed. Therefore, this study examines the effect of government expenditure on education and health on economic growth using error correction modelling approach. The study concludes that human capital formation is key to national development.

Keywords: Human capital, Growth, Government-spending, Education, Health, Nigeria.

Jel Classification: H0, I1, I2

1. Introduction

The contending views on the meaning and scope of human capital have remained on the centre stage for decades. The Classical argued that skills gained by human are some form of capital while the Neoclassical asserted that the human himself is capital. The proponents of this second view discussed the role of human capital in income distribution and production theory. They argued that differences in levels of education and skills gained by persons require that they receive different wages (Gonçalves, 1999). The implication of this is a shift from a functional distribution income to an individual distribution of income (Zweimüller, 2000).

Beyond the investment issue of human that makes up capital, there is a growing literature on the role of human capital in economic development and growth. This is deeply rooted within context of growth theories. Prominent among these theories is the endogenous growth theory which emphasizes that factors such as knowledge, human capital and technological progress that are excluded or assumed to be exogenous by other models should be internalized in the production process. According to Harbison (1973), human capital formation can be seen as the deliberate and continuous process of acquiring requisite knowledge, skills and experiences that are applied to produce economic value for driving sustainable national development.

In the past, more emphasis had been placed on the accumulation of physical or material capital to the detriment of human capital in Nigeria's quest for rapid socio-economic progress.

However, previous development strategies which virtually ignored the social or human aspects of development did little to accelerate the pace of development in the country. Despite the tremendous material gains produced by the innovation of man, poverty, disease and deprivation still run rampant in the developing world. With the ripple effect of the global credit crises yet to abate, and the rise in food prices across the globe, about 13. 6 % of the world experience hunger caused by deteriorating economic conditions (UN, 2013). The fact that a majority of people experiencing hunger come from the developing world, is a poignant reminder of the crucial role economic development plays, in determining social conditions in civil society.

The preponderance of research in human capital has revealed a strong link, between economic development and human capital investment. A general consensus has emerged on the importance of human capital to economic development (Florida, Mellander & Stolarick, 2008). The central role of human capital in economic development has been documented in large scale studies of national economic performance (Barro, 1991, Mayer, 2000, Benhabib & Spiegal, 1994).

The 2014 Human Development Index (HDI) puts Nigeria's population at 173.62 million people. The country's 2015 HDI value was 0.504 placing her in the 152 position among the 169 countries with comparative data. Whereas, Ghana ranked 138 with HDI value of 0.573 while South Africa placed 118 with HDI value of 0.658. In the three broad categories of high human development, medium human development, and low human development; Nigeria was grouped among the countries considered to have low human development (UNDP, 2015). The HDI provides a composite measure of three dimensions of human development namely health, education, and income: living a long and healthy life (measured by life expectancy), being educated (measured by adult literacy and enrolment at primary, secondary and tertiary levels), and having a decent standard of living (measured by purchasing power parity and income). Data obtained are combined into an index on a scale of 0-1 with the following subdivisions: high human development (0.8-1.0); medium human development (0.5-0.79); and low human development (0.0-0.49) (UNDP, 2015).

Moreover, Nigeria's score on the 2015 Global Competitiveness Index (GCI) was 3.4 which gave her a rank of 127 out of the 144 countries surveyed. Comparatively, Ghana placed 111 with a GCI of 3.7 while South Africa ranked 56 with a GCI of 4.4. Furthermore, National Average per capita income, using Purchasing Power Parity (PPP) method, in Nigeria in 2015 was US$1,692 compared to US$1, 730 in Ghana and US$6, 621 in South Africa with the corresponding rank of 193, 157 and 74 for Nigeria, Ghana and South Africa respectively. In 2014, life expectancy in Nigeria was 51.51 years, below that of Ghana at 61.1 years and South Africa at 56.9 years. The Global Hunger Index (GHI) survey revealed that the country's index is 14.7 compared to Ghana's 7.8. According to the report, the higher the index score, the higher the hunger level. While Nigeria's level is placed at "serious", Ghana's is considered to be at a "moderate" hunger level (Global Competitiveness Index, 2015; Global Hunger Index, 2015; UNDP, 2015).

