EXPORT FLUCTUATIONS AND ECONOMIC GROWTH OF NIGERIA: TWO-STAGE LEAST SQUARE (TSLS) APPROACH

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Abstract

This paper examines the impact of export fluctuations on economic growth in Nigeria, and to examine the veracity of the Growth-led export hypothesis, using time series data from 1981-2014. The Two-Stage Least Squares (TSLS) method, Multivariate Cointegration and Pairwise Granger Causality Tests are employed. The variables include Gross Domestic Product (GDP) (as dependent variable), Oil Export Earnings (OIEXPE), Non-oil Export Earnings (NOEXPE), Domestic Investment on Export Products (DOINV), and Bank Credit to Export Producers (BCEXP) as independent variables. The unit root tests show that all the variables are stationary at first difference and integrated of the order one 1(1). The multivariate cointegration test showed that all the variables are cointegrated in both Trace and Max-Eigen statistics. This shows that there is a long-run relation among the variables. The Pairwise Granger Causality Test shows the following direction of causation, OIEXPE⇆GDP;NOEXPE→GDP;DOINV→GDP;BCEXP→GDP;OIEXPE→NOEXPE; OIEXPE→DOINV; OIEXPE→BCEXP; DOINV⇆NOEXPE; BCEXP⇆NOEXPE; BCEXP⇆DOINV. The results of the TSLS show that OIEXPE, NOEXPE and BCEXP are positively related to GDP with coefficient values of 0.354911, 0.134272 and 0.496974 respectively, while DOINV is negatively and insignificantly related to GDP. The OIEXPE and BCEXP are positively and insignificantly related to GDP with t-statistic values of 6.196524 and 6.970363 respectively. The R-squared has a value of 0.99463, which shows that 99 percent changes in GDP of Nigeria could be attributed to the independent variables. The overall level of significance shows that the entire influence on GDP is statistically significant given the probability value of the F-statistic value of 0.000000 being less than 0.05. The findings reveal that the variables are related and can influence each other, and significantly affect the growth of the GDP in Nigeria. We therefore, recommend that policies aimed at encouraging, non-oil exports, Bank credit to export producers and domestic investment on export products should be the target of the policy makers. The results of this paper lend support to the Export-led Growth hypothesis for Nigeria for the period 1981-2014.

Keywords: Domestic investment, Bank credits, Export fluctuations, Non-oil exports, Economic growth, Two-stage least square

1.0   Introduction

Nigeria like many other developing countries in Africa started as a purely agrarian economy. Before the oil exploration and exploitation, the economy was dominated by agricultural commodity exports such as cocoa, groundnut, cotton, rubber, coffee, beniseed, palm produce and a host of others which are basic raw materials for a wide range of manufactured goods. By 1950's and 1960's, 3% to 4%, annual output growth rates for agricultural food crops were achieved. Government earnings also depended heavily on taxes on exports. During the period, the current account and fiscal balances depended on the agricultural sector (Osuntogun *et al.*, 1998). The agricultural products accounted for over 50 percent of Gross Domestic Product (GDP) and were the main source of export earnings and public revenue.

However, the revenue from agricultural products decreased substantially in early 1970's. This was attributed to – (i) low world price of primary products and; (ii) discovery of oil and the buoyant oil revenue which relegated agriculture to the background. The discovery of the oil wealth and its boom in mid 1970's raised the country's foreign exchange earnings which in turn resulted in a higher economic growth. This period was also characterized by high level of Government expenditure on capital intensive projects and administrative cost.

The windfall in oil revenue as a result of the boom was short-lived. In the late 1970's and early 1980's there was an oil glut and a fall in the country's foreign exchange earnings resulted. The fluctuations in foreign exchange earnings from agricultural products and oil produce have led to series of macroeconomic problems, such as high rate of unemployment, price instability, and balance of payment deficit, budget deficits and general economic hardships on the people. In response to these enormous problems, the government embarked on several economic policy reforms to liberalize and diversify the economy, but to no avail as the problems are multiplying each day.

At this juncture, it becomes imperative to examine the controversy on the relationship between export and economic growth. Some authors have argued that export growth precedes economic growth, hence giving a stand to the Export-led Growth (ELG) hypothesis. On the other hand, others have provided evidence in support of the Growth-led Export (GLE) hypothesis. They argue that economic growth comes before export growth. To test the plausibility of the GLE hypothesis, we included domestic investment on export products and bank credit to export producers as some of our variables. Therefore, this study aims to examine the impact of export fluctuations on economic growth in Nigeria, and also examine the veracity of the Growth-led export hypothesis. The study is organized into five sections: section one comprises the introductory background of the study. Section two covers the review of the related literature. Section three discusses the research methodology. Section four deals with the empirical results and discussion of results. Finally, section five covers summary of findings, policy implications and recommendations.

