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Can Foreign Trade Propel Economic Growth in Nigeria? Evidence from Causality Analysis

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Abstract

Documented studies in the existing literature pertaining to causality relationships between foreign trade and economic growth indicators are quite enormous. This study investigates the dynamic causal relationship between foreign trade and economic growth in Nigeria during the period extending from 1995:Q1 to 2015:Q4. The study responds to the issue of omitted variable bias by incorporating trade openness and exchange rates as control variables. The study employed the granger-causality tests to determine the causal relationship, and in particular the direction of causality among the variables examined after carrying out the stationarity, cointegration and diagnostic tests. The study found a number of distinctive unidirectional causalities running from trade openness to exports, exports to exchange rates, real GDP to exports, trade openness to exchange rates, as well as from real GDP to exchange rates. These results suggest that, to increase and sustain economic growth, Nigeria should commit huge resources to its infrastructural development, diversification strategy, incentives pertaining to the country's manufacturing sector, trade promotion policy, as well as having in place, an effective monitoring mechanism of curbing dumping activities of multinational corporations. The study recommends that, in future studies, efforts should be made to increase the variables used in the causality model. It is also suggested that future research endeavours, should engage other causality models in the existing literature to further investigate the issue under consideration.

Key Words: *Nigeria, export, growth indicators, causality, time series, estimation, empirical*
JEL Classification: *C5, C13, C22, C51, F14, F43*

1. Introduction

Unquestionably, one of the issues in economic literature that is likely to be discussed and debated upon for a long time to come pertains to the relationship between exports and economic growth. Indeed, empirical results are at best mixed and in most cases contradictory and conflicting. This study explores the causality connection between foreign trade and economic growth using Nigeria as a test hub. Nigeria remains one of the largest economies in Africa. Only South Africa and Egypt are currently competing with Nigeria in terms of gross domestic product (GDP). However, when it comes to market size, Nigeria is undeniably in a class of its own (Adeleye, Adeteye & Adewuyi 2015, pp. 163-72). Nigeria attained independence on 1 October 1960. The country shares borders with Chad and Niger to the north, Cameroon to the east, Benin Republic to the west, as well as the Atlantic Ocean on the southern end. The Nigerian economy with an estimated population of approximately one hundred and eighty million is certainly the most strategic market in Africa (Atoyebi et al. 2012, pp. 1-12). This also makes the country to rank as the most populous in Africa, as well as, the most populated black nation on earth. The total landmass of the country is about 923,768 square kilometres with water covering approximately 13,000 square kilometres. The country is made-up of 36 political states in addition to the federal capital territory. Abuja is the political capital of the country, while Lagos remains its commercial capital since the attainment of the country's independence.

The country is endowed with huge deposits of minerals covering industrial minerals, metallic minerals, mineral fuel, gemstones, precious metals and dimension stones. According to research sources, about 34 different types of minerals are found in the country. However, the Nigeria economy continues to depend heavily on oil receipts, which accounts for over 85% of exports' earnings and about 60% of government total revenue. Agriculture alone employs 70% of the labour force and also contributes 34% to its gross domestic product (Usman 2011, pp. 4-13).

The study attempts to investigate the causal relationship between foreign trade and economic growth in Nigeria through cointegration analysis. This study contributes to the existing literature in the following ways: Firstly, the study employed modern time series methods that consider the dynamic behaviour of the variables in the model. Moreover, by focussing exclusively on Nigeria, the study enables the researcher to provide more facts pertaining to Nigeria. Besides, the study reviewed existing literature and, thereafter, made some valuable contributions. Contemporaneously, the study provides opportunities for policymakers, when it comes to formulating and designing strategies for the promotion of a country's exports.

The roadmap for the rest of the research article is as follows: Section 2 reviews the existing literature in a selective fashion, while section 3 details data sources and the method employed. Section 4 discusses the empirical results and section 5 concludes.

2. Literature Review

There are numerous empirical studies in the existing literature pertaining to the relationship between foreign trade and economic growth.

