Agricultural Export, Oil Export and Economic Growth in Nigeria: Multivariate Co-integration Approach

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Abstract*—Sustaining of nation's economic growth for better footing and outlook is very crucial for the globe of recent, most especially for developing countries like Nigeria. The country as a vivid example of a developing nation is oil based economy, which adopts export promotion policy as the essentialtactic for growth. Yet the nation has not maximized her abundance of resources to aids growth, despite notable economic growth being experienced. In this view, there is an attempt to examine the relationship among agricultural export, oil export and output growth in Nigeria. The causal relationship among the variables was investigated by using times series data for the period between 1981 and 2014. All the macroeconomic variables were found to be stationary. The study revealed that there is significant relationship between economic growth and the agricultural export and oil export. Based on the findings, government of the country is being advised to initiate new and re-defined old policies that will diversify the export base. Likewise, policies that will improveand aid the nation's domestic production is being encouraged, since long run relationship has been established among the macroeconomic variables.*

Keywords*—*Agriculture Export, Oil Export, Economic Growth, Co-integration.

I. INTRODUCTION

Exportation has long being considered as a part of the factors that improve economic growth, therefore making the importance of export promotion a debatable study in economic growth and development's literatures. However nations employ different ways and policies that will enable economies to grow through the import substitution and export promotion. There are numerous countries such as Nigeria that have embraced the export strategy as a main tool for economic growth. Nigeria being regarded as an oil based economy, exports most of the oil production; that accounts for around 4 percent of the global oil production. The country rely on the revenues generated from this sector to improve the economy, thereby paying less consideration on other sectors that can likewise be of use such as agricultural sector.

Agriculture is an importanteconomic sector influencing the basis industrial growth and development of most economies in the world. This sector is also being regarded as the engine of growth and development by most nations likewise oil sector in cases of countries with abundance of oil. Therefore improvement of major sartorial aspect that contributes to nations' economy can help in poverty alleviation of most thirdworld countries. Similarly, recent studies on the cause of growth and development have being identifying sartorial transformation of most nations as way for their economic liberation. Nigeria as a country considered in this study has its major foreign income from non-oil exports during last decade before pattern changed when oil suddenly became of crucial position in the world economy as shown in Table 1.

TABLE 1
SECTORAL CONTRIBUTION TO TOTAL EXPORT

Sectors	1960	1970	1980	1990	2000	2010	2011	2012	2014
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Oil	25.3	57.6	96.1	97.1	98.7	96.4	96.5	96.8	85.3
Non-oil:									
Agriculture	64.2	30.2	2.6	1.5	0.5	3.51	1.8	1.4	2.1
Others	10.5	12.2	1.3	1.4	0.8	2.45	1.7	1.8	12.6

Source. From CBN Annual Report and Statement of Accounts, 2015.

Table 1 show the percentage contribution of oil and non-oil exports to total export.Oil export remains the foremost contributor**,** upholding its dominant role and trend in the economy. However, agricultural exports show a low input to the total exports of the country compared to what it used to be(CBN, 2015).

In the 1960s, agriculture was the main stay of the economy and the greatest foreign exchange earner. Agricultural products constitute the bulk of Nigeria's non-oil exports. The shares of these products both processed and unprocessed in total value of non-oil exports is as high as 70 per cent (CBN, 2011). The agricultural commodities market experienced an export boom between 1960 and 1970 but declined in the early 1980s as a result of the fall in international primary commodity markets associated with deterioration in the terms of trade. This however weakens the international demand for Nigeria's agricultural exports.Since then, the economy has been depending on proceeds from oil that constitutes 90 percent of foreign exchange earnings in total (Okoh, 2004).

The performance of agricultural export in the past three decades leaves little or nothing desirable in spite of the efforts to promote non-oil exports in Nigeria. For these reasons if Nigerian economy is to be returned to the path of sustainable growth and external viability indeed, there is the need for a change in the policy focus and a movement to the industrialization sector. Thus raising the question of the function of the agricultural export in the economic growth of the country.In this light, the paper is to further empirically analyze the existence and way of causality between oil, agriculture export and economic growth. Furthermore, this study also determines the long run relationship between the selected sectorial exports and economic growth in Nigeria.

