Does Tertiary Enrolment Cause Growth in Nigeria? A Vector Auto Regression Mechanism

Michael Segun Ogunmuyiwa[1] & Babatunde A. Okuneye[1]

[1] Department of Economics, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria

Correspondence: Michael Segun Ogunmuyiwa, Department of Economics, Olabisi Onabanjo University, Ago-Iwoye, P.O Box 285, Ota, Ogun State, Nigeria. Tel: 234-805-543-0044. E-mail: misego@yahoo.com

Abstract

The trend in tertiary enrolment indicates that even though it has nominally been increasing, in real terms, it is abysmally nose-diving. This is largely due, in part, to the declining trend of the budgetary allocation to education in Nigeria. Against this backdrop, this paper investigates the causal effects of tertiary enrolment on economic growth in Nigeria between 1980 and 2010. The study utilized the VAR approach and the VAR-Granger causality test to analyze the empirical model of the study. The findings of the empirical investigation suggest that there is a uni-directional causality between tertiary enrolment and economic growth in Nigeria. The causality runs from economic growth to tertiary enrolment in Nigeria. The paper therefore recommends that there is need for government to genuinely be committed to funding the educational sector if the aspiration to be among the twenty most developed economies by the year 2020 will not be a mirage.

Keywords: education, tertiary enrolment, economic growth

1. Introduction

The relationship between education and development is deeply rooted in the literature. As a matter of fact, education is a key index to development and that the development of nations in the 21st century depends on the quality and quantum of their educated citizens (World Bank, 2008). It has been documented that schooling improves productivity, health and reduce negative features of life such as child labour as well as bringing about empowerment. From a global perspective, economic and social developments are increasingly driven by the advancement and application of knowledge. Education in general and higher education in particular, are fundamental to the construction of a knowledge-based economy and society in all nations (World Bank, 2008). Besides acting as an important vehicle of achieving equitable income distribution, human resource development is also a potent means of addressing the problem of poverty. Thus, education is very vital to the pace of social, political and economic development of any nation. Corroborating this increased global awareness regarding the significance of education, the United Nations (UN) dedicated a goal (Goal 2) in the Millennium Development Goals (MDGs) to achieving Universal Primary Education (UPE) among the member nations by 2015. Specifically, the most obvious direct benefit of education is that educated workers will receive higher income apparently due to increased productivity than those who are less educated. Thus, the direct benefit of education to any individual is higher lifetime earnings (Glick & Sahn, 2000; Lincove, 2009).

Enrollment rates and years of schooling have risen in most countries of the world and this can be attributed to successive generations of parental investment in children's education within the confine of a stable household structure. Overtime, these investments have narrowed the differences in schooling across and within countries, and between and within genders. In 1960, the average schooling of men aged 25 and over in advanced countries were 5.8 times that of men in developing countries. In 2000, this ratio fell to 2.4. During the same period, women's average schooling level as a ratio of men increased from 0.5 to 0.7 in developing countries. While increasing incomes, shifts in demand for more skilled labour and government investment of considerable resources on building and equipping schools (through various policy interventions), have all contributed to this global convergence in enrollment rates and completed years of schooling. Nevertheless, substantial education gaps persist between the rich and the poor countries, and even between male and female enrolment in many developing countries (Orazem & King, 2008).

In Nigeria, available evidence has shown that tertiary enrolment growth rates are quite inconsistent and sluggish.

The profile of tertiary enrolment in Nigeria reveals that tertiary enrolment has relatively been increasing over the years with the highest growth rate of 219.64 percent in 1997 and the lowest growth rate in 2004. However, 1995 and 2004 recorded major distortions in the tertiary enrolment in Nigeria. In fact, tertiary enrolment dropped substantially in Nigeria by 67 percent in 2004 after which it grew by 4.8 in 2009 before falling to 1.2 percent in 2010. This fluctuating trend is largely due to the low budgetary allocation to the sector coupled with the political crisis and industrial disputes witnessed during these periods. It should be noted that in spite of various policy interventions initiated by the government over the years to stimulate schooling at all levels of education, enrolment rates of school-aged children particularly the tertiary enrolment is abysmally low. The contribution of this paper is two-fold. Firstly, even though the empirical evidences regarding the impact of education on economic growth is legion yet the causal effect of tertiary enrolment on growth is still very nascent. Secondly, the nonchalant attitude of the government towards the development of educational sector in Nigeria, as reflected in the government funding preferences, calls for empirical investigation. Therefore, the main objective of this paper is to examine the causality between tertiary enrolment and economic growth in Nigeria. The rest of this paper is organized as follows: Section 2 presents the review of related literature on education and growth nexus. It also provides a performance analysis of tertiary education in Nigeria between 1980 and 2010. Section 3 houses the theoretical framework and the methodology adopted for the study as well as the discussion of the empirical result while section 4 concludes the study.

