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Export of Agricultural Raw Materials, Exchange Rate and Economic Growth in Nigeria: An ARDL Approach to Cointegration

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Abstract
This paper investigated the long run cointegration between export of agricultural raw materials, exchange rate and economic growth in Nigeria. An annual time series data was used for the period of 32 years from 1981 to 2013, and Auto Regressive Distributed Lags (ARDL) cointegration approach was employed in achieving the objective of the study. The result revealed that, both short run and long run models were cointegrated. Agricultural raw material export and exchange rate are instatistically and negatively related to GDP with the exception of exchange rate. Therefore, this paper suggested as part of its policy recommendation that, the Federal Republic of Nigeria in line with its transformation agenda should focus more on human capital, infrastructural and agricultural sector development, and not only increase export of agricultural raw materials, but also encourage exportation of processed agricultural products for achieving inclusive economic growth and development.
Keywords: Agricultural raw materials export, Exchange rates, GDP, ARDL cointegration, Nigeria.

1. Introduction

Agricultural sector has been considered as a major contributor and driver of the Nigeria's economic growth. This is especially prior to and immediately after independence before the discovery of black gold (crude oil) in the country. The sector alone has been providing job to about 70% of the country's total working population (Victor, 2015). In early 1960s, more than 60% of total share of Gross Domestic Products (GDP) and about 90% of the Nigeria's foreign exchange earnings also came from the exports of Agricultural raw materials (Gbaiye et al., 2013; Ahungwa, Haruna, & Abdusalam, 2014). Nigeria's currency fetch higher value in ratio of United States dollars (USD) and rest of the world, this was due to favourable exchange rate regime from 1960s until early 70s, and coupled with the global demand of Agricultural raw materials. Before the oil boom, the country was ranked first globally in the export of Agricultural products such as oil palm, well ahead of Malaysia and Indonesia. It was also exporting about 47% of its groundnuts produce, putting it ahead of the United States (US) and Argentina combined (Green,2016). During those periods, the country had recorded higher foreign exchange earnings and was considered amongst the world champion in the production and exportation of vital cash crops such as oil palm, Cocoa, Cotton, Rubber, Groundnut, Cashew, Millets, Guinea corn, Cowpea and the likes (Thisday,2013; WDI, 2013).

However, the discovery of oil in commercial quantity in early 1970s led Nigeria to a paradigm shift from Agricultural in to an oil economy. The continues wearing away of the competiveness of the Agricultural tradable products resulted in the sizeable decline of Nigeria's Agricultural exports earnings, especially when oil production was at its peak (NCEMA;2004). Since then Agricultural sector was neglected, foreign exchange earnings from the sector also declined. On the other hand, oil sector especially during the oil boom era has contributed massively to GDP, until recently (Anon, 2001; Kwaghe, 2015). Despite the nature of Nigeria's monocultural economy, the contribution of Agricultural sector would not be under estimated. It still represents some share of GDP, but this did not happen without hitches of other factors like price fluctuations in the global Agricultural markets, exchange rate, that is geared by other external forces. The adoption of the structural adjustment programme (SAP) by the military government in June, 1986 (NCEMA, 2004). The program has adversely affected the country's exchange rates which eventually affected the rate of returns from the selling of Agricultural raw materials. In the same vein, fluctuation in commodity price positions a real challenge to the economies of developed countries like United

States and Japan, and other African countries where Nigeria is no exception (Olufemi, 2015). World Bank(2014) reported that, Nigeria's oil sector remains country's main source of macroeconomic uncertainty. The country's high dependence on oil revenue for its budgetary and balance of payments did not go smooth without hitches such as internal and external shocks like changes in prices, and the performance of the sector. One year after World Bank report, the global oil price shock has continued eroding the foreign exchange earnings of all the oil producing countries around the globe, in which Nigeria is not exceptional. However, Akpata et al. (2015) a PWC's report on Nigeria's economic scenarios for 2015 and 2016 on what next for Nigerian economy, suggested that the development in services and agriculture sector independently of the oil sector, should help to separate the real economy from a downturn in oil prices. Despite the fluctuations and hike in the price of dollar, and decline in the volumes and size of the Nigeria's export of Agricultural raw materials, the sector could not be neglected. The current global oil price-shock will force many countries that abandoned agriculture in the past due oil discovery such as Nigeria to make a U-turn and reinvest in the agricultural sector and the business circle continues. AfDB(2015) pointed out that, the Nigeria's agricultural sector reform is targeting to transform the sector into a business, and focusing on value-chain improvement, technological adaptation and creating employment, will help the country out of the current economic dilemma as outlined in the Agriculture Transformation Agenda.

