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Education and Economic Growth in Nigeria: A Granger Causality Analysis *(Pp. 90-108)*

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Abstract

This paper examines the notion that formal education accelerates economic growth using Nigerian data for the period 1980-2005. Time series econometrics (cointegration and Granger Causality Test) are applied to test the hypothesis of a growth strategy led by improvements in the education sector. The results show that there is cointegration between public expenditures on education, primary school enrolment and economic growth. The tests revealed that public expenditures on education Granger cause economic growth but the reverse is not the case. The tests also revealed that there is bi-directional causality between public recurrent expenditures on education and economic growth. No causal relationship was established between capital expenditure on education and growth and primary school enrolment and economic growth. The paper recommends improved funding for the education sector and a review of the primary school curricula to make it more relevant to the needs of the Nigerian society.

Key Words: Education, causality, Growth, cointegration, Expenditure

Introduction

Education is an age long phenomenon in all societies although it may take various forms from one society to another. In Nigeria two forms of education were in existence before the advent of colonialism. They were indigenous education and Islamic education. Traditional education as was practised in

the southern and some parts of the middle belt Nigeria, consisted essentially of general but informal training in character, norms, agriculture, fishing intellectual and other ways of life as approved by society. Islamic education on the other hand was practiced mainly in Northern part of Nigeria. It is based on the Quran. Both forms of education preceded the Western education which was introduced to Nigeria in the 19th century by the European Christian missionaries. The advent of colonialism brought about formal education in Nigeria. The colonialists had to organise the training of the indigenous people to understand the Queen's language. The Christian missionaries organised schools and trained Nigerians the art of reading and writing. The initial persons that were trained in the communities became the first indigenous persons to be employed by the colonial government as interpreters, clerks and teachers.

It did not take long before the benefits of formal western education became manifest in Nigeria. The regional governments of independent Nigeria expanded educational opportunities, building more schools and providing grant-in-aid to missionary schools in their respective regions especially in the southern regions. Expanded educational facilities were seen as the panacea to the manpower needs and overall development in post colonial Nigeria.

The role of human capital formation in economic development has long been recognised in the literature. According to Harbison (1973, p.3), "human beings are the active agents who accumulate capital, exploit natural resources, build social, economic and political organisations and carry forward national development. Clearly, a country which is unable to develop the skills and knowledge of its people and utilise them effectively in the national economy will be unable to develop anything else". Several other theoretical and empirical studies have found a positive correlation between human capital development and economic growth (Lucas, 1958; Romer, 1990; Barro, 2001; Abbas and Foreman – Peckb 2007).

Education – formal and informal, contributes to skill acquisition. Informal education begins at the household level where children are taught how to sweep, clean their environment, fish or farm. By participating in these activities they learn how to do things by themselves and contribute to family income growth. Although such incomes are not recorded in national income accounting, they nevertheless amount to substantial family income. According to Schultz (1962), formal education is a kind of investment in human being that enables them to acquire skills. Such skills raise the

marginal product of the worker itself and also help to raise the marginal product of the other co -operant factors. Thus human capital has a unique character – it enters the production function as a factor of production and also as a marginal product augmenting variable. The latter makes the marginal rate of return on capital and other inputs rise continuously so that the unexplained growth rate explains the Solow's surplus.

Human capital development through schooling is often associated with access to big jobs and higher incomes. This helps to explain the phenomenon of the Kuznets inverse "U" curve hypothesis (Gylfason and Zoega, 2003). The higher the incomes of the educated class and the more educated persons we have, the higher would be tax revenues which could be used for pro-poor growth projects and programmes. Due to the education – high income link, there is a common belief in Nigeria that education is the sure way to escape from abject poverty and from the drudgery of rural farm life. Parents see the education of their children as the best insurance not only for their future but also as a vessel of sustenance in their old age.

