

Country Characteristics and Education-Economic Growth Paradox in Nigeria

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ABSTRACT

Studies on growth empirics with negative coefficient for education proxy have provided challenging puzzles. Since education is expected to promote economic growth. One of the best ways to explain this puzzle is to use an augmented growth model that incorporates country specific characteristics. This study builds such model with Nigerian data to test whether the structural characteristics of the Nigerian economy explain the impact of education on economic growth. Using annual data for gross enrolments, secondary and tertiary institutions as proxy for education, gross capital formation as proxy for investment and labour force as proxy for labour, the study finds that education and labour force are not associated with increased output proxy by real gross domestic product, while investment impacts growth positively. Three auxiliary variables—exchange rate black market premium, government consumption expenditure in real gross domestic product and ratio of primary product export total export were then introduced to capture the structural characteristics of the Nigerian economy. Black market premium and government expenditure impact negatively on economic growth. This suggests that the structure of the economy might have resulted into unproductive use of schooling. This study therefore recommends that changing the structure of Nigerian economy is important for use of education.

1.0

INTRODUCTION

Nigeria has seen her educational sector expanded dramatically since independence with primary school enrolment growing at an annual rate of 18 percent between 1970—1980, while both post-primary and tertiary education enrolment increased by 24 and 19.5 percent respectively during the same period (CBN, 2008). However, the average growth rate of GDP per capita and GDP for the same period was 5.5 percent and 4.7 percent respectively (CBN, 2008).

Also during the period of 1981—1990, the enrolment rate for the three levels of education grew at an annual average rate of 25 percent for primary, 2.2 percent for secondary and 18.3 percent for tertiary, while the average annual growth rate of GDP per capita was -1.9 percent and that of GDP was 4.9 percent. The fact that such high average annual growth rate of enrolment at the three levels of education can be associated with GDP per capita growth rate of almost -2 percentage point should inspire important questions.

For the decade of 1991—2000 annual average growth rate of both GDP and GDP per capita were at 1.3 and 0.4 percents respectively. However, primary school enrolment, post-primary school and tertiary enrolments all grew at 6.11, 8.1 and 17.6 percentage points respectively (IFS, 2009; CBN, 2008; Easterly and Sewadash, 2000). These figures show how the fantastic growth rates of enrolment of the three levels of education have not resulted into sustainable and high growth rate in both GDP per capita and GDP. The question is where has all the schooling gone? (Pritchett, 2001). Why is it that this relatively massive

expansion in education has not resulted into steady and sustainable economic growth rate? In other words, the puzzle now is what impact has education had an economic growth in Nigeria in the last-five decades if the growth rate of per capita income has stagnated during the same period.

This paper seeks to answer these questions by testing whether the unique structure and characteristics of the Nigerian economy explain this paradox. It starts by first empirically confirming the relationship between education and economic growth with a standard growth model that incorporates human capital. It then extends the equation further by incorporating other variables that might capture the unique characteristics of the Nigerian economy.

This paper is organised in this sequence, what follows this introductory section is a brief review of literature. Section three describes the model. The results of the empirical analysis are presented in section four, section five produces a short concluding remark.

2.0 A Brief Review of Literature

Most studies in education-economic growth nexus have concentrated mostly on finding the relationship between education and economic growth in cross-country studies without attempting to explain why this relationship happen. This is mostly common to study that return positive coefficient for education proxy. Some studies that return negative relationship between these two variables have attempt to find reasonable explanation for such puzzling behaviour (Pritchett, 2001; Roger, 2005).

Some studies (Islam, 1995; Benhabib & Spiegel, 1994; Spiegel, 1994) find that massive expansion in education has occurred in most developing countries in the last 40 years in some cases average gross enrolment in primary school has increased to almost 90 percent in some countries while average gross enrolment in secondary school has increased from 14 percent to 40 percent in the last-two decades, yet average growth rate has not responded at the same rate. This has led to the suggestions that the education-economic growth nexus is sensitive to the usage of education. It may, as a matter of fact stunt economic growth, if it is used for directly unproductive and rent seeking activities. This may produce stagnant growth rate of per capita income as witnessed in Nigeria in the past few decades.

Pritchett (2001) finds that cross-country data show no association between increase in human capital attributable to the rising education attainment of the labour force and the rate of growth of output per worker. The study used rate of return on education instead of years of school to differentiate returns on education across levels of education. It reports that the estimate of the impact of growth in educational human capital on growth of output per worker is negative and significant.