II. LITERATURE REVIEW

This segment consists of relevant literatures which are reviewed empirically alongside with theories in line with studies that have shown linkage between exports and economic growth.

2.1 Theoretical Review

The achievement of sustainable and inclusive growth has been the main aim of most nations of the world, which has created lot of consideration among the various schools of economic thought extending from the classical to the neo-classical views. In the discussion of growth theory decades, the neo-classical exogenous growth theory has been the dominant school of thought. The Solow-Swan growth model explained that output growth rate is based on two exogenous factors in the long run which are technical progress and growth in labour and capital contributions. This model provided the few links of macroeconomic factors influence on output growth. As a result of this model deficiencies, led to the development of other growth theories such as Feder's model that encompasses other exogenous variables.However, for examining of the relationship between sectorial export and economic growth, this paper will present models based on the existing literatures where a production function framework in which capital, labour, exports and other factors are used as potential explanatory inputs.

2.2 Empirical Review

Several early studies in numerous nations have been conducted and supporting the opinion that exports have a strong positive impact on growth. Some of these studies include Michaely, 1977; Fajana, 1979, Feder, 1982; Ram, 1985; Balassa, 1990 and so on. However, few studies found (Chan,Clark& Davis, 1990; Ahmad & Kwan, 1991) that exports does not cause economic growth.

Bahmani-Oskooee et al (1991) examined the direction of causality between export and growth for some developing nations. It was found that there is causal link between export and growth in some cases, while no existence of causality in others. Similarly, Al-Yousif (1997) investigated on export and GDP using co-integration tests on four countries (Saudi Arabia, Kuwait, Oman and UAE). No long run relationship was found between the variables but exports was proved to have positive effect on growth in the countries through the statistical finding. Likewise Love and Chandra (2004) examined the relationship between export and economic growth in three countries (Pakistan, India and Sri Lanka) using Johansen's co-integration test. The result shows that export affects growth positively in India and Pakistan but no effect in the case of Sri Lanka. Reppas and Christopoulos (2005) carried out a study on 22 less developing countries in Asia and African on exports relationship with economic growth for the period of 1967 to 1999. The result supported a positive influence of export on economic growth in the long run for most of countries examined. Bahmani-Oskooee, Mohtadi&Shabsigh (1991)investigated on the causal relationship between growth in export and the economy of 20 countries. The Akaike's optimal lag criterion was

used in the Granger causality test, in order to overcome the limitations of the former approach. However, the study is inconclusive in carrying out the hypotheses since only few of the countries support the export promotion hypothesis.

Apart from studies on selected countries, examining of countries individually was not left out. Panas and Vamvoukas (2002) analyzed the relationship between exports and Greece's growth using co-integration and granger causality test over the period of 1948 – 1997. The study indicated that causality run from growth to export for the nation. In the same manner, Awokuse (2006) conducted the causality test between exports and economic growth in Japan from 1960 to 1991. A bi-directional causality was found. In Chile, Siliverstovs and Herzer (2006) examined relationship between export and growth for the period of 1960 to 2001. The exports was divided into two which are the primary and manufactured exports. It was discovered that both export sectors are statistically significant and positive related to growth in the country. Likewise Siliverstovs and Herzer (2007) studied was conducted in the same country on relationship between manufacturing and mining exports on output. The results indicated that there is long run relationship between the variables and GDP.Babatunde (2014) investigated on the long run relationship between export and imports sectors in Nigeria, from 1960 to 2014. Disaggregation into oil and non-oil sectors was made use of. The study revealed that the nation's macroeconomic sectors have been effective since there is long run relationship.

From the above, conclusion can be arrived that the role of export is one of theprospects forbetter economy overall. Likewise several studies have linked different export sectors to foster growth particularly oil and non-oil as whole and few studies does not support this view. Thus, most of the early studies could be misleading since there is still mixed findings on the pose of export to growth.This thereby necessitates investigating of sectorial components that consist of non-oil such as agricultural export influences on economic growth in Nigeria.

