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International trade and economic growth in Nigeria: An auto regressive and distributed LAG bound test approach

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Abstract. This paper empirically investigated the impact of international trade on economic growth in Nigeria during the period 1981 – 2017. To achieve the purpose of this research, we estimated real GDP as a function of imports, exports, gross fixed capital formation, unemployment rates and exchange rate. The methods used are: the Autoregressive Distributed Lag (ARDL) techniques, Augmented Dickey- Fuller unit root test, Johansen co-integration test, error correction technique, and the Granger causality test. The empirical results revealed that: all the variables used are integrated of the same order, 1(1) except for unemployment and gross fixed capital formation which were integrated of order 1(0); also, the bound test revealed that there is evidence of the existence of a long run relationship among the variables used; while the causality test revealed that exports granger causes economic growth in Nigeria. Findings revealed that there is short run impact of export trade on economic growth. Also, causality runs from imports and exports to economic growth in Nigeria. Based on these findings, the study therefore recommends among other things that: the government should improve on her trade contents and concentrate on the exportation of labour intensive products and as a result, improve economic performance.

Keywords. Economic growth, Exports, Factor endowment, Imports, ARDL.

JEL. F14, F43.

1. Introduction

International trade is described as an exchange of goods and services between the residents of a given country and those of the rest of the world (Babatunde, Jonathan & Muhyideen, 2017) as cited in Mannur, (1995). It is, therefore, a tool which links the nations of the world via service flows, commodity trade, and factor movements. This same concept according to (Li, Chen, & San 2010), international trade is often times referred to as '*foreign trade*' or '*global trade*'. It includes the inflow (import) and outflow (export) of goods and services in a country. A country's imports and exports represent a significant share of her gross domestic product (GDP). This will serve as the working definition of international trade for our study as it captures the contexts of trade flows such as "imports" and "export".

Atangana, Adamou, & Njie, (2017), sees economic growth as the process whereby the real per capita income of a country increases over a long

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period of time. Economic growth is measured by the amounts of goods and services produced in a country. It is a desirable goal for Nigeria. It is the long-term rise in capacity to supply increasingly diverse economic goods and services to its population. This growth capacity is based on advancing technologies, the institutional and ideological advancement that it demands. Economic growth can be regarded as an important macroeconomic objective of the government given the fact that it visibly impacts on the standard of living. Economic growth occurs whenever there is a quantitative increase in country's input and output over a period of time.

Hameed, Khalid, & Sabit, (2012), posits that economic growth is an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. It can be measured in nominal or real terms, the latter of which is adjusted for inflation. Traditionally, aggregate economic growth is measured in terms of Gross National Product (GNP) or Gross Domestic Product (GDP), although alternative measures are sometimes used. In the same vein, Ogunmuyiwa, & Ekone (2010), refers economic growth to an increase in aggregate productivity. Often, but not necessarily, aggregate gains in productivity correlate with increased average marginal productivity. This means the average laborer in a given economy becomes, on average, more productive. It is also possible to achieve aggregate economic growth without an increased average marginal productivity through extra immigration or higher birth rates thereby making economic growth to be described as increase in output of an economy over a period of time.

The trade theories have emphasized on attaining economic growth via international trade on the foundation of comparative economic advantages and disadvantages. Harnessing the principles of this trade theory, Nigeria was expected to be a foremost agricultural economy based on her enormous abundant labour resources and unexploited cultivatable land. Regrettably, since the oil price windfall of the early 1970s, the nation sidelined the industrial and agricultural sectors of the economy. The economic agents of both public and private sectors of the economy channeled their resources in the oil and gas sector so much that the key sectors of the economy are deprived of funding, managerial capabilities and even required investment. Thus, the keystone economy has been rendered uncompetitive internationally while the nation has become a trading settlement for foreign firms (Sanusi, 2010).

The oil sector in Nigeria is characterised by wastage, unchecked dominance of foreign multinationals low productivity and corruption Hassan, Olawoye & Nnadozie, (2002) as cited in (Babatunde, Jonathan & Muhyideen, 2017). The economy has been relegated to a mono-product economy with the major part of government revenues resulting from oil exports which is prone to fluctuations and shocks in the oil market internationally. Besides, several other solid minerals with which the nation is abundantly blessed remain generally undeveloped. More fundamentally,

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the economy has excessively focused on the primary sector with the absence of any significant value addition to the economic growth. In view of this, the growth recorded in the economy is negligible which has thus far been devoid of corresponding positive attitudinal change, employment, equitable income distribution, and value re-orientation, to mention but a few (Babatunde, Jonathan & Muhyideen, 2017). Based on the theory of factor proportion, Nigeria, for many decades, has stupendously been expending on the importation of technologically oriented goods mainly from Western Europe, even though the nation was not aggressively exporting agricultural and industrial output. A scrutiny of the Nigeria's profile regarding imports during the period 1981-2017 for instance revealed that due to high international oil prices, Nigeria's import trade has the capability of balancing export revenue.