Giles and Williams (2000, pp. 261-337) measured the relationship between exports and economic growth for South Korea and Japan with the use of quarterly data and found that in both countries, foreign trade granger-cause economic growth. The authors also maintained that countries that follow an export-led industrialisation strategy are better placed to achieve a higher level of economic growth. This findings of the study implies that countries in search of greater economic prosperity should first of all give priority to the development of the export sector of their economies.

Zuniga (2005, pp. 94-102) employing cointegration methods investigated the relationship between exports and economic growth over the long-run for Hondurus, Guatemala, El Salvador, Nicaragua and Costa Rica for the years stretching from 1970 to 2000. The study found mixed results for the five countries employed. The study found that in El Salvador, exports granger-cause growth. In Guatemala, in the short run exports granger-cause economic growth. In the case of Costa Rica, it was found that economic growth triggered exports. The use of five countries for purposes of the study, as well as the period of study, which stretches from 1970 to 2000 is highly commendable.

Yang (2008) assessed the relationship between exports and economic growth over the period 1958 to 2004 based on 44 selected countries. The majority of the results generally reinforced the export-led growth hypothesis. The author also observed that real exchange rate can serve as a good proxy variable for distinguishing between situations of exports-driving growth and growth-driving exports' situations. The author's use of cointegration procedures ensures that the research datasets are initially tested for stationarity. Furthermore, the use of cointegration method is more robust in relation to the direct application of Ordinary Least Squares regression (OLS) method.

Likewise, Mag (2010, pp. 4-16) tested whether export promotion measures led to export expansion in South Korea. He used data based on the export pattern of South Korea since the 1960s, as well as her export policies. The study found that during the period of rapid economic growth, the South Korean authorities, indeed, gave tax concessions and financial incentives so as to promote manufacturing for exports. In addition, the government of South Korea established a number of export promotion agencies. These measures and incentives contributed significantly to a rise in respect of exports from South Korea to the rest of the

world. Besides, these measures and incentives have also assisted South Korea in earning and retaining its status as one of the South-East Asian Economic Miracle Countries.

Contributing to the empirical literature, Bojanic (2012, pp. 51-70) assessed the relationship between economic growth, financial development and trade openness using annual macroeconomic time series data for Bolivia during the period stretching from 1940 to 2010. The results, indeed, suggests the existence of long-run relationships among the variables used in the study. Besides, the study found a unidirectional relationship running from financial development and trade openness to economic growth. Therefore, financial sector development and trade openness can be used as instruments for the promotion of economic growth in the economy.

Abayomi (2013, pp. 157-63) investigated the determinants of external trade in Nigeria through cointegration method. The result found that GDP, inflation rate, capacity utilization, exchange rate and exports are variables influencing Nigeria's external trade. The study recommends that the government of Nigeria should commit massive financial resources in infrastructures, human capital and technology so as to promote and improve upon productivity and competitiveness in the country's export sector. The study should have also tested for causalities among the variables used in the model. Moreover, real GDP should have been used as the dependent variable in the model, instead of nominal GDP so as to capture the influence of price disturbances.

Adeleye, Adeteye and Adewuyi (2015, pp. 163-72) probed into the impact of international trade on economic growth in Nigeria using cointegration and error correction modelling techniques. The authors used net export and balance-of-payment as proxies to international trade, while gross domestic product represented economic growth. Only net export was found to granger-cause economic growth. The study maintained that in order for Nigeria to realise the full benefits from participating in international trade, the need to introduce incentives for purposes of encouraging non-oil exports, as well as manufacturing activities cannot be overemphasised. The finding of the study stresses the significance of exports in the process of economic growth.

Obadan and Okojie (2016, pp. 1-23) attempted to measure the impact of trade on economic growth in Nigeria for the period 1970-2007 by employing Ordinary Least Squares approach. The study found trade openness to have a positive impact on Nigeria's economic growth, while political instability had a contradictory impact on growth. The study recommends the need for Nigeria to diversify her export base to include agricultural exports and solid minerals, instead of depending exclusively on petroleum. The OLS method employed by the two authors makes it impossible to establish the possibility of long-run relationships among

the variables used in the model. Besides, the variables used in the model are not likely to be stationary. Therefore, the findings arising from the study should be used with caution.