It also finds that the association of educational capital growth with conventional measures of total factor productivity is large, strongly statistically significant and negative. Although the results vary across countries and regions, the sub-sample with sub-Saharan African data shows that the impact of education on economic growth is negative and significant. This study concludes that this might have been because of perverse institutional and governance environment, low marginal return to education and poor educational quality.

Roger (2005) attempts to investigate whether specific countries characteristics may explain how education proxy behaves in growth empirics. The study finds that variables like black market exchange premium, size of government and brain drain explain substantially the inability of education to impact economic growth for a sub-sample with African countries.

Stoeks, Javanovich, Lach & Levy (1992) used annual data on education attainment in growth empirics found negative coefficients on education for a non-OECD sample. Also using panel data to allow for country specific effects, Islam (1995) consistently found negative impact of human capital on economic growth when student-teacher ratio was used. This is to reflect the quality of education.

Lace, Jamison & Louat (1995) provided data on 58 developing countries from 1960 to 1986 to estimate an aggregate production function with average educational attainment of the labour force as a proxy for human capital. Their finding is that primary education has an estimated negative effect in Africa, Middle East and North Africa, insignificant effects in South Asia and Latin America and positive and significant education to have negative and significant effect on economic growth models. In the model with both levels of education, they found a negative and significant relationship for primary and secondary education. They also found total education (primary plus secondary) to have negative effect on growth for the African region.

Ayara (2002) uses, growth rate of gross domestic product, deflated real capital formation, labour force and real budget allocation for Nigerian data. The study consistently finds a negative impact of education on growth rate of gross domestic product.

3.0 The Model

The education human capital augmented model considers education human capital as an independent factor of production. Most popularly associated with the work of Markiw, Romer & Weil (1992). This can be presented in a Cobb-Douglas production function with constant return to scale:

$$Y = (A \cdot K^\alpha \cdot H^\beta \cdot L)^{(1-\alpha-\beta)} \quad \dots 1$$

where: Y = output

A = level of technology or total factor productivity

K = physical capital

H = human capital

L = labour

Converted into logarithms expression, the production function can be estimated in the structural form:

$$\ln y_t = \ln A + \alpha \ln k_t + \beta \ln h_t + u_t \quad \dots 2$$

Incorporating the error correction term gives:

$$\ln y_t = \ln A + \gamma_1 \cdot \Delta \ln k_t + \gamma_2 \cdot \Delta \ln h_t + \gamma_3 \cdot EC_{t-1} + u_t \quad \dots 3$$

Eqn 3 becomes the eqn to be estimated.

Incorporating the required variables to eqn 3.7 gives:

$$ry = a_0 + a_1 inv + a_2 sse + a_3 lbf + a_4 pse + a_5 tee + u_t \quad \dots 4$$

where:

ry = real gross domestic product
 inv = investment
 sse = gross secondary school enrolment
 lbf = labour force
 pse = primary school enrolment
 tee = gross tertiary enrolment
 u_t = error term

Model 2: Incorporating variables to show the effect of country-specific characteristics

Lee (1994) argues that the characteristics and structure of individual country may change the coefficient of variable used in growth empirics. Here, this study attempts to test this hypothesis by incorporating three auxiliary variables into eqn (4). The aim is to test whether the relationship between education human capital and economic growth is sensitive to its usage. This is measured by three variables, ratio of primary product export to total export, ratio of government final consumption expenditure in gross domestic product and black market exchange rate premium. These variables measure the extent of rent-seeking and directly unproductive activities in the economy (Roger, 2005). They also show the structure and characteristics of the Nigerian economy.

Incorporating these three variables into eqn 4 gives

$$ry = b_0 + b_1 inv + b_2 lbf + b_3 sse + b_4 rpe + b_5 ggdp + b_6 bmp + u_t$$

where:

rpe = ratio of primary product exports total export
 ggdp = ratio of government consumption to gross domestic product
 bmp = black market exchange rate premium

Notes on variables:

Real Gross Domestic Product:

This is the variable that measures economic growth. It reveals actual output after adjusting for inflation. Gross fixed capital formation is used for investment which represents capital stock. This is used in place of calculating capital stock through perpetual inventory method which has some considerable uncertainties associated with the process of calculation. Education human capital uses secondary school gross enrolment, which though is a flow, may be actually better than education expenditures which is an input. Labour force uses the fraction of the population that belongs to working age.