Public spending on social services such as education and health care that are critical to human capital development is generally low in Nigeria. For instance, the average national budgetary allocation to education as percentage of total budget for the period 2005- 2014 was 6.86% (Budget office of the Federation, 2015). The country's budgetary allocations to education is still a far cry from the United Nations Educational, Scientific and Cultural Organization (UNESCO) recommended 26% of national budget to be spent on education in member

countries, of which Nigeria is one. The outcome of the low spending on education is the continued decline in educational opportunities and standards in the country. According to a survey carried out by the National Commission for Mass Literacy, Adult and Non-Formal Education (NCMLANE), over 47.50% of Nigeria's population or 60 million Nigerians are still illiterates in the 21st century (NCMLANE, 2010). Consequently, it is hardly surprising that the Nigerian Education System was placed a poor 90 position in the world in 2015 (UNDP, 2015).

The health sector in Nigeria is likewise in a state of parlous decay. Budgetary allocation to health as proportion of the national budget fluctuates between 2.70% and 7.00 from 1999 to 2014 (Budget office of the Federation, 2015). The country's health system was ranked 189 among 201 countries surveyed by the World Health Organization (WHO) in 2015. However, it is obvious that only a healthy population can be fully productive as healthcare is not only health producing but also wealth producing. The fore goings is indicative that human capital in Nigeria is severely under-developed. It must be re-emphasised that human capital formation should be the vanguard for national development in Nigeria.

Amidst the stated research problem, this study examine if the impact of human capital on growth varies from one measurement of human capital to the other by creating three recursive equations to show the contribution of technological progress, government expenditure on education and health as measures of human capital to growth in Nigeria during the study period. The study also adopts a dynamic modelling approach to capture the time lag human capital takes to impact meaningfully on growth. To confirm the robustness of the results and to corroborate the important of human capital, a sensitivity analysis would be carried out on the three specified models by removing the measures of human capital in the specifications so as to ascertain the importance human capital in the growth process of a nation. The rest of the paper is organized as follows: section 2 presents a review of the literature on human capital–growth nexus. It is followed by the discussion of the estimation procedure and data used for the study in section 3. Section 4 discusses empirical results, while the last section concludes with policy implications.

2.0 Review of existing Literature

One particular source of externalities that has been emphasized in the recent growth literature is the accumulation of human capital and its effect on the productivity of the economy. Lucas (1988) provides one of the best-known attempts to incorporate the spillover effects of human capital accumulation, in a model built upon the idea that individual workers are more productive, regardless of their skill level, if other workers have more human capital.

Since the theoretical presentation of Lucas (1988), the empirical literature on the impact of human capital development on economic growth has witnessed major contributions by different scholars over the years. Observably, the empirical evidence provided by most of these studies has been mixed, and a consensus has not yet emerged.

Mankiw *et al.* (1992) empirically examine the Solow growth model with and without human capital as a factor of production using panel regression for 121 countries from 1960 to 1985. The percentage of people aged between 12 to17 enrolled in the secondary schools was used to proxy human capital. Their result revealed that the model with human capital best explain the variation in income across the countries sampled in the study. Similarly, using the growth accounting framework and the OLS estimation technique, Abbas (2000) compared the effect of human capital on economic growth in Pakistan and India between 1970 and 1994. Enrolment

rates at primary, secondary and higher secondary levels were used as proxies for human capital. The results revealed that primary and secondary schooling was positive and significantly related to growth for the two countries but the magnitude of this effect varied across the two countries.