According to NBS (2016) as cited in (Babatunde, Jonathan & Muhyideen, 2017), imports to Nigeria decreased by 24.7 percent year-on-year to N507.4 million in December 2015. In the last quarter of the year, purchases declined 22.4 percent. Imports in the country averaged N164, 266.67 million from 1981 until 2015, reaching an all-time high of N1, 554,732.90 millions in March of 2011 and a record low of N167.88 million in May, 1984. Nigeria imports mainly from: industrial supplies (27% of total in 2014), fuel and lubricants (14%), food and beverage (17%), consumer goods (7%), capital goods (23%), and transport equipment and parts (12%). 43% of total imports come from Asia; 34% from Europe; 15% from America and 7% from Africa. As a technologically backward and weak nation, the product life cycle theory is to some level irrelevant to Nigeria, even though the nation used to be preeminent exporter of rice in the 60s but now relegated to be a prima importer of same product. For example, Nigeria consumes about five million metric tons of rice annually. Over the years, the local production, however, has not kept pace. The difference between what is produced and what is consumed is supplied via importation of about 2.1 million metric tons, at such huge annual import expenses of about N356 billion. This is not healthy for an economy like Nigeria who is trying to recover from the adverse effect of her 2016 economic recession. Now, compare that with what can be produced locally at a cheaper cost, with a number of associated benefits such as employment creation and GDP growth.

Despite the gloomy state, Nigeria's prospect of becoming one of the top 20 economies of the world is still green. This is owing to the fact that Nigeria is Africa's largest economy has Africa's largest population and the largest black nation in the world, this can be capitalized upon by the nation's policy makers and foreign investors as destination for investment.

The objective of rapid and sustained economic growth as well as that of full employment of resources is among the top macroeconomic goals of every economy (Abula & Ben, 2016). The world has become a global village as economies are now linked together through globalization and external trade. Hence, nations are acted in alignment with the postulations

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of the classical and the neoclassical theories on trade with the expectant improvement on their macroeconomic performance when they engage in trade (Sanusi, 2010). In line with the trend, Nigeria has experienced tremendous increase in the value and volume of trade with other countries of the world as shown in Figure 1.

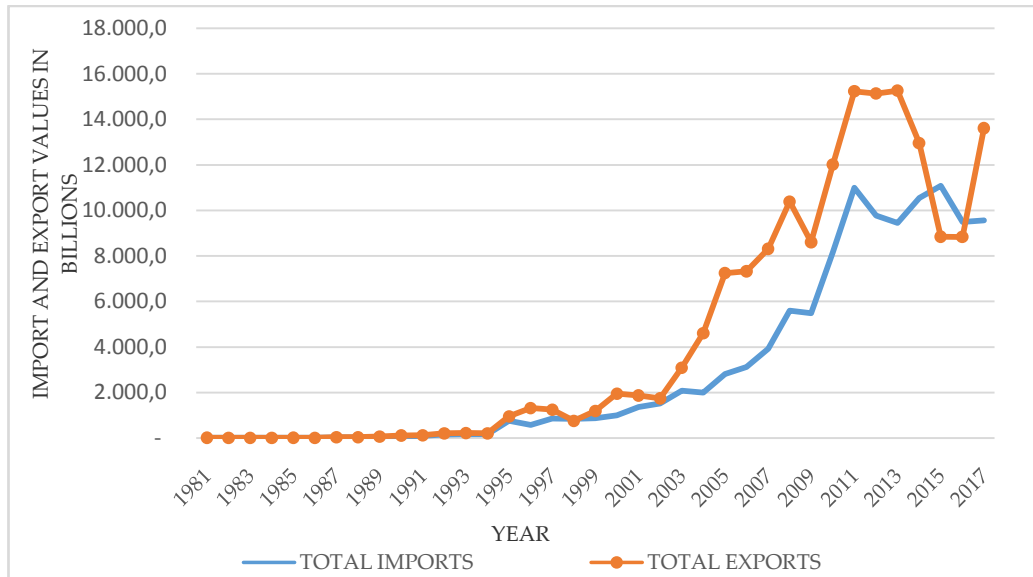


Figure 1. Import and export trend in Nigeria 1981-2017

Source: Author’s computation (2017) (from CBN statistical bulletin, 2017)