It is not surprising therefore that there was a rapid expansion in the education sector in Nigeria beginning from 1960 when political independence was attained. Between 1960 and 1974, educational facilities were expanded culminating in the take over of privately owned primary / secondary schools by government. In 1975 the central government also took over the universities and other tertiary institutions (Aigbokhan et al 2003) and created new ones. It is rather surprising when the federal ministry of education in 2003 reported that all is not well in the education sector since 1978. Financial inadequacies among other factors were responsible. The central Bank of Nigeria in year 2000 reported that inadequate funding has been the bane of the Nigerian education system. One question that borders one's mind is that why should government not fund education properly. Again does education no longer contribute to growth in Nigeria as it is elsewhere? Although some authors (Aigbokhan et al 2005; Adebiyi and Oladele 2005) have studied human capital development, through education in Nigeria, the causality issue is largely neglected. Although regression analysis deals with the dependence of one variable on other variables, it does not imply causation or the direction of influence. It is the aim of this paper therefore to fill this gap by focusing on the causality between education and growth in Nigeria. The result of the study will reveal the direction of causation between education development and economic growth. This will provide a guide to educational planners and administrators in formulating appropriate plans and strategies for the sector.

The paper is structured as follows. Section 1 is the general introduction. Section 2 presents an overview of the education sector in Nigeria. Section 3 presents the review of related literature which is followed by the empirical analysis in section 4. Section 5 concludes the paper.

Education in Nigeria: An Overview

The education sector in Nigeria has passed through two phases of development. There is the first phase of rapid expansion in the growth of the sector. This phase may be broadly located within the period 1950 – 1980. There is the second phase of rapid decline in the sector in terms of growth. This phase falls within the period 1981 – 2009.

In the early 1950s when representative governance took its roots in Nigeria, the three regional governments had control of the educational development in their respective regions. This first phase in educational development in Nigeria effectively marked the beginning of rapid expansion in terms of access. For example the number of pupils in primary schools was 626,000 in 1954, the figure rose to 2,912,619 in 1960. Similarly the number of post primary school rose from 161 in 1955 to 912 in 1960. The student population in post primary schools rose from 9,908 in 1947 to 140,401 in 1960 (Aigbokhan 2005). The surge in access to schools was due largely to the policies and programmes of governments that built primary and post primary schools and also provided grant – in- aid to missionary schools. We must note here that the missionary churches dominated the provision of schools before the government take over of primary and post primary schools in the early 1970s.

It must be noted also that at this initial phase of educational development no effort was made to select school curricula that would meet the long-run developmental needs of the Nigeria society. Rather emphasis was placed on numeracy and general intellectual capacity while technical and practical skills were neglected. The university college Ibadan which was the only university in Nigeria before 1960 had no facilities of engineering, law and technology.

Access to tertiary education was more than doubled with the establishment of the University of Nigeria, Nsukka (1960), university of Lagos (1962), University of Ife, Ile – Ife (1961), Ahmadu Bello university, Zaria (1962), University of Benin, Benin City (1970). These universities were established and funded by the post independence regional governments. In 1975, the federal government took over the regional universities and also extended

grants – in – aid to state owned polytechnics. More universities and colleges of technology (polytechnics) were established between 1975 and 1980. Awopegba and Adedeji (2000) noted that in establishing the new educational institutions, sound investment criteria were not followed; instead the need to have regional balance, ethnicity, nepotism and opportunity for personal gains were the determining factor.

One significant government policy to ensure unimpeded access to primary education was the introduction of the universal primary education (UPE) programme. This policy made primary education free to all Nigerian children.

The second phase of the educational development in Nigeria was a period characterised by a decline in educational inputs leading to deterioration of educational fixed assets, inadequate funding and declining standards. Aighokhan et al (2005) noted that the period 1978 – 1999 was a crisis period in the education sector in Nigeria and the root cause of the crises was inadequate funding. Table 1 below presents the declining trend in real resource allocation to education from 1990 – 2003.

