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A REAPPRAISAL OF THE NEXUS BETWEEN INVESTMENT IN HUMAN CAPITAL DEVELOPMENTAND ECONOMIC GROWTH IN NIGERIA

Ditimi Amassoma, Ephraim Ikechukwu
Department of Economics and Development Studies, Federal Universities, Oye – Ekiti Eiti, Nigeria
E-mail: amassoma.dit@gmail.com

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Abstracts
The role of human capital development on economic growth cannot be over – emphasized in Nigeria. This is because in the past three decades there had been conflicting opinion of researchers, policy makers and academics concerning the role investment in human capital development play on economic growth of a country. Hence, the reason why this paper is conducted to reappraise the nexus between investment in Human capital development and economic growth in order to ascertain if truly investment in human capital can induce economic growth of Nigeria or not with data spanning between 1970 – 2012 using a Two Stage Least Square and Pairwise Granger Causality methodologies. The variables used in the study were tested for stationarity using the Augmented Dickey Fuller (ADF) and Philip Perron (PP) test. The result of the test showed that the variables were stationary at first differencing. The co-integration test was also performed and the result revealed the absence of co-integration between Investment in human capital and economic growth. Furthermore, it was discovered from the results of the TSLS that there exist a positive and statistical significant relationship between PERCAPITA and some explanatory variables (like; HUMANCAP, PUBLIC, and EXCHR) in the first estimated equation. The result also shows that LABFORCE exhibited a negative but significant effect on the level of PERCAPITA income in Nigeria. Similarly, it was equally discovered from the second estimated equation that public expenditure has a positive and significant relationship with investment in human capital. This means that the amount the government spends on human capital development in form enrollment and making schools to be easily accessible to pupils and students has the tendency to foster economic growth in Nigeria. Therefore, the study recommends the need to increase budgetary allocation to the education and health sector and the establishment of sound and well-functioning vocational institute needed to bring about the needed growth in human capital that can stimulate economic growth. In this regard, policy-makers in conjunction with employers and individuals needs up to date information on the real labour market value of different qualifications, in order to help them navigate through the increasingly complex education system and make the strategic kinds of educational investment decisions needed to propel economic growth due to issues associated to labour mis-match.

Research paper

Keywords: Human Capital, Economic Growth, Pairwise Causality, TSLS

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Introduction

Over the last few decades the tie between human capital investment via education and economic growth in Nigeria and other developing countries has attracted the attention of many economists and policy makers. This is due to the common assumption that investment in human capital vis-à-vis education has had an important positive effect on economic growth but to date the evidence, for this supposition has been surprisingly weak in the attempt to ascertain extensively whether or not the attainment of education has contributed significantly to the generation of overall output accrued to an economy. Despite that there had been inconsistencies and controversial result that has led to an inconclusive answer to the above raised question as opined by Pritchett (1996).

Surprisingly, as put by neoclassical growth theory, acquisition of human capital is a relevant donor to economic growth. This is because human capital is a significant component of economic growth in any economy which was followed by technological progress and institutions as opined by Solow and Ramsey (1956). Owing to the aforementioned, there have several cross –country studies regarding whether or not the investment in education as the tendency to contribute to overall output in an economy. Notably in the literatures, we discover that their outcomes had been inconsistent and controversial as observed by Pritchett (1996). These outcomes emanated from both macro and micro perspective. The former assertion which is the macro is submission but forth by Pritchett (1996) that their outcomes have been inconsistent and controversial in the literatures. Conversely, on the other hand, numerous studies have examined related issues regarding the relation between the accumulation of human capital and economic growth

and have shown a positive relationship between the education of a working individual and his or her labour earnings and productivity at large. The aforementioned connotes that there is the tendency for more educated persons to exhibit higher employment rate and earnings and showcase more output compare to those who have lesser educational qualification as opined by Hyun (2011). To him it therefore offers a robust rationale why the government and private households to invest reasonable portion of their in education with the hope that it would yield better returns. As a result of this, education is therefore perceived as an investment that enables persons to be equipped with skills and knowledge the eventually advance their rate of employability and productive capacities which yield higher earnings in the long run.

As a matter of fact, a country cannot accomplish any evocative economic growth without adequate human and natural resources that is aimed at enhancing a sustainable development. According to IMF (2000) as quoted in Awe and Ayeni (2011), Sustainable development when critically assessed entails three pillars such as; Economic Development, Social Development and Environmental Protection. In spite of this, the process of economic performance is inadequately conceptualized and poorly understood and as a result it has partly been attributed to lack of a generalized or unified theory and also the myopic way conventional economist approaches such issues according to Arielavis etal (2007).

Although a country like Nigeria has not completely been able to achieve this as a result, it's over dependence on oil and imbalance in her policy measures. However, the theoretical basis of education on economic growth is rooted in the endogenous growth theory (Solow's growth model)

which emphasize on the relevance of investment on education as an input to production. More recently endogenous growth model focuses attention to human capital and innovation, capacity and now the focus of economic growth has moved to Myrdal's cumulative causation theory and the new economic geography school. Economists believe that, endogenous growth is linked with improvement in productivity which results to a faster pace of innovation and extra investment in human capital.

The growth theorist further predicted that externalities and spill-over effects from development of a high valued added knowledge economy that is able to develop and maintain a competitive advantage in growth industries in the global economy. Indeed there is rather a strong theoretical basis pertaining the key role of human capital in economic growth as opined (by Romer 1986, 1990; Lucas 1988 Quah and Rauch 1990, Grossman and Helpman 1991, Rivera-Batiz and Romer 1991) The empirical evidence is however related to contentious issues such as measurement of human capital while recent studies has provided mixed assessments on the magnitude of social returns to human capital.