In another study, Abbas (2001) empirically examined the effect of human capital on economic growth in Pakistan and Sri-Lanka using OLS and the same proxy for human capital (enrolment into primary, secondary and higher secondary) covering the period 1970 to 1994. Human capital was found to be positively related with economic growth in Pakistan at 1% level of significance and at 5% level of significance in case of Sri-Lanka at secondary and higher secondary level respectively. Investigates the long run relationship between education and economic growth in Nigeria between 1970 and 2003, Babatunde and Adefabi (2005) considered two different channels through which human capital can affect long run economic growth in Nigeria using the Johansen cointegration technique and vector error correction mechanism. The first channel is when human capital is a direct input in the production function and the second channel is when the human capital affects the technology parameter. The results of the study suggest that a well-educated labour force appears to significantly influence economic growth both as a factor in the production function and through total factor productivity.

Examining the relationship between human capital, growth and brain drain for 77 countries using panel data analysis for the period 1990 to 2001, Bildirici, *et al.* (2005) found that education index, adult literacy rate, schooling rate, education investments, per capita income, growth rate and average life expectancy are major determinants of human capital across the countries sampled. They also found a positive relationship between migration, human capital, education investments, literacy, per capita income, workers' savings and growth. They concluded that the pace of increase in urban population, average life expectation index, imports, exports and wages negatively affect growth in Less Developed Countries (LDC). In the same vein, Abbas and Foreman-Peck (2007) used the co-integration technique for estimating the effect of human capital on economic growth of Pakistan between 1961 and 2003. Stock of human capital was used as a proxy for human capital which was calculated through the perpetual inventory method using secondary enrolment data. Another proxy for human capital used in the study was health expenditures as a percentage of GDP. They found an increasing return to physical and human capital specially in case of investing in health sector.

The study by Quadri and Wahab (2011) on the relationship between human capital and economic relationship for Pakistan used OLS estimation technique for the period 1978 to 2007. A health adjusted education indicator for human Capital was used in the standard Cobb-Douglas production function which confirms the long run positive relationship between human capital and the economic growth in Pakistan. This indicator was found to be a highly significant determinant of economic growth, which suggests that both the health and education sectors should be given special attention in order to ensure long run economic growth. The sensitivity analysis performed to check the robustness of the results corroborates with the initial findings.

Furthermore, Gennaioli *et al*. (2013) in their study on human capital and regional development for 110 countries between 1985 and 2010 reveal that the importance of human capital in accounting for regional differences in development. However, their results suggest that entrepreneurial inputs and human capital externalities are essential for understanding variation in growth across regions.

Bakare and Sanmi (2011) examined the trend of health expenditure in Nigeria and its impact on economic growth between 1970 and 2008 using the OLS multiple regression method. They proxy human capital with health care expenditure and secondary School Enrolment and found a significant and positive relationship between health care expenditures and economic. The study recommended that Nigerian policy makers should pay closer attention to the health sector by increasing its yearly budgetary allocation to the sector. Nevertheless, they submit that the key to good results lies not in ordinarily increasing particular budgetary allocation but rather in implementing a public finance system that, to the extent possible, links specific expenditure and revenue decisions and ensure the usage of the allocated fund as transparently as possible.

Ayuba (2014) utilized Vector error correction model based causality test to investigate the relationship between public social expenditure and economic growth in Nigeria from 1990 to 2009. The study found a unidirectional causality running from economic growth to health expenditure, which supports the Wagner's Law. It also discovers that causality runs from economic growth to education and aggregate social expenditure. The study concludes that public social expenditure amplify economic growth at bivariate (aggregated) levels.

Using available quarterly data spanning from 1995 to 2009 and granger causality test, Onisanwa (2014) examine the causal link between health expenditure and per capita GDP in Nigeria. The results of the study reveal bi-directional causality between per capita GDP and health indicators.

Acemoglu *et al.* (2014) used panel analysis to investigate the link between Institution, Human capital and development for 42 countries and found that institutional development is one of the major factors explaining differences in growth noticed across countries sampled. However, their results did not support the view that differences in the human capital endowments of early European colonists have been a major factor in the subsequent institutional development of these countries.

3.0 Theoretical Framework and Methodology

3.1 Theoretical Framework

The starting point is the traditional production function which may be written as follows:

$$Y_t = f(K_t L_t) \tag{1}$$

Where *Y* is growth rate of real GDP, *K* is capital stock, *L* is labour, and *t* is time.

