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## External Sector Liberalization and Output Growth in Nigeria



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### Abstract

*The paper investigates the impact of external sector liberalization (foreign direct investment, external debt stock, trade openness and exchange rate) on the output growth in Nigeria from the period 1981 to 2019, utilizing correlation analysis, Granger causality test and vector autoregression (VAR). The results indicate that foreign direct investment, external debt stock, trade openness and exchange rate all correlate positively with gross domestic product. Also, the granger causality test indicates that foreign direct investment, trade openness and exchange rate granger cause the output growth in Nigeria. From the VAR result foreign direct investment exerted positive and significant impact on the output growth in Nigeria. The paper thus recommended the formulation of an admixture of fiscal and monetary policy, including harmonized foreign exchange policy, to ensure stable macroeconomic environment that will attract foreign direct investment, especially into the tradeable sector that holds higher potential for output growth.*

*Keywords: External debt stock, Foreign direct investment, Nigeria, Trade openness, VAR.*

*JEL Classification: C13; C22; O47; F41; F43; F22*

### 1.0 Introduction

The Nigerian economy is largely dependent on the rest of the world. This has necessitated her participation in some regional / international economic organizations including the Economic Community of West African States (ECOWAS), Africa Free Trade Area, and the World Trade Organization (WTO). The country's activities with the rest of the world therefore constitutes her international transactions which represent the external sector. These transactions take the form of "imports, exports, capital accounts inflows, capital accounts outflow, etc., with the rest of the world and are recorded in the form of accounts which shows the contribution of external sector" (Shah and Fazal, 2016).

Nigeria being an open economy, from time to time experiences some degree of external shocks with attendant pressure on the domestic economy. Such pressures come from various sources including trade, capital flows, currency exchange rate, and external debts.

Scholars including Edward (1990) and Quinn (1997) have observed that the external sector, have significant effect on economic growth. Some follow-up studies in the in the early 2000s (Chanda, 2000; and Donell, 2001) have reported that economic growth is not significantly influenced by the external sector. Although Ghosal (2012) supported the later findings, the effects were disaggregated into short run and long run. He observed a negative long-run effect of external sector liberalization on economic growth, but a positive short-run effect. Similarly, Herzer

(2012), noted that foreign direct investment (financial liberalization) may increase capital and, therefore, production, it may also crowd-out domestic firms, so its total effect in developing countries might be negative. It has also been argued that “trade liberalization may have a negative impact on developing countries because of the increase of imports, which worsen the trade balance” (Santos-Paulino and Thirlwall, 2004) cited in Berasaluce and Romero (2016).

This lack of consensus on the effect of the external sector liberalization on the output growth forms the main motivation for this study. This study therefore seeks to empirically investigate the impact of the Nigerian external sector in propelling the growth of the economy; and to test for the direction of causality between the external sector variables and economic growth of Nigeria. In this regard, four key external sector variables – foreign direct investment, external debt stock, trade openness, and exchange rate are examined.

The study adapted the methodology employed by Nguyen (2011) on the impact of trade liberalization on Malaysian and South Korean economic growth. Econometric approach, including the Granger causality test, VAR estimates, impulse response analysis, and variance decomposition were utilized. Following this introduction, the remaining part of this paper is structured as follows: Part II comprises literature review – both theoretical and empirical, while Part III dwells on methodology. Part IV presents the findings and discussion. Part V contains conclusion and some policy recommendations.

## 2.0 LITERATURE REVIEW

### 2.1 Theoretical Literature

The theoretical underpinning of the impact of external sector on real sector of the economy can be traced to the Keynesian aggregate demand function. This function is given as follows:

$$Y=C+I+G+E \text{ ----- (1)}$$

Where Y is the output; C is private sector consumption spending; I is private sector investment spending; G is the government consumption and investment spending; and E captures the external sector.

Given equation (1), the external sector can be traced to be the tradable sector with the rest of the world. Hence,

$$E= \text{Exports} - \text{Imports} (E_x - I_m) \text{ ----- (2)}$$

Incorporating Equation (2) into Equation (1),

$$Y=C+I+G+(E_x - I_m) \text{ ----- (3)}$$

Equation (3) defines the fact that the aggregate output of an economy is also defined by external factors through net exports. Thus, external sector shocks that will cause exports to be greater than imports will lead to a positive net export, leading an increase in aggregate output. Similarly, an external sector shock that will cause imports to be greater than exports will give rise to a negative net export, culminating to a decline in the aggregate output of the economy.