Due to constraints to the availability of data, this study aims at analysing the long run cointegration between export of Agricultural raw materials, exchange rates and economic growth in Nigeria from 1991 to 2013. Auto regressive distributed lags (ADRL) as proposed by Pesaran and Shin(1999) can be used to achieve the stated objectives. Many research on Nigeria concerning Agricultural raw materials export and economic growth have been conducted, however, majority of them such as (Noula Armand Gilbert, 2013; Ojo, Olufemi, 2014; Daramola, Ehui, Ukeje, Mcintire, 2005; Akpaden, Enin, State, Ibom; 2010;Victor, 2015) amongst others, they used less dynamic methods such as OLS, VECM, ECM etch. Nevertheless, this study added value to the stream of knowledge in the following ways; firstly it will employ dynamic method in analysing the long run association between Agricultural raw materials export and economic growth using ARDL cointegration techniques. Secondly, some studies are based on individual crop or commodity like cocoa, Rubber etc., but this research will investigate the long run association among the entire Agricultural raw materials export, and economic growth in Nigeria. Thirdly, considering the dynamic nature and fluctuations in price of Agricultural raw materials as a result of fluctuation and other external factors, including an important variable such as exchange rates in the model, makes this study different from previous ones.

The organization of this paper is as follows: following introduction in section one, is the review of related literatures in section two. Section three comprises of theoretical framework and methodology, sources of data, and explanations of variables. While section four is the analysis of data, result and discussion. Lastly section five is the summary, conclusion, policy implication and gap for future researches to come in.

2. Literature review

This section reviews related literatures on the relationship between agricultural export, exchange rates and economic growth in some countries, using different methods. Some of these studies are as follows:

The Ordinary Least Squares (OLS) was used by Oyejide(1986) and Abolagba *et al.* (2010) while the former looks at the effects of trade and exchange rate policies on Nigeria's agricultural export between 1960-1982, the latter utilizes data around the SAP programme i.e. 1970 period (1961-1969), pre-SAP period (1970-1985), SAP period (1986-1994) and the post-SAP period (1995- 2005) with an aim to determine the factors that influence agricultural exports with specific reference to Cocoa and Rubber in Nigeria. They both found that rise of real exchange rate negates the non-oil export especially during the oil boom. Abolagba *et al.* (2010) further asserts that the negative relationship of real exchange rate was especially evident on the export of cocoa and rubber.

Autoregressive Distributive Lag (ARDL) was also used in testing the relationship of exchange rate to export of agricultural products. Piri (2008) used it to study the short and long run effect of fluctuation of the Iran's exchange rate on Saffron export price using ARDL. He discovered that the fluctuations of exchange rate have more effect on Saffron export price more than all other variables under his study and this effect was found to be positive and significant in long-run. Abule and Abdi A.mehara (2012), also used ARDL to Investigate the effect of exchange rate variability on export of oilseeds using data from (1992-2010) using (ARDL) with Wald test, to test their hypothesis that 'there is no short run and long run relationship between export of oilseeds and explanatory variables included in the model. They were able to do that based on the result which shows a negative relationship of oil seed with exchange rate variability and also GDP shows insignificant contribution of oilseeds to the export basket of the country. Hence their proposed hypothesis was rejected by them, an indicator of the long run relationship between export and oilseeds in the country (Ethiopia).

Using annual data of agricultural and industrial outputs in Pakistan, from 1971 to 2007, Muhammad and Hye (2009) applied Autoregressive Distributed Lag (ARDL) bounds testing approach and model. Their findings found a long relationship amongst agricultural output and industrial output, though the agricultural output effect when (ECT is 0.61) on the industrial output is more than the effect of industrial output on agricultural output, when

(ECT) is 0.13. Where (ECT) is error correction terms which shows the annual speed of adjustment in the event of disequilibrium.

Ogunleye (2010) on the other hand applied the Two-stage Least Squares method to study the Exchange Rate Volatility and Foreign Direct Investment in Sub-Saharan Africa with a focus on Nigeria and South Africa using data spanning between 1970 and 2005. Nigeria was found to be more sensitive to external shocks emanating from quirks of world price of agricultural commodities and oil price. ,this statement is substantiated by literatures that assert that when economy depend on agricultural exports, real exchange rate volatility was less pronounced given the fact that the products are less vulnerable to volatility.

Sanjuán and Dawson (2010) taking a larger number of nation (forty two underdeveloped countries) attempted to analyse the impact of agriculture exports on economic growth in underdeveloped countries using panel co-integration techniques. Their aim was to evaluate the relationship between Gross domestic product and agricultural and non-agricultural exports for these countries. They discovered an agricultural export elasticity of GDP of 0.07 and non-agricultural export elasticity of GDP of 0.13. Hence they concluded that they support the export-led growth hypothesis.