According to Babatunde, Jonathan & Muhyideen (2017), Nigeria exported \$94.8B and imported \$53.3B, leading to favourable trade balance of \$41.6B in 2013. In the same year, the per capita GDP of Nigeria was \$5.6k and her GDP was \$521B. Further analysis of the components of export and import indicates that exports of Nigeria are Refined Petroleum (\$3.07B), Cocoa Beans (\$561M), Crude Petroleum (\$75.3B), Petroleum Gas (\$10.3B), and special purpose ships (\$463M), while her top imports are Wheat (\$1.42B), Rolled Tobacco (\$1.34B), Refined Petroleum (\$9.5B), Cars (\$1.87B) etc. Expressed in percentage, the major traded items are tabulated below:

Table 1. Major trade items for Nigeria in 2016

Export Products	% of total exports	Import Products	% of total imports
Crude Petroleum	79.4%	Refined Petroleum	17.9%
Petroleum Gas	10.9%	Cars	3.51%

Note: NBS (2016).

The Nigerian Bureau Statistics (NBS) reported this Balance of Trade and this tendency is expected over the long term due to the unrelenting calls for heightened trade liberalization to foster economic growth across the globe. During the same period, Nigeria’s economic performance recorded successes especially in the Gross Domestic Product (GDP) where she became the largest economy in Africa with GDP value of N89043.62b

before suffering one of her worst economic recession in 2016 (Q₂ and Q₃) (World Bank, 2013; NBS, 2017 and Central Bank of Nigeria, 2017).

Economic theory (Heckscher–Ohlin theory of trade) has it that the pattern of international trade is determined by differences in factor endowments and predicts that countries will export those goods that make intensive use of locally abundant factors and will import goods that make intensive use of factors that are locally scarce for the growth of her economy (Balami,2006).

Nigeria’s factor endowment is labour with an active working population of about 108.59 million in 2015 195,874,740 million people in 2018 (World Bank, 2019). Her major export commodity is crude oil whose production is capital intensive and its inputs are imported, its price is exogenously determined and requires very little quantity of Nigeria’s factor input (labour) for its production. Prior to crude oil discovery in commercial quantity around the early 1980s, the agricultural sector was highly labour intensive and was the largest export sector for Nigeria where cocoa, groundnut, palm oil and other cash crops were produced using her endowments and the balance of trade were favourable during the periods as shown in the diagram below.

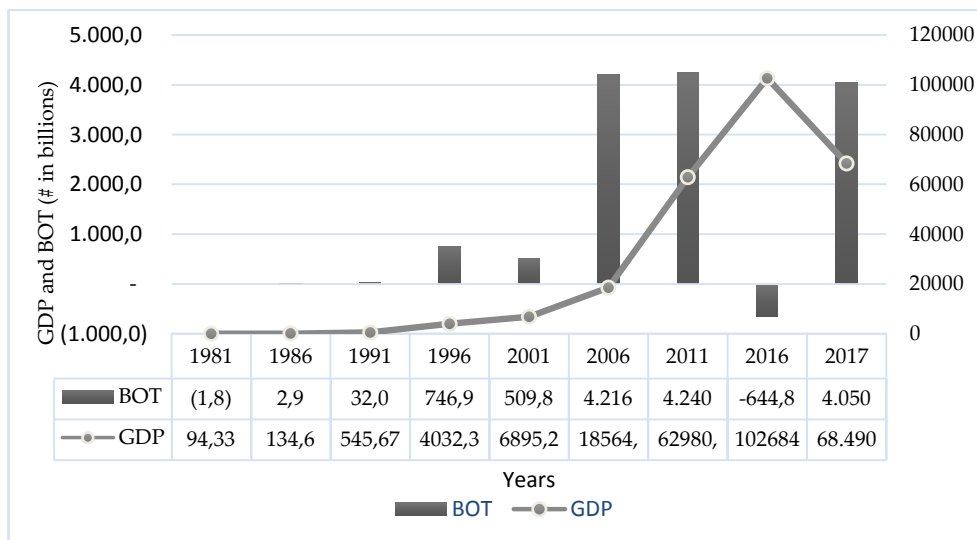


Figure 2. Balance of Trade and Gross Domestic Product Trend in Nigeria (1981-2017)
Source: Author’s computation from.

The focus of the government on crude oil exports led to the neglect of the agricultural sector being the largest employer of Nigeria’s factor endowment (labour) hence, reducing the overall productivity of the economy. As the balance of trade nosedived, the economy plunged into one of her worst economic recession of 2016 in 20 years (as shown in figure 2 above).

