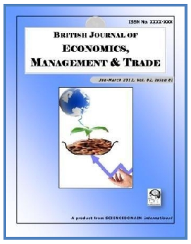

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Export - Led Growth or Growth – Driven Exports? Evidence from Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. The lead author SRA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. The co-author BOM managed the analyses of the study while both authors read and approved the final manuscript.

Research Article

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ABSTRACT

Aims: This paper examined the role of export in the economic growth process in Nigeria.
Study Design: Case Study.
Place and Duration of Study: Nigeria. Time series data ranging from 1970 to 2009.
Methodology: The study employs unit root testing, co-integration analysis and VAR Granger Causality/Exogeneity Wald Tests to analyze annual time series data from Nigeria. The study uses three measures of export namely, Total export, Oil export and Non-Oil export. This enhances the stability and robustness of results.
Results: The unit root test showed that both economic growth and export are integrated of order one, i.e. 1(1). The cointegration test confirmed for model 1 and model 2 (where total exports and oil exports are used respectively as proxy for Nigeria exports) that economic growth and export are cointegrated, indicating an existence of long run equilibrium relationship between the two as confirmed by the Johansen cointegration test results. However, there is no evidence of cointegration between export and economic growth for model 3. Granger causality was applied to test the causal relationship between GDP and economic growth. The results show that there is evidence of uni-directional causality between export and economic growth in Nigeria in three measures of exports and the direction of causality runs strictly from economic growth to exports.

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Conclusion: This study provided support for growth-led export in case of Nigeria. Thus effort should be direct towards policies that will enhance economic growth such as import substitution industrialization (ISI) strategy, in order to impact more on exports.

Keywords: Exports; growth; grangercausality; cointegration.

1. INTRODUCTION

There has been a renewed interest in the study of export-led-growth hypothesis (ELGH) in the literature even though it had been the subject of considerable research and empirical study in the last three decades [see 1,2]. The major strand of this argument is the question of whether economic growth as witnessed by some East Asian Tiger economies (South Korea, Hong Kong, Taiwan and Singapore) and the Latino-American countries like Mexico and Brazil over the past three decades, is usually driven by exports or that it is economic growth that leads to export performance. This question is key in the sense that, establishing the causality between export and growth has a great implication for policy-makers' decision about the appropriate and relevant strategies and policies to adopt for economic growth and development.

Nigeria, a developing nation, had employed several policy measures which include the Import Substitution Industrialization (ISI) Strategy, a strategy that aimed at replacing imported items with the locally produced ones. The ISI strategy among others was targeted at reducing importation and subsequently the depletion of foreign exchange reserves in the early 1980s. The ineffectiveness of these measures led to the adoption of Structural Adjustment Programme (SAP) in 1986 of which Export Promotion Industrialization (EPI) strategy is key component [3]. This strategy is now pursued with the aim that it will translate into economic growth and efforts have been made (and are still being made) to encourage domestic production for exports especially in other sectors of the economy apart from oil sector so as to increase the number of products in the country export structure.

As evident in Fig. 1 and Fig. 2, under the period of study (1970-2009) there exists a relatively high (except with non-oil export) and positive correlation between the growth rates of export and output. This does not really come as surprise given the role of oil in domestic market and international market. Before the oil boom of 1970s, Nigeria's economy was mainly an agrarian economy and the huge part of its foreign exchange comes from the sales of cash crops such cocoa, groundnut, coffee, cotton, solid minerals and palm produce. With the discovery of oil, crude oil took over from agriculture as the major Foreign exchange earner to the country and it then constituted on average about 96% of the total exports between 1970 and 1984, 91% by 1985 – 1996 and has risen to about 98% between 1997 and 2009. However, the share of non-oil exports in total exports has been on decline, from about 48% in 1970 to about 4% in 2009. In term of share of non-oil export to GDP, the downward trend moved from 7% in 1970 to 1.18% in 2009.