Although researchers like that of the International Institute of Applied systems Analysis (IIASA) are of the view that to overcome these inconsistencies regarding the relation between education and economic growth which has emanated from the past studies is that a new dataset needs to be generated on educational attainment as observed by IIASA (2008).

In Nigeria, the future direction of macroeconomic policy of investing in educational capital is uncertain based on the fact that, the existence of macroeconomic disequilibrium in financial allocation and unsatisfactory performance of the country's economy in the recent times.

This corroborates the reason why some economist put forth the assertion why most developing and underdeveloped economies have not achieved sustainable development. Economists are of the view that they have not been able to ascertain the tie between human capital investment and economic growth. More so, because they have not also asserted concretely whether economic growth and development cause human capital investment enhancement or that human capital investment causes economic granted and sustainable development in Nigeria. Hence the thrust of this study is to investigate the tie between human capital investment and economic growth in Nigeria. This paper in its own way follows format of many other works that have been done in this area but a unique attribute. Similar because would ascertain the nexus between investment in human capital development and economic growth. Different in the sense that it would take a stride ahead most other studies of its kind by examining whether causality runs between investment in human capital and economic growth or not. This would be buttressed by reviewing the contribution of Myrdal's cumulative causation theory in other to fill the above existing gaps.

Expectedly the structure of this paper is clear and as follows. The next section briefly reviews the relevant literatures and also proffers theoretical evidences. Thereafter section three focuses on the specification of model and analytical framework, which is followed up by the discussion of the estimation techniques and data sources while in section four empirical findings are discussed. The study is rounded up with the summary, conclusion and recommendations.

Literature Review

The growing evidence on the role and relevance of human capital investment via education in the development process of an economy for sustained growth and development is increasing in an alarming rate. Education at all levels has been identified to contribute to economic growth through imparting of skills, discipline that is required for various work places. It is pertinent to pinpoint that the significance of the educational system to any labour market would highly depend on its ability to produce a literate, disciplined, flexible labour force vis-à-vis high quality education. Consequently with economic development induced by new technology is applied to production which results in an increase in the demand for workers and better education. Similarly, Jhingan (2005) opined that in the process of economic growth, it is habitual to attach more important to the accumulation of physical capital than human capital. No wonder, Leeuwen (2007), buttressed that human capital is implicitly described as a formal and informal education, despite that it contain factors which among others includes cost of raising children, health cost and ability to mention a few. To him health and education are identified although education component is the foremost according to their contribution.

Interestingly, Dees and Picken (2000), sees human capital from an organizational view point as the capabilities, knowledge, skills and experience they have acquired which is relevant to the task at hand, as well as the capacity to add to the reservoir of knowledge, skills and experience through individual learning. Similarly, Todaro and Smith (20030 opined that human capital must be given direct attention in its own right even in economies that are growing rapidly more especially in the developing countries

that wish to break free from their vicious cycle in other to achieve sustainable growth and development.

Conversely, Aigbokhan etal (2007) buttressed that the magnitude and trend of increases in allocation might be misleading to pass judgments on the budgetary performances of human capital in Nigeria. Igun (2006), sees human capital as the total stock of knowledge, skills, competencies, innovative abilities possessed by the population.

In particular, the pioneer work in this regard is the work of Lucas (1988) who revealed that the growth rate of human capital is dependent on the amount of time an individual puts into acquiring skills. This is followed up by the work of Easterly and Rebelo (1993) who opined that the creation of new idea is a direct function of human capital that manifest in the form of knowledge which in turn has led to growth in physical capital and economic growth.

Another aspect of literature is the theory of cumulative causation developed by Myrdal (1957) and Kalder (1970) which argued that initial condition of production determines economic growth such that it places emphasis on self-sustainability. Although there is tendency for positive spillover effects spreading growth from the more to the less advanced economies, this is because they are incapable of bringing the system into a balance state due to the fact that the market forces alone are left at work.

The advent of democratic regime in 1999 for example, has made the Nigerian government to place its emphasis on the need to invest adequately in human capital via educational sector which has reflected on the federal government spending between 1999 and 2009 respectively. This expenditure has been fluctuating till date. For instance in 2007, it fell from

10.4% it was in 1980 to 8.7% in 2007 and later rose to 9.6% in 2009. Furthermore, studies like that of Akram and Pada (2009) conducted a survey to assert the relationship between education and economic performance which emerged from the review of literatures. The study revealed that there exist a positive relationship between education and economic growth.

In a similar vein, Ararat (2007) measured the role and effect of education on economic growth in two of the largest economies of the former soviet Bloc i.e. the Russian federation and Ukraine. The aim of the study among others was to estimate the relevance of diverse educational levels for the initiation of substantial economic growth. The study adopted and estimated the model of endogenous economic growth and the system of linear and log-linear equations that accounted for different time lags as the possible impact of higher education on economic growth. The results from the model showed that there is no significant impact of educational attainment on economic growth, but that increase in access of the population to higher education can bring positive results to the per-capita GDP growth in the long run.

Bakare (2006) investigated the growth implications of human capital investment in Nigeria by using vector auto regression and Error corrections model. Findings from the study revealed that there is a significant functional and institutional relationship between the investments in human capital and economic growth in Nigeria such that 1% fall in human capital investment led to a 48.1% fall in the rate of growth in gross domestic output between 1970- 2000 that was examined.

Babatunde and Afolabi (2005) measured the long run relationship between education and economic growth in Nigeria between 1970 and

2003 by applying Johansen Cointegration method correction model and vector error model. The findings reveals that there is a long run relationship between education and economic growth there by laying emphasis that a well-educated labour force appears to significantly influence economic growth both as a factor in the production function and through total factor productivity.