Several reasons have been advanced for the low and unstable trend in the allocation of resources to the education sector. First, the dwindled oil revenues due to a fall in oil prices in the early 1980s lowered federal government budgetary allocations and education sector was the first to get the knock. Second the IMF/World Bank inspired structural Adjustment Programme (SAP) that was adopted as a development policy beginning from 1986 engendered cuts in fiscal spending including education expenditure. Third, the debt overhang of the 1980s and 1990s constrained the amount of resources available for the other sectors of the economy including the education sector. Fourth, it has also been suggested that the long military rule in Nigeria favoured the defence sector to the neglect of the education sector in terms of resource allocation. Fifth, widespread corruption in the management of educational institutions by political and school administrators has contributed to the underfunding of the education sector in the past three decades. These factors have led to gross underfunding of the schools in the phase of increased enrolment, leading to what was described in the National Economic Empowerment and Development Strategy (NEEDS) document as, "Findings from an ongoing educational sector analysis confirms the poor state of education in Nigeria. The national literacy rate is currently 67

percent. Some 49 percent of the teaching force is unqualified. There are acute shortages of infrastructure and facilities at all levels" (NEEDS, P 34).

In 1976, a new structure was introduced into the education system in Nigeria to replace the old structure of 6 years primary; 5 to 7 years post primary (i.e. secondary, teacher training colleges and sixth form or higher school) and 4 – 7 years of tertiary education (University, Polytechnics, and colleges of education). What is new in the new system is that post primary education is now made of two tiers i.e. three years of Junior secondary and 3 years of Senior secondary education for ages 11-13; 3 years of senior secondary school for ages 14 – 16 years and 4-7 years of tertiary education for ages 17 years and above.

Review of Related Literature/Analytical framework
The relationship between human capital development through education (schooling) and economic growth of countries have been variously studied. Most of such studies however have been more of cross-country analysis. These studies adopted various methodologies such as the ordinary least squares (OLS) (Geol, 1974; Barro, 1991, Barro and Lee 1994; Abbas 2001; Lin, 2003), three –stage least square (Sylvester, 2000; Barro 2001), co integration (Babatunde and Adefabi, 2005) Granger Causality (Self and Grabowski 2004). The results from these studies are mixed but majority point to a positive relationship between education and economic growth.

Although earlier studies (Lucas 1988; Romer 1990) analysed the importance of education and human capital development in the growth process, it was Barro (1991) that brought to the limelight the link between educational expenditures and economic growth. The study found a positive relationship between the growth rate of real per capital output and the level of school enrolment. The study argued that an increasing rate of investment in human capital development would help to close the development gap between the developing and developed countries.

Ramirez et al (1997) employing cross country data investigated the channels through which human capital development affects economic growth and vice visa. The study argues that economic growth may lead to human capital development and human capital development could also lead to economic growth. This bi-directional relationship could lead to virtuous or vicious cycles of economic growth. The study finds that countries which promoted economic growth tend to achieve the vicious category while countries which favoured human capital development encounter the virtuous growth.

Loening (2005) examined the relationship between human capital development and economic growth using data from Guatemala and found that a better educated labour force appears to have a positive impact on output growth.

Dorian (1997) employing a neoclassical framework estimated a structural growth model in which he included education and health as explanatory variables. The study found a positive relationship between economic growth and health. The relationship between education and economic growth was found to be insignificant.

Adebiyi and Oladele (2005) empirically investigated the relationship between public education expenditure and defence spending in Nigeria. The study employed the error correction mechanism and the vector autoregressive (VAR) models and found a negative trade – off between defence spending and public education expenditure. Analysis of the impulse response functions derived from the VAR model reveals that past public education expenditure shocks has a positive but declining relationship with current public education expenditure in the first two years after which it turns negative. Also the impulse responses show that increase in defence spending will increase public expenditure available for education in the short-run. The study did not examine the causal link between the various levels of education and economic growth.