To abate these trends, Nigeria has put in place series of economic and trade reforms such as trade barriers in the form of imports licensing so as to complement imports tariffs in the control of import, as well as protect

domestic industries that were set up to produce import substitutes. The customs tariff structure was deliberately discriminatory, biased in favour of capital goods and raw materials. Items considered as luxury goods were either put on import prohibition list or had very high import tariffs placed on them in order to diversify the export base and regulate her import pattern to ensure that trade serves as a driving force for the macroeconomic improvement. Despite all these and following the Heckscher–Ohlin theory of trade, Nigeria is still battling to reap the benefit of her factor endowment which is which has remained a key factor of production and *sine qua non* for economic growth for many nations of the world. There is therefore need to empirically investigate the impact of international trade on economic growth of Nigeria with special emphasis on how labour (Nigeria's factor endowment) employment/unemployment in production of her export contents has affected the growth of the economy. This study will investigate the impact of import and export trade on economic growth in Nigeria via the Heckscher – Ohlin framework. The remainder of this paper is organized as follows: the next section contains the literature review on the relationship between international trade and macroeconomic performance in Nigeria and the review of the empirical literatures. Section three presents the methodology and section four presents and analyses the empirical results. The final section contains conclusions and policy recommendations of the paper.

2. Review of related literature

2.1. Theoretical literature review

2.1.1. Heckscher – Ohlin theory of trade (or the theory of factor proportion)

Two Swedish economists, Eli Heckscher and Bertil Ohlin in 1933 promulgate this theory. The theory of factor proportion on the other hand is capable of giving an explication for discrepancies in advantage demonstrated by trading nations. As explained by the theory, nations have the tendency to produce and exchange internationally goods and services that exploit large amounts of abundant production factors that they have, while they import those that require large amounts of production factors which are comparatively and scarcely unavailable Heckscher and Ohlin, 1933 cited in (Babatunde, Jonathan & Muhyideen, 2017). The theory fleshes out the concept of economic advantage in the context of costs of factors of production and endowment.

The H–O model makes the following core assumptions:

- Labor and capital flow freely between sectors
- The amount of labor and capital in two countries differ (difference in endowments)
- Technology is the same among countries (a long-term assumption)
- Tastes are the same.

Despite the wide acceptability of this theory, it still holds some drawbacks which can be traced to some of the highlighted unrealistic

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assumptions. According to the theory, Technology is the same among countries. This does not hold sway in reality as trading nations of the world are classified according to their level of technological advancements into developed and developing countries. Despite this short coming, the theory is still relevant to the study as it emphasizes on difference in factor endowments which have accounted for why nations like Nigeria (a labour endowed nation engage in international trade.

2.1.2. *The Solow growth theory*

This is an economic growth model in which the growth of total GDP is explained by population increase, technical progress, and investment. In this model there is full employment, with an aggregate production showing constant returns to scale. In analysing the process of economic growth Balami (2006) and Solow (2002) combined the supply and demand sides of the economy together to generate economic growth. He argued that economic growth can best be understood from neo-classical point of view (supply side) which says $Q = f(AK^\alpha L^{1-\alpha})$. Hence, the Solow model can also be referred to as the neo-classical growth model. He assumed that savings is a linear function of income, that capital does not depreciate so that investment is simply the rate of increase of capital stock, that savings is equal to investment, and that labour grows at an exogenous constant proportion, the rate of growth or level of technology is exogenously given.

The key assumption of the neoclassical growth model is that capital is subject to diminishing returns in a closed economy. Critics have faulted this theory on the basis of the assumption that there can be technological progress in a country practicing closed economic system citing the Chinese closed economy around the 1980's where she witnessed increasing growth in technology and the economy in general (Balami, 2006). Despite the drawback, the Solow endogenous growth model is still relevant to this study as it points out the importance of exogenous factors (such as international trade and capital movements) as drivers of economic growth.

2.2. Empirical review

Ajayi & Atanda (2012) empirically examined trade and capital inflow channels of globalization on macroeconomic stability of Nigeria between 1970 and 2009. They utilized an autoregressive model which indicated that the first lag of real output growth rate has a significant positive effect on real current growth rate, while the second autoregressive term is found to exert insignificant negative effect on current real output growth rate. As recommendation, the study posited that inflation should be targeted to encourage proper economic growth planning. This study failed to look into the outflows of goods and services among which forms the context of international trade. Thus it will be improved upon by including export trade as a variable and to employ the real GDP instead of the GDP growth rates.

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Emeka, Ikpesu, & Peter (2012) investigated macroeconomic impact of trade on Nigeria's economic growth over the periods of 1970 to 2008 using a combination of bi-variate and multivariate models. The empirical examination points out that exports and Foreign Direct Investment inflows have positive and significant impact on economic growth in the Nigerian economy. The study recommended that the government should create an enabling environment for trade to thrive. The study will be improved upon by extending the scope from 2008 to 2016.