Furthermore, UNR (1996) expressed categorically that education is fundamental in enhancing the quality of life and ensuring social and economic progress. This is because education tends to play a key role in the ability of a developing country to absorb modern technology and to develop the capacity for self- sustaining growth and development. Lee (1989) opined that the main problem that is associated with the belief that education is good for economic growth could be tied with how to maintain an equilibrium position. This equilibrium is in terms of balancing a scenario where there will be no shortage of the supply of educated people because such shortage may mar or limit growth while on the other hand excessive supply of it might create unemployment and thus limiting economic growth.

Griffin and Mckinley (1992) are of the opinion that human capital development is targeted at growth and development strategy intended to improve the well-being of people within a short time possible. To them, the implementation of strategy will require a change in the composition of government spending and that the percentage of the budget earmarked for activities which do not contribute to development should be reduced to the minimal that is, activities such as military defense among others.

On the contrary, Ayara (2003) provided evidence on the linkage between the paradose of education and economic growth in Nigeria using

the standard growth accounting model. The results revealed that education has not had the expected positive growth impact on economic growth.

Put together, the finding from the array of literatures surveyed supports the notion that education matters for growth and development in both developed and developing countries. Also literature have proved overtime that there is the possibility that the relationship that existed in the theory may not be replicated in real economy activities given the presence of some factors, which may not be clearly identified in the theory as identified by Ajisafe et al. (2006).

This study is very significant because past studies have focused on the relationship between Investment in human Capital and growth such as that of Dauda, R.B. (2010), Adebiyi (2009) etc. by means of mere estimation and the like but this current paper attempts to evaluate the causation involved in the variables used.

Theoretical Framework

The theoretical framework of this paper is going to rest on the novelty seminal of Solow growth model and the unified growth theory as buttressed by (scholars like; (Galor and Weil, 2000; Lucas, 2002; Hansen and Prescott, 2002; Galor and Moav, 2002). Solow used this growth model to explain the reason why there is disparity in the growth level different countries and why some countries are more developed than the others. The reasons for above differences can be explained by merging the assumptions of two theories that are like Siamese- twins. First is the one taken from the Solow's Augumented growth model. According to Solow (1956), the basic Solow model holds considerable explanatory power regarding contemporary income

differences thereby leaving much income variation unexplained thereby leading to different argumentations vis-à-vis schooling (enrollment) which is the focal point of the current paper (Mankiw, Romer and Weil, 1992; Ram, 2007), R&D (Nunnemann and Vanhout, 1996). That is human capital is well developed in terms of skills, knowledge and competence and are utilized in a typical production process; the question is that can increase in human capital development lead to increase in economic growth of a country like Nigeria according to Solow's growth model?

On the other hand, another aspect of literature believes that to understand comparative development, it is paramount to first understand the take-off stage to sustained growth, which separate an era of stagnation from the current regime where many countries grow persistently in terms of income per capita according to (Galor and Weil , 2000; Lucas, 2002; Hansen and Prescott, 2002; Galor and Moav, 2002). Seemingly, the Unified growth theory posits that the neoclassical growth theory can only be analyzed by the growth process once it has begun; hence, it is incomplete basis for an understanding of comparative development as put by Galor (2010a),
Kumar (2014) and Chege (2015) respectively For instance, Galor (2010) took his argument from a theoretical standpoint which is narrowly connected to the demographic transition via fertility transition. It is equally believed that the fertility transition stimulates subsequent growth in labour productivity for two key reasons: (i) by reducing population, it lowers the extent of capital dilution; (ii) by stimulating human capital accumulation it drives growth directly, but also indirectly via technological innovation.

Generally, Solow growth model is a model of capital accumulation in a pure production economy this is because there is no price ascribed

due to the fact that the economy is only interested in output which is equivalent to real output. It is equally believed that everyone works at all time; hence, there is no labour/ leisure choice. Apparently, the consumer always saves a fixed portion of income and because they always work, they collect all wages (income) and profit. At the macro level it is assumed that all people work, and it is equally assumed that they save a proportion of their income = investment and on the long run affects the standard of living via per capita income. Since population is allowed to vary.

The Solow model is specified as thus:

Production function, with physical capital K, labor L and knowledge or technology A:

$$Y(t) = F(K(t), A(t), L(t)) \quad (1)$$

Time affects output only through K, L and A. Technology is labor-augmenting: AL is effective labour. Land and natural resources are ignored (not considered among factors of production).

Constant returns to scale (CRTS): $F(cK, cAL) = cF(K, AL)$ for any $c \geq 0$ (2)

Empirical Evidence

Different scholars have utilized various techniques and approaches to examine the relationship between investment in human capital and economic growth in both developing and developed economies over the years and the results has generated diverse outcomes although most of them depicts that human capital investment engenders economic growth. For simplicity few of such studies would be highlighted in this current study. For instance, Ogujiuba (2013) employed Error correction method to evaluate the impact of education on economic growth; findings from his study exhibit that in-

vestment in human capital in the form of education and capacity building has significant effect on economic growth using data spanning from 1970 – 2010.

