

Testing the validity of the export-led growth hypothesis in Nigeria: Evidence from non-oil and oil exports

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Abstract

Nigeria is a developing economy and leading oil exporter in Africa. This study tests for the validity of the export-led growth hypothesis in Nigeria between 1981 and 2014 by disaggregating export trade into non-oil export and oil export trade. It examines the causal effect of non-oil export, oil export and import trade on economic growth. The Toda-Yamamoto augmented Granger non-causality test reveals that there is unidirectional causality from non-oil export, oil export and import trade to economic growth, thus implying that Nigeria is non-oil export-led, oil export-led and import-led. Also, it shows that non-oil export trade leads economic growth more than oil export trade. On the whole, the study finds evidence to validate the export-led growth hypothesis in Nigeria.

Keywords: *export-led growth hypothesis, export, non-oil export, oil export, Granger non-causality*

JEL Codes: *F1, F14*

1. Introduction

Export is a source of foreign exchange earning which increases the rate of capital formation in an economy. It helps to alleviate balance of payment deficits and generates employment opportunities. Feder (1982) argues that export may influence total factor productivity through its externalities on the rest of the economy. A country's international competitiveness and relevance is heavily dependent on its export. The endogenous growth theory postulates that export promotes economic growth by allowing an increase in technological innovation and 'learning by doing'. The relationship between export and growth is often linked to the possible positive externalities for the domestic economy as a result of participation in the global market (Medina-Smith, 2000).

The export-led growth hypothesis (ELGH) postulates that export is a crucial determinant of economic growth and that causality runs from export to economic growth. The proponents of the ELGH are the neo-classical economists. They are of the view that export expansion would drive growth. Awokuse (2003) states that export expansion can be an indirect catalyst of growth in an economy through efficient allocation of resources, greater capacity utilisation, exploitation of economies of scale, and stimulation of technological improvement as a result of competition in the world market.

Policy makers and academic believe that export is a key factor in promoting economic growth in developing economies (Dreger & Herzer, 2011). Sannasse, Seetanah and Jugessur (2014) observe that countries with low levels of economic development gain less from exports as a driver of economic growth. Nigeria is a developing economy and an active player in the world market through its oil exports. Prior to the discovery of oil in Nigeria, agricultural products were the major export commodities of the country. The period of oil boom in the 1970s caused a neglect of agricultural exports and oil became the main export commodity. In 1986, Nigeria adopted the International Monetary Fund (IMF) Structural Adjustment Programme (SAP). The SAP recommended the outward-oriented trade (export expansion) strategy as a means to promote economic growth in developing countries. However, over the last three decades, oil export annually accounts for more than 90% of total export in Nigeria. It is against this statistical observation that this study separately determines the causal effect of non-oil export and oil export on economic growth and in attempt to provide evidence to validate the ELGH in Nigeria.

In testing for causal effect of non-oil and oil exports, import would be included. Studies like Riezman, Summers and Whiteman (1996), Thangavelu and Gulasekaran (2004) among others have shown that inclusion of import is important because failure to control while testing the ELGH may produce misleading outcome. The

exclusion of import creates the problem of omitted variable bias because significant export growth is usually associated with rapid import growth (Awokuse, 2008; Mishra, Sharma & Smyth, 2010). Nigeria is a leading oil exporter in Africa and heavily relies on proceeds from oil exports. The decline in global oil prices coupled with the fall in crude oil production as a result of militancy activities in the Niger Delta region led to a shortfall in oil revenue and this subsequently led to retrogression in economic performance. Therefore, it is imperative to examine whether oil exports drive economic growth more than non-oil exports in Nigeria.

An augmented Granger causality test proposed by Toda and Yamamoto (1995) has been widely used to test for the export-led growth hypothesis, however, its application is new to Nigeria. The Toda-Yamamoto Granger causality testing approach works in Vector Autoregressive (VAR) system. Toda and Yamamoto (1995) note that the method is inefficient and suffers some loss of power due to intentionally over-fitting the VAR model, but the relative inefficiency is dependent on the VAR model. However, Toda-Yamamoto approach's is better than the traditional Granger causality tests because it produces valid estimates irrespective of the order of integration of the series and cointegration (Wolde-Rufael, 2005). The results from the Toda-Yamamoto Granger causality test showed that non-oil export trade drives the Nigerian economic growth more than oil export trade. Overall, it showed that the export-led hypothesis is valid for Nigeria. The outcome of this study informs the government that export promotion strategy should be adopted with more emphasis on non-oil exports. The rest of the paper is sectioned as follows. Section 2 provides the literature review and Section 3 discusses the data issues and preliminary analyses. Section 4 and Section 5 present the estimation and conclusion respectively.