3. Methodology

3.1 Procedure

The study tested for causal relationships among the variables investigated using Granger-causality procedures within vector autoregression (VAR) framework. VAR can be considered as a means of conducting causality tests, and more specifically Granger-causality tests (Gujarati 2003). In this regard, the study followed the following procedures: Unit root tests, cointegration tests, diagnostic tests, and Granger-causality analysis.

Unit root test enables the study to determine if the time series data used are either stationary or nonstationary. In most cases, time series data are nonstationary. Therefore, estimation based on nonstationary variables is almost certain to yield spurious results, hence, the necessity of the unit root test. Several unit root test methods are provided in the empirical literature. Examples of these methods are the Dickey-Fuller (DF) test, augmented Dickey-Fuller (ADF) test, cointegration regression Durbin-Watson (CRDW) test, Phillips-Perron (PP) test, Kahn and Ogaki test, Leyborne-McCabetest test, as well as the Kwiatkowski, Phillips, Schmidt and Shin (KPSS) tests. This study made use of the KPSS test procedure in testing for unit roots, instead of more popular techniques (ADF and PP tests) for the following pertinent reasons: Firstly, it has higher power than the ADF and PP tests. Besides, the KPSS test is considered more efficient by econometricians in relation to ADF and PP unit root tests (Love & Chandra 2004, pp. 483-96).

Cointegration tests are required to establish whether the variables in the model have long-term relationships (Peracchi 2001). That is, the existence of a long-run equilibrium to which an economic system converges over time. The approach used in this regard is the Johansen cointegration test. Once cointegrating relationships is established among the variables, the long run equation can be estimated if required. The study also performed specific diagnostic tests on the causality model so as to check for serial correlation, heteroscedasticity and normality distributions before proceeding with causality analysis.

Causality analysis is essentially to test for causal relationships amongst the variables used in the model (Brooks 2002). A priori economic knowledge indicates four possibilities, when it comes to the relationship between foreign trade and economic growth. The first possibility is that there is no causal relationship between foreign trade and economic growth. The second option is that economic growth follows foreign trade. The third permutation maintains that increased foreign trade stimulates economic growth, while the fourth variation considers foreign trade and economic growth to be mutually causal. In this regard, the Granger-

causality test was used in the study to check for causality occurrences among the variables examined in the model.

The method employed in the study is justified on the following grounds: Firstly, the method is widely used in empirical econometric studies. Moreover, it enables the researcher to determine the possibility of long run relationships among the variables used in the model. Furthermore, it permits the researcher to determine causalities among the variables used in the model, as well as the direction of the causality. Besides, the chosen method helps in ensuring that the time series data used are tested for unit roots (stationarity).

3.2 Modelling Causality

Whenever a relationship between two variables say X and Y do exist whether negative or positive will not necessarily imply that X is causing Y, or Y is causing X, or X and Y are simultaneously causing one other. Assuming that X is causing Y, then it would imply that X contains important information about Y that allows the researcher to predict the value of Y in an efficient manner. For example, if exports (X) are positively related to real GDP (RGDP), the granger-causality test can be employed in determining the direction of the causality between these two variables. In specific terms, this test determines whether the causality runs from X to RGDP or from RGDP to X or both the RGDP and X are simultaneously granger-causing each other or the causality between RGDP and X are not in existence. The pairwise granger-causality test used in the study involves estimating the following two regression models, to test, for example the causality between RGDP and X:

$$RGDP_t = \sum_{i=1}^{n} \alpha_i X_{t-i} + \sum_{j=1}^{n} \beta_j RGDP_{t-j} + u_{1t} \quad (1)$$

$$X_t = \sum_{i=1}^{n} \lambda_i \ X_{t-1} + \sum_{j=1}^{n} \delta_j RGDP_{t-j} + u_{2t} \quad (2)$$

Where RGDP represents real gross domestic product. While X refers to exports. Also, u_{1t} and u_{2t} are the stochastic terms that are not correlated with one another; and α_i, β_j, λ_i, δ_j implies the coefficients of the variables.