2.0   Review of Related Literature

Economic literature on international trade, according to Giles and Williams (2000), which suggests that exports have a positive impact on economic growth, is known as the export-led growth hypothesis. But generally, from the growth-theory literature point of view, export expansion is the key factor promoting economic growth. The theory posits that growth could be achieved through high rate of capital formation and growth of export helps release the foreign exchange constraints, thereby facilitate import of capital goods and hence faster growth. This suggests that there must be a basic growth, i.e. growth in capital formation, before export growth or growth in export. However, once the basic growth in capital formation is achieved, export could trigger or accelerate growth. The growth-theory does not preclude international trade, but rather suggests that competition from overseas ensures an

efficient price mechanism that fosters optimum resource allocation. Also, literature on exogenous growth theory support export driven economic growth hypothesis. The theory posits that long-run economic growth due to increased export allows for specialization in the sectors with economies of scale. Increased exports over imports also harness terms of trade and improve foreign exchange earnings (Kucukasoy, 2011; and Ozughalu and Ajayi, 2004). Gossman and Helpman (1991), notes that countries that have adopted outward oriented development strategy have grown faster and achieved higher levels of standard of living than their counterpart who engage in protectionist trade policies.

The proponents of the export-led growth hypothesis found that there is long-run relationship between export and economic growth, and that export positively and significantly impacts on economic growth in Nigeria (Olaleye *et al*., 2013; Ugwuegbe and Uruakpa, 2013; Giles and William, 2000; Ifeacho *et al.*, 2014; Kucukasoy, 2011; and Lin and Li, 2007).

On the other hand, Akpokodje (2000); Ewetan and Okodua (2012); and Abodan et al (2014) found a contrary result. Ewetan and Okodua (2012) investigated the applicability of the Export-led Growth (ELG) hypothesis to Nigeria using annual time series data from 1970-2010 and the result obtained did not support the Export-led Growth hypothesis for Nigeria.

3.0   Data and Method of Analysis

3.1   Data
The data used for this paper are the time series covering 1981-2014 periods and are obtained from the Statistical Bulletin of Central Bank of Nigeria (CBN) for various years, CBN Annual Reports and Statement of Accounts of various issues and CBN Economic and Financial Review for 2014.

3.2   Method of Analysis
This paper makes use of econometric procedure in estimating the relationship between the variables. The Two-Stage Least Squares (TSLS) method is employed in obtaining the numerical estimates of the coefficients of the equation. The Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests are used to test the stationary of the variables. Also, the Johansen cointegration procedure is used to test the existence of long-run equilibrium (Stationary) relationship among the economic variables. Equally, Pairwise Granger Casualty Tests are used to establish the causal relationship and direction of causality between the variables. The Two-Stage Least Squares provides more satisfactory results for estimates of the structural parameters. In demonstrating the application of TSLS, the multiple linear regression analysis is used where the Gross Domestic Product (GDP), Oil Export Earnings (OIEXPE), Non-oil Export Earnings (NOEXPE), Domestic Investment on Export Products (DOINV) and Bank credit to export producers (BCEXP) are the relevant variables. The GDP is used as the dependent variable while the OIEXPE, NOEXPE, DOINV and BCEXP are the independent variables. The selection of this method is justified because the data are time series and all time series data exhibit a random walk. Also, the method provides an additional structural parameter such as j-statistic that helps to validate the statistical significance of the result.

3.3   Model Specification

The export fluctuations-economic growth nexus is built and tested using the five macroeconomic variables, applying the augmented function of the kind:

GDP   =   f(OIEXPE, NOEXPE, DOINV, BCEXP) ---------(1)

Where:

GDP   =   Gross Domestic Product (as proxy for economic growth)

OIEXPE   =   Oil export earnings

NOEXPE   =   Non-oil export earnings

DOINV   =   Domestic investment on export products

BCEXP   =   Bank credits to export producers

In a more explicit and econometric form, equation (1) can be stated as

$$GDP_t = \alpha_0 + \alpha_1 OIEXPE_t + \alpha_2 NOEXPE_t + \alpha_3 DOINV_t + \alpha_4 BCEXP_t + e_t \text{ ---- (2)}$$

Where:

α_0 is the constant term

$\alpha_1 - \alpha_4$ =   coefficients of each of the variable

t =   is the time trend and

e_t =   is the stochastic random term

by log linearising, the model becomes:

$$Log(GDP_t) = \alpha_0 + \alpha_1 log(OIEXPE_t) + \alpha_2 log(NOEXPE_t) + \alpha_3 log(DOINV_t) + \alpha_4 log(BCEXP_t) + e_t \text{---(3)}$$

Where: log = natural log

4.0   Empirical Results

4.1   Unit Root Test

We tested whether the variables in equation (3) are stationary and to determine their order of integration. The results of the ADF and PP tests are presented in tables 4.1.1 and 4.1.2

Table 4.1.1: Unit Root Test for Stationarity at Levels

Variables	ADF (Intercept)	PP (Intercept)	1%	5%	10%	Order of Integration
Log GDP	-0.197552	------------	-3.646342	-2.954021	-2.615817	N S
	-----------	-0.183246	-3.646342	-2.954021	-2.615817	
Log OIEXPE	-0.965784	------------	-3.646342	-2.954021	-2.615817	N S
	-----------	-0.997290	-3.646342	-2.954021	-2.615817	
Log NOEXPE	-0.674537	------------	-3.646342	-2.954021	-2.615817	N S
	-----------	-0.644954	-3.646342	-2.954021	-2.615817	
Log DOINV	-0.701490	------------	-3.646342	-2.954021	-2.615817	N S
	-----------	-0.445392	-3.646342	-2.954021	-2.615817	
Log BCEXP	0.352149	------------	-3.646342	-2.954021	-2.615817	N S
	-----------	0.321471	-3.646342	-2.954021	-2.615817	

Source: Author's estimation using Eviews 7.0

Note: NS = Not stationary and No order of integration

The result in table 4.1.1 shows that all the variables are not stationary at levels. There is presence of unit root in the variables at levels. We then proceeded to test it in the first difference of the variables. The results are presented in table 4.1.2

Table 4.1.2: Unit Root Test for Stationarity at First Difference

Variables	ADF (Intercept)	PP (Intercept)	1%	5%	10%	Order of Integration
Log GDP	-5.378421	------------	-3.653730	-2.957110	-2.617434	1(1)
	-----------	-5.394077	-3.653730	-2.957110	-2.617434	
Log OIEXPE	-6.239669	-----------	-3.653730	-2.957110	-2.617434	1(1)
	-----------	-6.421689	-3.653730	-2.957110	-2.617434	
Log NOEXPE	-7.178069	-----------	-3.653730	-2.957110	-2.617434	1(1)
	-----------	-10.57704	-3.653730	-2.957110	-2.617434	
Log DOINV	-6.466686	-----------	-3.653730	-2.957110	-2.617434	1(1)
	-----------	-11.00958	-3.653730	-2.957110	-2.617434	
Log BCEXP	-4.219491	-----------	-3.653730	-2.957110	-2.617434	1(1)
	-----------	-4.036014	-3.653730	-2.957110	-2.617434	

Source: Author's estimation using Eviews 7.0
Note: 1(1) means integrated of order one, i.e. 1(1) and stationary at 1st difference.

The result in table 4.1.2 reveals that all the variables became stationary at first difference. The observed values (in absolute terms) of ADF and PP tests statistic are greater than the critical values (also in absolute terms) of the test statistic at 1%, 5% and 10% levels of significance. The null hypothesis of non-stationary is rejected. We conclude that all the variables are integrated of order one, i.e. 1(1).

4.2 Cointegration Test Result

Table 4.2.1: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(S)	Eigen value	Trace Statistics	0.05 Critical Value	Prob. **
None*	0.993029	376.4849	69.81889	0.0001
At most 1*	0.960638	217.5733	47.85613	0.0001
At most 2*	0.898479	114.0549	29.79707	0.0000
At most 3*	0.586913	40.85514	15.49471	0.0000
At most 4*	0.324719	12.56403	3.841466	0.0004

Note: Trace test indicates 5 cointegrating eqn(2) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) ρ –values
Source: Author's estimation using Eviews 7.0

We conducted the cointegration test after the unit root test to examine the presence or non-presence of cointegration among the variables. Johansen and Juselius multivariate cointegration test was employed and the result shown on table 4.2.1. The Trace statistic test indicates five cointegrating equations at 5% level of significance of 32 included observations after adjustments with trend assumption in linear deterministic trend series at lags interval (in first differences) 1 to 1. The Trace statistic is greater than the critical value at 5 percent level of significance. Five of the hypothesized equations satisfy this condition. We therefore reject the hypothesis of no cointegration among the variables. There is therefore a long-run relationship between the variables.