2. Literature Review

The export-led growth hypothesis argues that a unidirectional causality moves from exports to economic growth with no feedback. The direct opposite of the export-led growth hypothesis is the growth-led export hypothesis which argues that economic growth drives exports. Contrary to these hypotheses is the feedback effect hypothesis which states that exports and economic growth cause each other.

Evidence supporting the export-led growth hypothesis: Tang, Lai and Ozturk (2015), employing the Toda-Yamamoto Granger causality approach with a rolling window analysis, showed that the export-led growth is valid for the Four Little Dragon countries (Hong Kong, South Korea, Singapore and Taiwan), but not stable over time. Employing the Vector Error Correction Model (VECM) Granger causality test, Tsegaye (2015) showed that no feedback effect occurred in the unidirectional causal link moving from exports to economic growth in South Korea. Gossel and Biekpe (2014) used the Toda-Yamamoto Granger causality testing procedure to show that growth is export-led in South Africa after liberalisation.

Azeez, Dada and Aluko (2014) discovered that exports predict economic growth in Nigeria using the Ordinary Least Squares (OLS) regression analysis. The VECM estimated by Shahbaz (2012) revealed that there is a long-run unidirectional causality from exports to economic growth in Pakistan. Hye and Siddiqui (2011) discovered that exports drive economic growth in Pakistan using the Autoregressive Distributed Lag (ARDL) modelling approach and rolling window regression method.

Ozturk and Acaravci (2010) utilised the Toda-Yamamoto Granger causality test to show a unidirectional causal flow from exports to economic growth in Turkey. In a sample consisting of Argentina, Colombia and Peru, Awokuse (2008), based on the VECM Granger causality test, found evidence to validate the export-led growth for Peru. Utilising the VECM Granger causality test, Narayan, Narayan, Prasad and Prasad (2007) showed that the export-led growth hypothesis is valid for Fiji in the long-run but upheld for Papua New Guinea in the short-run.

Parida and Sahoo (2007) showed evidence to uphold the export-led growth hypothesis in four South Asian countries using the Pedroni panel cointegration method. Using Luktkepohl and Wolters weak exogeneity test, Herzer, Nowak-Lehman and Siliverstovs (2006) found that manufactured exports cause economic growth in Chile. Love and Chandra (2005) applied the VECM Granger causality test and found that only India, Maldives and Nepal is export-led in the South Asian region.

Abual-Foul (2004) revealed one-way causality from exports to output in Jordan employing three bivariate models namely VAR in levels, VAR in first differences, and Error Correction Model (ECM). Awokuse (2003), in a study on Canada, found that exports lead economic growth using the VECM and Toda-Yamamoto Granger

causality tests. Following the Toda-Yamamoto Granger causality test procedure, Hatemi-J and Irandoust (2000) showed a unidirectional causal link moving from exports to economic growth exists in Ireland and Portugal.

Evidence against the export-led growth hypothesis: Balcilar and Ozdemir (2013), employing the Toda-Yamamoto Granger causality test based on bootstrapping, found evidence of feedback effect between exports and output in Japan. Alimi and Muse (2012) revealed a unidirectional causality running from economic growth to exports in Nigeria using the VAR Granger causality/exogeneity wald tests. Husein (2010) provided strong evidence of bidirectional causal relation between exports and economic growth in the MENA region using the VECM Granger causality test.

In a panel of Pacific island countries (Fiji, Papua New Guinea, Solomon Islands, Tonga, and Vanuatu), Mishra, Sharma and Smyth (2010) showed that the causality between exports and economic growth is bidirectional using the panel Granger causality test. Awokuse (2006) found bidirectional causal relationship between exports and economic growth in Japan with the aid of the Toda-Yamamoto Granger causality test and directed acyclic graphs. Awokuse (2005), applying VECM and Toda-Yamamoto Granger causality tests, showed that there is a two-way causality between exports and Korean economic growth.

