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The Dynamics of Exports and Economic Growth: Assessing the Evidence from Nigeria

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Abstract
The paper empirically examines the dynamics of exports and economic growth in Nigeria using time series data for 1970 to 2017. The Vector autoregressive model (VAR) was used to investigate the long run and short run relationship between exports and economic growth as well as some selected variables. The result shows that there exists a stable long run relationship among economic growth, exports, capital expenditure on education and social services. Also, the Granger causality results reveal that export Granger causes economic growth and not the other way round. This means that an increase in economic growth may result from increase in export, but increase in economic growth does not necessarily lead to increase in exports. The Impulse Response Function (IRF) shows that a one standard innovation in exports will lead to permanent positive impact on economic growth in Nigeria. This therefore supports the exports led growth hypothesis for Nigeria.

Keywords: Economic Growth, Endogeneity, Multivariate and Granger Causality.

1. Introduction
Since the late 1960s, studies have been conducted to examine the role of export performance in the economic growth process. Although, the empirical literature can he considered to be vast, however, its results are clearly contradictory for developing countries and industrialized economies, a feature that could explain why this topic is still at the top of the agenda for many economists. Most authors as well as multilateral institutions would agree that promoting exports and achieving export expansion are beneficial for both developed and developing countries for many reasons which according to (World Bank, '1993) as documented in Medina Smith and de Carabobo (2000), include the following (i) they generate a greater capacity utilization; (ii) they take advantage of economies of scale; (iii) they bring about technological progress; (iv) they create employment and increase labour productivity; (v) they improve allocation of scarce resources throughout the economy; (vi) they relax the current account pressures for foreign capital goods by increasing the country's external earnings and attracting foreign investment; and (vii) they increase the total factor productivity and consequently the well-being of the country.

Although, most of the empirical works support the export led economic growth hypothesis, there is no overall consensus on this issue. While some economists like (Ram, 1985; Fosu (1990) as well as Salvatore and Hacler, 1991) seem to generally agree that exports benefit economic growth, others like (Jung and Marshal, 2016 as well as Ahmad and Harnhirum, 1995) did not find much support for export led economic growth hypothesis. On the other hand, Henriqes and Sadorsky (1996) found that export Granger causes economic growth, Shan and Sun (1998) found bi-directional causality between these variables.

Since there appears to be no consensus on the relationship between export and economic growth in Nigeria and the direction of causality, this paper investigates this relationship using data from 1970 to 2003. This paper is organized as follows. Section two provides a review of some relevant literature while section three considers methodology and empirical analyses and results obtained. Section four deals with conclusion and policy implications.

2. Review of Relevant Literature

Although, like several other authors, Caves (1971) stated many decades ago that "Tests of the export-led model, then, must intrinsically involve country case studies - present industrial countries in their years of rapid growth or of presently underdeveloped countries". These investigations have examined the connection between export performance and the rate of economic growth in particular nations, in some cases using modern time series analysis (Khan and Saqib, 2017; Serletis, 1992; Henriques and Sadorsky, 1996 & Al-Yousif 1997). While the results that emanate from cross-section studies, based on bi-variate models or ad hoc aggregate production function generally agree on the positive relationship between export performance and economic growth, it is odd that the empirical results obtained by researchers involved in country case studies strongly differ between nations and periods of time studied (Shan & Sun, 2015). This disparity might imply that although cross-section studies are empirically attractive for researchers, they could obscure inter-country differences and sacrifice revealing information about the behaviour of many countries.

The most recent time series investigations concerning developed countries that have used the econometric methodology of cointegration have not been able to establish unequivocally that a robust relationship between these variables indeed exists in the long run, namely that the variables are cointegrated as documented in, for example, (Islam, 1998). While some have been able to find a long-run relationship, many others have rejected the ELG hypothesis i.e. that export expansion causes growth in the long run. Al-Yousif (1997) attempted to remedy the lack of empirical evidence related to major oil exporters by analyzing four Arab Gulf countries which are all members of OPEC: Saudi Arabia, Kuwait, the United Arab Emirates and Oman. As in other empirical studies in this field, he was unable to verify the existence of a long-run relationship between exports and economic growth in the four major petroleum exporters of the Persian Gulf.