Similarly, Gumarsson (2008), as quoted from Verhoeven et al (2007) sees the education in two forms via the performance indicators; which are the desired outcomes and the intermediate output indicators. He is of the view that the desired outcomes correspond with the underlying objectives sought by policy makers. On the other hand, the intermediate outputs are thought to be related to related outcomes but can be closely associated with current spending as opined by Isola and Alani (2012). Similarly, Sankay, Ismail and Shaari (2010) investigated the impact of human capital development on economic growth in Nigeria during the period 1970 – 2008. He employed Johansen cointegration technique and vector error correction analysis to ascertain this relationship. The results indicated that human capital development has a significant impact on the economic growth of Nigeria. In the same vein, Dauda (2010), utilized the human capital model of endogenous growth developed by Mankiew. Similarly, Romer and Weil (1992) examined empirically, the role of human capital in the economy of Nigeria. Their findings show that there is feedback mechanism between human capital formation and economic growth in Nigeria. Therefore the policy implication of the above findings is that government should place more emphasis on human capital development by intensifying an induced investment in human capital to achieve the growth which would foster economic development. These imply that education should be placed at the forefront of Nigeria's developmental pursuit. Similarly Amassoma and Nwosa (2011) examined the nexus between investment in human capital and economic

growth in Nigeria by employing error correction modeling approach and Granger causality methodologies. The results showed that there is a mismatch between labour and the job they found themselves doing which in turn leads to inadequate productivity and there is no causality between human capital and economic growth in Nigeria. Based on the above they suggested that the government should increase budgetary allocation on education increase enrollment in the key institutions of learning to enhance sustainable economic growth in the Nigeria.

In the same vein, Johnson (2011) evaluated human capital development and economic growth in Nigeria by adopting conceptual analytical framework that employs the theoretical and ordinary least square (OLS) to analyze the relationship using the GDP as proxy for economic growth; total government expenditure on education and health, and the enrolment pattern of tertiary, secondary and primary schools as proxy for human capital. The analysis confirms that there is strong positive relationship between human capital development and economic growth. Following the findings, it was recommended that stakeholders need to evolve a more pragmatic means of developing the human capabilities, since it is seen as an important tool for economic growth in Nigeria. Also proper institutional framework should be put in place to look into the manpower needs of the various sectors and implement policies that will lead to the overall growth of the economy.

As a matter of fact, while there is persuasive evidence about the positive relationship between initial human capital levels and output growth and (weaker) empirical support for the relationship between changes in human capital and growth, this is because it is undistinguishable whether there is a causal relationship between human capital and growth. For instance,

Bils and Klenow (2000) suggest that the causal direction may run from growth to schooling. Inspired by the fact that there has been a dramatic increase in schooling in the last 30 years at the same time that the "productivity slowdown" became manifest in many of the higher income economies, a Mincerian model would predict that relationship by asserting that growth leads to lower discount rates in the country thus increasing the demand for schooling.

Furthermore, Oluwatobi and Ogunrinola (2011) examined the relationship between human capital development efforts of the government and economic growth in Nigeria. The aim of their study is to ascertain the impact of government recurrent and capital expenditures on education and health in Nigeria couple with their effects economic growth. The results show that there exist a positive relationship between government recurrent expenditures on human capital development and to the level of real output. The study went further to recommend that appropriate channeling of the country's capital expenditure on education has the tendency to promote economic growth.

In consonance to the above, Ng'ang'a (2015), examined firms' investment determinant in Kenya using panel data analysis to explain how interest rate, firms size, cash flow affects investment behaviour and economic growth at large. The study finds that cash flow has a significant influence on investment and relatively smaller firms invest proportionally more than larger firms. Therefore the study recommends that the government by so doing encourage a policy shift that will stimulate investment in the small firms with respect to large firms and hence, rolling out financial models to build capacity in emerging firms.

Model Specification and Estimation

The objective of this study is basically to re-examine whether human capital development cause economic growth in Nigeria or if the reverse is the case. More so the study hopes to ascertain the extent of causality between the variables in a case where causality exist. To achieve the above mentioned objective, this study would utilize co-integration, correlation and granger causality tests. Causality is said to be essential in econometrics analysis in the sense that it makes us to know whether a past change in one variable X has a corresponding impact on current variable Y or whether the relation works in the opposite direction. We applied Two Stage Least Square (2SLS) method of estimation not because it is the best technique that has ever been used to address studies of this kind rather because of some advantage(s) it has over some other techniques in the empirical literatures. For instance, it is preferred over the OLS when the error term of the dependent variables is correlated with the independent variables and when there are feedback loops in the mode as put by Gujarati (2009) and Greene (2013). While achieving the aforementioned we hope to conduct the econometrics test in nominal logarithm version. The elegance of this approach will be that apart from helping us to curtail the econometric problems that may rear its head in our work, it enables us to obtain parameter estimates that are straightway elasticity (Kelejian and Prucha 1998) These elasticity's are, of course more relevant for policy-making purposes as better compared to other econometric technique use for any structural equations of this kind.

Model Specification

The functional form of the model on which our econometric analysis is based on is given as follows:

PERCAPITA = f (HUMANCAP, PUBLIC, GFCF, INF, EXCHR, LABFORCE) (1)

Similarly, the above functional form would generate a system of equations. This system of equations will help us in formulating a system of simultaneous equation model. The reason for this is not far –fetch from the fact that economic growth and human capital are jointly determined as the case may be in this study. However, this current study would not forget to note the fact that the neglect of reverse causality in either a cross-sectional or time series modeling framework might introduce simultaneity bias as pinpointed by (Wooldridge, 2006; Gujarat and Sengaatha, 2007). Hence the two equations are therefore specified as follows:

$$PERCAPITA_t = \alpha_0 + \alpha_1 HUMANCAP_{t-i} + \alpha_2 PUBLIC_{t-i} + \alpha_3 GFCF_{t-i} + \alpha_4 INF_{t-i} + \alpha_5 EXCHR_{t-i} + \alpha_6 LABFORCE_{t-1} + \varepsilon_{1t} \quad \text{.....(2)}$$

$$HUMANCAP_t = \beta_0 + \beta_1 PERCAPITA_{t-i} + \beta_2 PUBLIC_{t-i} + \beta_3 GFCF_{t-i} + \beta_4 INF_{t-i} + \beta_5 EXCHR_{t-i} + \beta_6 LABFORCE_{t-1} + \varepsilon_{2t} \quad \text{.....(3)}$$