Abughalia & Abusalem (2013) investigated the empirical analysis on the Libyan economy and its structural changes, with special reference to Libyan foreign trade during the last three decades (1980-2010). The analysis was conducted using descriptive analytical methods and statistical tools such as linear regression analysis. The study observed that the gains from export were higher than the loss for import, where this situation has led to positive balance of payment. The study recommended that export trade should be emphasized upon under fixed exchange rate regime. This study will be domesticated to capture Nigeria's trade peculiarities.

Arodoye & Iyoha (2014) studied the nexus between international trade and economic growth in Nigeria making use of quarterly time-series data for the period 1981 to 2010. The OLS results indicated that there is a stable, long- run relationship between international trade and economic growth and they concluded that trade policies which are in favour of export expansion should be encouraged because exports are a driver of economic growth. Furthermore, the study recommended that an exchange rate policy which is favourable to export expansion should be encouraged. This study is based on quarterly data which are relatively volatile. Thus, the annual time series data will be used as an extension for the study.

Stephen & Obah (2017) adopted multiple regression estimation techniques to examine the impact of international trade on economic growth in Nigeria from 1981 to 2015. The model specified economic growth measured by gross domestic product as dependent on international trade proxy by non-oil imports, oil imports, Non-oil exports, and oil exports. The study discovered that international trade has a significant positive impact on economic growth in Nigeria. The study recommended that Nigerian government should give more emphasis to specialization in agriculture for diversification of her production and export base so as to enable the country gain all the benefits of trade including economic growth. This study neglected to include a control variable as important as exchange rate, which is a key determinant of international trade volumes. Therefore, an inclusion of the exchange rate variable in our model will serve as an extension to the study.

From the above, it is evident that literatures abound on the study of international trade on macroeconomic performance of the world economies. These studies have been reviewed critically and was discovered to best of the knowledge of the researcher that none have employed the Auto Regressive Distributed Lag (ARDL) model to fully capture the past

annual progress in trade influencing the RGDP and the rate of increase in capital stock which according to the Solow model, is brought about by exogenous factors such as import trade. This methodology became necessary because the variables were identified to be integrated of I(0) and I(1) and the model is a single equation. The advantages of using this approach instead of the conventional Johansen (1998) and Johansen & Juselius (1990) approach is that while the conventional cointegration method estimates the long-run relationships within a context of a system of equations, the ARDL method employs only a single reduced form equation. Therefore, to close the literature gap and extend the existing literature, this study focuses on the effect of international trade on the economic growth of Nigeria from 1981-2017 using the Auto Regressive Distributed Lag (ARDL) and analyzing labour (factor endowment) employment towards productivity.

3. Methodology

3.1. Analytical framework

The Solow exogenous model of growth developed by Nobel Prize winner Robert Solow in 1956 appears to be the most suitable theoretical framework for this study. The model suggests that exogenous factors such as population increase, technical progress, and investment can significantly affect economic growth. The theory argued that economic growth can best be understood from the supply side which says:

$$Q = f(T, K, L). \quad (1)$$

Where Q is output or income, F the function of technology, K capital input, and L labour input. According to the model, net investment depends on saving rate, technological level, capital and labour supply (Solow, 1956). This model assumes that the rate of increase of capital stock usually from exogenous factors, and that labour grows at an exogenous constant proportion usually which can apply by this study to Nigeria through high labour employment (being a factor endowment for the country) for production of tradable commodities in line also with the Heckscher - Ohlin theory of trade. Also the rate of growth or level of technology is exogenously given which is usually affected by rate of exchange.

3.2. Model specification

This model will be used to capture the effect of international trade on GDP growth of Nigeria.

In line with the framework, our model is explicitly specified primarily thus:

$$\begin{aligned} \Delta RGDP_t = & \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta RGDP_{t-1} \\ & + \sum_{i=1}^n \beta_{2i} \Delta IMP_{t-1} \\ & + \sum_{i=1}^n \beta_{3i} \Delta XPT_{t-1} + \sum_{i=1}^n \beta_{4i} \Delta GFCF_{t-1} + \sum_{i=1}^n \beta_{5i} \Delta UMP_{t-1} \\ & + \sum_{i=1}^n \beta_{6i} \Delta EXR + \alpha_1 RGDP_{t-1} + \alpha_2 IMP_{t-1} + \alpha_3 XPT_{t-1} \\ & + \alpha_4 GFCF_{t-1} + \alpha_5 UMP_{t-1} + \alpha_6 EXR_{t-1} + \mu_t \end{aligned}$$

Where:

RGDP = Real Gross Domestic Product (proxy for economic growth),

RGDP_{t-n} = Lag values of Real Gross Domestic Product

IMP = Total Imports;

XPT = Total Exports;