In line with the spirit of learning-by-doing as proposed by Romer (1996), equation (1) is augmented to include technological progress (A) to account for knowledge that brings about efficiency in capital and labour in the production process. This yield:

$$Y_t = AK_t^{\alpha} L_t^{1-\alpha}, \qquad 0 < \alpha < 1 \tag{2}$$

Where A measures the level of technology and other variables remain the same as defined earlier.

Considering the accumulation of human capital and its effect on the productivity of the economy, measurement of human capital is included in equation (2). Lucas (1988) provides one of the best-known attempts to incorporate the spillover effects of human capital accumulation, in a model built upon the idea that individual workers are more productive,

regardless of their skill level, if other workers have more human capital. Human capital is accumulated through explicit "production": a part of individuals' working time is devoted to accumulation of skills. Thus, the production process is described by:

$$Y_t = AK_t^{\alpha}(hL_t)^{1-\alpha}, \quad 0<\alpha<1 \tag{3}$$

Following Alogoskoufis (1995), parameter *h* stands for human capital per worker which is a function of the existing total private and public capital stock per worker denoted by *K* and *Λ* respectively so that:

$$h = \phi \frac{K^{\beta}\Lambda^{1-\beta}}{L} \tag{4}$$

where $\phi > 0$ is an efficiency parameter that measures the degree of efficient use of total capital. According to (3) and (4) output is a function of private capital and of the total capital which is available for the economy. The return on private capital from (3) is clearly diminishing since $\alpha<1$ given the total capital stock.

Thus, based on the objectives of this study, A in equation (2) is proxy by total tertiary enrolment while h is measured by government expenditure in education and health. Therefore, the functional forms of growth models adopted for this study are:

$$Y = f(A*K, L, \varphi) \tag{5}$$

$$Y = f(K, L*h_1, L, \varphi) \tag{6}$$

$$Y = f(K, L*h_2, L, \varphi) \tag{7}$$

Where: $A*K$ is the impact of technological progress on capital; $L*h_1$ and $L*h_2$ are human capital per worker brought about by government expenditure in education and health respectively. φ is a vector of control and policy variables frequently used as determinants of growth. These variables include real exchange rate, financial depth (M2/GDP) and consumer price index (cpi).

3.2 Methodology

3.2.1 Model specification

Based on the functional forms presented in equation (5-7) and the definition of the variables, the following estimable models are proposed for this study:

$$g_t = a_0 + a_1K_t + a_2ter*K_t + a_3L_t + a_4ex_t + a_5m2GDP_t + a_6cpi_t + \varepsilon_t \tag{8}$$

$$g_t = b_0 + b_1K_t + b_2eduxp*L_t + b_3L_t + a_4ex_t + a_5m2GDP_t + a_6cpi_t + \mu_t \tag{9}$$

$$g_t = c_0 + c_1K_t + c_2hexp*L_t + c_3L_t + c_4ex_t + c_5m2GDP_t + c_6cpi_t + \nu_t \tag{10}$$

Where: g is the growth rate of GDP; K is private capital (domestic investment) proxy by gross fixed capital formation; ter is the tertiary enrolment; ter*k is technologically improved private

capital; L is total number of employed people; ex is exchange rate cpi is consumer price index measuring price stability; m2GDP is a measurement for financial depth; eduxp*L and hexp*L are human capital per worker brought about by government expenditure in education and health respectively. eduxp*L and hexp*L define the role of education and health government expenditure on human capital and its impact on growth rate of GDP.

3.2.2 Estimation Techniques and Procedures

In order to address the objectives, the study adopts a three step estimation procedure. First, the Ng and Perron (2001) unit root test was used to determine the stationarity of the data. This test uses the GLS detrending procedure of Elliott, Rothenberg and Stock (1996) to create an efficient version of the modified PP tests of Perron and Ng (1996). This modified test is adopted for two reasons: firstly, it does not exhibit the severe size distortions for errors with large negative MA or AR roots common with the Phillip Perron (PP) tests; and secondly, when the autoregressive term is close to unity, it possesses substantially higher power than the PP tests (Ng and Perron, 2001).