Description of Variables

HUMANCAP = human capital development (proxy by total primary and secondary enrolment)

PUBLIC = Public expenditure

GFCF = Gross Fixed Capital Formation

INF = Inflation

EXCHR= Exchange rate

PER CAPITA = Per Capita income

LABFORCE = Labour force participation

where

$\alpha_0 and\ \beta_0$ are the constant terms

ε_{1t} and ε_{2t} are the disturbance terms

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the estimated coefficients

t is the time period, i is the number of lags and $t-i$ are the time lags

Estimation procedure

Unit root test

To test for stationarity or the absence of unit roots, this test is done using the Augmented Dickey Fuller test (ADF) with the hypothesis which states as follows: If the absolute value of the Augmented Dickey Fuller (ADF) test is greater than the critical value either at the 1%, 5%, or 10% level of significance, then the variables are stationary either at order zero, one, or two. The Augumented Dickey Fuller test equation is specified below as follows:

$$\Delta\hat{u}_t = \beta\hat{u}_{t-1} + \sum_{i=1}^{k} \Delta\hat{u}_{t-1} + \varepsilon_t \qquad (4)$$

The cointegration Approach

The presence of a (long-run) relationship between real budget deficits (or surpluses) and exchange rates is examined through the methodology of cointegration as it was developed by Engle and Granger (1987) and Johansen and Juselius (1990). For the purposes of this paper use will be made of

the technique by Johansen and Juselius (1990), who developed a method to estimate whether two or more variables are cointegrated, via a multivariate maximum likelihood procedure that overcomes many of the limitations of the bivariate tests of Engle and Granger (1987). These limitations require that one of the two variables is considered exogenous, while these tests do not have well-defined limiting distributions and, therefore, their critical values are sensitive to sample size.

The Johansen maximum likelihood procedure begins by expressing a process of NI(1) variables in an Nx1 vector x as an unrestricted autoregression:

$$X_t = \lambda_1 + X_{t-1} + \lambda_2 X_{t-2} + ... + \lambda_k X_{t-k} + \mu_t \quad (5)$$

with t = 1, 2, …, T and μt being the random error term. The long-run static equilibrium is given by $\prod_x = 0$, where the long run coefficient matrix Π is defined as:

$$\prod = 1 - \prod_1 - \prod_2 - ..... - \prod_k \quad (6)$$

where I is the identity matrix and Π is an n x n matrix whose rank determines the number of distinct cointegrating vectors which exist between the variables in x. Define two n x r matrices α and β, such that:

$$\prod = \alpha\beta' \quad (7)$$

with the rows of β′ to form the r distinct cointegrating vectors. The likelihood ratio statistic (LR) or trace test for the hypothesis that there are at most r cointegrating vectors is:

$$\text{LR or TRACE} = -T\sum_{i=r+1}^{n} \ln(1-\lambda i) \quad (8)$$

where λr + 1, …, λn are n-r the smallest squared canonical correlations between the residuals of xt–k and Δxt series, corrected for the effect of the

lagged differences of the x process. Additionally, the likelihood ratio statistic for testing at most r cointegrating vectors against the alternative of r + 1 cointegrating vectors, namely, the maximum eigenvalue statistic, is given as:

$$\lambda MAX = T\ln(1-\lambda r+1) \quad (9)$$

Both statistics have non-standard distributions under the null hypothesis, although approximate critical values have been generated by Monte Carlo methods and tabulated by Johansen and Juselius (1990). If exchange rates are found to be cointegrated with budget deficits, among other macroeconomic variables, the next step is to examine the associated causality tests, since if two or more variables are cointegrated causality in at least one direction must be implied (Hall and Milne, 1994).

Granger causality test

Causality test was conducted to explore the transmission mechanism between human capital investment and economic growth. Thus within our human capital investment and economic growth, the Engle and Granger (1987) two step procedure was estimated with following equations:

$$PERCAPITA_t = \delta_0 + \delta_1 HUMANCAP_{t-1} + \delta_2 PUBLIC_{t-2} + \delta_3 GFCF_{t-3} + \delta_4 INF_{t-4} + \delta_5 EXCHR_{t-5} + \delta_6 LABFORCE_{t-6} + \mu_{1t} \quad \text{.....(10)}$$

$$HUMANCAP_t = \lambda_0 + \lambda_1 PERCAPITA_{t-1} + \lambda_2 PUBLIC_{t-2} + \lambda_3 GFCF_{t-3} + \lambda_4 INF_{t-4} + \lambda_5 EXCHR_{t-5} + \lambda_6 LABFORCE_{t-6} + \mu_{2t} \quad \text{.....(11)}$$

where δ , λ are the parametric coefficients ; μ_1 and μ_2 are assumed to be white noise with zero mean and constant variance.

Analysis and Discussion of Results

Unit Root Test

Economic variables are generally non-stationary and hence they are a random process. Linear combination of non-stationary series in general is a non-stationary series and closely associated with economic theory. In this study Augmented Dickey Fuller (ADF) and Phillip Peron (PP test) for stationarity is utilized. The results of the ADF and PP test procedures are as follows:

Table 1. Result of Unit root Test

VARIABLE	ADF		PP TEST	
	I(1)	Prob.	I(1)	Prob.
D(PERCAPITA (-1))	-4.523160	0.0001	-5.934985	0.0000
D(LOG(HUMANCAP(-1)))	-3.441517	0.0014	-5.267283	0.0000
D(PUBLIC(-1))	-5.378707	0.0000	-9.831454	0.0000
D(GFCF(-1))	-6.621504	0.0000	-12.38558	0.0000
D(INF(-1))	-5.173855	0.0000	-7.102582	0.0000
D(EXCHR(-1))	-3.363240	0.0017	-7.018903	0.0000
D(LABFORCE(-1),2)	-5.320736	0.0000	-11.15108	0.0000

The tests indicate that that all the variables are integrated of order one at 5% level of significance in both ADF and PP test procedures.