Babatunde and Adefabi (2005) examined the long-run relationship between Education and economic growth in Nigeria using the Johansen co- integration approach as a framework of analysis. The results of the co integrating technique suggest that there is long-run relationship between enrolments in primary and tertiary levels of education and the average years of schooling with output per worker. The study concluded that a well educated labour force possessed a positive and significant impact on economic growth through factor accumulation and on the evolution of total factor productivity.

Aighokhan et al (2005) analysed the impact of education expenditures on human capital development. The study used historical data to establish the correlation between public education expenditure and human capital development in Nigeria and noted that insufficient and uncertain budgetary allocations to education have resulted in the deterioration of its impact on human capital development. Education spending as percentages of annual budgets were low and unstable during the period studied. The study did not

analyse the channels through which education expenditure impact on human capital development.

Omotor (2004) analysed the determinants of federal government expenditures in the education sector in Nigeria using the ordinary least squares (OLS) methods. The study revealed that the trend in education expenditure in Nigeria is unstable which reflects the instability in government earning. Government revenue was the only significant determinant of education expenditures as revealed by the results of the regression. The study recommends a diversification of the sources of funding education so as to reverse the unstable trend in that sector.

Owoeye and Adenuga (2005) investigated the relationship between expenditures on education and health, and economic growth. The study estimated a parsimonious error correction model and found that expenditures on education impacts positively on economic growth. The study recommended that more resources should be channelled towards the level of education where the benefits are higher for the individual and the society at large. The study did not investigate the direction of the link between educational expenditures and economic growth. Following Adebiyi and Oladele (2005), this study seek to examine the causal relationship between federal government spending on education and economic growth using Nigerian data.

Empirical Analysis
The Model
This study seeks to investigate the direction of causation between variables in the education sector and economic growth in Nigeria using the Granger causality test as developed by Granger (1969). According to this test, a variable (say educational expenditure) is said to Granger cause another variable (say GDP) if past and present values of educational expenditure help to predict levels of output growth (GDP).

The Granger causality procedure between two variables may be demonstrated thus:

$$EDEXP_t - \sum_{i=1}^{n} \alpha i EDEXP_{t-i}$$

$$+ \sum_{i=1}^{n} \beta i\, RGDPG_{t-i}$$

$$+ u_i \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$RGDPG_t = \sum_{i=1}^{n} \tau_i EDEXP_{t-i}$$

$$+ \sum_{i=1}^{n} \delta_i\, GDP_{t-i}$$

$$+ v_i \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where:

EDEXP =   Public education expenditure

RGDPG =   Real Gross domestic product growth

The null hypothesis to be tested are

H_1: $\tau_i = 0$, i = 1 . . . n i.e. education expenditure do not Granger cause RGDPG, and

H_1: $\beta_{i =}$ 0, i = 1 . . . n, i.e. RGDPG does not Granger cause public expenditure on education. It has been suggested (Engle and Granger 1987; 1998; Jordan and Eita, 2009) that if variables in a model are 1(I) and cointegrated, the use of the Granger causality test employing the simple F-test may not be sufficient. It is therefore suggested that if the variables in the analysis are 1(1) and are cointegrated, the traditional Granger causality test should not be used, rather analysing the causality relationship on the basis of the error correction model (ECM) would produce proper statistical estimates (Jordan and Eita, 2007). Given these circumstances and adopting Granger causality should be conducted in the ECM framework as expressed below.

$$\Delta TDEXP_{t-1} = \sum_{i=1}^{n} \alpha i \Delta TEDEXP_{t-i}$$
$$+ \sum_{i=1}^{n} \beta i \Delta RGDPG_{t-i} + \emptyset_1 \varepsilon_{1t-1}$$
$$+ u_t \dots (3)$$

$$\Delta RGDPG_{t-1} = \sum_{i=1}^{n} \tau i \Delta TEDEXP_{t-i}$$
$$+ \sum_{i=1}^{n} \delta i \Delta RGDPG_{t-i} + \emptyset_2 \varepsilon_{2t-1}$$
$$+ V_t \dots (4)$$