GFCF = Gross Fixed Capital Formation (proxy for the stock of capital),

UMP = Youth Unemployment rate ((proxy for labour employment in production)

EXR = Real Exchange Rates

Δ is the first difference operator, β_0 is the drift component and μ_t is the white noise error term. The equation above connotes the term with the summation sign represents the error correction dynamics i.e. β_{1-5} , while the second part α_{1-5} represents the long-run relationship. Accounting for the short term relationship, the primary form becomes;

$$\begin{aligned} \Delta RGDP_t = & \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta RGDP_{t-1} + \sum_{i=1}^n \alpha_{2i} \Delta IMP_{t-1} \\ & + \sum_{i=1}^n \alpha_{3i} \Delta XPT_{t-1} \\ & + \sum_{i=1}^n \alpha_{4i} \Delta GFCF_{t-1} + \sum_{i=1}^n \alpha_{5i} \Delta UMP_{t-1} + \sum_{i=1}^n \alpha_{6i} \Delta EXR_{t-1} \\ & + \delta ECT_{t-1} + \varepsilon_t \end{aligned}$$

Where: *ECT* is the error correction term which is the residuals retrieved from the estimated long-run relationship.

Where:

β_0 = intercept term; β_1 – β_6 =Parameter estimates Ln = natural log notation.

μ = stochastic error term (purely random)

A priori Specification;

$$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 < 0, \beta_6 < 0$$

3.3. Data sources

The study employed secondary data. They are the time series data on the included variables. All the data shall be sourced from (NBS, 2017; CBN, 2017).

3.4. Estimation procedure

This paper employs the ARDL model in estimating the relationship between international trade and Nigeria's economic growth. Auto regressive Distributed Lag (ARDL) model plays a vital role when comes a need to analyze an economic scenario. In an economy, change in any economic variables (especially trade) may bring change in other economic variables beyond the time. This change in the economy is not what reflects immediately, but it distributes over future periods; hence the choice of the technique.

4. Empirical results and discussion

4.1. Unit root test

The first stage is to test for the stationarity properties of the variables by employing the unit root test. The Augmented Dickey-Fuller (ADF) Unit root test is used to establish stationarity of data. The decision rule is that the ADF test statistic value must be greater than the Mackinnon critical value at 5% in absolute terms. The specification of the ADF equation assumes intercept and no trend. The null hypothesis underlying unit root testing is that the variable under investigation has a unit root and the alternative is that it does not. The table below shows the summary of unit root test result conducted on the parameter at level.

Table 2. *Augmented Dickey-Fuller (ADF) Unit Root Test Result*

Variable	ADF Stat.	5% Critical values	ADF Prob.	Order of integration	Significance level
LGFCF	-5.660166	-2.967767	0.0000	1 (0)	5%
LIMP	-6.700219	-2.948404	0.0000	1 (1)	5%
LXPT	-6.199300	-2.948404	0.0000	1 (1)	5%
LRGDP	-3.339741	-2.951125	0.0000	1 (1)	5%
UMP	-2.974419	-2.945842	0.0470	1 (0)	5%
EXR	-5.801376	-2.951125	0.0000	1 (1)	5%

Source: Author's Compilation (E-View9 output).

The Table 2 above represents the estimation of unit root test. The results revealed that all of the variables are difference stationary at 5% level of significant except LGFCF and UMP which are level stationary. This implies that the data is expected be free from spurious and misleading regression estimates as well as suitable for the adoption of an ARDL model.

4.2. Cointegration test

Co-integration analysis is carried out to determine the existence of long-run relationship that exists between the dependent variable and its

regressors. To identify the long run relationship among the included variables, the Johansen (1988) multiple cointegration test has been employed by using a lag length of one year suggested by Schwarz Information Criterion (SIC) criteria. These tests results are summarised below:

Table 3. Lag Length Result

Lag Length	AIC	SC	HQ
0	-1.455366	-1.183274	-1.363816
1	-3.891321*	-3.573880*	-3.784512*
2	-3.872829	-3.872829	-3.750762

Source: Authors computation (E-views), 2019.

Based on the result in Table 3, the lag length which minimizes SC, AIC and HQ is lag one and thus our optimal lag length. Given our optimal lag length, we proceed to test for long-run relationship among the variables using the bound test approach.

4.3. ARDL bound test

To investigate the presence of long-run relationships among the variables, the bound testing under Pesaran, *et al.*, (2001) procedure is used. The bound testing procedure is based on the F-test which is basically a test of the assumption of no cointegration among the variables against the premise of its existence, the hypotheses are presented as:

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$$

i.e., there is no cointegration among the variables.

$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$$

i.e., there is cointegration among the variables.