Second, the long-run relationship between the variables was also determine using the Johansen cointegration test. Lastly, the Fully-Modified Ordinary Least Square (FMOLS) as proposed by Phillips and Hansen (1990) was adopted to determine the long run impact of the measures of human capital on growth. The FMOLS modifies the ordinary least square to account for serial correlation and endogeneity in regressors as a result of cointegrating relationship. The FMOLS also provide optimal coefficients for cointegrating regressions (Phillips, 1995).

3.3 Data

The study will utilize annual time series data from 1980–2014. Data for the variables will be sourced from Central Bank of Nigeria *Statistical Bulletin* (2014) and National Bureau of Statistics' Annual Abstracts (2014). The variables of interest in this study are: GDP, gross fixed capital formation, tertiary enrolment, total number of employed people, real exchange rate, consumer price index, broad money supply, government expenditure in education and health.

4.0 Empirical Results

4.1 Unit Root Test

In the Ng and Perron (2001) test adopted, three M-tests (MZa, MZt and MSB) and modified Elliot, Rothenberg and Stock's (1996) Point Optimal Test (MPT) were considered in ascertaining the stationarity of the time series data used in this study. The null hypothesis is that there is the presence of unit root.

Table 2 presents the results of the Ng and Perron unit root tests. From the table, it can be seen that all the series in our sample are integrated of order one, or are I (1) series.

Table 2: Results for Ng and Perron Unit Roots Test

Variables	MZa	MZt	MSB	MPT
g				
Level	-6.099	-1.506	0.104	3.902
First Difference	-13.313*	-2.572*	0.193*	6.888*
K				
Level	-4.769	-1.408	0.042	4.051
First Difference	-17.615*	-3.431*	0.273*	6.670*

M2GDP				
Level	-4.018	-1.223	0.113	2.745
First Difference	-16.466*	-5.8540*	0.173*	5.620*
L				
Level	-2.738	-0.924	0.037	2.284
First Difference	-16.457*	-2.863*	0.174*	5.565*
EX				
Level	-2.911	-0.986	0.176	3.870
First Difference	-16.168*	-2.842*	0.339*	5.641*
CPI				
Level	-5.981	-0.149	0.124	2.933
First Difference	-13.379**	-2.586*	0.193*	6.813*
EDUXP*L				
Level	-4.371	-1.415	0.018	4.023
First Difference	-10.541**	-2.262**	0.193*	8.804*
HEXP*L				
Level	-6.099	-1.341	0.119	2.707
First Difference	-13.313*	-1.706**	0.193*	6.888*
TER*K				
Level	-3.562	-1.267	0.112	3.954
First Difference	-9.812**	-1.977**	0.215*	9.749*

Notes: (1) The asymptotic critical values for the MZa test are -14.20 and -7.30 for 1% and 5% significance levels respectively.

(2) The asymptotic critical values for the MZt test are -2.42 and -1.68 for 1% and 5% significance levels respectively.

(3) The asymptotic critical values for the MSB test are 0.13 and 0.16 for 1% and 5% significance levels respectively.

(4) The asymptotic critical values for the MPT test are 4.03 and 5.48 for 1% and 5% significance levels respectively.

(5) *, ** depicts the rejection of the null hypothesis at 1% and 5% significant level.

4.2 Cointegration Test

The Johansen and Juselius (1990) cointegration method is adopted in testing if a long run equilibrium relationship exists between the variables. In adopting this approach, we first determine the optimal lag length of the Vector Autoregressive (VAR) model using various criteria, and the test results of the lag length selection criteria are presented in Table 3. It is seen from Table 3 that all the five different information criteria considered, i.e., Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Hannan-Quinn Information Criterion (HQ), Final Prediction Error (FPE) and Sequential modified LR test statistic (LR), suggest the optimal lag length as 1.