2. Review of Relevant Literature

The potential benefit of education (measured by human capital development) on growth is well documented in the literature. While some studies showed a positive and significant relationship others exhibit a negative but significant relationship. For instance, a positive but significant link between human capital and economic growth are found in the works of Barros (1991), Mankiw, Romer, and Weil (1992), Burneth, Marble, and Patrinos (1995), Grammy and Assane (1996), Ojo and Oshikoya (1995) as well as Podrecca and Carmeci (2002). However, Barros (1991) study of 98 countries between 1960 and 1985, used school enrolment rates as proxies for human capital. His findings revealed that growth rate of real per capita GDP is positively related to initial human capital proxied by 1960 school enrolment rates. According to Romer (1990), human capital is the key input to the research sector that generates the new product or ideas which underlie technological progress. Thus, countries with greater initial stocks of human capital experience a more rapid rate of introduction of new goods and thereby, tend to grow faster. Mankiw, Romer and Weil (1992) used the augmented Solow growth model with the product of secondary school; enrolment ratio and the proportion of the Labour force of secondary school age as a measure of flow of investment in human capital. Their results show that investment in human capital substantially and significantly influenced per capita income growth. Even when primary school enrolment was used as suggested by Romer (1995) and Klenow and Rodriguez-Clare (1997), the results still show that human capital term is highly significant.

In the study conducted on East Asia, Burneth, Marble, and Patrinos (1995) indicate that massive investment in both primary and lower secondary education significantly explained the development "miracle" experienced in the region. Using varied forms of human capital investment such as school enrolment, human development index, and economic liberty index, Grammy and Assane (1996) have found that human capital formation positively and significantly contributed to economic growth. In their study of African countries, Ojo and Oshikoya (1995) found literacy rate and average year of schooling to be positively related to per capita output growth. Using other indices such as school enrolment, they found that the signs of their coefficients were either wrong or statistically insignificant. A significant departure from the cross-sectional or cross-country studies is that of Ncube (1999). Incorporating human capital variable (proxied by total enrolment) into the standard growth model, he found a very strong long-run relationship between human capital investment and economic growth in Zimbabwe.

In similar vein, a negative but significant relationship between education and human capital is evident in the works of Benhabib and Spiegel (1994), Islam (1995), Caseli, Esquivel, and Lefort (1996) and Hoeffler (1999). Benhabib and Spiegel (1994), use a standard growth accounting framework that includes initial per capita income and estimates of years of schooling from Kyriacou (1991) and found a negative coefficient on growth of years of schooling. Using annual data on a different set of capital stock Jovanovich, Lach, and Levy (1992) found negative coefficients on education for a non-OECD countries sample. Recent studies based on panel data to allow for country specific effects such as Islam (1995), Caselli, Esquivel, and Lefort (1996) and Hoeffler (1999) consistently found negative signs on schooling variables. Even Barro (1991) found a negative impact of human capital on growth when student-teacher ratios (showing quality of education) and adult literacy rates were used as proxies for human capital.

In Nigeria, there have been considerable attempts to empirically validate the effects of educational investment on

growth. Few of these attempts include Akangbou (1983) Anyanwu (1996) and Aliu (2001) among others. Using 1974/75 data from the former Mid-western Nigeria, Akangbou (1983) calculated the crude private average rates of investment return on education for secondary and post secondary levels. The estimated crude private rates of returns were 13.4 percent for lower secondary school level, 11.9, 11.2 and 17.2 percent for secondary technical, upper secondary and university levels respectively. He also computed the crude social average returns to be 12.3, 11.0, 10.4 and 12.7 percent for lower secondary school, secondary technical, upper secondary school and university levels respectively. The general conclusion of his findings is that no matter the magnitude of monetary resources expended on education, the private and social returns are always profitable and justifiable. Thus, investment on education positively affects the economy.