Table 4. Bound Test Result

F-Statistics	1%		5%		10%	
	Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
7.063283	3.41	4.68	2.62	3.79	2.26	3.35

Source: Author, 2019.

Given the result of the Bound Test, the F-statistic value should be compared with the Pesaran critical value at traditional levels of significance. From the result above, the F-statistic 7.063283, is greater than the upper bound critical value at 1% level of significance (4.68), we thus reject the null hypothesis and conclude that there is co-movements in the long-run among the selected trade and growth determining variables in Nigeria. From the result, we can hence estimate both the short-run and the

long run relationship between real gross domestic product and the explanatory variables selected for the study.

4.3. Error correction model

Having identified the existence of a long run relationship between variables of interest whose order of integration have been determined, in this section, an error correction model is formulated. The error correction model represents an alternative way of presenting long run equilibrium relationship between variables. It shows the dynamic error analysis of the cointegrated variables (Madichie & Maduka 2014). The results of the error correction model are reported in Table 5.

Table 5. ARDL Short-Run Coefficients Regression result

Variable	Coefficient	t-Statistic	Prob.*
C	-0.357419	-0.804916	0.4279
LRGDP(-1)	1.043818	20.68950	0.0000**
LIMP	-0.037982	-1.975899	0.0585
LXPT	0.039803	2.081517	0.0470*
LGFCF	-0.006806	-0.810500	0.4247
LGFCF(-1)	-0.013893	-1.678293	0.1048
UMP	-0.001314	-1.834900	0.0776
UMP(-1)	0.002248	3.172642	0.0037*
EXR	1.28E-05	0.099914	0.9212
R-squared	0.997959	Durbin-Watson stat	
Adjusted R-squared	0.997354		
F-statistic	1650.291	1.676307	
Prob(F-statistic)	0.000000		

Notes: **(*) implies significant at 1%(5%) levels

Source: Author's Compilation (using E-View 9.1 Output) (2019).

The results in Table 5 denote the ARDL error correction regression. The differenced variables' coefficients represent short run effect of these variables on the dependent variable. The results in Table 5 show that our model has a high coefficient of determination. This can be seen from the R-squared of about 99.8 percent and the adjusted R-squared of about 99.7 percent. The R-squared measures the percentage of variations in the dependent variable that was accounted for by variations in the explanatory variables. Thus, it can be argued that our data is well fitted in our model.

The value of the F-statistic is 1427.674 and its associated probability value is 0.000000 which is less than 1%. This implies that our overall regression model is statistically significant at 1% level. Thus, all the explanatory variables jointly explain variations in the dependent variable (LRGDP).

The estimated coefficients of the explanatory variables show that the explanatory variables conform to a priori specification except for gross fixed capital formation and the first lag of gross fixed capital formation. The first lag of real GDP, exports, and first lag of unemployment all have statistically significant impact at the conventional 5% level on the present

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value of real GDP whereas gross fixed capital formation, first lag of gross fixed capital formation, unemployment rates, exchange rate, and imports do not have statistically significant on the present value real GDP at the conventional 5% level. This further implies that a unit increase in *LIMP*, *LGFCF*, *LGFCF_{t-1}*, and *UMP*, leads to about a 4%, 1%, 1%, and 0.1%, decrease in real GDP respectively. On the contrary, a unit increase in the first lag of *LRGDP*, *LXPT*, first lag of *UMP* and *exchange rates* leads a 104%, 4%, 0.2% and 0.0013% increase in real GDP respectively. This means that international trade especially in terms of Nigeria's export pattern have played active role in economic growth in Nigeria during the period covered by the study; with The mean value of the real GDP being -0.357419 when all other factors are held constant.

The value of the Durbin-Watson statistic is 1.676307 and is close to 2. It is known that when the value of Durbin-Watson is 2, there is no autocorrelation in the residuals; when DW approaches 0, there is evidence of positive autocorrelation (first order autocorrelation) in the residuals. However, when DW approaches 4, there is problem of negative autocorrelation (2nd order autocorrelation) in the residuals. With this in mind, we can safely argue that our model is not plagued by autocorrelation of any order. This implies that our model is reliable for making inferences.

The coefficient of the error correction term of about -0.043818 is statistically insignificant at 5% level although with the expected negative sign. An insignificant error correction term with the right sign indicates a weak feedback effect of deviation of the real GDP from its short run growth path to a long run equilibrium. The value of the coefficient of the error term represents the speed of adjustment from one period to another. The coefficient -0.043818 of the error term shows that about 4 percent of the discrepancies between the actual and the equilibrium value of the real GDP is corrected in each period.