Al Mamun and Nath (2005) showed that economic growth predicts exports in Bangladesh employing Granger causality test based on ECM. Panas and Vamvoukas (2002) utilised the VECM Granger causality test and found that economic growth drives exports in Greece. Based on VECM Granger causality test, Dhawan and Biswal (1999) found that causality flows from economic growth to exports in India in the short and long-run but causality runs from exports to economic growth in the short-run.

Shan and Sun (1998a) employed the Toda-Yamamoto Granger causality testing approach and revealed that exports is growth-driven in Australia. Biswal and Dhawan (1998) showed that bidirectional causality is evident between exports and economic growth in Taiwan using the ECM based Granger causality test. Utilising the Toda-Yamamoto Granger causality test, Shan and Sun (1998b) also found bidirectional causality between exports and economic growth in China.

3. Data Issues and Preliminary Analyses

This study tests for the export-led growth hypothesis by examining the causality between economic growth and export (oil and non-oil) in Nigeria between 1981 and 2014. Economic growth is measured with gross domestic product (GDP) at constant basic prices usually known as Real GDP (RGDP). Annual time series data on real GDP, non-oil export value (NOILEXP), oil export value (OILEXP) and all import value (IMP) were sourced from the 2014 Annual Issue of the Central Bank of Nigeria (CBN) *Statistical Bulletin*. The preliminary analyses consist of descriptive statistics, graphical representations, unit root test and co-integration test. The logarithm form of the series was used, thus RGDP, NOILEXP, OILEXP and IMP are presented as LRGDP, LNOILEXP, LOILEXP and LIMP respectively in the analysis.

Table 1: Descriptive Statistics

Statistic	LRGDP	LNOILEXP	LOILEXP	LIMP
Mean	6.042885	2.990760	6.330676	5.969070
Maximum	6.923209	7.030124	9.569633	9.305274
Minimum	5.426051	-1.593565	1.974248	1.789022
Skewness	0.4539876	-0.118817	-0.382172	-0.335386
Kurtosis	2.085069	1.897116	1.732192	1.701286
Jarque-Bera (p-value)	0.308239	0.405926	0.211749	0.220156
Observations	34	34	34	34

Source: Author's Computation

From Table 1, LRGDP has a positively skewed distribution while LNOILEXP, LOILEXP and LIMP have a negatively skewed distribution. The Kurtosis statistics indicates that all the series have a platykurtic (thin and low-peaked) distribution. The Jarque-Bera statistics indicates that the null hypothesis of normal distribution is accepted for all the series.