A possible justification of the positive results obtained in the investigation conducted by most researchers is that these researchers employed population and investment as proxies for the appropriate aggregate inputs, i.e. labour force and capital stock. Although they have been widely used in many cross-section growth studies as well as time series analysis, many researchers have had serious doubts about them, They thus expressed their suspicion regarding studies that have tested the export promotion hypothesis by using, for instance, the investment - output ratio, as opposed to capital stock or population instead of labour force, For instance, Alexander (1994) among others rejected the use of these proxies in growth studies not only on theoretical grounds but also from an empirical point of view. They suggested that if capital stock data are available, they should be used instead of investment because of the "significant measurement errors" present in these types of empirical growth studies. However, if data regarding the stock of capital are not available, a common recommendation nowadays is to construct a series of capital stock (Khan & Saqib, 2017).

3. Methodology and Empirical Analyses

In general, previous literature suggests that there are a numbers of factors influencing economic growth generally and thus spurious regression will result it only the relationship between export and economic growth is being tested. The model used for this study is stated below:

$$GDP_1 = f(EXP_1 + XEDU_1 + XSOS_1 \text{----------(1)}$$

Where; t is time measured chronologically;

GDP_1 = Growth rate of gross domestic product (Proxy for economic growth)

EXP_1= Total exports

$XEDU_1$= Capital Expenditure on Education

$XSOS_1$= Capital Expenditure on Social Services

A priori, it is expected that there will be positive relationship between total exports, capital expenditure on education, social services and economic growth. For example, Balassa (1985) argued that in general export expansion helps to concentrate investment in those sectors which in turn increase the overall total factor productivity. The theory also suggests that causality may run from output to export. For example, Lancaster (1980) and Krugrnan (1984) justify one – way causality from output to exports. The data for the study are obtained from the Central Bank of Nigeria Statistical Bulletin (2004).

3.1 Stationarity Test

The Augmented Dickey Fuller (ADF) [Dickey and Fuller, 1979] and Phillips — Perron (PP) [Phillips and Perron, 1988] tests were used to find out the stationarity of the variables. Consider the equation below:

$$\Delta\lambda_1 = a_1 + a_2 + \Phi\lambda_{1-1} + \beta_1 \sum_{1=1}^{m} \Delta\lambda X_{1-1} + \Sigma_1 \text{ ----------(2)}$$

Where:

λ_1 is our variable of interest $(GDP_1, EXP_1, XEDU_1, XSOS_1), \Delta$ is the difference operator, it is the time trend and c is the while noise residual of zero mean and constant mean and constant variance; $(a_1, a_2, \beta_1, \ldots \beta_m)$ is a set of parameters to be estimated. The null and the alternative hypotheses in the unit root tests are:

$H_0 : \phi \neq 0$ (λ_1 is non — stationary)

$H_1 : \phi \neq 0$ (λ_1 is stationary)

The unit root hypothesis of Dickey- Fuller can be rejected if the t-statistics from these tests is negatively less than the critical value.

3.2 Cointegration Test

To perform cointegration test, the study uses the Johansen and Juselius (1990) multivariate cointegration test by formulating the VAR model below:

$$\lambda_1 = I_1(L)\lambda_{1-1}(L)_{t-1} + \ldots + I_P(L)\lambda_{t-p} + \Sigma_{1-P} \text{ ----------(3)}$$

where λ_1, is $(GDP_1, EXP_1, XEDU_1, XSOS_1)$; a column vector and I, (L) with I = 1,..., p is a lag operator ε is the while noise residual of zero mean and constant variance. The order of lag of the model p is determined in advanced by Akaike's Information Criterion (AIC). In the test, the null
hypothesis of the cointegrating vectors is the alternative of r + 1 cointegrating vectors.