Where

ε_{1t-1} *and* ε_{2t-1} *are the lagged values of the error of the following*

Co integration equations:

$$TEDEXP_i = \sigma + \theta RGDPG_i + \varepsilon_{1i} \dots\dots (5)$$

$$RGDPG_i = \omega + \varphi TEDEXP_i + \varepsilon_{2i} \dots\dots (6)$$

The Data
The data used for this study are defined as follows: TEDEXP = Total Expenditure on public education

REDEXP = Recurrent Expenditure on education

CEDEXP Capital Expenditure on education

PEDEN = Primary education enrolment

RGDPG = Real Gross Domestic Product Growth

The data on these variables were obtained from the National Bureau of Statistics. Abstract of statistics, various editions.

Empirical Methodology
To avoid the problem of "spurious" regression, the Augumented Dickey-Fuller (ADF) statistics was used to test the stationarity or non-stationarity of the variables and their order of integration. If the results of the ADF tests show that the variables are (1(1), then we proceed to test whether they are cointegrated. To do this we use the Johansen (1988, 1995) full information maximum likelihood procedure.

This methodology corrects for autocorrelation and endogeneity parametrically using a vector error correction mechanism specification (Jordan and Eita 2007). Defining a vector Xi of μ potentially endogenous variables, a data generating process may be specified and a model Xi as an unrestricted vector autoregression (VAR) involving up to K lags of Xi could be specified as

$$Xi = \varphi + A_i x_{i-1} + \cdots + A_i x_{i-k} + \varepsilon_{i.}$$

$$\varphi_i \sim IN(0\varepsilon) \ldots\ldots\ldots\ldots\ldots.(7)$$

Where Xi is (n x l) and each of the Ai is an (n x n) matrix of parameters. Jordan and Eitas (2007) suggest this type of VAR modelling in estimating dynamic relationships among jointly endogenous variables. Equation (7) can be re-specified into vector error correction model (VECM)

Thus:

$$\Delta x_{i=}\varphi + \sigma_1 \Delta x_{i-1} + \cdots + \sigma_{k-1}\Delta x_{i-k-1} + \pi x_{i-k} + \varepsilon_i \ldots\ldots. (8)$$

Where

$$\sigma_i = -(I - A1 - \cdots\ldots\ldots - Ai), (i = 1 \ldots\ldots k - 1) and$$

π = -(I – Ai _ .... – AK), I is a unit matrix and Ai (i = I.......P) are coefficient vectors, P is the number of lags included in the system. ε is the vector of residuals which represent the influence of exogenous shocks. φ is a constant term and Δ represent variables in difference form.

In equation (8) $\sigma \text{ and } \pi$ provides information about the short-run and long-run in the system. The long-run coefficients are defined as a multiple of two (n x r) vectors and represented by $\pi = \alpha \beta$ where α is a vector of the loading matrices and denotes the speed of adjustment to equilibrium if it was initially displaced. β is a matrix of long-run coefficient so that the term βx_{i-1} in equation (8) represents up to (n – 1) cointegrating relationships in the cointegration model. If there is evidence of cointegration among the variables, it is then appropriate to test the direction of causality as illustrated in equation (3) and (4) and others.

Empirical Results

First we test the stochastic characteristics of the variable using the augmented Dickey Fuller (ADF) to determine whether the variables are stationary. The result of the ADF test is reported in table 2 below.

The results of table 2 show that the variables are non-stationary in levels, but stationary in first difference. With this result, we now proceed to test if the variables are cointegrated using Johansen (1988), Johansen and Juselius (1990) reduced rank procedures. The lag length for all estimations was based on the Akaike information criteria, log likelihood ratio and Schwarz information criteria. In determining the number of co-integration of vectors, we used the degrees of freedom, adjusted version of trace statistics in determining the number of co-integrating vectors. The results of the Johansen Co-integration tests are presented in tables 3-4.