In the long run coefficients as depicted in the Table 6 below:

Table 6. *ARDL Long-Run Coefficients Regression result*

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIMP	0.866802	1.038828	0.834403	0.4114
LXPT	-0.908351	1.213048	-0.748817	0.4604
LGFCF	0.472380	0.440817	1.071601	0.2934
UMP	-0.021315	0.035992	-0.592209	0.5586
EXR	-0.000293	0.003076	-0.095107	0.9249
C	8.156807	0.957819	8.516021	0.0000

Notes: **(*) implies significant at 1%(5%) levels

Source: Author's Compilation (using E-View 9.1 Output) (2019).

The mean value of the real GDP becomes 8.156807 when all other factors are held constant

4.4. Autocorrelation & heteroskedasticity test

The Breusch-Godfrey test is conducted to test for any form of heteroskedasticity among the variables employed in the study. Heteroskedasticity is when the error term of a variable monitored over a period of time is non-constant implying that all residuals (error terms) of the series in the model are not correlated and the error terms and the model are not correlated. Autocorrelation on the other hand implies that the residuals of the model are correlated. The result of the tests are presented in Tables 7 and 8.

Table 7. *Breusch-Godfrey Serial Correlation Test*

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.786475	Prob. F (1,26)	0.38
Obs*R-squared	1.056992	Prob. Chi-square(1)	0.30

Table 8. *Heteroskedasticity Test: Breusch-Pagan-Godfrey Test*

Heteroskedasticity Test: Breusch-Pagan-Godfrey:			
F-statistic	0.160328	Prob. F (8,27)	0.99
Obs*R-squared	1.632604	Prob. Chi-square(8)	0.99
Scaled explained SS	1.062875	Prob. Chi-square(8)	1.00

The Breusch-Godfrey test for autocorrelation and heteroskedasticity shows the absence of autocorrelation and heteroskedasticity in the model, as the probability value of the F-statistic is insignificant, which thus lay credence to the reliability of the ARDL model specified as well as the outcome the study arrived at.

4.5. Causality test

It is the aim of this study is to determine the causal relationship between international trade and economic growth in Nigeria. In other words, is it international trade that causes economic growth? hence, the supply-leading hypothesis. Or is it economic growth that causes international trade? hence, the demand leading hypothesis. To do this, the Granger causality test was carried out between international trade variables and the real GDP in Nigeria. The null hypothesis underlying the Granger causality test is that the variable under consideration does not Granger-cause the other while the alternative is that it Granger-causes it.

The results of the Granger causality test are reported in Table 9 below;

Table 9. *Granger Causality Test*

Direction of Causality	F-statistic	Prob	Decision
LIMP → LRGDP	4.68707	0.0377*	Reject H ₀
LRGDP → LIMP	0.02440	0.8768	Do not reject H ₀
LXPT → LRGDP	9.23255	0.0046*	Reject H ₀
LRGDP → LXPT	0.12764	0.7232	Do not reject H ₀

Notes: * means rejection of the null hypothesis of non-Granger causality.

Source: Author’s Computation using E-View 9 Output).

The results in Table 9 show the Granger causality test between international trade (import and export) on economic growth in Nigeria. The Granger causality test makes it possible for us to determine the direction of the Granger causality. In the Granger causality approach, causality exists if the F-statistic is statistically significant given its associated probability value. Thus, in this study, causality is established up till 5% level. The results shown in Table 9 revealed that export granger causes real GDP also, import granger causes real GDP. Although, there is no bi-directional causality between international trade (import and exports) on economic growth in Nigeria. This result debunks the postulates of the demand-leading hypothesis in Nigeria and negates the findings of Tang (2006) who reported that there is direction of causality flowing from economic growth to imports in the short run.

5. Conclusion

Empirical studies have shown that international trade is linked to economic growth. This study investigated the effect of international trade on economic growth in Nigeria during the period 1981–2017. Following the objectives of this study, we estimated the real GDP as a function of imports, exports gross fixed capital formation; unemployment rate and exchange rate using Nigeria data.

Findings emanating from the study suggest that international trade in terms of export has a significant positive impact on the Nigerian economy for the period under review. This is line with the postulation of Hecksher–Ohlin theory that international trade has positive effect on economic growth especially when a country focuses on her factor endowment. The insignificant impact of unemployment rates on the growth of the economy may be attributed to the fruits yielded by the various efforts of the government to tackling labour unemployment in the country and implying that labour employment has significant contribution to the production of contents in Nigeria international trade. The study also confirmed the existence of one-way causality and cointegration between international trade and economic growth in the long run. Capital formation and exchange rates does not have significant effect on economic growth.

From the stand point of policy the implication of these results is that since there is significant impact of international trade and economic growth but gross capital formation does not significantly impacts growth, the Nigerian government should increase labour employment towards production and concentrate on the massive exportation of labour intensive products and export them for the growth of her economy.

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