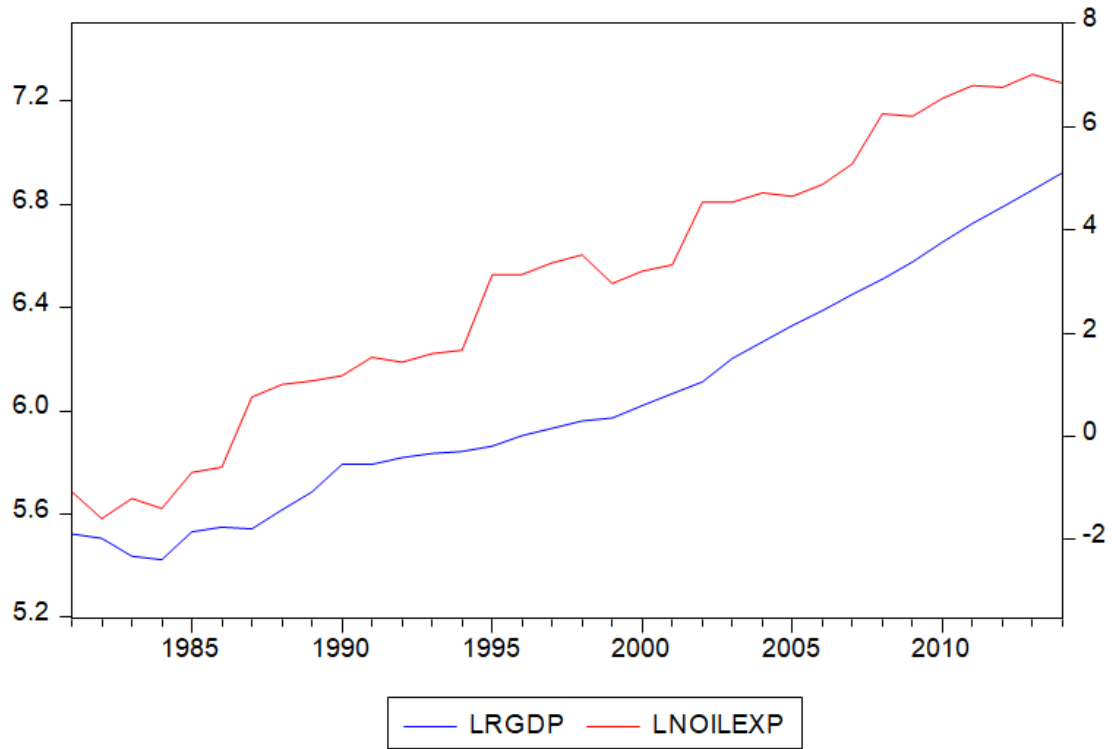


Fig. 1: Combined Graph of LRGDP and LNOILEXP

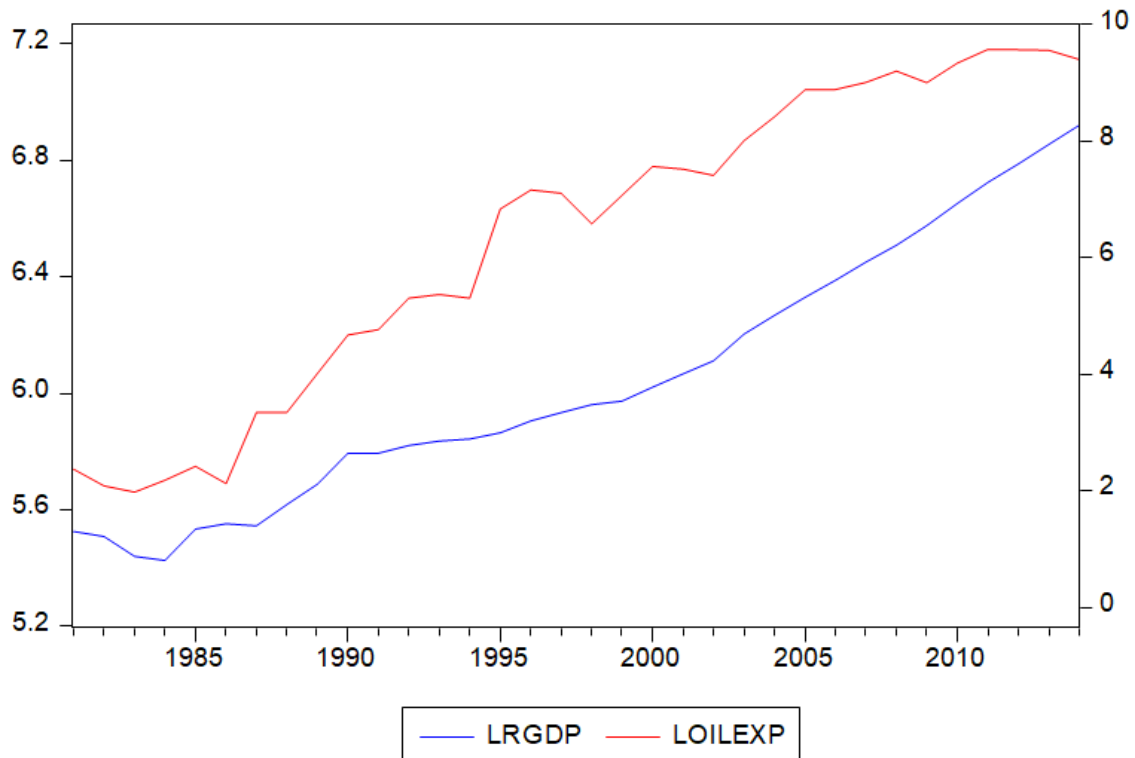


Fig. 2: Combined Graph of LRGDP and LOILEXP

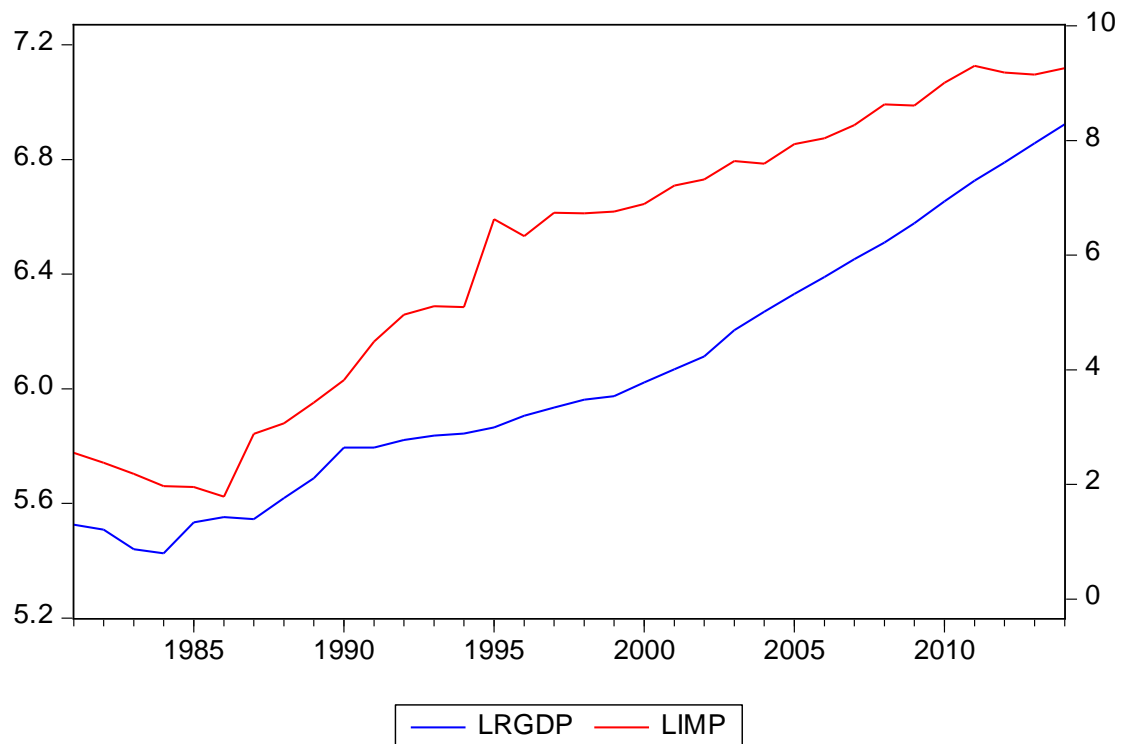


Fig. 3: Combined Graph of LRGDP and LIMP

Fig. 1 shows that LRGDP and LNOILEXP move in the same direction and Fig. 2 shows that LRGDP and LOILEXP also move in the same direction. Also, Fig. 3 shows that LRGDP and LIMP move in similar direction.

Unit Root Test

The Ng-Perron (NP) modified unit root test and Augmented Dickey Fuller (ADF) breakpoint unit root test were employed to check for the presence of unit root in the series and to determine the order of integration – $I(d)$ in the absence or presence of structural break in the series respectively. The NP unit root test consists of MZa, MZt, MSB and MPT statistics but this study utilises only MZa and MZt. The ADF breakpoint unit root test was performed in an Innovative Outlier (IO) model. The null hypothesis for the test is that the series has a unit root. Table 2 presents the summary results of the unit root tests on the series and the order of integration.