On the present trends of the structure of Nigerian economy, it is unlikely that the country will be able to take the advantage of increased trade openness in order to achieve trade induced growth. Despite the increase in Nigeria's total exports earnings, the country has been confronting a considerable amount of balance of payment deficit over the years. Thus it is imperative and worthwhile to examine whether export growth can enhance economic growth to help reduce this deficit, and also to know if there is casual relationship between exports and economic growth in Nigeria.

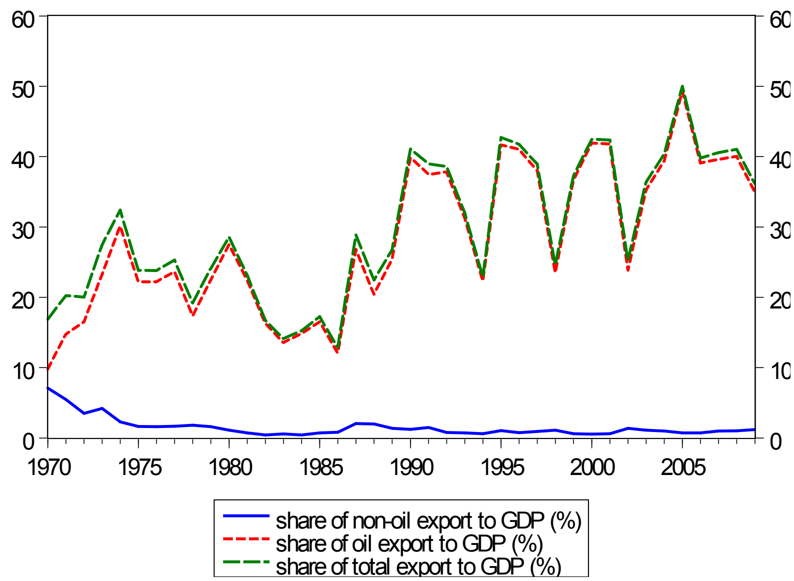

Fig. 1. The Share Of Non-Oil Export, Oil Export And Total Export To GDP

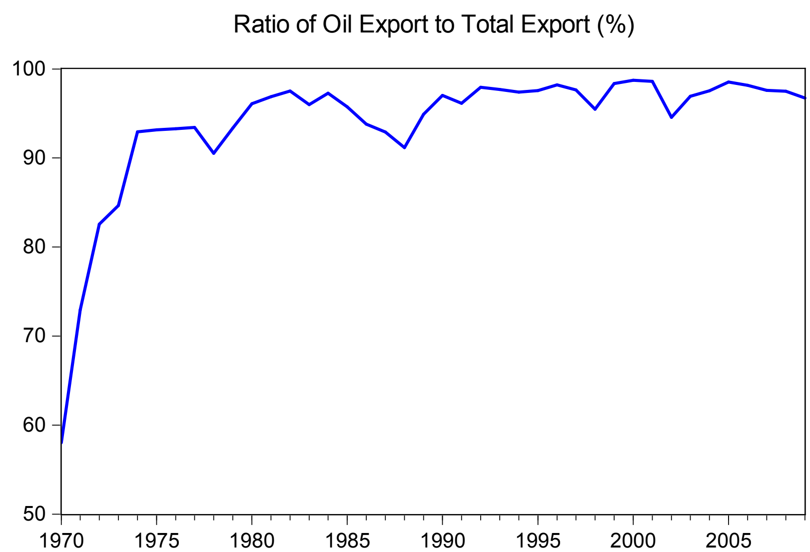

Fig. 2. Contribution Of Oil Export To Total Export

Export-led growth is a development strategy aimed at growing productive capacity by focusing on international markets. This is part of consensus among economists about the gains of economic openness that took hold in the 1970s, which rests on a fusion of three lines of argument; the first, based on Hecksher–Ohlin–Samuelson comparative advantage theory, is about the benefits from trade between countries with different capital–labor ratios; the second concerns the benefits of openness for controlling rent seeking and the third which was developed later, concerns the benefits of openness for growth. The claim is trade encourages technology diffusion and knowledge spillovers that contribute to faster productivity growth [4]. A contradictory posit that economic growth leads to the growth of exports (i.e Growth-led Export Hypothesis) is also expressed for some countries, especially nations that are at their early stages of economic development.