The Johansen co-integration technique is another techniques utilized by researchers to explore the relationship of agricultural exports to economic growth. In Nigerian context Tulasombat et al, (2015) used it to test relationship with agricultural export commodities with exchange rate in Thailand. They found the Lagged values of exchange rate devaluation to have had a significant and positive relationship with agricultural export commodities, however the effect was more pronounced on aggregated agricultural produce than on individual commodities). Also in Pakistan it was used to explore and quantify the contribution of agricultural exports to economic growth by Faridi(2012) using data for the period 1972 – 2008. Results reveals that all variables turned out to be non-stationary at their level and become stationary at their first difference, indicating a long run relationship between economic growth, labour force participation, agricultural exports, non-agricultural exports and fixed capital formation in Pakistan. Furthermore, they indicate that the agricultural exports have negative and significant effect on economic growth while agricultural exports elasticity is 0.58. This reveals a bidirectional causality in agricultural exports and real GDP. This accentuate the need for non-agricultural exports to be promoted in the country.

Using Export- Led Growth Hypothesis and the Neo-classical Growth Models to assess the long run relationship of agricultural exports and economic growth performance in Nigeria for the period 1980-2010. A long run equilibrium relationship was proved to exist between agricultural exports and economic growth. Indicating an elastic relationship meaning that a unit increase in agricultural exports would bring a more than proportionate increase in the Real Gross Domestic Product in Nigeria (Gbaiye et al., 2013).

(Gbaiye et al., 2013)in the formulated model, variables like Gross Fixed Capital Formation, Labour force, Foreign Direct Investment and Agricultural exports where used , while Real Gross Domestic Product was used as the proxy for economic growth. The researchers made use of unit root tests and Johansen Maximum Likelihood Test of Co-Integration.

The impact of exchange rate volatility on export in Nigeria for the time frame of 1970-2009 was documented by Umaru *et al.,* (2013) applying Ordinary Least Square (OLS), ADF technique in testing the unit root property of the series, the Granger causality test for causation was conducted, ARCH and GARCH techniques were tested to see the presence of volatility in the series. The results of unit root suggested that all the variables in the model are stationary at first difference, the results of causality showed that there is causation between export and exchange rate in Nigeria, but the causation flows from exchange rate to export (i.e. exchange rate granger causes export), and ARCH and GARCH results revealed that the data is unstable, especially the exchange rate is volatile, however, export is found to be non-volatile. The results also indicated that when exchange rate is increased by 1 unit export increase by 4.4% units, which means that there, is a positive relationship between exchange rate and export trades in Nigeria as revealed by the regression results.

Ojo & Olufemi (2014) examined the causal relationship between export growth and economic growth in Nigeria using time series data from 1980 to 2012. The Phillips-Peron unit root, multivariate Johansen co-integration and error correction techniques was used in this study to estimate the stationarity, the long-run and the short-run dynamics of the research models. Result have shown that agricultural export, agricultural output, net capital flow and world price of Nigeria's major agricultural commodities are long run determinants of economic growth in Nigeria. In another study by Sulaiman (2014)seeks to empirically analyse the impact of exchange rate volatility on Nigeria export using ARDL approach. This analysis was performed on monthly data, covering period from January, 1999 to December, 2012 and it confirmed a long association between export, exchange rate, volatility of exchange rate and foreign earnings. These factors together affect the short and long run of the Nigerian export.

Evidently, the Naira determine the magnitude of the export for Nigeria as it depreciate it stimulate more export and this is almost immediately. However, in the long run the effect of Naira's depreciation is seen to be a hindrance to Nigeria's export. Findings further buttressed the sensitivity of the Naira to nominal exchange rate

has a positive and significant effect on the Nigeria's export in the short in the run volatility of nominal exchange rate, while in the long run foreign income has positive and significant effect on the Nigeria's export. Aktas, *et al.,* (2015) utilizing Johansen co-integration method and the error correction model. Researched the short-term and long-term effects of the real income of foreign countries, and the relative price and uncertainty of the real exchange rate on Turkey's real agricultural export income. He found a weak cointegration between variables in the long-term. The variable which affects agricultural exports in the long term is exchange rate uncertainty. With a value of -1.65, meaning that 1 unit rise in real exchange rate uncertainty will result in a decrease of 1.6% in agricultural exports. Also based on the results of the Error Correction Model, a positive and statistically significant relationship between agricultural exports & exchange rate uncertainty and world foreign demand in the short term was revealed, and there is a negative and statistically significant relationship between agricultural export and exchange rate uncertainty and relative price change. While there is a negative relationship between exchange rate uncertainty and agricultural export income in the long term, there is a positive relationship in the short term. This can be interpreted as follows: the relationship between exchange rate uncertainty and agricultural exports in the short term is temporary because of the fact that producers take high risks and tend to export as a result of sales opportunities decreasing on the domestic market. In the long term, this is in accordance with expectations. Gökhan ÇINAR(2015) is one of the very few studies that have attempted to bridge the gap on the effects of real exchange rate on agricultural exports .The study aimed determining the magnitude and direction of the effects of real exchange rate shocks on exports of processed agricultural products in Turkey. Vector Autoregressive (VAR) model was used in this study with monthly time series between January, 1988 and December, 2012. A significant relationship exist between real exchange rates and exports of processed agricultural products, though for short while (it lasted for only three months) it was positive then it became negative with a downward slope. . The shocks of real exchange rate only explains 0.2-0.7 percent of the prediction error variance for exports of processed agricultural products. This means even if the country attempt to expand processed agricultural products there won't be meaningful contribution to GDP. Wahid, et al., (2015) seek to find the impact of agricultural exports on macroeconomic performance of Pakistan using Johansen co-integration technique with a time series data for the period 1972-2008. They explore the Gross domestic product (GDP) and agricultural and non-agricultural exports of the country. Results shows a negative relationship between agricultural exports and economic growth of Pakistan, while non-agricultural exports indicate a positive relation with economic growth.