### 2.2 Empirical Literature

Berasaluce and Romero (2017) investigated the relationship between the external sector variables (exports, imports and foreign direct investment) on the growth of the economy of Korea. The study utilized the vector autoregressive model and the findings suggest that exports and foreign direct investment are not growth driven in Korea.

Therefore, caution must be made about policies that are promoting foreign direct investment and trade.

Badejo, Maku, Adelowokan and Alimi (2018) utilized data for the period 1980 to 2016 to examine the growth effects of external sector in Nigeria, taking due cognizance of the non-oil export commodities. The study employed the vector error correction mechanism to investigate both the long run and short run dynamics. Findings of the study revealed that non-oil export had a positive and significant effect at 10% in the long-run indicating a weak contribution of non-oil export commodity on output growth. The paper further revealed that "output growth was directly influenced by investment, labour force and government expenditure while negatively affected by exchange rate".

Also, Okodua and Ewetan (2013) studied the export-led growth hypothesis for the period 1970 to 2010. The Granger causality test showed that a unidirectional causality flows from gross domestic product to exports. This finding therefore rejects the export-led growth paradigm. Similarly, a unidirectional causality flowing from export to growth in the long-run was observed in Nigeria in a study conducted by Alimi, Yinusa and Ilo (2016) to ascertain the validity of the export-led growth hypothesis under the vector error correction framework.

Shah and Fazal (2016) investigated the external sector impact on the Pakistan economy using quarterly time series data for the period 1990: Q1 to 2010: Q4. The study utilized vector autoregression coupled with the vector error correction mechanism. They

observed that "financial integration has positive while trade integration has negative effect on economic growth of Pakistan in the long run; while the short run dynamics shows that output lag accounts for error correction.

In Italy, Pistoresi and Rinaldi (2011) studied the relationship between real imports, exports and output growth for the period 1863 – 2004 using the cointegration and Granger causality test techniques. The result of the data analysis showed that exports, real imports and real output have "long-run relationship while their direction of causality varies over the periods". The study concludes by stating that both export and import stimulates output growth of Italy.

In Egypt, Abou-Stait (2005) scrutinized the export led growth for the period of 1977 to 2003 by using Augmented Dickey-Fuller unit root test, Granger causality test, vector autoregression (VAR), and the impulse response function. No long run relationship was recorded between exports, imports and output. Further, the study reported a uni-directional causality running from export to output growth.

Using panel multivariate cointegrated vector autoregressive (VAR) technique, Awokuse (2007) examined how total trade influenced the growth of output in Bulgaria, Czech Republic and Poland. Findings of the study nullifies the validity of the export-led hypothesis but upheld the fact that import is the driver of growth. Also, a panel analysis on twenty-four OECD countries was carried out by Laszlo (2007) using Granger causality and Seemingly Unrelated Regression estimator to establish the relationship between real export

and output. A unidirectional causality was observed between export and output in New Zealand, Denmark, Ireland, Belgium, Sweden, Italy, Iceland, and Spain.

Other studies have been geared towards analysing the impact of trade openness and foreign direct investment on output growth. the study of Khan (2007) aimed at examining the impact of foreign direct investment on the growth rate using the Bounds test for cointegration. It was observed that foreign direct investment stimulates growth in the short run and in the long run. Similarly, Ray (2012) studied the influence of foreign direct investment on India's economic growth using the OLS approach. It was observed that a positive relationship exists between foreign direct investment and the growth of India's economy.

Also, Umme and Manni (2012) examined the impact of trade openness on Bangladesh's growth rate. The study used the OLS approach and it was realized that trade liberalization stimulates economic growth. Finally, a study by Herath (2010) on Sri Lanka was geared towards finding the causal relationship between trade openness and economic growth using multiple regression analysis. It was realized that trade liberalization has a positive relationship with economic growth of Sri Lanka.