A significant amount of research has been conducted in developed countries and emerging economies to prove and establish this hypothesis. Giles and Williams [5,6] provide a comprehensive survey of the empirical evidence on the export-growth nexus from cross-sectional and time-series studies. Their conclusions are fairly mixed. Among the recent survey of this literature are; Panas and Vamvoukas [7], Jordan and Eita [8], Abou-Stait [9], Yao and Zhang [10], Alam [11], Mrdalo [12], Herzer, et al. [13], Abu-Quarn and Abu Bader [14], Abual-foul [15], Awokuse [16], Lee and Huang [17], Medina-Smith [18], In Africa, similar studies include Kareem [19], Okoh [20], Amavilah [21], Olomola [22], Oladipo [23], Ekpo and Egwaikhide [24], Egwaikhide [25], Fosu [26], Fajana [27], Oyejide [28], Omisakin [29], Chimobi [30] etc.

While some of these studies supported export-led-growth hypothesis, i.e. Awokuse [16], Wadud [31], Olomola [22], Park and Prime [32], Jordan and Eita [8], Al-Yousif [33], Ekpo and Egwaikhide [24], Egwaikhide [25], Sheehey [34], Fosu [26] and Fajana [27]. Other empirical results show that the direction of causality is from economic growth to export growth therefore confirming the growth led export hypothesis (GLEH); e.g. Abu-Quarn and Abu-Bader [14], Herzer, et al [13], Bhasin [35], Ahmed and Kwan [36] among others. Further studies, such as Kareem [37], Ahmed and Harnhirun [38], Kwan and Cotsomotis [39], Chow [40], etc still found a bi-directional relationship between export and output growth while Dodaro [41] and Tang [42] concluded that there is no causality between export growth and output growth.

The early works in this area adopted a cross-sectional framework and a country specific time-series studies, adopting both bivariate and multivariate models to test the validity of the ELG hypothesis; however, the empirical evidence based on those studies is mixed. In part, differences in the measures of exports used, the sampling period, and methodologies adopted explain the mixed results. Thus, the purpose of this paper is to analyze the causality between exports and economic growth of Nigeria and to evaluate the relationship of these variables for the period 1970 to 2009, using three variant measures of export. Granger causality econometric techniques will be applied to test the hypothesis of an export-led growth strategy. It tests whether export Granger causes economic growth, or whether the causality runs from economic growth to exports, or if there is bi-directional causality between exports and economic growth. The results of this paper will help to evaluate the effectiveness of Nigeria's strategy of growth led by exports. The paper is organized as follows. Section two describes the methodology and data while section three presents the empirical results and section four concludes.

2. MATERIALS AND METHODS

2.1 Granger Causality Test

The Granger causality test was developed by Granger [43], and according to him, a variable (in this case export) is said to Granger cause another variable (GDP) if past and present values of export help to predict GDP. To test whether exports Granger cause GDP, this paper applies the causality test developed by Granger. A simple Granger causality test involving two variables, exports and GDP is written as:

$$EXPORT_t = \sum_{j=1}^{p} \alpha_j Export_{t-j} + \sum_{j=1}^{p} \beta_j GDP_{t-j} + \mu \quad (1)$$

$$GDP_t = \sum_{j=1}^{p} \eta_j Export_{t-j} + \sum_{j=1}^{p} \Upsilon_j GDP_{t-j} + \gamma \quad (2)$$

Testing null hypothesis: H_0: $\eta_j = 0$: j=1...... p, this hypothesis mean that export does not Granger cause GDP against the alternative hypothesis H_1: $\eta_j \neq 0$: j=1...... p, this hypothesis mean that export does Granger cause GDP.

Similarly, testing H_0: $\beta_j = 0$: j=1...... p, this hypothesis means that GDP does not Granger cause exports against H_1: $\beta_j \neq 0$: j=1...... p, this hypothesis means that GDP does Granger cause exports.