Another attempt to see the effect of foreign exchange on agricultural exports was made by Fareed(2015). He looked at exchange rate fluctuations on the agricultural exports of 29 Sub-Saharan African countries for the period 1996-2008. Random effects model, difference generalized methods of moments (GMM) and systems GMM were employed for the estimation, while fluctuations of the official exchange rate of SSA countries was generated using GARCH (1,1) and ARCH models. The Standard gravity model augmented by variables which affect trade between SSA and major trading countries was estimated, it was found out that exchange rate fluctuations negatively affect agriculture exports and significantly. Suggesting that people will reduce their activities, source alternative sources of supply and demand change prices in order to maximize their exposure to effect of exchange rate risk. This, in turn can alter the distribution of output across many sectors in the concerned countries.

By applying linear regressions on the time series of agricultural goods exports (were rice, rubber, tapioca) and exchange rates over the monthly period of January, 2003 to June, 2014, Tulasombat *et al.,* (2015) determined the Effects of Exchange Rates on Thailand's agriculture Goods Exports. The results indicated negative relationships between exchange rates and agricultural goods exports these were agriculture goods like rubber, rice, and tapioca exports respectively. This implies that appreciation of exchange rates has statistically significant and negative impact on exports of rubber, rice, and tapioca in Thailand.

3. Theoretical framework and Methodology

Following the work of Faridi (2012) and Waziri et al. (2015). In order to determine the long run association that exists amongst Agricultural raw materials exports, exchange rates and economic growth in Nigeria. This study will adopt the neo-classical growth model developed by Solow (1956). The neo-classical growth model is explaining the technical relationship between input and output, in which two important factor inputs; labour and capital determines the level of total output in production. This relationship can be explained in cobb-Douglas production function as follows:

$$Q = f(AL^{\alpha}K^{1-\alpha}) \quad (1)$$

In the same vein an extended Solow growth model can be generated by introducing other variables (factor inputs) such as exports of agricultural raw material (E) that can influence the total output (Q) in addition to labour and capital and holding other factors constants (all things being equal), hence model two can be specified as:

$$Q = f(AL^{\alpha}E^{\beta}K^{1-\alpha-\beta}) \quad (2)$$

From equation (1) and (2) above, Q stand for total output, and will be used as proxy to economic growth (GDP per capita) that depends on the function of factor inputs; (L) as labour input, (E) as agricultural raw materials exports, (K) is capital and proxy to gross fixed capital formation, and (A) is the level of technology. Likewise $\alpha, \beta, and\ 1-\alpha-\beta$ are the coefficients of labour, export of agricultural raw materials and capital in which their summations is equals to one. Also representing the percentage share of factor inputs to total output GDP in the country.

In the same vein, linear function can be derived by taking the first difference of equation (2) as follows:

$$\ln Q = f \ln(AL, E, K) \tag{3}$$

An econometric model can also be drawn from equation (3) by adding an intercept of the slope (α_0) and the disturbance variable (η) that take care of all other factors that can affect (Q) but are outside the model:

$$\ln Q = \alpha_0 + \beta_1 \ln L + \beta_2 \ln E + \beta_3 \ln K + \eta \tag{4}$$

Furthermore, equation (4) above can be well presented in to a time series model by adding subscript (t) in each variable with the exception of intercept (α_0) as:

$$\ln GDP_t = \alpha_0 + \beta_1 \ln L_t + \beta_2 \ln E_t + \beta_3 \ln K_t + \eta_t \tag{5}$$

Another important variable exchange (ER) can be added to the model as to enable us estimate the long and short run models toward achieving the objective of the study, hence we have:

$$\ln GDP_t = \alpha_0 + \ln \beta_1 L_t + \ln \beta_2 E_t + \ln \beta_3 K_t + \beta_4 ER_t + \eta_t \tag{6}$$