Cointegration Test

Co-integration tests are conducted by using the reduced rank procedure developed by Johansen (1988) and Johansen and Juselius (1990). This method

should produce asymptotically optimal estimates since it incorporates a parametric correction for serial correlation. The nature of the estimator means that the estimates are robust to simultaneity bias, and it is robust to departure from normality (Johansen, 1995). Johansen method detects the number of cointegrating vectors in non-stationary time series. It allows for hypothesis testing regarding the elements of co-integrating vectors and loading matrix.

Johansen procedure is used to determine the rank r and to identify a long-run relationship. The number of lags used in the VAR is based on the evidence provided by the Akaike Information Criteria (AIC). However, in the case of serial correlation, sufficient numbers of lags are introduced to eliminate the serial correlation of the residuals. The cointegration tests include: PERCAPITA, LOG (HUMANCAP), PUBLIC, GFCF, INF, EXCHR and LABFORCE which includes two lags in the VAR as suggested by AIC.

Table 2. Result of cointegration test

Series: PERCAPITA LOG(HUMANCAP) PUBLIC GFCF INF EXCHR LABFORCE
Lags interval: 1 Lags interval: 1 to 2

Hypothesized No. of CE(s)	1 Percent Critical Value	5 Percent Critical Value	Likelihood Ratio	Eigenvalue
None **	133.57	124.24	306.7207	0.956380
At most 1 **	103.18	94.15	178.2987	0.843677
At most 2 **	76.07	68.52	102.2096	0.755047
At most 3	54.46	47.21	44.53540	0.365397
At most 4	35.65	29.68	25.89041	0.316451
At most5	20.04	15.41	10.29168	0.144025
At most 6 *	6.65	3.76	3.915628	0.091084

*(**) denotes rejection of the hypothesis at 5%(1%) significance leve

L.R. test indicates 3 cointegrating equation(s) at 5% significance level

The results of the conducted Johansen tests for cointegration amongst the variables is specifies in Table 2 below: The results indicate that there are at most three cointegrating vectors.

Descriptive analysis

The descriptive statistics of the variables used in this study are shown in the table below. The probabilities of Jarque-Bera test of normality for variables are all greater than 5% level of significance which indicates that the data are normally distributed.

Table 3. Descriptive statistics of the variables

LABFORCE	EXCHR	INF	GFCF	PUBLIC	LOG(HUMANCAP)	PERCAPITA	
53704119	48.01296	17.91405	191958.4	2289968.	16.42371	19163.29	Mean
50650000	13.60395	12.69813	174775.0	182970.2	16.51878	4139.550	Median
82000000	156.1234	72.80000	429230.0	12700000	17.11491	69367.50	Maximum
29500000	0.546400	0.220000	5019.800	1133.702	15.07611	135.0000	Minimum
17431358	59.29115	15.41345	170376.2	3588998.	0.567541	24878.21	Std. Dev.
0.289562	0.710670	1.910741	0.076885	1.394685	-1.120057	0.829818	Skewness
1.722185	1.663540	6.264876	1.186478	3.563259	3.190487	1.884943	Kurtosis
3.608358	6.978275	46.31574	6.072933	14.84605	9.266389	7.329192	Jarque-Bera
0.164610	0.030527	0.000000	0.048004	0.000597	0.009724	0.025615	Probability
44	44	44	44	44	44	44	Observa-tions

The table above shows the descriptive statistics for the dependent and independent variables, PERCAPITA EXCHR, INF, GFCF, PUBLIC, LOG (HUMANCAP), and LABFORCE all have a positive mean value which ranges from 16.42371 to 53704119 with 44 observations. The highest standard deviation of 17431358 is recorded by LABFORCE while the least standard deviation of 0.567541 is recorded by LOG (HUMANCAP). Notwithstanding the deviations from the mean, the relationships among the studied variables depicted in the model were tested using correlation and the result presented below:

Correlation

In the correlation test, we test the variables to ascertain the degree of relationship that exist between the independent variables and the dependent variable. For the variables under consideration, the values obtained are as follows:

Table 4. Correlation test

LABFORCE	EXCHR	INF	GFCF	PUBLIC	LOG(HUMANCAP)	PERCAPITA	
0.910218	0.984923	-0.226489	0.804546	0.905430	0.669169	1.000000	PERCAPITA
0.850594	0.691504	0.034355	0.762996	0.584160	1.000000	0.669169	LOG(HUMANCAP)
0.852833	0.869638	-0.198806	0.701959	1.000000	0.584160	0.905430	PUBLIC
0.909376	0.836182	-0.070614	1.000000	0.701959	0.762996	0.804546	GFCF
-0.083771	-0.213770	1.000000	-0.070614	-0.198806	0.034355	-0.226489	INF
0.929601	1.000000	-0.213770	0.836182	0.869638	0.691504	0.984923	EXCHR
1.000000	0.929601	-0.083771	0.909376	0.852833	0.850594	0.910218	LABFORCE

The correlation result shows that our focal variables, LOG (HUMANCAP), PUBLIC, GFCF, EXCHR and EXCHR have positive relationships with PERCAPITA. The relationships are actually strong at 66%, 90%, 80%, 98% and 91% respectively. This result suggests these variables have a direct relationship with percapita income. Only the variable INF indicates a negative correlation of 22%.