If none of the null hypotheses is rejected, it means we accept the claims that export does not Granger cause GDP and GDP also does not Granger cause exports. This indicates that the two variables are independent of each other. If the first hypothesis is rejected, it shows that exports Granger causes GDP. Rejection of the second hypothesis means that the causality runs from GDP to exports. If all hypotheses are rejected, there is bi-directional causality between exports and GDP.

We re-specify equation (1) as well as (2) and estimate the 3 variants of the export-growth model as;

Model 1

$$lnEXPORTtotal_t = \theta + \delta lnGDP_t + u_t \quad (3)$$
$$lnGDP_t = \lambda + \eta lnEXPORTtotal_t + \mu_t \quad (4)$$

Model 2

$$lnEXPORToil_t = \theta + \delta lnGDP_t + u_t \quad (5)$$
$$lnGDP_t = \lambda + \eta lnEXPORToil_t + \mu_t \quad (6)$$

Model 3

$$lnEXPORTNoil_t = \theta + \delta lnGDP_t + u_t \quad (7)$$
$$lnGDP_t = \lambda + \eta lnEXPORTNoil_t + \mu_t \quad (8)$$

Where lnEXPORTtotal is the natural log of the sum of all Nigerian export, lnEXPORToil is the natural log of the total oil export, lnEXPORTNoil is the natural log of the sum of non-oil export and lnGDP is the natural log of gross domestic products, used as a proxy for economic growth.

We start this analysis by first examining the stationarity of our variables. A non-stationary time series has a different mean at different points in time, and its variance increases with the sample size [44]. A characteristic of non-stationary time series is very crucial in the sense that the linear combinations of these time series make spurious regression. In the case of spurious regression, t-values of the coefficients are highly significant, coefficient of determination (R2) is very close to one and the Durbin Watson (DW) statistic value is very low, which often lead investigators to commit a high frequency of Type 1 errors [45]. In that case, the results of the estimation of the coefficient became biased. Therefore it is necessary to detect the existence of stationarity or non-stationarity in the series to avoid spurious regression. For this, the unit root tests are conducted using the Augmented Dickey-Fuller (ADF) test and Philips-Perron (PP). If a unit root is detected for more than one variable, we further conduct the test for cointegration to determine whether we should use Error Correction Mechanism.

2.2 Cointegration Analysis

Cointegration can be defined simply as the long-term, or equilibrium, relationship between two series. This makes cointegration an ideal analysis technique to validate the export led growth hypothesis (ELGH): by ascertaining the existence of a long-term relationship between economic growth and export. The Vector Autoregression (VAR) based cointegration test methodology developed by Johansen [46] is described as follows;

The procedure is based on a VAR of order p:

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + Bz_t + \varepsilon_t \tag{9}$$

where y_t is a vector of non-stationary I(1) variables, z_t is a vector of deterministic variables and ε_t is a vector of innovations. The VAR may therefore be reformulated as:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} + \Gamma_i \Delta y_{t-p} + Bz_t + \varepsilon_t \tag{10}$$

$$\text{Where } \Pi = \sum_{i=1}^{p} A_i - I \tag{11}$$

$$\text{and } \Gamma_i = \sum_{j=i+1}^{p} A_j \tag{12}$$

Estimates of Γ_i contain information on the short-run adjustments, while estimates of Π contain information on the long-run adjustments, in changes in y_t. The number of linearly dependent cointegrating vectors that exist in the system is referred to as the cointegrating rank of the system. This cointegrating rank may range from 1 to n-1 [47]. There are three possible cases in which $\Pi y_{t-1} \sim I(0)$ will hold. Firstly, if all the variables in $y_t$are I (0), this means that the coefficient matrix Π has r=n linearly independent columns and is referred to as full rank. The rank of Π could alternatively be zero: this would imply that there are no cointegrating relationships. The most common case is that the matrix Π has a reduced rank and there are $r<(n-1)$ cointegrating vectors present in β . This particular case can be represented by:

$$\Pi = \alpha\beta' \tag{13}$$

where α and β are matrices with dimensions n x r and each column of matrix α contains coefficients that represent the speed of adjustment to disequilibrium, while matrix β contains the long-run coefficients of the cointegrating relationships.