The short and long run dynamic models for testing cointegration between economic growth, export of Agricultural raw materials, and exchange rate in Nigeria, can be captured by the unrestricted error correction model (UECM) as specified below:

$$\begin{aligned} \ln GDP_t = {} & \alpha_1 + \sum_{i=1}^{k} \beta_i \Delta \ln GDP_{t-1} + \sum_{i=0}^{k} \delta_i \Delta \ln L_{t-1} + \sum_{i=0}^{k} \chi_i \Delta \ln E_{t-1} + \sum_{i=0}^{k} \pi i \Delta \ln K_{t-1} \\ & + \sum_{i=0}^{k} \phi_i \Delta ER_{t-1} + \lambda_1 \ln GDP_{t-1} + \lambda_2 \ln L_{t-1} + \lambda_3 \ln E_{t-1} + \lambda_4 \ln K_{t-1} + \lambda_5 ER_{t-1} + \eta_t \end{aligned} \tag{7}$$

In the same vein, for us to estimate the long run association amongst the series, we conduct the joint significance test of the coefficients of lagged level variables via F-test for the two hypotheses as follows:

$H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0$ (No cointegration amongst variables)

$H_1 : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq 0$ (Cointegration exist amongst variables)

H_0 is the null hypothesis suggesting that, there is no cointegration which is against the alternative (H_1). We obtained the value of F-statistics and compare it with F-tabulated critical values in the (Narayan, 2005a). If the value of F-statistics is greater than the upper bound values I(0) and I(1) in the critical table, then we reject null and suggest that cointegration exists, but if it is below, we fails to reject null of no cointegration, whereas if the value falls within the two bound then it is inconclusive.

However, if cointegration exist then we estimate the long run model as equation (8) as follows:

$$\begin{aligned} \ln GDP_t = {} & \alpha_1 + \sum_{i=1}^{k} \beta_{1i} \Delta \ln GDP_{t-1} + \sum_{i=0}^{k} \delta_{1i} \Delta \ln L_{t-1} + \sum_{i=0}^{k} \chi_{1i} \Delta \ln E_{t-1} + \sum_{i=0}^{k} \pi_1 i \Delta \ln K_{t-1} \\ & + \sum_{i=0}^{k} \phi_{1i} \Delta ER_{t-1} + \eta_{1t} \end{aligned} \tag{8}$$

Then the error correction model (ECM) also the short run model will be estimated below as:

$$\ln GDP_t = \alpha_2 + \sum_{i=1}^{k} \beta_{2_i} \Delta \ln GDP_{t-1} + \sum_{i=0}^{k} \delta_{2i} \Delta \ln L_{t-1} + \sum_{i=0}^{k} \chi_{2i} \Delta \ln E_{t-1} + \sum_{i=0}^{k} \pi_{2_i} \Delta \ln K_{t-1} + \sum_{i=0}^{k} \phi_{2i} \Delta ER_{t-1} + \ell \mathrm{ECT}_{t-1} + 2\eta_{2t} \quad (9)$$

From equation (9), ℓ represent the coefficient of error correction term (ECT_{t-1}), it shows the annual speed of adjustment in which the variables would come back to equilibrium in the long run due to shock, and it is assumed to be negative, less than one and significance, hence equation (10) is estimated as:

$$\mathrm{ECT}_{t-1} = \ln GDP_t - \alpha_1 + \sum_{i=1}^{k} \beta_{1i} \Delta \ln GDP_{t-1} + \sum_{i=0}^{k} \delta_{1i} \Delta \ln L_{t-1} + \sum_{i=0}^{k} \chi_{1i} \Delta \ln E_{1t-1} + \sum_{i=0}^{k} \pi_{1i} \Delta \ln K_{t-1} + \sum_{i=0}^{k} \phi_{1i} \Delta ER_{t-1} \quad (10)$$

4. Data analysis and result

Based on the availability of data, this study utilised an annual data from 1981 to 2013. The variables were retrieved from the world development indicators (WDI). From equation (10) in section three, GDP stand for gross domestic product per capita and proxy to economic growth. L is total population aged from 16 to 64 year as proxy to labour force, whereas E is an Agricultural raw materials export, while K is gross capital formation and proxy to capital, then ER stand for exchange rate in USD respectively.

Table 1.0 ADF and PP Unit root test(s) result.

Variable	I(0)	I(0)	I(1)	I(1)
	ADF	PP	ADF	PP
lnGDP	-0.759(0.163)***	-0.759(0.163)***	-1.394(0.165)***	-1.394(0.165)***
lnL	-0.059(0.0334)	-0.021(0.038)	-0.241(0.046)***	-0.273549(0.104)
lnE	-0.577(0.181)**	-0.233(0.126)	-1.605(0.275)***	-0.979155(0.244)
lnK	-0.289(0.062)***	-0.289(0.062)***	-0.832(0.190)***	-0.586(0.167)**
ER	-0.005(0.0402)	-0.005(0.042)	-0.986(0.186)***	-0.986(0.186)***

Figures in parenthesis are standard errors, while *, **, *** are significant level at 10%, 5%, and 1% respectively.