Table 2: Unit Root Test Results

Ng-Perron Test			
Series	MZa statistic	MZt statistic	$I(d)$
LRGDP	-15.1920*** ^b	-2.75106*** ^b	I(1)
LNOILEXP	-167.748* ^b	-9.14507* ^b	I(0)
LOILEXP	-15.6325* ^a	-2.78835* ^a	I(1)
LIMP	-15.7769* ^a	-2.80828* ^a	I(1)
ADF Breakpoint Test			
Series	ADF statistic	Break Date	$I(d)$
LRGDP	-7.287193‡ ^b	1990	I(1)
LNOILEXP	-5.336499‡ ^b	1989	I(0)
LOILEXP	-4.931804† ^b	1994	I(0)
LIMP	-4.997209• ^b	1998	I(0)

* and *** denote 1% and 10% asymptotic critical value respectively and ^a and ^b indicates intercept only and intercept and trend in test equation, respectively. Also, ‡, † and • denotes p-value less than 1%, 5%, and 10% respectively.

Source: Author’s Computation

The results in Table 2 show that LRGDP, LOILEXP and LIMP are non-stationary series while LNOILEXP is a stationary series. Therefore, there is a mix of I(0) and I(1), thus indicating that the series are integrated in different order.

4. Estimation

The augmented Granger non-causality test developed by Toda and Yamamoto (1995) was utilised. The existence of co-integration and stationarity of series are not pre-requisites for the test. However, utilising the Toda-Yamamoto (T-Y) test, the maximum order of integration (d_{max}) is required, hence the need to perform unit root test on the series. From the unit root test, d_{max} is 1. The test is performed in a Vector Autoregressive (VAR) framework which treats all variables as endogenous. The T-Y VAR models for this study are stated as follows:

$$\begin{aligned} LRGDP_t = & \omega + \sum_{j=1}^k \beta LRGDP_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha LRGDP_{t-p} + \sum_{j=1}^k \rho LNOIL_{t-j} + \sum_{p=k+1}^{k+d_{max}} \sigma LNOIL_{t-p} + \sum_{j=1}^k \partial LOIL_{t-j} \\ & + \sum_{p=k+1}^{k+d_{max}} \alpha LOIL_{t-p} + \sum_{j=1}^k \phi LIMP_{t-j} + \sum_{p=k+1}^{k+d_{max}} \theta LIMP_{t-p} + \varepsilon_t \end{aligned} \quad \dots (1)$$

$$\begin{aligned} LNOIL_t = & \omega + \sum_{j=1}^k \rho LNOIL_{t-j} + \sum_{p=k+1}^{k+d_{max}} \sigma LNOIL_{t-p} + \sum_{j=1}^k \beta LRGDP_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha LRGDP_{t-p} + \sum_{j=1}^k \partial LOIL_{t-j} \\ & + \sum_{p=k+1}^{k+d_{max}} \alpha LOIL_{t-p} + \sum_{j=1}^k \phi LIMP_{t-j} + \sum_{p=k+1}^{k+d_{max}} \theta LIMP_{t-p} + \varepsilon_t \end{aligned} \quad \dots (2)$$

$$\begin{aligned} LOIL_t = & \omega + \sum_{j=1}^k \partial LOIL_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha LOIL_{t-p} + \sum_{j=1}^k \rho LNOIL_{t-j} + \sum_{p=k+1}^{k+d_{max}} \sigma LNOIL_{t-p} + \sum_{j=1}^k \beta LRGDP_{t-j} \\ & + \sum_{p=k+1}^{k+d_{max}} \alpha LRGDP_{t-p} + \sum_{j=1}^k \phi LIMP_{t-j} + \sum_{p=k+1}^{k+d_{max}} \theta LIMP_{t-p} + \varepsilon_t \end{aligned} \quad \dots (3)$$

$$\begin{aligned} LIMP_t = & \omega + \sum_{j=1}^k \phi LIMP_{t-j} + \sum_{p=k+1}^{k+d_{max}} \theta LIMP_{t-p} + \sum_{j=1}^k \partial LOIL_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha LOIL_{t-p} + \sum_{j=1}^k \rho LNOIL_{t-j} \\ & + \sum_{p=k+1}^{k+d_{max}} \sigma LNOIL_{t-p} + \sum_{j=1}^k \beta LRGDP_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha LRGDP_{t-p} + \varepsilon_t \end{aligned} \quad \dots (4)$$

An optimal lag length (k) of 1 was chosen for the VAR model based on the sequential modified LR test, Final Prediction Error (FPE), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). Table 3 reports the VAR optimal lag length selection by the different criteria.