III. METHODOLOGY

The study utilized secondary data regarding the selected macroeconomic variables (oil and agricultural export) and Nigeria's output growth. Annual time series data covering from 1981 to 2014 are analyzed through the unit root test, regression analysis and Granger causality test. The data required was sourced from Central Bank of Nigeria Statistical Bulletin and Annual Financial Reports of Statistics for various issues.

3.1 Model Specification

Based on studies reviewed previously and theoretical clarification,various factors have been acknowledged to be liable for changes in growth rate of GDP. The vector error correction model (VECM) or vector autoregressive model (VAR) will be used in the study for assessing the relationship. However, the stationary test will be carried out before the determining of the estimation model. Hence, the choice of estimation model is based on Engle and Granger's view that once all the selected variables are co-integrated that is of order I(1), VECM can be employed for the short and long run relationship. Thus, these VAR model specifications are established:

$$\ln Y_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \ln Y_{t-i} + \sum_{i=1}^{p} \beta_2 \ln AgrE_{t-i} + \sum_{i=1}^{p} \beta_3 \ln OilE_{t-i} + \mu_t \quad (1)$$

$$\ln AgrE_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \ln Y_{t-i} + \sum_{i=1}^{p} \alpha_2 \ln AgrE_{t-i} + \sum_{i=1}^{p} \alpha_3 \ln OilE_{t-i} + \nu_t \quad (2)$$

$$\ln OilE_t = \lambda_0 + \sum_{i=1}^{p} \lambda_1 \ln Y_{t-i} + \sum_{i=1}^{p} \lambda_2 \ln AgrE_{t-i} + \sum_{i=1}^{p} \lambda_3 \ln OilE_{t-i} + \gamma_t \quad (3)$$

where:

$\ln Y_t$ = natural logarithm of growth rate of GDP

$\ln AgrE_t$ = natural logarithm of agricultural export

$\ln OilE_t$ = natural logarithm of oil export

$\alpha_0,\ \lambda_0,\ \beta_0$ = constants of the explanatory variables

t = current time

3.2 Estimation Procedure and Technique

Firstly, time series properties of the variables used in the model will be examined to check their order of integration to avoid spurious regression by using Augmented Dickey Fuller (ADF) and Philips-Perron (PP) test for permission of robustness. These tests for unit roots are carried out by employing the equation as follows:

$$\Delta X_t = \alpha_0 + \alpha_{1t} + \alpha_2 X_{t-1} + \sum_{i=0}^{p} \lambda_i \Delta X_{t-i} + \varepsilon_t$$

Where α_0, α_1, α_2 and λ_1 are parameters to be estimated while ε_t represents the error term which is assumed to be similarly and generally distributed. Thus, a co-integration test can be carried out using Johansen co-integration test procedure and immediately followed by VECM for estimation once all variables examined are stationary at first differences that is I(1). While for the short and long run examination of variables without indication of co-integration can proceed with the use of VAR and Granger causality test.

IV. EMPIRICAL RESULTS AND DISCUSSION

4.1 Unit Root Test

The ADF test and PP test has been carried out for the variables. The results of the ADF and PP test at level and first differences are being reported in Table 1. Based on Table 1, the t-statistics for growth rate of GDP for ADF and PP test are statistically significant at 0.01 (1%) significance level. Other variables (oil and agricultural export) are stationary at first difference by ADF and PP tests; except for agricultural export according to ADF test that is statistically significant at 0.05 (5%) significance at level. In summary, this indicates that these variables are stationary at level form I (0) and integrated of order one I (1).