The extent of unproductive activities in the economy of Nigeria may be very difficult to quantify. One approach is to use some variables to capture both rent-seeking and directly unproductive activities or to capture country specific characteristics of the economy (Lee, 1995). For this study, the following variables are considered: ratio of primary product export to total export; the black market foreign exchange premium and the share of government consumption in gross domestic product.

i. Ratio of Primary Product Export to Total Export

The extent of rent-seeking and the inability of a country to produce value-added export may be measured by the fraction of primary product export in total export while large proportion of primary product export may show a high level of underdevelopment. It is also indicative of extent of rent-seeking in the economy. Revenue from primary product exports rewards location, while revenue from value-added export rewards effort. For years, crude oil export has dominated Nigerian export, accounting for an average of 80 percent of total export earning (CBN, 2005).

ii. Black Market Premium

A large difference between official and parallel exchange is reflective of large rent-seeking activities and country specific characteristics of an economy (Roger, 2005; Easterly & Levine, 2001; Lee, 1994). This premium has consistently been used to measure the price differential between official and unofficial exchange rate (and other subsidies). A rather long period in both 1980s and 1990s showed large differentials between both exchanges. This study uses this premium to measure both directly unproductive (DUPs) and country specific characteristics of the Nigerian economy.

iii. *Share of Government Expenditure in GDP*

In an economy with a large informal sector, the size of government may reflect the extent of rent-seeking (Roger, 2005). A government that spends a large proportion of her revenue on recurrent expenditure with little capital expenditure may reveals directly unproductive activities (DUPs). This study measures rent seeking with share of government expenditures in GDP.

4.0 RESULTS

This section provides the results of the analysis of the models using the three level test of unit root test, cointegration test and error correction model.

Unit Root Test

The Philips-Peron unit root test was conducted for the variables in the model. Naturally, the null hypothesis is that there is a unit root in each variable. That is each variable is not stationary. The rule of the thumb is that the null hypothesis of the unit root should be accepted if the PP statistics are less than negative than critical value. Table 1 shows that all the variables were stationary at first difference I(1). All these tests were done on the lag values of all the variables except those in ratio: ratio of government expenditure to gross domestic product (ggdp) and ratio of primary product exports to total export (rpe).

Table 1: (II) Unit Root Test

<i>Variable</i>	<i>PP*</i>		<i>d*</i>
	<i>With constant trend</i>	<i>With constant (no & trend)</i>	
Logy	-1.8670	-2.8736	I (1)
Δ logy	-8.4234	-8.3104	I (0)
Loginv	0.2111	-1.3742	I(1)
Δ loginv	-3.9857	-4.0105	I(0)
Loglbf	0.9143	-19.054	I(1)
Δ loglbf	-42.441	-40.064	I(0)
Logsse	-2.2776	-3.3283	I(1)
Δ logsse	-7.5944	-7.6289	I(0)
Logpse	-1.8912	-2.1623	I(1)
Δ logpse	-4.3866	-4.4543	I(0)
Logtee	-2.8059	-1.8513	I(2)
Δ logtee	-2.8597	-3.3127	I(1)
Logbmp	-3.3746	-4.0266	I(1)
Δ logbmp	-8.7072	-8.5851	I(0)
ggdp	-4.0209	-4.0336	I(1)
Δ ggdp	-9.4708	-9.7947	I(0)
Rpe	-10.796	-9.7877	I(1)
Δ rpe	-7.0873	-7.0236	I(0)
lm/inv	-1.4286	-1.6464	I (1)
Δ (lm/inv)	-6.5150	-6.5000	I(0)
Critical values:			
<i>Level</i>			
1% level	-3.6171	-4.2242	
5% level	-2.9422	-3.5348	
1st Difference			
1% level	-3.6228	-4.2324	
5% level	-2.9446	-3.5386	

Notes: PP and d denote Philips-Peron test and decision about the order of integration of variables respectively.

Cointegration Test

Cointegration test was conducted for the two models in the study. The rule is that the absolute value of the Augmented Dickey Fuller should be greater than the critical value at either 1 percent or 5 percent level of significance.

Model 1: Cointegration test results: OLS Regression of logy on INPT, loginv, loglbf, logpse, logsse.

ADF	Critical values	
	1% level	5% level
4.8583	-3.6228	-2.9446

Model 2: Cointegration test results: OLS regression of log y on INPT, log inv logtee, logbmp, ggdp, rpe

ADF	Critical values	
	1% level	5% level
-4.7561	-3.6228	-2.9446

The cointegration test for the two models shows that the all the equations are cointegrated, that is they have a long term relationship with the dependent variable in both models.