Table 4.2.2: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(S)	Eigen value	Max-Eigen statistics	0.05 Critical Value	Prob. **
None*	0.993029	158.9116	33.87687	0.0001
At most 1*	0.960638	103.5185	27.58434	0.0000
At most 2*	0.898479	73.19971	21.13162	0.0000
At most 3*	0.586913	28.29111	14.26460	0.0002
At most 4*	0.324719	12.56403	3.841466	0.0004

Note: Maximum Eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) ρ –values
Source: Author's estimation using Eviews 7.0

Equally, table 4.2.2 that presents the Maximum Eigenvalue statistic indicates 5 cointegrating equations. The computed Eigenvalues are significantly different from zero as can be seen from table 4.2.2 and the Max-Eigen Statistic is greater than the critical value of 5 percent level of significance. Also, the ρ –value of each of the equations is less that 0.05. The null hypothesis of no cointegration among the variables is rejected. There is long-run relation among the variables.

4.3 Causality Tests Result
Table 4.3.1: Pairwise Granger Causality Tests Result (Lags:2)

Null Hypothesis	Obs	F-statistic	Prob.
OIEXPE does not Granger Cause GDP	32	9.04331	0.0010
GDP does not Granger Cause OIEXPE		7.05499	0.0034
NOEXPE does not Granger cause GDP	32	19.6681	5.E-06
GDP does not Granger cause NOEXPE		2.88545	0.0732
DOINV does not Granger cause GDP	32	7.30373	0.0029
GDP does not Granger cause DOINV		1.95532	0.1610
BCEXP does not Granger cause GDP	32	17.7619	1.E-05
GDP does not Granger cause BCEXP		2.79144	0.0791
NOEXPE does not Granger cause OIEXPE	32	3.08714	0.0620
OIEXPE does not Granger cause NOEXPE		6.49435	0.0050
DOINV does not Granger cause OIEXPE	32	1.48613	0.2442
OIEXPE does not Granger cause DOINV		4.89522	0.0153
BCEXP does not Granger cause OIEXPE	32	0.37957	0.6877
OIEXPE does not Granger cause BCEXP		14.0907	6.E-05
DOINV does not Granger cause NOEXPE	32	63.2778	6.E-11
NOEXPE does not Granger cause DOINV		8.92744	0.0011
BCEXP does not Granger cause NOEXPE	32	9.09071	0.0010
NOEXPE does not Granger cause BCEXP		5.25074	0.0119
BCEXP does not Granger cause DOINV	32	6.63791	0.0045
DOINV does not Granger cause BCEXP		37.5799	2.E-08

Source: Author's estimation using Eviews 7.0

The table 4.3.1 presents the pairwise Granger Causality tests. There is a bi-directional relationship between Oil export earning (OIEXPE) and Gross Domestic Product (GDP) i.e. OIEXPE⇆GDP, as the ρ –values of the variables are less than 0.05 each and have significant F-statistic values of 9.04331 and 7.05499 respectively. Therefore, the null hypothesis that OIEXPE does not granger cause GDP and GDP does not granger cause OIEXPE are rejected and alternates accepted. From the table 4.3.1, there is a unidirectional relationship between Non-oil exports (NOEXPE) and Gross Domestic Product (GDP) i.e. NOEXPE→GDP. It means that causality runs from NOEXPE to GDP as the ρ –values for NOEXPE is 5.E-06 (in standard form) less than 0.05 and the ρ –value for GDP is 0.0732 greater than 0.05. In the table 4.3.1 we observed the following results:

DOINV →   GDP i.e. DOINV granger cause GDP = unidirectional
BCEXP →   GDP i.e. BCEXP granger cause GDP = unidirectional
OIEXPE→   NOEXPE   = unidirectional
IEXPE →   DOINV   = unidirectional

OIEXPE →	BCEXP		= unidirectional
DOINV ⇄	NOEXPE		= bidirectional
BCEXP ⇄	NOEXPE		= bidirectional
BCEXP ⇄	DOINV		= bidirectional

4.4 Two-Stage Least Square (TSLS)

Table 4.4.1: Two Stage Least Squares Result

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	415.1551	1031.560	0.402454	0.6903
OIEXPE	1.242828	0.564400	2.202036	0.0358
NOEXPE	47.80185	19.12595	2.499319	0.0184
DOINV	-10.25863	4.448242	-2.306222	0.0284
BCEXP	3.107460	0.889747	3.492521	0.0016
R-squared	0.971440			
Adjusted R-squared	0.967501			
F-statistic	246.6052			
Prob.(F-statistic	0.000000			
J-statistic	0.000000			
Durbin-Watson Stat.	1.581491			