2.1 Performance of Tertiary Education in Nigeria

The profile of tertiary enrolment and government expenditure on education in Nigeria between 1980 and 2010 is presented in table 3.1. The trend analysis reveals that tertiary enrolment has relatively been increasing over the years with the highest growth rate of 219.64 percent in 1997 and the lowest growth rate in 2004. However, 1995 and 2004 recorded major distortions in the tertiary enrolment in Nigeria. This is essentially due to the political crisis and industrial dispute witnessed during these periods. With the exception of 1996 and 2004, the growth rates revealed positive trends over the years under consideration even though they followed an inconsistent pattern. In fact, tertiary enrolment dropped substantially in Nigeria by 67 percent in 2004 after which it grew by 4.8 in 2009 before falling to 1.2 percent in 2010. It is however disheartening to observe that since the return of the country to civil rule, the growth rates of tertiary enrolment is less than 12 percent despite the colossal amount of money expended on the sector. This is grossly inadequate for a country aspiring to be among the 20 leading developed economies of the world by the year 2020. In addition, stringent admission process and financial incapability on the part of the parents to meet up with rising costs of education are some of the reasons why tertiary enrolment has been nose-diving over the years.

Although, the expenditure pattern showed considerable increases for a good number of years, yet, the trend in growth rate suggests that the observed increases have been quite insignificant and inconsistent. For instance, the growth rate of total government expenditure on education was negative in 1981, 1983, 1984, 1985, 1987, 1991, 1993, and 2003. This profile largely depicts irregular and inconsistent preferences as well as lack of genuine commitment on the part of the government towards the development of the educational sectors in Nigeria. Between 2006 and 2010, the total government expenditure on education was less than 15 percent of the entire annual budget during these periods. This indeed portends great threat to the human capital development drive of the country towards achieving sustainable economic growth and development.

3. Methodology and Empirical Results

3.1 Theoretical Framework

The standard methodology of growth studies begins with the neoclassical (Solow) production function of the form.

$$Y_t = A_t f(K_t, L_t) \qquad (1)$$

Where Y is aggregate real output, K is the capital stock, L is labour, A is the efficiency factor and t is the time dimension. However, the capital stock K takes account of the energy consumed in the economy. Expressed in growth form, equation (1) becomes

$$G_y = G_A + \beta_k + G_k + B_L\,G_L \qquad (2)$$

Within the growth accounting framework and given the fact that capital stock data is generally not available (unless computed using inventory method), equation (2) is usually estimated in the form:

$$G_y = G_a + \beta k\,(I/Y) + B_L\,G_L \qquad (3)$$

Where *I/Y* is the investment aggregate output (income) ratio.

The emergence of endogenous growth theory and models (e.g., Romer, 1990; Barro, 1991) suggests that other endogenous factors such as government policies as well as political stability, market distortions, human capital development and school enrolment and so on largely influence economic growth. In other words, it is impossible for economic growth to occur without exogenous factors such as changes in technology or population. Accordingly, several studies (see those reviewed by Renelt, 1991) have attempted to integrate exogenous forces with endogenous factors in explaining economic growth across countries. In these studies, the augmented Solow neoclassical production function was used.

In particular, the formulation adopted by Mankiw et al. (1992) and Grammy and Assane (1996) can be modified

and expressed as:

$$Y_t = A_{(t)} K_{a_1} L_{a_2} H_{a_3} \quad E_{a_4} \quad a_1 > 0, \ a_2 > 0, \ a_3 > 0, \ a_4 > 0 \tag{4}$$

Where H is human capital, E is the total energy consumed and $a_1 + a_2 + a_3 + a_4 = 1$ (assuming constant returns to scale); other variable are as defined earlier. Taking the natural logarithm of both sides of the equation produces a linear equation in levels of the form.

$$LnY = a + a_1 \, lnK + a_2 InL + a_3 \, InH + a_4 \, InE \tag{5}$$

The linear in log levels specification can also be expressed in rates of growth thus.

$$y = a + a_1 k + a_2 l + a_3 h + a_4 e \tag{6}$$

Where *y, k, I, h* and *e* are the percentage growth rates of real output, physical capital, labour, and human capital respectively. In this formulation, 'a' is the growth rate of growth accounting residual.