The Granger causality tests

The procedure used in the study for testing statistical causality between the per capita income, human capital, public expenditure, gross fixed capital formation, inflation, exchange rate and labour force participation is the "Granger-causality" test developed by C.W.J. Granger in 1969. The Granger causality tests determine the predictive content of one variable beyond that

inherent in the explanatory variable itself. The study used two most common choices of information criteria: Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) and found that outcome of the test was sensitive to number of lags introduced in the model. In this case, we utilized two lags procedure.

Table 5. Granger causality tests

Pairwise Granger Causality Tests
Date: 03/13/15 Time: 09:00
Sample: 1970 2013
Lags: 2

Probability	F-Statistic	Obs	Null Hypothesis:
0.10991	2.34528	42	LOG(HUMANCAP) does not Granger Cause PERCAPITA
0.83899	0.17640		PERCAPITA does not Granger Cause LOG(HUMANCAP)
0.53426	0.63762	42	PUBLIC does not Granger Cause PERCAPITA
3.5E-05	13.6950		PERCAPITA does not Granger Cause PUBLIC
0.01230	4.96479	42	GFCF does not Granger Cause PERCAPITA
0.99535	0.00466		PERCAPITA does not Granger Cause GFCF
0.67447	0.39805	42	INF does not Granger Cause PERCAPITA
0.54244	0.62190		PERCAPITA does not Granger Cause INF
0.00011	11.7396	42	EXCHR does not Granger Cause PERCAPITA
0.41685	0.89606		PERCAPITA does not Granger Cause EXCHR
0.08125	2.68853	42	LABFORCE does not Granger Cause PERCAPITA
0.86584	0.14462		PERCAPITA does not Granger Cause LABFORCE
0.97786	0.02241	42	PUBLIC does not Granger Cause LOG(HUMANCAP)
0.31652	1.18687		LOG(HUMANCAP) does not Granger Cause PUBLIC
0.81938	0.20028	42	GFCF does not Granger Cause LOG(HUMANCAP)
0.23080	1.52586		LOG(HUMANCAP) does not Granger Cause GFCF
0.42945	0.86486	42	INF does not Granger Cause LOG(HUMANCAP)

0.69060	0.37392		LOG(HUMANCAP) does not Granger Cause INF
0.75185	0.28743	42	EXCHR does not Granger Cause LOG(HUMANCAP)
0.45388	0.80703		LOG(HUMANCAP) does not Granger Cause EXCHR
0.64766	0.43952	42	LABFORCE does not Granger Cause LOG(HUMANCAP)
0.43112	0.86080		LOG(HUMANCAP) does not Granger Cause LABFORCE
0.09546	2.50467	42	GFCF does not Granger Cause PUBLIC
0.99147	0.00857		PUBLIC does not Granger Cause GFCF
0.92150	0.08193	42	INF does not Granger Cause PUBLIC
0.48703	0.73359		PUBLIC does not Granger Cause INF
0.00041	9.71427	42	EXCHR does not Granger Cause PUBLIC
0.09152	2.55255		PUBLIC does not Granger Cause EXCHR
0.06818	2.89039	42	LABFORCE does not Granger Cause PUBLIC
4.4E-16	106.543		PUBLIC does not Granger Cause LABFORCE
0.00081	8.67569	42	INF does not Granger Cause GFCF
0.34769	1.08719		GFCF does not Granger Cause INF
0.99420	0.00582	42	EXCHR does not Granger Cause GFCF
0.00395	6.44927		GFCF does not Granger Cause EXCHR
0.09488	2.51168	42	LABFORCE does not Granger Cause GFCF
0.15766	1.94270		GFCF does not Granger Cause LABFORCE
0.49060	0.72601	42	EXCHR does not Granger Cause INF
0.54634	0.61451		INF does not Granger Cause EXCHR
0.76938	0.26404	42	LABFORCE does not Granger Cause INF
0.75082	0.28882		INF does not Granger Cause LABFORCE
0.08303	2.66367	42	LABFORCE does not Granger Cause EXCHR
0.05773	3.08349		EXCHR does not Granger Cause LABFORCE

The effect of investment in human capital on economic growth in Nigeria

Table 6. Two-Stage Least Squares

Dependent Variable: PERCAPITA
Method: Two-Stage Least Squares
Date: 03/12/15 Time: 19:31
Sample: 1970 2013
Included observations: 44
Instrument list: LOG(HUMANCAP) PUBLIC GFCF INF EXCHR LABFORCE

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.1223	-1.581247	32204.30	-50922.94	C
0.0793	1.804455	2349.054	4238.764	LOG(HUMANCAP)
0.0000	4.961158	0.000375	0.001858	PUBLIC
0.5330	0.629268	0.008341	0.005248	GFCF
0.9348	0.082323	37.72287	3.105467	INF
0.0000	13.09178	30.28646	396.5035	EXCHR
0.0291	-2.270587	0.000196	-0.000445	LABFORCE

19163.29	Mean dependent var	0.982989	R-squared
24878.21	S.D. dependent var	0.980231	Adjusted R-squared
4.53E+08	Sum squared resid	3497.934	S.E. of regression
1.793582	Durbin-Watson stat	356.3534	F-statistic
		0.000000	Prob(F-statistic)

The 2SLS result shows the coefficient of the LOG (HUMANCAP) variable is positive, this indicates investment in human capital contributes significantly to the economic growth of Nigeria during the period under review; the positive coefficient of the PUBLIC variable shows that public expenditure contributes to the overall economic growth. The result is in conformity with the findings of Ogungbenle, Olawumi and Obasuyi (2013) in a study of the effect of life expectancy and public health spending in Nigeria noting that public expenditure positively impacts on economic growth

Equally, the GFCF variable indicates a positive sign but is not statistically significant. The implication is that the nation's fixed capital formation positively affects economic growth of Nigeria. The outcome of the findings agrees with the results of Kanu and Ozurumba (2014) which carried a study on the impact of capital formation on economic growth of Nigeria. Their result indicates that in the short run, gross fixed capital formation had no impact on economic growth but there was positive impact of the variable on economic growth in the long run.