In this case, testing for cointegration entails testing how many linearly independent columns there are in Π , effectively testing for the rank of Matrix Π [48]. If we solve the eigenvalue specification of Johansen [46], we obtain estimates of the eigenvalues $\lambda_1 > \dots > \lambda_r > 0$ and the associated eigenvectors $\beta = (v_1, \dots v_r)$. The co-integrating rank, r, can be formally tested with two statistics. The first is the maximum eigenvalue test given as:

$$\lambda\text{- max} = -T \ln (1- \lambda_{r+1}), \quad . \tag{14}$$

where the appropriate null is r = g cointegrating vectors against the alternative that r ≤ g+1. The second statistic is the trace test and is computed as:

$$\lambda\text{-trace} = -T \sum_{i=r+1}^{n} \ln(1 - \lambda i), \tag{15}$$

where the null being tested is r = g against the more general alternative r ≤ n. The distribution of these tests is a mixture of functional of Brownian motions that are calculated via numerical simulation by Johansen and Juselius [49] and Osterwald-Lenum [50]. Cheung and Lai [51] use Monte Carlo methods to investigate the small sample properties of Johansen's λ-max and λ-trace statistics. In general, they find that both the λ-max and-λ trace statistics are sensitive to under parameterization of the lag length although they are not so to over parameterization. They suggest that Akaike Information Criterion (AIC) or Schwarz Bayesian Criterion (SBC) can be useful in determining the correct lag length.

The empirical analysis was presented by time series model. The study uses long and up-to-date annual time-series data (1970-2009), with a total of 40 observations for each variable. The data for the study are obtained from Central Bank of Nigeria Statistical Bulletin and Annual Report and Statements of Account for different years. All the variables are in logarithm form and the software application utilized is E-views 7.0.

3. RESULTS AND DISCUSSION

3.1 Unit Root Test

Table 1 therefore provide the results of the unit root tests both with and without trend.

Table 1. Results of (ADF) and (PP) unit root test

Series		ADF Test (Intercept & Trend)	Critical Value at 5% level	Order of Integration	PP Test (Intercept & Trend)	Critical Value at 5% level	Oder of Integration
lnGDP	Level	-1.774413	-3.5330	I(1)	-1.808221	-3.5297	I(1)
	first diff.	-5.246617	-3.5330		-5.244346	-3.5330	
lnEXPORTtotal	Level	-2.245995	-3.5297	I(1)	-2.211252	-3.5297	I(1)
	first diff.	-6.714182	-3.5330		-6.796099	-3.5330	
lnEXPORTNoil	Level	-2.208351	-3.5366	I(1)	-2.304085	-3.5297	I(1)
	first diff.	-6.605569	-3.5330		-6.731039	-3.5330	
lnEXPORToil	Level	-2.367438	-3.5297	I(1)	-2.367345	-3.5297	I(1)
	first diff.	-6.744715	-3.5330		-6.828386	-3.5330	

From the Table 1, both Augmented Dickey Fuller (ADF) and Phillips- Perron (PP) tests show that all the variables are stationary after first difference. On the basis of this, the null hypothesis of non-stationarity is rejected, and concludes that the variables are stationary.

3.2 Cointegration Test

Since all the variables are I(1), it is possible to conclude that various sub-sets of the variables under consideration may be integrated and thus further analysis would obviously be required to test this conjecture. We proceed to the next step of examining whether or not there exists a long run relationship between the variables in a bivariate framework. Using the optimal lag length of one (1) selected by four different criteria: Final Prediction Error (FPE), Schwarz and Akaike information criteria (SC, AIC) as well as Hannan-Quinn Information Criterion (HQ) we performed cointegration test to determine the long run relationship among the series by using Johansen and Juseliuscointegration test and the results are presented in Table 2.