**3.0 DATA AND METHODOLOGY**

**3.1 Data**

The data for the study were obtained from the Central Bank of Nigeria (2019) statistical bulletin and from the World Bank (2018) database on world development indicators. Data on real gross domestic product, external

debt stock, and exchange rate were obtained from the Central Bank of Nigeria while data on foreign direct investment was obtained from the World Bank database.

**3.2 Theoretical Framework**

With the intention of studying the dynamics of external sector variables, this study utilized the vector autoregressive (VAR) approach. This approach has been utilized by early researchers such as Aslam (2007) in Bangladesh; Ghosal (2012) in India; Shah1 and Fazal (2016) in Pakistan; and Nguyen (2011) in Malaysia and South Korea. This framework is appropriate because it has the advantage of avoiding misspecification and minimizes omitted-variables bias, while allowing for the testing and estimation of the causal relationship variables: real GDP, foreign direct investment, external debt stock, trade openness, and exchange rate, through a five-variable VAR model. (Berasaluce and Romero, 2016)

**3.3 Model Specification**

In examining the impact of external sector variables on real sector output in Nigeria, the model is specified as follows:

$$RGDP = f(FDIN, EXDS, TRPN, EXCR) \text{ ----- (4)}$$

Where:

RGDP = real gross domestic product Growth Rate

FDIN = foreign direct investment

TRPN = trade openness

EXCR = exchange rate.

Equation (4) is transformed into its estimable form to arrive at Equation (5).

$$RGDP_t = a_0 + a_1FDIN_t + a_2EXDS_t + a_3TRPN_t + a_4EXCR_t + u_t \text{ -----(5)}$$

Where  $a_0$  is the intercept;  $a_1$  to  $a_4$  are the parameters to be estimated; and  $u_t$  is the error term.

### 3.4 Estimation Procedure

The techniques of analysis utilized in this study are Granger causality test and the Structural VAR approach.

#### 3.4.1 Structural VAR

With  $x_t$  being considered as vector of variables RGDP (Real Gross Domestic Product – a proxy for economic growth), FDIN (foreign direct investment), EXDS (external debt stock), TRPN (trade openness), and EXCR (exchange rate),

$$x_{t-1} = (RGDP_{t-1}, FDIN_{t-1}, EXDS_{t-1}, TRPN_{t-1}, EXCR_{t-1}) \dots \dots \dots (7)$$

Our structural VAR model is specified as a system of equations as:

$$\begin{aligned}
 RGDP_t = & \beta_{10} - \beta_{11}FDIN_t - \beta_{12}EXDS_t - \beta_{13}TRPN_t - \beta_{14}EXCR_t + \sum_{i=0}^n \gamma_{11}EXCR_{t-i} \\
 & + \sum_{i=0}^n \gamma_{12}FDIN_{t-i} + \sum_{i=0}^n \gamma_{13}EXDS_{t-i} + \sum_{i=0}^n \gamma_{14}TRPN_{t-i} + \sum_{i=0}^n \gamma_{15}RGDP_{t-i} \\
 & + \mu_{1t} \quad (8)
 \end{aligned}$$

$$\begin{aligned}
 FDIN_t = & \beta_{20} - \beta_{21}RGDP_t - \beta_{22}EXDS_t - \beta_{23}TRPN_t - \beta_{24}EXCR_t + \sum_{i=0}^n \gamma_{21}EXCR_{t-1} \\
 & + \sum_{i=0}^n \gamma_{22}FDIN_{t-i} + \sum_{i=0}^n \gamma_{23}EXDS_{t-i} + \sum_{i=0}^n \gamma_{24}TRPN_{t-i} + \sum_{i=0}^n \gamma_{25}RGDP_{t-i} \\
 & + \mu_{2t} \quad (9)
 \end{aligned}$$

$$\begin{aligned}
 EXDS_t = & \beta_{30} - \beta_{31}TRPN_t - \beta_{32}EXCR_t - \beta_{33}RGDP_t - \beta_{34}FDIN_t + \sum_{i=0}^n \gamma_{31}EXCR_{t-i} \\
 & + \sum_{i=0}^n \gamma_{32}FDIN_{t-i} + \sum_{i=0}^n \gamma_{33}EXDS_{t-i} + \sum_{i=0}^n \gamma_{34}TRPN_{t-i} + \sum_{i=0}^n \gamma_{35}RGDP_{t-i} \\
 & + \mu_{3t} \quad (10)
 \end{aligned}$$