TABLE 2
ADF AND PP UNIT ROOT TEST OF VARIABLES

ADF PP					
Variable	Constant	C/Trend	Constant	C/Trend	Result
Agriculture Export	-2.452100	-3.914584**	-2.29447	-2.397820	
Oil Export	0.295789	-1.649725	0.295789	-1.673503	
GDP growth	-4.71592***	-5.32452***	-4.70958***	-5.32399***	I (0)
ΔAgriculture Export	-1.048330	-1.336463	-4.94742***	-4.88435***	I (1)
ΔOil Export	-4.493739***	-2.547769	-4.497089***	-4.27375***	I (1)
ΔGDP growth	-8.56979***	-8.43741***	-22.9762***	-25.7307***	I (1)

Notes: ***, **, * denotes rejection of the null hypothesis of a unit root at the 1%, 5%, and 10% significance level for ADF and PP. No asterisk indicates that the series is non-stationary

4.2 Co-integration Test (Johansen)

Table 3 represents the co-integration rank r test result, which is in appropriate assumptions on trends and lag selection, likewise in accordance with ADF and PP test. Thus, results indicated that there is long run relationship among the variables investigated. In other word, there is long run relationship among GDP growth, oil and agricultural export. Table 3 reveals both Trace and Maximum Eigenvalue tests, which indicates that the null hypothesis of no cointegrating vector is rejected since the rank "r" is greater than or equal to 2 at the 0.05 or 5% significant level. From the result of Table 3 in appendix A, showed there is co-integration among the three variables, meaning that long run relationship exists within the period studied; and likewise confirmed the use of VECM model for estimation.

4.3 ECM Analysis

In VEC model estimation, the lag length is crucial therefore using of lag order selection criteria in table 4 is necessary and also for obtaining the minimum values of the information criterion. Table 4 shows VAR lag order selection criteria for the variables

TABLE 4
ENDOGENOUS VARIABLES: GDP AGRICULTURE_EXPORT OIL_EXPORT

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-812.1679	NA	2.69e+18	50.94799	51.08541	50.99354
1	-753.9072	101.9563	1.24e+17	47.86920	48.41885*	48.05139
2	-740.8854	20.34656*	9.82e+16*	47.61784*	48.57973	47.93668

**** indicates lag order selected by the criterion***
FPE: Final prediction error
AIC:Akaike information criterion
SIC: Schwarz information criterion
HQ: Hannan- Quinn information criterion

According to Table 4 lag of 1 was being selected by the SIC, whereas the AIC and HQ criterion selected two as an optimal lag for the model. However, the VECM was used to assess the interaction among the variables. The result of VECM is presented in Table 5 in appendix B, where the coefficient of error correction term consists of information as to whether past affect the present values of variables examined. Thus, indicating that any significant coefficient of variables denote that past equilibrium error influences the present outcome.

4.4 VECM Test using Causality

Table 6 in appendix Cpresentsthe causation test result using VECM and showed that there is no existence of long run relationship among GDP and the selected exogenous variables, except presence of one way causality between agricultural export and oil export.

4.5 Results of Residual Diagnostics (Serial Correlation and Heteroskedasticity Test)

The Breusch-Godfrey serial correlation LM test revealed that $n.R^2 = 0.281843$ and the Prob. Chi-Square(2) which is 0.8686 is insignificant, implying that the estimated model is free from autocorrelation problem. Theheteroskedasticitytest was conducted under Harvey's assumption, the result show that $n.R^2 = 1.615458$ and the Prob. Chi-Square(3) which is 0.6559 is insignificant and indicating no heteroskedasticity problem. Also, the plot of CUSUM of recursive estimates for investigating the stability of the model shows that the cumulative sum of residuals are within the critical boundaries, accepting evidence of parameter stability. This can be summarized as shown in Table 7:

TABLE 7
DIAGNOSTIC TEST

Tests	Coefficient	Prob.
Serial correlation LM	0.281843	0.8686
Heteroskedasticity	1.615458	0.6559

[1]serial correlation LM Test
[2]Heteroskedasticity Test

V. CONCLUSION

The paper has investigated and was able to establish the relationship among GDP, agricultural export quantity and oil export; also possible of Granger causality among the variables during 1981 -2014 in Nigeria. The study findings exhibit that GDP, agricultural and oil exports are co-integrated, so there is long run relationship among the variables. The findings make it evident that the agricultural export and oil export are good indicators for predicting GDP outlook. The study hereby recommend that policies that will aid increase of the exportable goods by the expansion of output base and diversification of the export base should be prioritized for improvement of the nation's growth.