Table 3: VAR Lag Order Selection Criteria

Criteria/Lag Length	0	1	2
Sequential Modified Test Statistic (LR)	Not Available	313.13	35.48*
Final Prediction Error (FPE)	0.05	3.67	2.14*
Akaike Information Criterion (AIC)	16.78	7.22	6.42*
Schwarz Information Criterion (SC)	17.09	9.76*	11.18
Hannan-Quinn Information Criterion (HQ)	16.88	8.08	8.02*
Note: * indicates lag order selected by the criterion.			

The Johansen cointegration test is then applied to the variables using a lag length of 1 and the results are presented in Table 4. The results of the cointegration tests show a long-run equilibrium relationship between human capital measures and growth in Nigeria. The table reveals that for equations (8) to (10), the trace and Maximum eigenvalue tests indicate five cointegrating equations suggesting that there is long relationship between GDP, gross fixed capital formation, tertiary enrolment, total number of employed people, real exchange rate, consumer price index, broad money supply, government expenditure in education and health.

Table 4: Test Results for Cointegration between Pairs of Variables

	Trace Test			**K=1**	**Maximum Eigenvalues**			**K=1**	
Equation	H_o	H_A	Trace Statistics	5% Critical Values	H_o	H_A	Max-Eigen Statistic	5% Critical Values	No of Cointegrating Equation
Equation (8)	R=0*	R=0	218.36	134.68	R=0*	R=0	66.32	47.08	5
	R≤1*	R=1	152.03	103.85	R≤1*	R=1	51.82	40.95	
	R≤2*	R=2	100.21	76.97	R≤2*	R=2	37.18	34.81	
	R≤3*	R=3	63.03	54.08	R≤3*	R=3	28.59	27.55	
	R≤4*	R=4	35.47	35.19	R≤4*	R=4	22.18	18.23	
	R≤5	R=5	17.24	20.26	R≤5	R=5	10.18	15.89	
	R≤6	R=6	7.06	9.16	R≤6	R=6	7.07	9.16	
Equation (9)	R=0*	R=0	219.54	134.68	R=0*	R=0	66.98	47.08	5
	R≤1*	R=1	152.55	103.85	R≤1*	R=1	44.08	40.96	
	R≤2*	R=2	108.48	76.97	R≤2*	R=2	40.08	34.81	
	R≤3*	R=3	67.49	54.08	R≤3*	R=3	28.59	25.82	
	R≤4*	R=4	41.68	35.19	R≤4*	R=4	23.49	22.29	
	R≤5	R=5	18.19	20.26	R≤5	R=5	11.94	15.89	
	R≤6	R=6	6.25	9.16	R≤6	R=6	6.25	9.16	
Equation (10)	R=0*	R=0	210.79	134.68	R=0*	R=0	66.98	47.08	5
	R≤1*	R=1	136.49	103.85	R≤1*	R=1	44.12	40.96	
	R≤2*	R=2	96.03	76.97	R≤2*	R=2	40.98	34.81	
	R≤3*	R=3	63.80	54.08	R≤3*	R=3	28.59	25.82	
	R≤4*	R=4	39.92	35.19	R≤4*	R=4	23.49	22.30	
	R≤5	R=5	16.89	20.26	R≤5	R=5	11.94	15.89	
	R≤6	R=6	5.74	9.16	R≤6	R=6	6.25	9.16	

4.3 Results of the FMOLS Estimation

The FMOLS results for equations 8, 9 and 10 are presented in Table 5, 6 and 7. Equation 8 consists of the regression of growth rate of real GDP on technological progress as a measure of human capital and a number of other explanatory variables. Looking first at the primary variable of interest, it can be seen that the coefficient of technological progress is positive, thereby indicating a positive relationship between real GDP growth rate and human capital. Although the coefficient is statistically significant at 10%, however this coefficient (0.019) is low implying that the impact of technological progress as a measure of human capital is negligible. This is similar to the result obtained by studies such as Bildirici, *et al.* (2005) and Abbas and Foreman-Peck (2007) who all found a significant positive effect human capital proxy by tertiary enrolment on growth rate of real GDP.