In summary, endogenous growth model proponents believe that improvement in productivity can be linked to foster the pace of innovation and extra investment in human capital as well as a vibrant energy sector. Thus, the theory predicts positive externalities and spill-over effects from development of a high value-added energy economy which is able to develop and maintain a competitive advantage in growth industries in the global economy. In addition, the theory emphasizes that private investment in Research and development (R and D) is the central source of technical progress.

3.2 Model Specification

In order to determine the causal relationship between education and economic growth and particularly following the empirical works of Sharmistha and Grabowski (2004) and Podecca and Carmeci (2002), the following stationary autoregressive models were formulated:

$$Y_t = c_1 + \sum_{i=1}^{p=4} \alpha_i Y_{t-1} + \sum_{j=1}^{p=4} \beta_j LTE_{t-j} + \varepsilon_{1t} \tag{7}$$

$$LTE_t = c_2 + \sum_{i=1}^{p=4} \gamma_i Y_{t-1} + \sum_{j=1}^{p=4} \delta_j LTE_{t-j} + \varepsilon_{2t} \tag{8}$$

Where:

Y_t = log of Real GDP.

LTE_t = log of Tertiary Enrolment and the chosen lag length is 4.

Before proceeding to examining the relationship between tertiary enrolment and gross domestic product, it is incumbent to test for unit root to know whether the series are stationary or otherwise. Regressions without stationary series are not only spurious but its outcomes are also meaningless. Hence, the Augmented Dickey Fuller (ADF) unit root tests are performed on the series as shown below.

Table 1. Augmented Dickey Fuller (ADF) unit root test with trend (1980-2010)

ADF AT LEVELS				ADF AT 1ST DIFFERENCE		
Vars	**ADF**	**Prob**	**Lags**	**ADF**	**Prob**	**Stationarity**
GDP	4.82394	1.0000	1	4.5459	0.0072	I(1)
TE	2.110632	0.5189	1	12.3690	0.0000	I(1)

The ADF test in Table 1 revealed that both series are I(1) series i.e not stationary at levels but only at 1st difference. Having confirmed the stationarity of the series, we now proceed to determine their long run movement through Johansen co-integration technique.

Table 2. Johansen co-integration test (1980-2010)

Hypothesized No of CE	Eigen stat	Critical 0.05	Trace stat	Critical 0.05	Prob
None*	29.68825	19.38704	36.42940	25.87211	0.0011
At most 1	6.741142	12.51798	6.74142	12.51798	0.3723

Note. Both Trace and Max-Eigen value tests indicate 1 co-integrating equation at 0.05 level.

Having determined the long run movement with at least 1 co-integrating equation, the next thing is to proceed to

finding the relationship existing between these variables through a vector auto regression (VAR) framework.

Table 3. Vector auto regression (VAR) results (1980-2010)

	Log (Gdp)	Log (TE)
Log Gdp(-1)	0.8253 (0.51) [1.6]	0.1064 (0.52) [0.20]
Log Gdp(-2)	0.1014 (0.53) [0.18]	03245 (0.54) [0.59]
Log TE(-1)	0.2149 (021) [1.02]	-0.1707 (0.21) [-0.79]
Log TE(-2)	0.1373 (0.1997) [0.08]	0.1986 (0.20) [0.97]
C	-3.1011 (2.18) [-1.41]	6.6491 (2.23) [2.97]
R^2	0.9563	0.7793
Adj R^2	0.9480	0.7373
F-statistics	115.0152	18.5431
Akaike A/C	1.6130	1.6505
Schwartz S/C	1.8549	1.8984
Log likelihood	-15.9692	-16.5346

Note. Standard Errors ( ) and t-statistics [ ].