Table 2. Cointegrationrank test assuming linear deterministic trend

	Null Hypothesis	0.05 Critical Values	MODEL 1		MODEL 2		MODEL 3	
			Test Statistics	Prob. Value	Test Statistics	Prob. Value	Test Statistics	Prob. Value
Lags			1		1		1	
Trace	r=0	15.49471	14.25290	0.0763	17.20040	0.0274	9.811277	0.2955
Statistics	r=1	3.841466	0.045688	0.8307	0.049992	0.8231	0.008535	0.9260
Max-	r=0	14.26460	14.20722	0.0510	17.15041	0.0170	9.802742	0.2252
Eigen Statistics	r≤1	3.841466	0.045688	0.8307	0.049992	0.8231	0.008535	0.9260
Trace		No of Vectors	1		1		0	
Max-Eigen		No of Vectors	1		1		0	

Denotes rejection of the null hypothesis at 0.05 level

When both series are determined I(1) but not cointegrated, as the case of Model 1 and Model 3, the proper model is VAR in terms of the first differences. But when the series are cointegrated, as in Model 2, we can use a vector error correction (VECM) model or, for a bivariate system, a VAR model in levels [52]. Both the trace and max-eigenvalue tests indicate no cointegration at 10 percent level of significance for Model 3 while the result reports 1 cointegrating rank for model 1, at 10 percent level and also reports 1 cointegrating rank for Model 2 at 5 percent level. Therefore, the unrestricted VAR model is utilized.

3.3 Granger Causality Test

The next step is to test for the direction of causality between export and economic growth using VAR Granger Causality/Exogeneity Wald Tests. In Table 3, causality result is presented.

Table 3 suggests that there is an evidence of uni-directional causality between exports and economic growth and the causality run strictly from economic growth to exports in the three variants used to measure exports. Therefore providing a support for growth-led export hypothesis i.e exports respond to the movements in economic growth.

Table 3. VAR granger causality/exogeneitywald tests

Null Hypothesis	Df	χ^2	Prob.	Decision
Model 1				
GDP does not Granger Cause EXPORTtotal	1	5.041543	0.0247	Unidirectional Causality
EXPORTtotal does not Granger Cause GDP	1	0.063290	0.8014	GDP→EXPORTtotal
Model 2				
GDP does notGranger Cause EXPORToil	1	6.523998	0.0106	Unidirectional
EXPORToil does not Granger Cause GDP	1	0.016362	0.8982	Causality GDP→EXPORToil
Model 3				
GDP does not Granger Cause EXPORTnoil	1	4.545049	0.0330	Unidirectional Causality
EXPORTnoil does not Granger Cause GDP	1	1.061405	0.3029	GDP→EXPORTnoil

4. CONCLUSION

This paper has examined the role of export in the economic growth process in Nigeria using causality tests within an error-correction framework for data over the period 1970 to 2009. The unit root properties of the data were examined using the Augmented Dickey Fuller test (ADF) and Phillip Perron (PP) after which the cointegration and causality tests were employed. The major findings include the following; the unit root test clarified that both economic growth and export are integrated of order one, i.e. 1(1). The cointegration test confirmed for model 1 and model 2 (where total exports and oil exports are used respectively as proxy for Nigeria export), that economic growth and export are cointegrated, indicating an existence of long run equilibrium relationship between the two as confirmed by the Johansen cointegration test results. However, there is no evidence of cointegration between export and economic growth for both model 3. Granger causality was applied to test the causal relationship between GDP and economic growth. The results show that there is evidence of uni-directional causality between export and economic growth in Nigeria in three measures of exports and the direction of causality runs strictly from economic growth to exports. Our finding is consistent with that of Kareem [3], who obtained unidirectional causality between non-oil exports and GDP but at variance with Udah[53] which found no causality between export and growth for Nigeria.

In conclusion, this study provided support for growth-led export in case of Nigeria. Thus effort should be direct towards policies that will enhance economic growth such as import substitution industrialization (ISI) strategy, in order to impact more on exports.

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COMPETING INTERESTS

The author declares that no competing interests exist.

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