Table 5: Regression Results for Equation 8

Variable	Dependent Variable: Y (per capita GDP)	
	Coefficient	t-statistic
Constant	-18.175	-2.509*
K	0.695	3.803**
Ter*K	0.019	1.978*
L	0.619	3.148**
EX	-0.011	-0.143
M2GDP	-0.018	-9.637**
CPI	-0.175	-2.509*
R^2	0.792	
Adj R^2	0.775	
Durbin Watson	1. 993	

Note: *, ** and *** depict significance at the 10%, 5% and 1% levels respectively

The effect of government expenditure on education as a measure of human is positive and significant (Table 6). Though relatively low at 0.082, it indicate that a 1% increase in government expenditure in education bring about 8.2% increase in real GDP. This relatively low impact suggest that government expenditure in educational sector is low.

Table 6: Regression Results for Equation 9

Variable	Dependent Variable: Y (per capita GDP)	
	Coefficient	t-statistic
Constant	-10.466	-1.583
K	0.434	5.514**
EDUXP*L	0.082	2.357**
L	0.782	2.289*
EX	0.052	0.759
M2GDP	0.028	-7.371**
CPI	0.488	5.174**

R^2	0.812
Adj R^2	0.803

Note: * and ** depict significance at the 5% and 1% levels respectively

It is evident from the results presented in Table 7 that the measure of human capital (government expenditure in health sector) is not a major determinant of real GDP. Although the coefficient carried the expected sign but it is statistically insignificant. The implication of this result is that increase in real GDP is not accounted for by changes in government expenditure in health sector over time. This also suggest that government expenditure in health sector has not been enough to bring about any meaningful impact on real GDP in Nigeria. The result also reveal that variables capital, labour, exchange rate, CPI and the ratio of broad money to GDP are the major determinant of real GDP.

Table 7: Regression Results for Equation 10

Variable	Dependent Variable: Y (per capita GDP)	
	Coefficient	t-statistic
Constant	-10.433	-1.429
K	0.451	4.041***
HEXP*L	0.104	0.917
L	0.016	2.080**
EX	0.045	1.812*
M2GDP	0.018	-8.112***
CPI	0.514	5.435***
R^2	0.721	
Adj R^2	0.713	

Note: *, ** and *** depict significance at the 10%, 5% and 1% levels respectively

5. Conclusion

This study conducted an empirical investigation of the impact of three measures of human capital (technological progress, government expenditure in education and health sectors) on growth rate of real GDP in Nigeria. The study made use of the fully-modified OLS (FMOLS) estimation technique to examine the long run relationship between human capital and real GDP, and also account for plausibility of endogeneity.

The estimated results revealed that technological progress (proxy by tertiary enrolment) and government expenditure in education as a measure of human capital have had a positive and statically significant effect on growth rate of real GDP. Although these effect are relatively small but suggest that changes in growth rate of real GDP is account for by increase in human capital measurements in Nigeria. Also, the results showed that human capital, when measured by government expenditure in health sector exerts a positive but insignificant effect on real GDP in Nigeria. Generally, the results also indicates that variables like capital, labour,

exchange rate, CPI and the ratio of broad money to GDP are the major determinant of growth rate in real GDP.

REFERENCES

Abbas, Q. (2000). The Role of Human Capital in Economic Growth: A Comparative Study of Pakistan and India, *The Pakistan Development Review*, Pakistan Institute of Development Economics, vol. 39(4), Pp. 451-473.

Abbas, Q. (2001). Endogenous Growth and Human Capital: A Comparative Study of Pakistan and Sri Lanka, *The Pakistan Development Review*, Pakistan Institute of Development Economics, vol. 40(4), Pp. 987-1007.

Abbas, Q., and Foreman-Peek, J. (2007). Human Capital and Economic Growth in Pakistan 1960-2003. Cardiff Economics Working papers, E2007/22.