From tables 3-4, we establish that there is co-integration between the variables. This enables us to proceed to test for the direction of causality using the vector error correction model. The presence of a cointegrating vector allows for the use of a vector error correction model to test causality. The results of the Granger causality test are presented in table 5 above:

The results of the Pairwise Granger causality test between economic growth (RGDPG) and total government expenditure on education and primary education enrolment are presented in table 5 above. Total government expenditure on education is decomposed into capital expenditure on education and recurrent expenditure on education. The lag length adopted for the analysis is 6. This is informed by the fact that the structure of the educational system in Nigeria is made up of six years primary education, six years of post primary and four to six years of tertiary education. It could be

argued therefore that it will take an average of six or more years before a child who went to school would contribute to income growth in Nigeria.

From table 5, we observe that while total expenditure on education Granger cause income growth (RGDPG), the latter does not Granger cause the former. This is a reflection of the unstable and low level of government resource allocation to the education sector over time. For example, while federal government budget for the education sector was 8.15% in 1980, it declined to 1.94% in 1985, 2.97%, and 9.56% in 1990, 1995 and 2000 respectively (CBN, 2003).

From table 5, there is a bi-directional causality between recurrent expenditure on education and income growth. Since the bulk of recurrent expenditures are on manpower needs of the sector it implies that expenditures on recurrent items contribute to the growth of the sector and the economy at large. Income growth on the other hand facilitates the recruitment of higher level of manpower in the sector.

Table 5 also reveals that capital expenditure on education does not Granger cause economic growth. On the other hand, economic growth Granger- cause capital expenditure on education.

And finally, there is no causality between primary school enrolment and economic growth.

Conclusion
The aim of this article was to test the hypothesis that education promotes economic growth using Nigerian data. The analysis covers the period 1980 to 2005. A Granger causality test on the basis of the error correction mechanism was used to test the causality between public expenditures on education, primary school enrolment and economic growth in Nigeria. It also tested if public expenditures on education and primary school enrolment are co-integrated. The test results revealed evidence of cointegration. The results show that there is bi-directional causality between recurrent expenditure on education and economic growth. This suggests that improvements in the quality and quatity of manpower in schools have a positive effects on economic growth. This is so because the bulk of recurrent expenditures are on staff emoluments. The results also reveal that total public expenditures on education Granger- cause economic growth, while the reverse is not the case. This is a reflection of the inadequate funding of the education sector over time. Primary school enrolment does not Granger cause economic growth as

revealed by the results. This is not surprising because primary school curricula have been found to be modelled after the Western education system with little or no relevance to the domestic environment. The curricula do not impart skills in agriculture and other vocations.

In view of the findings of this paper, we recommend increased funding in the education sector and an overhaul of the primary school curricula that would accommodate training in the vocations and agriculture.

Table 1: Federal Government Budgetary Allocation to Education 1991 – 2003 (₦m)

Year	Federal government annual budget	Allocation to education	Allocation to education as % total allocation
1991	38.7	1.8	4.6
1992	52.1	2.4	4.6
1993	111.6	8.0	14.4
1994	69.2	10.3	14.4
1995	111.5	12.8	11.5
1996	121.2	15.4	10.8
1997	188.1	16.7	11.5
1998	246.3	23.7	9.6
1999	249.0	27.8	11.1
2000	N.A	N.A	8.4
2001	894.2	62.6	7.00
2002	N.A	69.0	5.9
2003	765	13.5	1.8

Source: *Education sector status Report 2003, effective funding and quality assurance in Nigerian education system. as in Aigbokhan et al(2005)*

Table 2: Results of ADF Unit Root Test

Variable	Test Statistic Levels	1st Difference	Critical Value	
RGDPG	-3.08470	-62568	-3.7497 1(1)	***
PEDUC	-3.55273	-5/35177	-4.4167 1(1)	***
TEDEXP	-0.6374	-469654	-4.3942 1(1)	***
REDEXP	-2.04777	-6.81817	-4.4167 1(1)	***
CEDEXP	-1.84546	-6.53196	-4.4167 1(1)	***