Source: Author's estimation using Eviews 7.0

Table 4.4.2: Two-Stage Least Squares Logged Result

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	3.04977	0.295242	10.33044	0.0000
Log(OIEXPE)	0.354911	0.057276	6.196524	0.0000
Log(NOEXPE)	0.134272	0.94896	1.414941	0.1677
Log(DOINV)	-0.132593	0.078423	-1.690746	0.1016
Log(BCEXP)	0.496974	0.071298	6.970363	0.0000
R-squared	0.994632			
Adjusted R-squared	0.993891			
F-statistic	1343.298			
Prob.(F-statistic)	0.000000			
J-statistic	0.000000			
Durbin-Watson Stat.	0.879971			

Source: Author's estimation using Eviews 7.0

The results of the Two-Stage Least Squares (TSLS) are presented in tables 4.4.1 and 4.4.2.

The table 4.4.1 shows the results of unlogged variables while table 4.4.2 shows the results of logged variables. The logged variables produced more realistic results than the unlogged variables because of the ρ –values, the t-statistic values and the standard error values. In the logged, the standard error values are significantly reduced.

It could be observed in table 4.4.2 that OIEXPE, NOEXPE and BCEXP are positively related to GDP with coefficient values of 0.354911, 0.134272 and 0.496973 respectively, while DOINV is negatively and insignificantly related to GDP with coefficient value of -0.132593 and t-statistic value of -1.690746. The OIEXPE and BCEXP are significantly related to GDP with t-statistic values of 6.196524 and 6.970363 respectively. The coefficient of determination i.e. R-squared has a value of 0.994632 that shows that 99 percent changes in GDP of Nigeria could be attributed to the independent variables. Also, the over all level of significance shows that the entire influence on GDP is statistically significant given the probability value of the F-statistic value of 0.000000 being less than 0.05 and confirmed by J-statistic value of 0.000000.

5.0   Conclusion, Policy Implications and Recommendations

This paper examines the impact of export fluctuations on economic growth in Nigeria, and lends support to the Growth-led export hypothesis, using time series data from 1981-2014. The two-stage least squares (TSLS) method was employed to obtain the numerical estimates of the coefficients of the equation. We equally employed multivariate cointegration and Pairwise Granger Causality Tests. The variables included Gross Domestic Product (GDP) as dependent variable, Oil export earning (OIEXPE), Non-oil export earning (NOEXPE), Domestic investment on export products (DOINV) and Bank credit to export producers (BCEXP) as independent variables.

The unit root tests show that the variables were not stationary at levels but all became stationary at first difference. The variables were integrated of the order one, 1(1) at first difference. The multivariate cointegration test showed that all the variables are cointegrated in both Trace and Max-Eigen statistics. The hypothesis of no cointegration was therefore rejected and alternate accepted. This shows that there is a long-run relation among the variables.

The Pairwise Granger Causality Test shows that there is a bi-directional relationship between OIEXPE and GDP i.e. OIEXPE⇆GDP, as the ρ –values of the variables are less than 0.05 each and have significant F-statistic values of 9.04331 and 7.05499 respectively. The null hypotheses that OIEXPE does not granger cause GDP and GDP does not granger cause OIEXPE are rejected and alternates accepted. There is a unidirectional relationship between NOEXPE and GDP i.e., NOEXPE→GDP. It means that causality runs form NOEXPE to GDP, but not otherwise, as the ρ –values for NOEXPE is 5.E-06 (in standard form) is less than 0.05 and the ρ –values for GDP is 0.0732 is greater than 0.05. The rest of the pairwise granger causality result is shown thus: DOINV→GDP   = unidirectional

BCEXP→GDP	= unidirectional
OIEXPE→NOEXPE	= unidirectional
OIEXPE→DOINV	= unidirectional
OIEXPE→BCEXP	= unidirectional
DOINV⇆NOEXPE	= bidirectional
BCEXP⇆NOEXPE	= bidirectional
BCEXP⇆DOINV	= bidirectional

The results of the TSLS shows that OIEXPE, NOEXPE and BCEXP are positively related to GDP with coefficient values of 0.354911, 0.134272 and 0.476974 respectively, while DOINV is negatively and insignificantly related to GDP. The R-squared has a value of 0.994632, which shows that 99 percent changes in GDP of Nigeria could be attributed to the independent variables.

The findings reveal that the variables are related and can influence each other, and significantly affect the growth of the GDP in Nigeria. We therefore recommend that policies aimed at encouraging, non-oil exports, bank credit to export producers and domestic investment on export products should be the target of the policy makers. The results of this paper lend support to the Export-led Growth hypothesis for Nigeria for the period of 1981-2014.

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