Equations 1 and 2 encompass past information for the values of X and RGDP. For example, the first equation shows that RGDP at time t is related to the past values of X (X_{t-1}, X_{t-2},…, X_{t-i}), as well as the past values of RGDP ($RGDP_{t-1}$, $RGDP_{t-2}$,…, $RGDP_{t-i}$). Likewise, the second equation shows that X at time t is related to the past values of X (X_{t-1}, X_{t-2},..., X_{t-i}), as well as the past values of RGDP ($RGDP_{t-1}$, $RGDP_{t-2}$,…, $RGDP_{t-i}$). By subjecting both equations 1 and 2 to causality test, the following four situations will be expected to occur:

Situation 1: In a situation where the set of estimated coefficients pertaining to the lagged X in equation 1 is statistically different from zero ($\sum_{i=1}^{n} \alpha_i \neq 0$ for i = 1, 2,…, n) and the estimated coefficients regarding lagged RGDP in equation 2 is not statistically different from

zero ($\sum_{j=1}^{n} \delta_j = 0$ for j = 1, 2,…, n), this would allow the researcher to infer that granger-causality runs from X to RGDP (X→ RGDP). This is a case of unidirectional causality.

Situation 2: In a situation where the set of estimated coefficients relating to the lagged X in equation 1 is not statistically different from zero ($\sum_{i=1}^{n} \alpha_i = 0$ for i =1, 2,…, n) and the estimated coefficients concerning the lagged RGDP in equation 2 is statistically different from zero ($\sum_{j=1}^{n} \delta_j = 0$ for j =1, 2,…, n), this would imply that granger-causality runs from RGDP to X (RGDP→X). This is also another case of unidirectional causality.

Situation 3: In a situation where the sets of lagged X and RDGP coefficients are statistically different from zero in equations 1 and 2, ($\sum_{i=1}^{n} \alpha_i = 0$ for i = 1, 2,…, n) and ($\sum_{j=1}^{n} \delta_j = 0$ for j = 1,2,…, n), this would imply that X granger causes RGDP and that RDGP also granger causes X (X↔RDGP). This is a case of bilateral causality.

Situation 4: In a situation where the sets of lagged X and RDGP coefficients are not statistically different from zero in equations 1 and 2, ($\sum_{i=1}^{n} \alpha_i = 0$ for i = 1, 2,…, n) and ($\sum_{j=1}^{n} \delta_j = 0$ for j = 1, 2,…,n), this would imply that both X and RGDP are independent. This is a case of no causality.

3.3 Data

The driving objective of this study was to determine the existence and direction of a causal relationship between foreign trade and economic growth using Nigeria as a test hub. In order to realise this objective, quarterly time series data for Nigeria covering the period from 1995:Q1 to 2015:Q4 were collected from the Central Bank of Nigeria, and the World Bank websites. The variables used in the model were first converted into their respective real values using appropriate deflators so as to control the effect of price disturbances. Correspondingly, the data used were also transformed into their respective natural logarithmic forms before estimation as a matter of econometric necessity. Indeed, real gross domestic product (RGDP) was used to represent economic performance, while trade openness (ToP), exchange rates (Exchr) and exports (X) served as explanatory variables in the model. Also, in the study, economic growth and economic performance are used interchangeably.

4. Results and Discussion

4.1 Stationarity Tests

Most time series analysis requires that the variables under investigation should first be tested for stationarity. The study used the KPSS approach to test for stationarity. The results reported in Table 1 indicates that after differencing the variables once, they all became stationary, suggesting that they are of I(1) processes. Stationarity test has been earlier elaborated upon under methodology.