Source: *Author's calculations*

***/** indicates rejection of the null hypothesis of a unit root at 5%/10% significance level.

Table 3: Jonansen Cointegration Test

Date: 11/20/09   Time: 14:10
Sample: 1980 2005
Included observations: 24
Test assumption: Linear deterministic trend in the data
Series: RGDPG   RGDPG   REDEXP   CEDEXP
Lags interval: 1 to 1

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	5 Percent Critical Value	Hypothesized No. Of CE(s)
0.947803	144.2841	29.68	35.65	None**
0.923674	73.41867	15.41	20.04	At most 1**
0.385145	11.67284	3.76	6.65	At most 2*

*(**) denotes rejection of the hypothesis at 5% (1%) significance level
 L.R. test indicates 3 cointegrating equation(s) at 5% significant level.
Source: Author's calculations

Table 4: Jonansen Cointegration Test
Date: 11/20/09   Time: 13:52
Sample: 1980 2005
Included observations: 24
Test assumption: Linear deterministic trend in the data
Series: RGDPG   PEDUC   TEDEXP
Lags interval: 1 to 1

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	5 Percent Critical Value	Hypothesized No. Of CE(s)
0.982429	149.2724	29.68	35.65	None**
0.858870	52.27562	15.41	20.04	At most 1**
0.197545	5.281896	3.76	6.65	At most 2*

*(**) denotes rejection of the hypothesis at 5% (1%) significance level L.R. test indicates 3 cointegrating equation(s) at 5% significant level.
Source: Author's calculations

Table 5: Results of the Pairwise Granger Causality

Pairwise Granger Causality
Date: 12/22/09   Time: 15:06
Sample: 1980 2005
Lags: 6

Null Hypothesis:	Obs	F-Statistics	Probability
TEDEXP does not Granger Cause RGDPG	20	27.9226	0.00015
RGDPG does not Granger Cause TEDEXP		32.3112	9.3E-05
REDEXP does not Granger Cause RGDPG	20	6.80888	0.01165
RGDPG does not Granger Cause REDEXP		22.5904	0.00030
CEDEXP does not Granger Cause RGDPG	20	112.329	1.3E-60
RGDPG does not Granger Cause CEDEXP		10.0833	0.00376
PEDUC does not Granger Cause RGDPG	20	1952.58	6.4E-11
RGDPG does not Granger Cause PEDUC		72 .6958	6.0E-06

Source: Author's calculations

References

Abbas, Q. (2001). Endogenous Growth and Human Capital: A Comparative study of Pakistan and Sri Lauka. *The Pakistan Development Review*, 40 Vol.(4): pp.987 – 1007.

Abbas, Q. And Foreman – Packb J. (2007). Human Capital and Economic Growth: Pakistan, 1960 -2003. NRPU projects by Higher Education Commission (HEC) of Pakistan.

Adebiyi, M. (2006): Education – Economic Growth Paradox in Nigeria: An Autoregressive Model. SSRN. http://ssrn.com/abstract = 876244. (Accessed february10, 2010)

Adebiyi M.A. and O. Oladele. (2005). Public Education Expenditure and Defence Spending in Nigeria: An Empirical Investigation. http//www.saga.cornell.educ/saga/educconf/adebiyi.pdf (accessed February 10, 2010)

Aigbokhan, B., Imahe O., and Ailemen, M.I. (2007) "Education Expenditure and Human Capital Development in Nigeria: Any correlation so far? Research Paper. Ambrose Ali University Ekpoma Nigeria.

Awopegba P.O. and Adedeji (2000). The Education Sector: Objectives, Priorities, Strategies and Policies", in Obadan M.I. (ed). Policy Issues in the Nigerian Economy. Ibadan NCEMA. Pp.187-206

Babatunde, M.A and Adefabi, R.A., (2005). Long-Run relationship between Education and Economic growth in Nigeria: Evidence from Johannes's cointegration Approach. Paper presented at the Regional conference on education in West Africa: constraints and opportunities. Dakar Senegal Nov. 1st – 2nd 2006.