3.3 Granger Causality Test

Equation (3) can be adapted for the Nigerian economy, particularly in examining the export led growth hypothesis in a multivariate framework with the variables as earlier described in equation (1), Equation (3) can be expressed in error correction (ECM) form as:

$$\Delta LGDP = y_0 + y_1 \sum y_1 \Delta LEXP_{t-1} + y_2 \sum \lambda_2 \Delta LXEDU_{t-1} + y_3 \sum y_3 \Delta LXSOS_{t-1} + y_4 ECM(-1) + V_1 = iid(0.\delta^2) \quad (5)$$

$$\Delta LEXP = y_0 + y_1 \sum y_1 \Delta LGDP_{t-1} + y_2 \sum \lambda_2 \Delta LXEDU_{t-1} + y_3 \sum y_3 \Delta LXSOS_{t-1} + y_4 ECM(-1) + U_t U_t = iid(0.\delta^2) \quad (6)$$

Where ECM lagged one period is the error correction term derived from the long run cointegrating relationship. While the estimated coefficient of ECM (y_4) measures the long run relationship, y_1, $y_2, \ldots, y_4$ Measures the short run causal relation.

3.4 Impulse Response Function (IRF)

The Generalized Impulse Response Function (GIRF) can be defined as:

GIRF (n, ε_1, ω_{t-1}) = E[y_{t+n} | ε_j, t, ω_{t-1}] – E[y_{t+n} | ϖ_{t-1}] t (7)

Where y_t a random vector is ε_{t+1} is a random shock, ϖ_{t-1} a specific realization of the information set Ω_{t-1} and n is the forecast horizon.

4. Results and Interpretation

4.1 Unit Root Tests

Using the ADF and the PP tests for stationarity, it was found that the series are all 1(1) at both 1% and 5% significance level as shown in the table below.

Table 1: Results for Unit Root Tests

Variables	ADF test			PP Test		
	Intercept Only	Trend & Intercept	Result	Intercept Only	Trend & Intercept	Results
LGDP	-3.843563*** (-3.6576)	-3.963021** (-3.5614)	1(1)	-5.685272*** (3.6496)	-5.768655*** (-4.2712)	1(1)
LEXP	-5.935315*** (-3.6576)	-5.846911*** (-4.2826)	1(1)	-8.447214*** (-3.6496)	-8.342028*** (-4.2712)	1(1)
LXEDU	-4.753569*** (-3.6576)	-4.537369*** (-4.2826)	1(1)	-5.632645*** (-3.6496)	-6.64272*** (-4.2712)	1(1)
LXSOS	-9.135986*** (-3.6661)	-4.537369*** (-4.2826)	1(1)	-7.379342*** (-3.6496)	-7.453436*** (-4.2712)	1(1)

*** Significant at 1% level of significance
** Significant at 5% level of significance

4.2 Results of Cointegration Tests

Using the Johansen multivariate cointegration technique and based on the Maximum Eigen value, we conclude that there exists a single cointegration vector in the model as shown in table two below:

Table 2: Results of Johansen and Juselius Cointegration Results
Sample: 1970 2017
Included observations: 48
Test assumption: Linear deterministic trend in the data
Series: LGDP LEXP LXEDU LXSOS
Lags interval: 1 to 1

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.559463	51.44444	47.21	54.46	None*
0.444390	25.21206	29.68	35.65	At most 1
0.180025	6.406039	15.41	20.04	At most 2
0.001706	0.054630	3.76	6.65	At most 3

*(**) denotes rejection of the hypothesis at 5% (1%) significance level
L.R. test indicates 1 cointegrating equitation(s) at 5% significance level

The normalized cointegrating coefficients give the long run estimate as below:

$$LGDP = -6.151 - 2.922LEXP + 1.464LXEDU + 3.104LXSOS$$
$$(1.209) \quad (1.055) \quad (1.435) \quad (7)$$

Equation (7) indicates that export has negative relationship with economic growth on the long run, though, with a high elasticity. The result is in line with the study of Dorado (1993) in a similar study of the Malaysian economy. However, in the short run, the estimated error correction term for D(LGDP) is statistically significant at 1%. Also, the speed of adjustment to long run is high at (-0673). The short run dynamics for the log of the first difference of gross domestic product reveals that all the variables have the expected sign except first lag of exports as well as first and second lags of capital expenditure on social services.