Testing the existing cointegration between export of agricultural raw materials, exchange rate on economic growth using Auto Regressive Distributed Lags (ARDL), a unit root test was conducted to enable us determine the stationarity of the data. However ARDL approach to cointegration as suggested by Narayan (2005b) is powerful in conducting cointegration relationship between time series variables, this is regardless to their stationarity at I(0), I(1) or mixture of both. From table 1.0, is the result of an Augmented Dickey fuller (ADF) and Johenson Juselius (JJ) unit root tests were employed among our variables. The result produced a mixture of I(0) and I(1), meaning that, some variables such as lnGDP, lnL, lnE, and lnK are stationary at level except ER which is stationary at first difference I(1), then All the variables move together at I(1). Therefore, this give us basis of conducting an ARDL approach to cointegration in achieving our objective of the study.

Table 2.0 ARDL Cointegration Test

Bound Test Result	**F-statistics**	**Lag**	**Significance level**	**Unrestricted intercept & no trend**	
		1	**10%**	**I(0)**	**I(1)**
lnGDPt=f(β1lnL,β2lnE,β3lnKt,β4lnERt)	**3.779**			**2.525**	**3.560**

Table 2.0 presented F-statistics result (F-test), and it reveals that F-calculated (3.799) is greater than the F-tabulated (3.560) of the upper bound value of Narayan table at 10% significant level. Therefore, this also give us a basis to proceed with the estimation of short and long run models respectively.

Table 3.0 Coefficient of the Estimated Short run model and the Long-run model.

Dependent Variable Δ ***Ln*GDP**		
Independent variables	**Coefficient**	**T-statistics(P-value)**
***Ln*L**	-2.005532	-0.526187
***Ln*E**	-0.785804	-0.822662
***Ln*K**	-0.377430	-1.895159***
ER	0.069157	1.686495
Constant	108.1351	0.539910
Short-run model result		
Δ***Ln*L**	-5.139966	0.943871
Δ ***Ln*E**	-0.953413	-0.418190
Δ ***Ln*K**	-0.225202	-0.587650
Δ **ER**	0.143581	0.5468**
Constant	0.434957	(0.317155)
ECT(-1)	-1.308011	(-4.493)***
Adjusted R-squared	0.255406	
Durbin-Watson stat	2.126650	
F-statistic	0.014597	

Figures in parenthesis are standard errors, while *, **, *** are significant level at 10%, 5%, and 1% respectively

The short run model reveals that there is negative relationship between export of agricultural raw materials, and economic growth in Nigeria, even though it is statistically insignificant, but exchange rate shown a positive sign but in significant. Therefore, this indicated that, there is no short run causality running between exports of Agricultural raw materials and exchange rate, meaning that, exports of Agricultural raw materials lag (-1) and exchange rate lag (-1) combine cannot jointly cause GDP in the short run in Nigeria.

labour force, capital as control variables shown negative relationship with economic growth, this suggest that, there is need for massive infrastructural and human capital development in terms of adopting new technology in transforming the sector in the long run.

The result of long run model is consistent with that of short run, in which agricultural raw materials exports, labour force and capital are negatively correlated with economic growth, however exchange is positively and statistically related with economic growth.

The coefficient of error correction model is consistent with economic theory; it is negative and statistically significant at 10%, but it's not less than one in its absolute value. However, this indicated that the speed of adjustment back to equilibrium is 30% per annum, but would take a different dimension before it converge into long run equilibrium.

5. Summary, conclusion and policy recommendation

This study investigated the long run cointegration between export of agricultural raw materials, exchange rate on economic growth in Nigeria. An annual time series data was used for the period of 32 years from 1981 to 2013. ARDL cointegration approach was employed in achieving the objective of the study. The result reveals that, both short run and long run models were cointegrated. The study has revealed an important role that Agricultural raw materials export can play for Nigeria's sustainable economic growth and development, more especially with the present or current global oil price shock that serves as a major macroeconomic disequilibrium to the country in terms of balance of payment. However, this study can serve as a reference point to policy makers for a paradigm shift in making reverse from oil to agricultural driven economy. Therefore investing in agricultural sector as a driver for agricultural revolution as pointed out by the new administration should be actualized. This can change people's perception toward government policies as it has become a business as usual in the past for politicians to make promises for the sake of winning their elections, without fulfilling them. This further suggests that central bank of Nigeria as part of its monetary policy reform should encourage financial institutions to support farmers and agro allied industries with enough funds. Finally, adopting new modern farming (technology) in agricultural sector is also recommended, and agro-forestry farming system which is consistent with United Nations 2030 agenda for sustainable development goals (SDGs). This will improve value-chain, increase job creation, and help in achieving food security, hence reduce over reliance on importation (import bill) of agricultural raw materials and products from other countries.