Barro, R.J. (1991). " Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics*. Vol. 106 pp. 407 – 443.

Barro, R.J. and Lee Jong – Wha (1993). "International Comparisons of Educational Attainment". *Journal of Monetary Economics* Vol.32 (3): pp. 263 – 394.

Barro, R.J. (2001). Human Capital and Economic Growth. *American Economic Review*. Vol.91(2), pp.12-17.

Dike, Victor (2009). The State of Education in Nigeria and the Health of the Nation. African Economic Analysis. Ahmadu Bello University Press Zaria Nigeria.

Dorian, S.K. (1997). Education and Health in an Effective – Labour Empirical Growth Model. *The Economic Record*. Vol.73: pp.314 – 328.

Engle, R. And Granger, C.W.J. (1987). Co-integration and error correction: Representation, estimation and testing. *Econometrica*. Vol. 55(2). Pp.251-276.

Geol, S.C. (1974), " Education and Economic Growth in India. *Comparative Education* Vol.10(2): pp.147 – 158.

Gylfason, T. And Zoeya, G. (2003), Education, Social Equality and Economic Growth: A view of the Landscape *Economic Studies* Vol.49: pp.557 – 579.

Granger, C.W.J. (1969). Investigating the causal relations by econometric models and cross-spectral methods. *Econometrica*. Vol.37(3) pp.424-438.

Harbinson .H. (1973). *Human Resources as the Wealth of Nations*. University Press. New York. Oxford

Johansen, S. (1988). "Statistical Analysis of Cointegrating Vectors." *Journal of Economic Dynamics and Control* Vol 12; pp.213 – 254

Johansen, S. And Juselius, K (1990), " Maximum Likelihood Estimation and Inference on cointegration with application to the Demand for money. *Oxford Bulletin of Economics and Statistics* Vol.55: pp.169-210.

Johansen, S. (1995). *Likelihood Based Inferences in Cointegrated Vector Autoregressive Models*. Oxford University Press. Oxford.

Jordan, A.G and Eita, J.H. (2007). Export and Economic Growth in Namibia: A Granger Causality Analysis. *The South African Journal of Economics Vol.* 75 (3): pp.540 – 547.

Lin, T.C. (2003), Education, Technical Progress and Economic Growth. The Case of Taiwan. *Economic of Education Review*. Vol.22 (2), pp.213-220).

Loening, J.L. (2005). Effects of Primary, Secondary and Tertiary Education: Evidence from Guatemala Policy Research Working Paper (3610).

Lucas, R.E. (1988). "On the Mechanics of Economic Development". *Journal of Monetary Economics.* Vol.22: pp.3 – 42

Omotor, D. G. (2004). "An Analysis of Federal Government Expenditure in the Education Sector of Nigeria: Implications for National Development . *Journal of Social Sciences.* Vol.9(2): pp.105-110

Owoeye and Adenuga (2005). Human Capital and Economic Development: An Empirical Analysis of A Developing Economy (1970 – 2000) A working paper. Univerity of Ado-Ekiti,, Nigeria *http//Paper.ssrn.com/so13/papers.cfm?abstract-id=726748* (accessed February 10, 2010)

Ramirez, A, Ranis, G. And Stewart, (1997). Economic Growth and Human development. Center Discussion Paper No 787.

Romer, P.M. (1990), "Endogenous Technical Change. *Journal of Political Economy.* Vol.98: pp.571 – 5102

Schulz T.H. (1962), " Reflections on Investment in man". *Journal of Political Economics.* Vol.70 (5): pp.1-8.

Self, S. And Grabowski, R. (2004). Does Education at all levels cause growth? India, a case study. *Economics of Education Review.* Vol.23 : pp.47 – 55.

Sylvester, K. (2000), Income Inequality, Education Expenditures and Growth. Journal of Development Economics. Vol.63: pp.379 – 398.