It is worthy to note that in the short run, an increase in exports only increase economic growth in the previous two years. Among the variables used, capital expenditure on education appears to be the most significant determinant of economic growth in Nigeria. It is also found that though the separate effects of the variables may be insignificant by the t-statistics, the joint effect of the variables will significantly influence economic growth based on the F-statistics.

In the dynamics of the first difference of exports, it was found that the second lag of capital expenditure on education is the most important variables. In the short run dynamics of capital expenditure on education, the estimated error correction term has a contrary sign with a very low coefficient. On the other hand, capital expenditure on social services appears to be the most important variable in the short run dynamics of D (LXSOS) as shown in table three below.

Table 3: Vector Error Correction Result
Sample (adjusted): 1973 2017
Included observations: 48 after adjusting endpoints
Standard error & t-statistics in parentheses

Cointegrating Eq:	**CointEg1**			
LGDP(-1)	1.000000			
LEXP(-1)	-2.217615			
	(0.41061)			
	(-5.40084)			
LXEDU(-1)	2.984899			
	(0.45394)			
	(6.57559)			
LXSOS(-1)	0.499324			
	(0.34344)			
	(1.45390)			
C	-6.137688			
Error Correction:	D(LGDP)	D(LEXP)	D(LXEDU)	D(LXSOS)
CointEq1	-0.673358	0.179768	0.014576	-0.046042
	(-4.89664)	(1.96920)	(0.21659)	(-0.41356)
D(LGDP(-1))	0.122411	0.035560	0.111561	0.187664
	(0.59406)	(0.25996)	(1.10625)	(1.12492)
D(LGDP(-2))	0.391359	-0.092342	-0.117404	-0.115013
	(1.84529)	(-0.65587)	(-1.13111)	(-0.66983)
D(LEXP(-1))	-0.853806	0.214416	-0.143186	0.674154
	(-1.42424)	(0.53185)	(0.73002)	(1.38904)
D(LEXP(-2))	0.149918	-0.214416	-0.143186	-0.267756
	(0.34010)	(-0.73271)	(-0.66372)	(-0.75028)
D(LXEDU(-1))	1.306010	-0.393377	-0.062907	0.393694
	(2.47897)	(-1.12476)	(-024398)	(0.92303)
D(LXEDU(-2))	1.362213	-0.745703	-0.271001	-0.154769
	(2.68709)	(-2.21579)	(-1.09230)	(-0.37710)
D(LXSOS(-1))	-0.212143	-0.022299	0.072594	-0.412545
	(-0.86316)	(-0.13667)	(0.60353)	(-2.07332)
D(LXSOS(-2))	-0.444017	0.358784	0.102615	0.260889

	(-1.82284)	(2.21875)	(0.86079)	(1.32294)
C	-0.062120	0.154324	0.080948	0.049992
	(-0.63310)	(2.36916)	(1.68567)	(0.62932)
R-squared	0.643745	0.4317077	0.173714	0.440659

4.3 Pairwise Granger Causality Test

The pair wise Granger causality tests reveal that there is unilateral relationship between exports and economic growth with the causality running from export to economic growth. The result further revealed that exports Granger causes capital expenditure on education and social services. The result did not show any evidence of reverse causality which means that there is no problem of endogeneity. The result is shown in table for below:

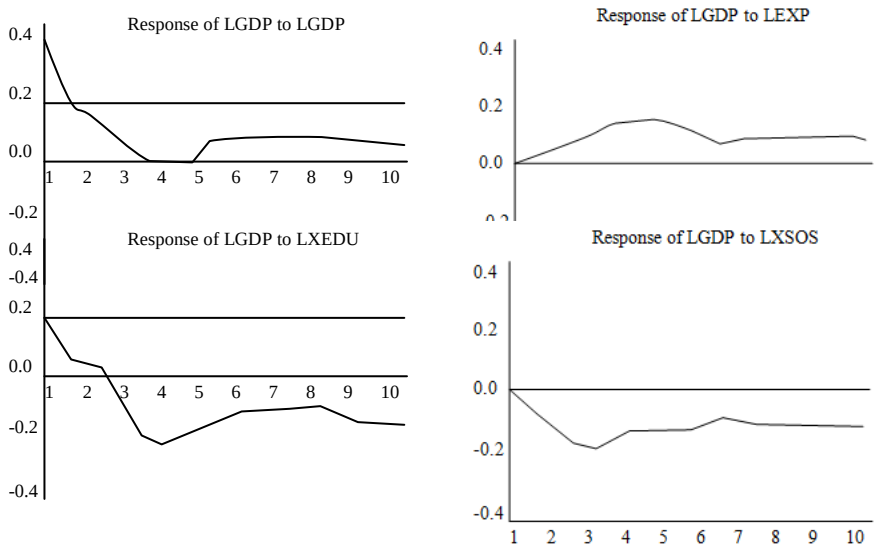
Table 4: Granger Causality Results
Pairwise Granger Causality Tests
Sample: 1970 2017
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
LEXP does not Granger Cause LGDP	48	2.95462	0.06912
LGSP does not Granger Cause LEXP		0.70405	0.50343
LXEDU does not Granger Cause LGDP	48	1.43754	0.25512
LGDP does not Granger Cause LXEDU		0.38559	0.68374
LXSOS does not Granger Cause LGDP	48	0.49497	0.61501
LGDP does not Granger Cause LXSOS		1.50237	0.24062
LXEDU does not Granger Cause LEXP	48	0.35426	0.70491
LEXP does not Granger Cause LXEDU		3.33236	0.05088
LXSOS does not Granger Cause LEXP	48	1.19172	0.31917
LEXP does not Granger Cause LXSOS		10.8496	0.00035
LXSOS does not Granger Cause LXEDU	48	0.79310	0.46270
LXEDU does not Granger Cause LXSOS		5.40114	0.01064

4.4 Results of Impulse Response Function (IRFs) and Variance Decomposition

The impulse response function as shown in figure one reveals that a one standard deviation shock on economic growth induces more economic growth in the first years and after the second year, began to fall and in the third year became negative throughout the ten years period. On the other hand, a one standard deviation shock on total exports induces more economic growth throughout the ten years period. This was the contrary with a one standard deviation shock on capital expenditure on education and social services. These impacted negatively on economic growth as shown in figure one below.

Figure One: Impulse Response Function (IFRS)
Response to One S.D. Innovations



4.5 Variance Decomposition

The result shows that at the end of ten years, all the variables are strongly endogenous except the variable representing economic growth. Specifically, the forecast error variance for LGDP, LEXP, LXEDU and LXSOS are 10.13%, 70.47%, 91.77% and 73.91% respectively as shown in table five below:

Table 5: Variance Decomposition

Period	LGDP	LEXP	LXEDU	LXSOS
1	100.000	54.01572	99.93407	93.90853
2	75.31464	63.43650	96.24512	69.67855
3	47.13629	59.45352	94.55185	74.71588
4	27.86811	62.75408	93.26340	73.19829
5	20.08576	64.88225	92.39210	72.87481
6	16.26251	66.85111	92.19956	73.60076
7	13.99194	67.93567	91.99272	73.55004
8	12.39418	68.83610	91.98258	73.84307
9	11.12299	69.72068	91.88635	73.87481
10	10.13392	70.47443	91.76646	73.90597
Ordering: LGDP LEXP LXEDU LXSOS				

5. Conclusion and Policy Implications

The main objective of the paper is to empirically examine the dynamics of exports and economic growth in Nigeria using time series data for 1970 to 2017. The Vector autoregressive model (VAR) was applied to investigate the long run and short run relationship between exports and economic growth as well as some selected variables. The result shows that there exists a stable long run relationship among economic growth, exports, capital expenditure on education and social services. Also, the Granger causality results reveal that export Granger causes economic growth and not the other way round. This means that an increase in economic growth may result from increase in export, but increase in economic growth does not necessarily lead to increase in exports. The impulse response function shows that a one standard innovation in exports will lead to permanent positive impact on economic growth in Nigeria. This therefore supports the exports led growth hypothesis for Nigeria. In general, exports are a viable variable that determines economic growth in Nigeria.

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