Acemoglu D., Gallego, F. A., and Robinson. J .A. (2014) Institutions, Human Capital and Development. *Annual Review of Economics,* Annual Reviews, vol. 6(1), pages 875-912.

Alogoskoufis, G.S. (1995). The two faces of Janus: Institutions, policy regimes and macroeconomic performance in Greece, *Economic Policy*, 20, 147-84.

Ayuba, A. J. (2014). The Relationship between Public Social Expenditure and Economic Growth in Nigeria: An Empirical Analysis. *International Journal of Finance and Accounting*. Vol.3 (3): 185-191.

Babatunde, M. A., and Adefabi, R. A. (2005). Long Run Relationship between Education and Economic Growth in Nigeria: Evidence from the Johansen's Cointegration Approach. Paper presented at the Regional Conference on Education in West Africa: Constraints and Opportunities Dakar, Senegal, November 1st - 2nd, 2005. Cornell University / CREA / Ministèrede l'Education du Sénégal.

Bakare A.S and Sanmi, O. (2011). Healthcare Expenditure and Economic Growth in Nigeria: An Empirical Study Journal of Emerging Trends in Economics and Management Sciences (JETEMS) Vol. 2 No.2. Pp. 83-87.

Barro, Robert J. (1991). Government Spending in a Simple Model of Endogenous Growth. *Journal of Political Economy* 5, 103–25.

Benhabib, J., & Spiegal, M. M. (1994). The role of human capital in economic development: Evidence from aggregate cross-country data. Journal of Monetary Economics, 34: 143-173.

Bildirici M, Orcan M, Sunal S, and Aykaç E. (2005). Determinants of Human Capital Theory, Growth and Brain Drain: An Econometric Analysis for 77 Countries *Applied Econometrics and International Development*. Vol. 5, issue 2.

Central Bank of Nigeria (CBN). *Annual Report and Statement of Account,* December, 2015.

CBN. *Statistical Bulletin (various issues).*

Florida, R., Mellander, C., and Stolarick, K. (2008). Inside the black box of regional development: Human capital, the creative class and tolerance. Journal of Economic Geography, 23 (2):1-35.

Gennaioli, N., La Porta., R. López-de-Silanes, F., and Shleifer. A. (2013). Human Capital and Regional Development., Quarterly Journal of Economics, 128(1), 105-164.

Global Hunger Index. (2015). Index. http//www.ifpri.org/publication/2015-global hunger-index.

Global Competitive Report. (2015). Report. http//gcr.weforum.org/gcr.

Goncalves, R. (1999). Globalizacao e Desnacionalizacao Rio de janeiro: Paz e Terra

Harbison F (1973). Human Resources as the Wealth of Nations. New York: Oxford University Press.

Lucas, R. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22(1):3-42.

Mankiw, Gregory, David Romer, and David Weil (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 107(2): 407-437.

National Bureau of Statistics' *Annual Abstracts* (2014).

Nigeria. (2010). *National Survey*. Abuja: National Commission for Mass Literacy, Adult and Non-Formal Education (NCMLANE).

Onisanwa, I. D. (2014). The Impact of Health on Economic Growth in Nigeria. *Journal of Economics and Sustainable Development.* Vol.5, No.19. Pp. 159-166.

Qadri, F. S. and Waheed, A. (2011). Human capital and economic growth: Time series evidence from Pakistan. Pakistan Business Review, 1, 815-833.

Romer, D. (1996). *Advanced Macroeconomics*, 2nd edition. McGraw-Hill Companies, Inc.

UNDP. (2014). *Nigeria Human Development Report*. New York: Oxford University Press. http//www.indr.undp.org/en/reports/global.html.

Zweimuller, Josef, (2000). Schumpeterian Entrepreneurs Meet Engel's Law: The Impact of Inequality on Innovation-Driven Growth, *Journal of Economic Growth*, Springer, Vol. 5(2), Pp. 185-206.