Table 3: VAR Optimal Lag Length Selection Result

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.001127	4.563003	4.749829	4.622770
1	200.2998*	1.10e-06*	-2.382322	-1.448190*	-2.083485*
2	12.85635	1.84e-06	-1.927862	-0.246425	-1.389956
3	25.89504	1.38e-06	-2.384433*	0.044309	-1.607457
4	7.886983	3.15e-06	-1.924457	1.251590	-0.908412

* denotes lag order selected by each criterion at 5% significance level.

Source: Author's Computation

The validity of the lag length of 1 is further validated by the VAR residual serial correlation test. The test accepts the null hypothesis of no serial correlation at lag 1. Table 4 presents the result of the serial correlation test.

Table 4: VAR Residual Serial Correlation Test Result

Lag	LM statistic	p-value
1	22.37872	0.131
2	22.20307	0.137
3	14.08642	0.592
4	18.99582	0.269

Source: Author's Computation

The null hypothesis for the T-Y Granger non-causality test is that there is no causality. The T-Y test uses $k + d_{max}$ as its optimal length; hence the optimal lag length for the T-Y VAR models is 2. Table 5 reports the result of the T-Y Granger non-causality test based on a modified Wald (MWALD) statistic.

Table 5: T-Y Granger non-Causality Test Result

Dependent Variable	Independent Variables				All
	LRGDP	LNOILEXP	LOILEXP	LIMP	
LRGDP	DV	{6.017959} [0.0142]**	{2.702048} [0.100]***	{3.296863} [0.069]***	{9.098757} [0.028]**
LNOILEXP	{0.016435} [0.898]	DV	{0.418344} [0.518]	{0.160905} [0.688]	{0.59361} [0.898]
LOILEXP	{0.933209} [0.334]	{0.611588} [0.434]	DV	{0.099197} [0.753]	{1.387694} [0.708]
LIMP	{0.988182} [0.3202]	{0.195765} [0.658]	{0.679249} [0.410]	DV	{1.242301} [0.743]

** and *** denote rejection of null hypothesis at 5% and 10% significance level respectively. DV indicates Dependent Variable, MWALD statistic in { } and p-value in [].

Source: Author's Computation

The result of the T-Y Granger non-causality test reveals that there is unidirectional causality from LNOILEXP, LOILEXP and LIMP to LRGDP and no reverse causality from LRGDP to LNOILEXP, LOILEXP and LIMP in Nigeria. This suggests that non-oil export, oil export and import trade drive economic growth with no feedback effect from Nigerian economic growth. It also shows that there is absence of causality between LNOILEXP and LOILEXP. This implies that non-oil and oil export trade do not predict each other. Furthermore, LNOILEXP and LOILEXP do not have causal effect on LIMP and *vice versa*. This indicates that non-oil export and oil export trade do not cause import trade and are not led by import trade. Overall, the result from the Granger causality test suggests that the export-led growth hypothesis can be upheld for Nigeria and this is in tandem with evidence from other developing countries such as Tsegaye (2015) for South Korea, Shahbaz (2012) for Pakistan, and Ozturk and Acaravci (2010) for Turkey among others. However, in an attempt to use ARDL as a result of different order of integration of series in line with condition for estimating T-Y, it only considers a univariate form of estimation without taking into consideration the nature of the relationship of the series under consideration.

5. Conclusion

This study tested the validity of the export-led growth hypothesis in Nigeria by determining the causal effect of non-oil export, oil export and import on the economic growth of the country. It finds that there is a long-run relationship among economic growth, non-oil export, oil export and import. Also, it observes that economic growth is led by non-oil export, oil export and import trade. It was further revealed that economic growth does not lead non-oil export, oil export and import trade. This study discovered that non-oil export trade is more relevant to the growth of Nigeria than oil export trade. Overall, there is strong evidence to support the export-led growth hypothesis in Nigeria. The policy implication of this study is that government should intensify efforts to

increase the country's export by adopting the export promotion strategy. There is also need for the government to prioritise the non-oil sectors, especially the agricultural sector which tends to be the viable source for the country to generate foreign revenue as it was the mainstay of the economy before the discovery of oil.

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