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Appendix A

TABLE 3
CO-INTEGRATION BETWEEN VARIABLES

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.617335	45.37555	29.79707	0.0004
At most 1 *	0.391836	15.59713	15.49471	0.0483
At most 2	0.005806	0.180500	3.841466	0.6709

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.617335	29.77842	21.13162	0.0024
At most 1 *	0.391836	15.41663	14.26460	0.0327
At most 2	0.005806	0.180500	3.841466	0.6709

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Notes:

(a) r represents the numeral of cointegrating vectors at level of 5%
(b) Trace test symbolizes the inclusion of 2cointegrating equation at the level of 5%
(c) Max-Eigen value shows that 2cointegrating equation at 5% significance level
(d) * refer to the rejection of the null hypothesis at level of 5%
(e) Critical value are derived from Mackinnon-Haug -Michelis (1999)

Appendix B: Table 5

Vector Error Correction Estimates
Date: 01/28/16 Time: 01:12
Sample (adjusted): 1984 2014
Included observations: 31 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
GDP(-1)	1.000000	0.000000
AGRICULTURAL_EXPO...	0.000000	1.000000
OIL_EXPORT(-1)	0.000659	-16.26387
	(0.00033)	(1.38295)
	[1.99323]	[-11.7603]
C	-6.728624	19921.65

Error Correction:	D(GDP)	D(AGRICULT...	D(OIL_EXPO...
CointEq1	-0.977753	1068.403	136.5042
	(0.40371)	(1074.62)	(45.4002)
	[-2.42194]	[0.99422]	[3.00669]
CointEq2	-0.000125	-0.927332	0.001550
	(9.9E-05)	(0.26244)	(0.01109)
	[-1.26983]	[-3.53347]	[0.13980]
D(GDP(-1))	0.117852	-658.2673	-59.16364
	(0.33276)	(885.757)	(37.4212)
	[0.35417]	[-0.74317]	[-1.58102]
D(GDP(-2))	-0.069088	-623.6383	-32.30702
	(0.22006)	(585.765)	(24.7473)
	[-0.31396]	[-1.06466]	[-1.30548]
D(AGRICULTURAL_EXP...	6.07E-05	1.120148	0.015654
	(8.3E-05)	(0.21973)	(0.00928)
	[0.73483]	[5.09787]	[1.68628]
D(AGRICULTURAL_EXP...	0.000140	-0.613404	0.008653
	(8.0E-05)	(0.21382)	(0.00903)
	[1.73915]	[-2.86879]	[0.95786]
D(OIL_EXPORT(-1))	0.001132	-9.537680	-0.519475
	(0.00212)	(5.63815)	(0.23820)
	[0.53424]	[-1.69163]	[-2.18084]
D(OIL_EXPORT(-2))	-0.000528	-37.99102	-0.831883
	(0.00201)	(5.35014)	(0.22603)
	[-0.26281]	[-7.10095]	[-3.68039]
C	-0.902121	26760.05	974.1028
	(2.11727)	(5635.90)	(238.104)
	[-0.42608]	[4.74814]	[4.09108]

Appendix C: Table 6

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 01/28/16 Time: 01:20
Sample: 1981 2014
Included observations: 31

Dependent variable: D(GDP)

Excluded	Chi-sq	df	Prob.
D(AGRICULT...	3.038276	2	0.2189
D(OIL_EXPO...	0.551921	2	0.7588
All	4.038632	4	0.4008

Dependent variable: D(AGRICULTURAL_EXPORT)

Excluded	Chi-sq	df	Prob.
D(GDP)	1.133517	2	0.5674
D(OIL_EXPO...	51.90310	2	0.0000
All	55.02031	4	0.0000

Dependent variable: D(OIL_EXPORT)

Excluded	Chi-sq	df	Prob.
D(GDP)	2.575703	2	0.2759
D(AGRICULT...	2.871332	2	0.2380
All	10.62656	4	0.0311