Arising from table (3) and based on the VAR lag order selection criteria conducted, it is evident that the optimal lag length for the model is 1 and we therefore carry out our analysis based on lag length 1. The gross domestic product (GDP) lagged against itself is correctly signed as well as against tertiary enrolment. However, the t-statistics is insignificant at 5 percent. Also, tertiary enrolment (TE) lagged against itself showed–ve and insignificant relationship while for Gdp the relationship is +ve but equally insignificant.

The R^2 of 0.95 and 0.77 is indicative of 95 and 77 percent variation being explained by either of the variables. The F-statistics of 115.01 and 18.54 confirms the significance of the overall regression at 5 percent level. The Akaike and Schwartz criteria with respect to both GDP and TE are not only permissible but equally satisfactory. The results of the VAR diagnostics tests in Table 4 revealed that the Portmanteau test for autocorrelation up to lag 5 showed no residual autocorrelation. Also, the LM test shows no serial autocorrelation up to lag 5 while the normality test @ 0.000 < 0.05 revealed that the residuals may not be multivariate normal. Finally, the heteroscedaticity showed that there are no cross terms @ 0.0616 < 0.05.

Table 4. VAR diagnostics tests

Lags	Portmanteau Auto corrTest	LM serial corr test
1	NA*	0.000
2	NA*	0.1700
3	0.6575	0.4142
4	0.2652	0.0548
5	0.4588	0.2693

Note. Normality Test = 0.0000 < 0.05. Heteroscedaticity Test = 0.0616 > 0.05.

Table 5. VAR-granger causality test result (1980-2010)

Dependent Variable: Log(GDP)			
Excluded	Chi-sq	Df	Prob
Log (TE)	1.393558	2	0.4982
All	1.393558	2	0.4982
Dependent Variable: Log(TE)			
Excluded	Chi-sq	Df	Prob
Log (GDP)	9.083043	2	0.0107*
All	9.083043	2	0.0107

Note. * significant @ 5% ; ** significant @ 10%.

To determine the direction of causality between gross domestic product (GDP) and tertiary education (TE) in

Nigeria, we employed the VAR-Based causality test as shown in Table 5, the Chi-square results proved that a uni-directional causality runs from GDP to TE at 5 percent level. That is, the direction of causality is from gross domestic product to tertiary education in Nigeria.

4. Conclusion and Policy Implications

The findings of this research work are indeed instructive. It is evident from the above analysis that tertiary enrolment is a veritable tool for enhancing economic growth in Nigeria. Again, the study has also confirmed the UNESCO's position of improved government investment in education as this can exert significant impact on tertiary enrolment and by extension stimulate sustainable economic growth and development for the country. Therefore, it is very imperative on the part of government to be committed towards achieving the UNESCO's recommendation of 26 percent of annual budget if our aspiration to be among the twenty most developed economies by the year 2020 will not be a mirage. This could be achieved by channeling the growth in GDP towards the improvement of tertiary education in Nigeria. In conclusion, unless conscious and aggressive funding is bestowed on the education sector in the country, the declining trend of school enrolment will continue unabated couple with its consequential effect on economic growth.

In the light of the findings of this study, a blend of these policy options could contribute immensely to the revival of educational sector in Nigeria:

➢ There is need for government to adequately and conscientiously increase the budgetary allocation to education sector in order to stem the tide of incessant industrial disharmony in the sector.

➢ There should be effective and functional regulatory framework saddled with the responsibility of monitoring the public funds committed into the educational sector in order to guide against wastages.

➢ Government should initiate and implement both short and medium-term framework for the provision and upgrading of infrastructural facilities in all our citadels of learning in order to enhance the quality of teaching in the education sector.

➢ The funding of educational sector should not be left in the hands of the government alone. There is need for effective collaboration between the government and private sector within the framework of public-private partnership.

Acknowledgements

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Appendix

Pairwise Granger Causality Tests			
Date: 04/30/14 Time: 09:24			
Sample: 1980 2010			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
TERENR does not Granger Cause RGDP	26	2.61738	0.0966
RGDP does not Granger Cause TERENR		5.91578	0.0092

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