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Appendices:

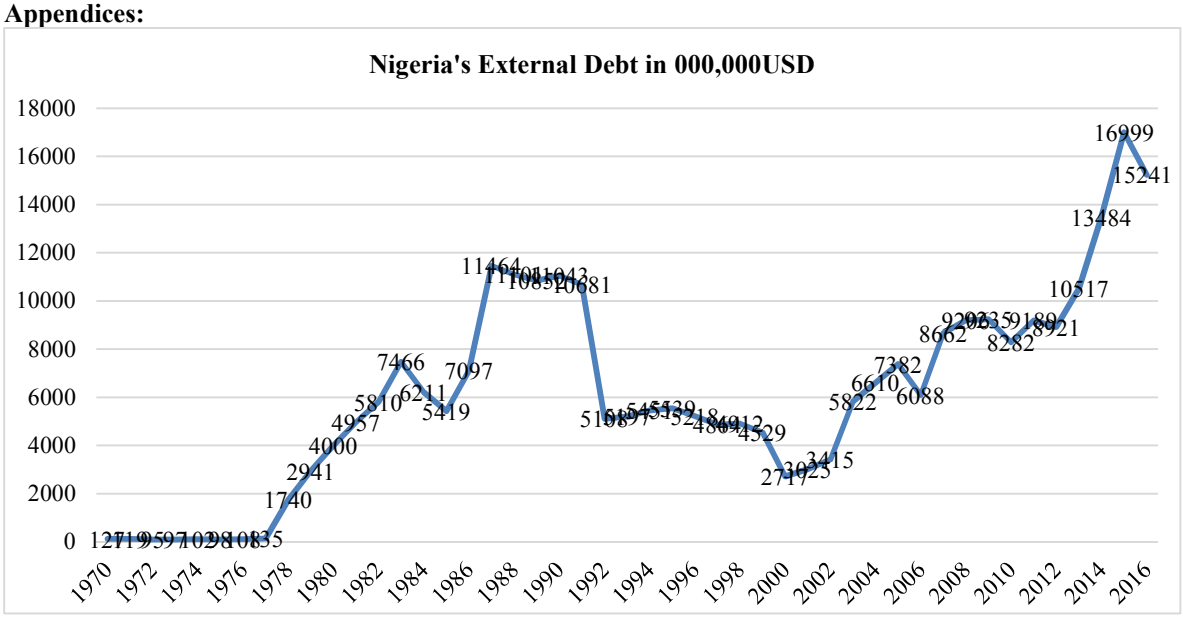


Figure 0.1: The Trend of External Debt Stocks of Nigeria from 1970 to 2016.
Source Author's computation from WDI 2017

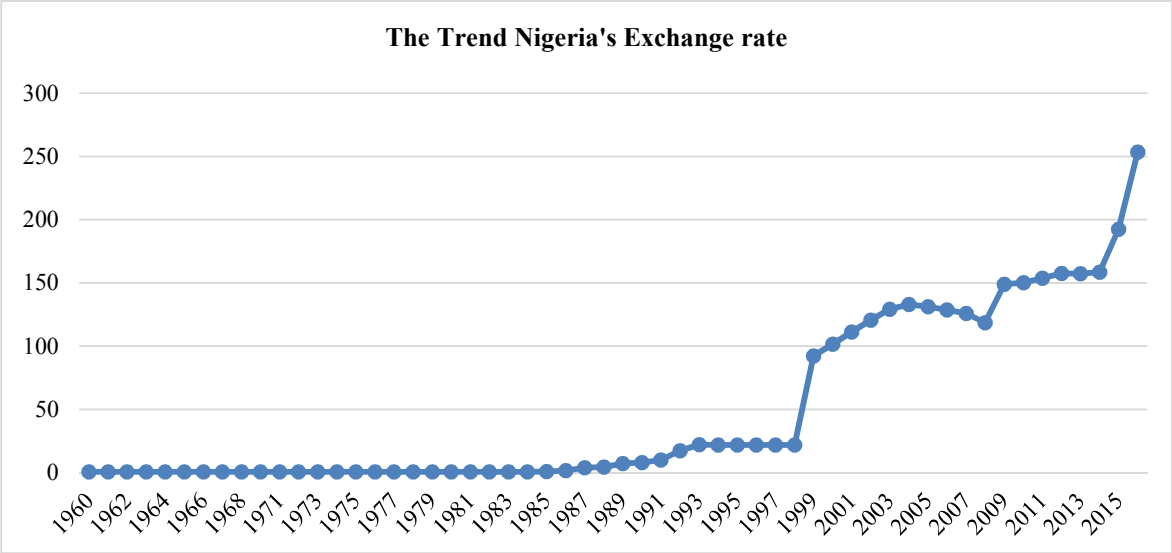


Figure 0.2: The Trend of Nigeria's Exchange to USD
Sources: Author's computation from WDI 2017