The coefficients of the variables, INF and EXCHR indicate positive signs. In the aggregate demand and supply (AS-AD) theoretical framework, it is postulated that there exist a positive relationship between inflation and economic growth (Vikesh and Subrina, 2004). While in the dynamic adjustment of the short run AD and AS curves yields an adjustment path which exhibits an initial positive relationship between inflation and economic growth; however, it turns negative towards the latter part of the adjustment process (Dornbusch, Fisher and Kearney, 1996).

The coefficient of the LABFORCE variable shows a negative sign. The implication is that the active labour force negatively impacts on economic growth of the country during the period under review. Zimmer and Guzman (2011) in their study of what is behind labour force participation for the US economy noted that rational behaviour and self-interest should indicate a positive relationship between economic growth and labour force participation. They however noted in their findings that the relationship between labour force participation and economic growth is not significant statistically. Statistically, the t-statistics of the variables LOG (HU-

MANCAP) (1.804455), PUBLIC (4.961158), EXCHR (13.09178) and LABFORCE (-2.270587) are significant statistically.

Table 7. Two-Stage Least Squares

Dependent Variable: HUMANCAP
Method: Two-Stage Least Squares
Date: 03/16/15 Time: 08:33
Sample: 1970 2013
Included observations: 44
Instrument list: LOG(PERCAPITA) LOG(PUBLIC) LOG(GFCF) INF EXCHR LOG(LABFORCE)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.05E+08	96605352	-4.192472	0.0002
LOG(PERCAPITA)	2131979.	1031074.	2.067726	0.0457
LOG(PUBLIC)	-1047873.	597922.7	-1.752522	0.0880
LOG(GFCF)	-1051138.	424159.2	-2.478169	0.0179
INF	9262.544	20660.88	0.448313	0.6565
EXCHR	-28421.17	14326.53	-1.983814	0.0547
LOG(LABFORCE)	24141824	5941961.	4.062939	0.0002
R-squared	0.936008	Mean dependent var		15411552
Adjusted R-squared	0.925631	S.D. dependent var		6544489.
S.E. of regression	1784732.	Sum squared resid		1.18E+14
F-statistic	90.19912	Durbin-Watson stat		1.378855
Prob(F-statistic)	0.000000			

The result from the human capital equation shows an interaction effect of the LOG (PERCAPITA), LOG (PUBLIC), LOG (GFCF), INF, EXCHR and LOG (LABFORCE) to the human capital investment equation. The coefficient of the variables, LOG (PERCAPITA), INF and LOG (LAB-FORCE) indicate positive sign. The implication of the positive coefficient of the variables under consideration implies that percapita income positively affects human capital development of the country; and also the active labour

force participation growth is an indication of its significant contribution to the country's human capital development as corroborated by Amassoma and Nwosa (2011). Furthermore the public expenditure variable (PUBLIC) shows a negative sign, indicating that during the period under review, the public expenditure growth of Nigeria had little effect on the human capital development of the country. Likewise, the coefficient of the GFCF variable indicates a negative sign; the implication is that during the period under consideration, the fixed capital formation had a little effect on the human capital development of Nigeria.

Conclusion and Policy Recommendation

The endogenous growth theory by Romer and Lucas (1988) identified human capital development as an important factor in explaining the growth process. The emergence of the endogenous growth theory has been followed by empirical studies investigating the relationship between human capital development and economic growth. In line with related research in this area, this study examined the extent of causal nexus between human capital development and economic growth. The empirical analysis of this study revealed that there is no causality between human capital development and economic growth in Nigeria. This result is in contrast to theoretical proposition by Romer and Lucas (1988) and also in contrast to the findings of empirical analysis of the developed countries. The reason for the non-causality between these variables can be attributed to the progressive decline in the budgetary allocation to the educational and health sector over the years. The study equally showed that there exist a positive and statisti-

cally significant relationship between human capital development and economic growth in Nigeria.

The implication of the aforementioned is that if the government increases its budgetary allocation in the education and health sectors there is the tendency for economic growth to be stimulated appropriately. There is therefore the need to increase the budgetary allocation to the education and health sector and the establishment of sound and well-functioning vocational institute needed to bring about the needed growth in human capital that can influence economic growth. Notably, the result indicates that all most all the explanatory variables are in line with theoretical expectations. This means that a greater amount of each would stimulate increase in output level or rise in the growth of the economy.

Furthermore, the study identified that there is a mismatch between the labour market and the educational system and has generated controversy among experts how to fix it and as such generated unproductivity in the highest order and reduction in the economic growth of developing countries as observed by Balaguer (2016), Sarjana (2015) and Braga (2013) respectively. Hence, recommends that the government expend more its resources on training and skill acquisition to enhance growth of output productivity in the country. Furthermore, the government should ensure transparency when recruiting and appointing personnel into key sectors and positions so as to enhance productivity in general and more so to avoid the observed labour mismatch. Despite the remarkable findings of the current study it has some limitations which include: adequate resources, inaccessibility to data that would have been instrumental in covering a wider scope such as Sub Saharan Africa which in turn would have made the study more

robust. Hence, researchers can consider the aforementioned for further study regarding the implication it can have on Africa at large.

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