Table 1: KPSS Unit Root Tests in Levels and Difference

Variable	Model specification			
		Levels	**First difference**	**Order of integration**
$lnRGDP_t$	Intercept and trend	0.242	0.083**	1
	Intercept	1.136	0.052**	1
lnX_t	Intercept and trend	0.358	0.127**	1
	Intercept	1.421	0.149**	1
$lnTop_t$	Intercept and trend	0.173	0.085**	1
	Intercept	0.168	0.065**	1
$lnExchr_t$	Intercept and trend	0.074	0.099**	1
	Intercept	0.095	0.072**	1

Notes: (a) ** implies rejection of the null hypothesis at 5 percent.
Source: Author's compilation

4.2 Cointegration Tests

Before proceeding to causality analysis, a cointegration test was carried out so as to determine the possibility of long-run relationships among the variables under investigation. In this context, the study employed the Maximum-Eigen and Trace tests. The null hypothesis of r=0 (No cointegrating relations) was tested against the alternative hypothesis of r≠0 (There are cointegrating relations). The rejection of H_o would imply the acceptance of H_1. That is the existence of cointegrating relations among the variables being examined. In this particular case, both Maximum-Eigen test and Trace test indicates one cointegrating equations at the 5% level, since the t-Statistic is greater than the critical value at the 5% level implying cointegrating relationship among the variables assessed. These results are reported in Table 2.

Table 2: Johansen Cointegration Test

Maximum Eigen test				**Trace test**			
H_0: rank = r	**H_a: rank = r**	**Statistic**	**95% Critical value**	**H_0: rank = r**	**H_a: rank = r**	**Statistic**	**95% Critical value**
r = 0	r =1	33.232	29.584	r = 0	r >=1	77.816	47.856
r <=1	r = 2	18.776	23.132	r <= 1	r >= 2	26.554	27.537
r <=2	r = 3	9.384	16.598	r <= 2	r >= 3	12.129	17.581
r <=3	r = 4	1.272	4.199	r <= 3	r >= 4	2.929	5.195

Note: Both Maximum Eigen and Trace tests indicate one cointegrating equation at the 5% level.
Source: Author's compilation

4.3 Diagnostic Tests

The study performed three diagnostic tests on the causality model so as to ensure its robustness before proceeding to causality analysis. In this regard, the study tested the following hypotheses for serial autocorrelation, heteroscedasticity and normality distributions:

Hypothesis 1

H_o: The model is free from autocorrelation

H_1: The model is suffering from autocorrelation

Hypothesis 2

H_o: The model is homoscedastic

H_1: The model is heteroscedastic

Hypothesis 3

H_o: The model is normally distributed

H_1: The model is not normally distributed

Decision

The decision rests upon comparing the computed probability values with the level of significance of 5% or 0.05 in probability terms. If the computed probability value is greater than 0.05, accept Ho and reject H1. Consistently, all the computed probability values are greater than 0.05, and therefore the study accepted the three null hypotheses, and then rejected all the three alternative hypotheses.

In specific terms, the results show no serial correlation, no conditional heteroscedasticity, and also the model was found to be normally distributed. This is a very important procedure to ensure that the causality model is robust. These results are displayed in Table 3.

Table 3: Diagnostic Checks

Test	**Null hypothesis**	T-statistic	probability
Langrange multiplier (LM)	No serial correlation	33.823	0.411
Jarque-Bera (JB)	There is normality	11.290	0.504
White (chi-square)	No conditional heteroscedasticity	40.591	0.179

Source: Author's construct

4.4 Granger-causality Tests

Upon establishing cointegrating relationship amongst the variables in the model, the next step was to test for causality relationships among the variables under examination. In this respect, the pairwise granger-causality test was utilized. The results reported in Table 4 indicate a number of distinctive unidirectional causalities. More specifically, trade openness was found to granger-cause exports, exports granger-cause exchange rates, real GDP granger-cause exports, openness granger-cause exchange rates, while real GDP granger-cause

exchange rates. Indeed, the study found a unidirectional causal relationship running from trade openness to exports. This implies that a country would need certain degree of trade openness in order to promote exports. Similarly, the study found a unidirectional causal relationship running from exports to exchange rates. This implies that a country would need to boost its exports' capacity so as to effectively allow its currency exchange rates to favourably compete with other available currencies in the foreign exchange market. Furthermore, the study found a unidirectional causal relationship running from real GDP to exports. This suggests that a country needs to generally expand upon the volume of its domestic economic activities in order to achieve a higher level of exports. In addition, the study found a unidirectional causal relationship running from openness to exchange rates. This is indicative of the fact that a country needs certain amount of trade openness so as to allow its currency to favourably compete with other currencies in foreign exchange markets. Besides, the study found a unidirectional relationship running from real GDP to exchange rates. This suggests that in order to have a competitive currency exchange rate for a country's currency that particular country would need to continually expand upon and sustain its economic growth objective.