Cointegration Regression Equation

Model 1:

$$\text{Log}y = 10.9300 + 0.2144\text{loginv} - 0.6287\text{loglbf} - 0.2011\text{logpse} - 0.0271\text{logsse}.$$

(8.42) (6.81) (1.71) (2.27) (0.32)

R-square = 0.76; R-bar-square = 0.73; DW = 1.87

Model 2:

$$\text{Log}y = 8.7924 + 0.1978\text{loginv} - 0.1656\text{loglbf} - 0.1498\text{logsse} - 0.0636\text{logbmp} - 0.4974\text{loggd} - 0.3430\text{rpe}$$

(4.07) (6.20) (0.31) (1.70) (2.69)

(1.07) (0.65)

R-square = 0.78; R-bar-square = 0.74; DW = 2.04

(t-ratio in parenthesis)

For model 1, the evidence of cointegration indicates that economic growth cointegrates with the other variables, while the second model shows all the other variables cointegrate with economic growth while the coefficient of investment was positive for both models, the coefficient of all other variables were negative.

Error Correction Model

Summary of OLS Results

Nigeria: Error Correction Model (dependent variable: DLogY)		
Ordinary Least Square Regressions		
Variables/Model	1	2
Constant	-0.0491(-0.0640)	-0.1067(-1.441)
DLOGINV	0.3691(4.815)	0.3332(4.361)
DLOGLBF	-2.0474(-0.712)	1.0759(0.377)
DLOGPSE	-0.2455(-1.470)	
DLOGSSE	-0.0414(-0.333)	-0.0877(-0.770)
DLOGSSE(-3)	-0.3775(-3.654)	-0.2907(-2.632)
DLOGBMP		-0.0329(-1.860)
DLOGBMP(-1)		-0.0187(-1.057)
DGGDP		-0.42987(-1.057)
DRPE		1.0751(0.295)
ECM(-1)	-0.9090(-5.558)	-0.9280(-4.958)
R-squared	0.71	0.78
Adj. R-squared	0.65	0.70
S.E	0.09	0.08
D.W	2.3	2.2

Note: t-values are in parenthesis

The first model attempts to investigate the impact of education human capital on economic growth using school enrolments. The parsimonious error model shows that investment is positively and significantly related to real income at 1 percent. The coefficient of labour force is not appropriately signed and is significant. This may be due to high level of unemployment in Nigeria (Chete & Adeoye, 2002). The coefficient of school enrolments is negative which means education has negative relationship with economic growth. This supports the hypothesis of Ayara (2002) that the education economic growth nexus in Nigeria is negative. The adjusted R-square of 0.65 shows a high goodness of fit while the F-statistics shows the overall goodness of fit. The ECM is correctly signed and significant at 1 percent. The DW is 2.3.

The second model incorporates additional variables into the model to show whether the structure of the Nigerian economy can resolve the puzzle of why education human capital has not impacted significantly on economic growth.

The first interesting result of this model is that labour force turns out with positive coefficient, although insignificant, unlike in the first model. This may be because of the inclusion of the three new variable which represent rent seeking and directly unproductive activities (DUPs), which explain low productivity of labour. It may also be that these additional variables explain substantially the level of distortion in the economy. Investment has a positive and significant coefficient. While education proxy by gross secondary school enrolments turn out with negative and insignificant coefficients. Two of the three new variables, black market premium and government consumption have negative relationship with economic growth while the third one, ratio of primary product export to total export has positive relationship with economic growth. The negative coefficients of both black market premium and government consumption show how the large black market premium and government consumption explain the long period of stunt growth that the Nigerian economy has witnessed for most of the past forty years. The positive coefficient of ratio of primary product export may explain how important oil export is to the Nigerian economy.

5.0 CONCLUDING REMARKS

This study has investigated the paradox of education and economic growth in Nigeria and ask the puzzling question, ‘Why is it that relatively large expansion in education, through both enrolments and expenditures not impacted positively on increase in output?’ The study attempts to answer this question by first providing a model that shows that education has

not been associated with economic growth. It then extended the model by incorporating three variables that attempts to explain the structure of the Nigerian economy: black market premium, share of government consumption in GDP and share of primary product export in total export.

Black market premium shows that the level of distortion in allocation of foreign exchange reflects rent seeking in the economy. The coefficient of this variable, which is negative and significant at 10 percent, shows that the Nigerian economy suffers from low value-added activities which might affect the ability to use education productivity. A large share of government consumption in gross domestic product show how large public sector may impede economic growth and the productive use of education.

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