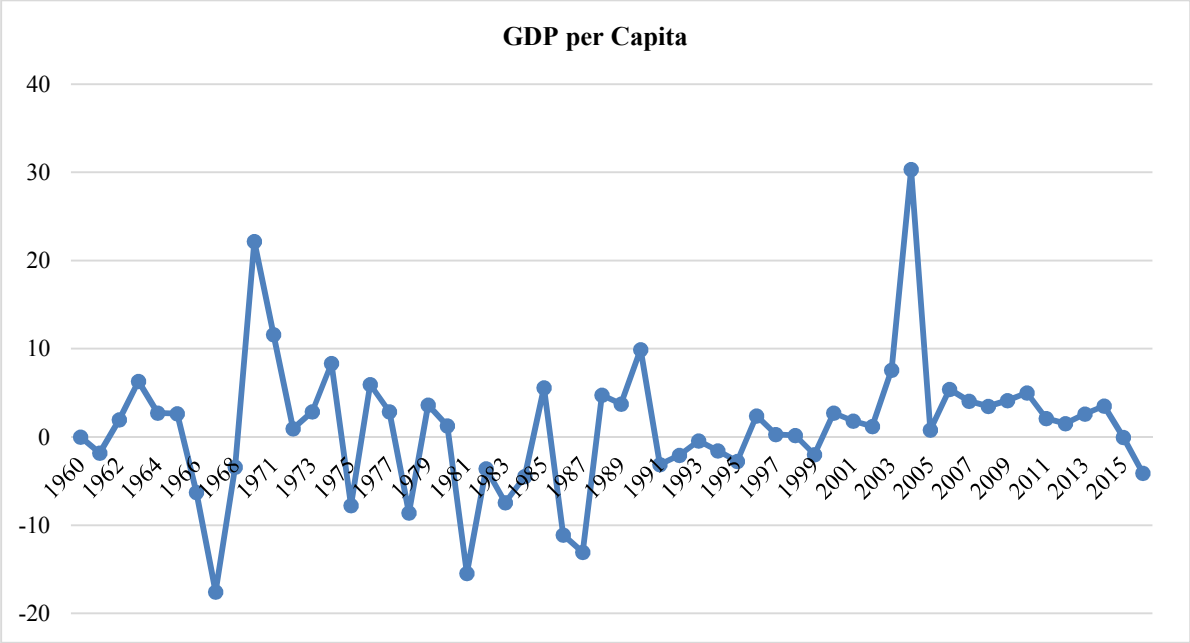
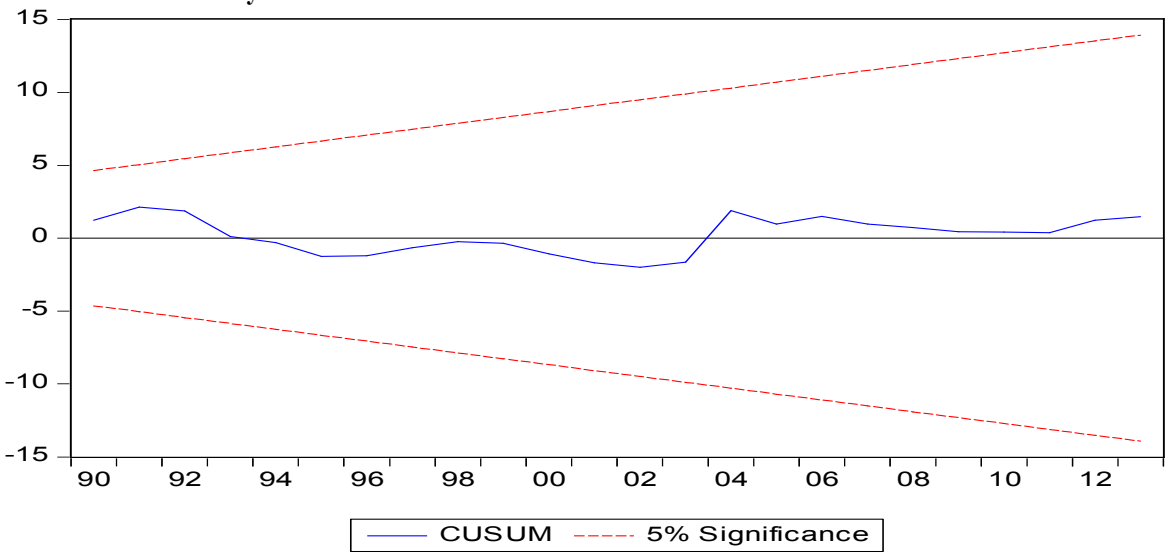


Figure 0.3: Nigeria's GDP per capita growth (annual %)
Sources: Author's computation from WDI 2017

Stability Diagnostic Test

Cusum test of stability



Cusum sum of square test