Table 4: Pairwise Granger-causality test results

Null Hypotheses	Obs	Prob.
Ln(Trade openness) does not Granger Cause LN(Exports)	**80**	**7.E-05****
Ln(Exports) does not Granger Cause Ln(Trade openness)	80	0.7867
Ln(Exchr) does not Granger Cause Ln(Exports)	80	0.5957
Ln(Exports) does not Granger Cause Ln(Exchr)	**80**	**8.E-05****
Ln(Real GDP) does not Granger Cause Ln(Exports)	**80**	**2.E-06****
Ln(Exports) does not Granger Cause Ln(Real GDP)	80	0.1646
Ln(Exchr) does not Granger Cause Ln(Trade openness)	80	0.6879
Ln(Trade openness) does not Granger Cause Ln(Exchr)	**80**	**0.0181****
Ln(Real GDP) does not Granger Cause Ln(Exchr)	**80**	**0.0016****
Ln(Exchr) does not Granger Cause Ln(Real GDP)	80	0.4484

Note that ** means the rejection of the null hypothesis at the 5 percent level.
Source: Author's computation.

In particular, the causality test results for Nigeria are consistent with findings of other previous empirical studies that this study reviewed (Yang 2008, p. 83-7; Abayomi 2013, p. 157-63; Obadan & Okojie 2016, pp. 1-23). Another striking fact about the causality model is that, it was found to be free from autocorrelation and heteroscedasticity. Moreover, the

causality model was also found to be normally distributed. Therefore, from analytical point of view the causality model adopted in the study is quite robust.

5. Conclusions and Policy Choices

This study examined the possibility of a causal relationship between foreign trade and economic growth based on Nigeria's macroeconomic time series quarterly data for the period of 1995:Q1 to 2015:Q4. The study introduced two control variables into the causality model, namely trade openness and exchange rates as a way of controlling the omission-of-variable-bias. By implication, the study employed a multivariate granger-causality model. Before applying the granger-causality approach to determine causalities, as well as the direction of causality among the variables under examination, the variables were subjected to stationary and cointegration tests. Thereafter, the causality model was tested for the presence of serial correlation, heteroscedasticity and normality distribution so as to establish the robustness of the model used in the study. Thereafter, causality analysis was carried out.

The study established the following: The study found a unidirectional causal relationship running from trade openness to exports. Similarly, the study found a unidirectional causal relationship running from exports to exchange rates. Furthermore, the study found a unidirectional causal relationship running from real GDP to exports. In addition, the study found a unidirectional causal relationship running from openness to exchange rates. Besides, the study found a unidirectional relationship running from real GDP to exchange rates.

In light of the findings of the study, the following recommendations are put forward:

- The government of Nigeria should place emphasis on the development of manufactured goods, while contemporaneously encouraging value addition activities on the country's traditional exports, especially primary commodities and solid minerals so as to improve upon the competitiveness of its exports in foreign markets.
- There is the need to provide incentives to firms that operates in the country's export sector, similar to those that the South-East Asian Economic Miracle Countries' governments have provided to firms operating in the export sector of their economies.
- Infrastructural development, especially communication network, seaports, energy supplies among others should be prioritised.
- There is also the need to establish a responsive and reliable monitoring system for purposes of curbing the dumping activities of multinationals.
- Efforts to diversify her export base should be strengthened. In this regard, the receipts realised from oil exports should be deployed towards achieving this purpose.

In future studies, efforts should be made to increase the variables used in the causality model. It is also suggested that future studies, should employ other causality models in the existing literature to further investigate the issue under consideration.

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