$$\begin{aligned}
 TRPN_t = & \beta_{40} - \beta_{41}EXCR_t - \beta_{42}EXDS_t - \beta_{43}FDIN_t - \beta_{44}RGDP_t + \sum_{i=0}^n \gamma_{41}EXCR_{t-i} \\
 TRP_t = & \beta_{40} - \beta_{41}EXCR_t - \beta_{42}EXDS_t - \beta_{43}FDIN_t - \beta_{44}RGDP_t + \sum_{i=0}^n \gamma_{41}EXCR_{t-i} \\
 & + \sum_{i=0}^n \gamma_{42}FDIN_{t-i} + \sum_{i=0}^n \gamma_{43}EXDS_{t-i} + \sum_{i=0}^n \gamma_{44}TRPN_{t-i} + \sum_{i=0}^n \gamma_{45}RGDP_{t-i} \\
 & + \mu_{4t} \quad (11)
 \end{aligned}$$

$$\begin{aligned}
 EXCR_t = & \beta_{50} - \beta_{51}RGDP_t - \beta_{52}FDIN_t - \beta_{53}EXDS_t - \beta_{54}TRPN_t + \sum_{i=0}^n \gamma_{51}EXCR_{t-i} \\
 & + \sum_{i=0}^n \gamma_{52}FDIN_{t-i} + \sum_{i=0}^n \gamma_{53}EXDS_{t-i} + \sum_{i=0}^n \gamma_{54}TRPN_{t-i} + \sum_{i=0}^n \gamma_{55}RGDP_{t-i} \\
 & + \mu_{5t} \quad (12)
 \end{aligned}$$

where  $\beta$  is the vector of the coefficient of variable;  $\beta_0$  is the vector of the intercept;  $\gamma$  is the vector coefficient of lag dependent and independent variables; and  $\mu$  is the error term.

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#### 3.4.2 Granger Causality Test

We specify the model for the Granger causality test to trace the nature of the relationship between external sector variables and the real sector output. The

model is specified as follows.

$$\begin{cases}
 y_t = \sum_{k=1}^k \beta_1 y_{t-1} + \sum_{k=1}^k \beta_2 x_{t-1} + \varepsilon_t \\
 x_t = \sum_{k=1}^k \beta_1 x_{t-1} + \sum_{k=1}^k \beta_2 y_{t-1} + \varepsilon_t
 \end{cases} \dots \dots (13)$$

Where  $k$  is the lag order;  $t$  is the time period; while  $\gamma_t$  and  $\chi_t$  are the variables to be tested for the existence of causality. The estimation of Equation (13) yields F-statistics which are used to carry out the test. The test yields three scenarios: unidirectional causality – where either  $\gamma_t$  causes  $\chi_t$  or  $\chi_t$  causes  $\gamma_t$  bidirectional



causality – where both  $\gamma_t$  and  $\chi_t$  causes each other; and no causality – where neither of the variables causes each other.

captures both the measures of central tendency (mean and median) along with the measures of dispersion or variability (standard deviation). The result is presented in Table 1.

#### 4.0 RESULTS AND DISCUSSION

##### 4.1 Descriptive Statistics

The descriptive statistics of the variables

	RGDP	FDIN	EXDS	TRPN	EXCR
Mean	34690.67	2.78E+09	1698.21	16.95	94.14
Median	23688.28	1.87E+09	633.14	11.25	101.70
Maximum	71387.83	8.84E+09	9022.42	56.53	306.93
Minimum	13779.26	1.89E+08	2.33	0.10	0.62
Standard Deviation	20237.78	2.55E+09	2195.77	16.68	92.82
Observations	39	39	39	39	39

Source: Output Extracted from EViews 10 Software Package

From Table 1, RGDP averaged 34,690.67 billion with a standard deviation of 20,237.78. The maximum RGDP over the study period was 71,387.83 while the minimum was 13,779.26 billion. This therefore gives the range to be 56,608.57 billion. Other variables can be interpreted in a similar manner given their statistics in the table.

##### 4.2 Correlations Analysis

The correlation analysis is carried out to examine how each of the variables correlates with the other and to ascertain the possibility of multicollinearity in our model. Table 2 presents the correlation matrix.

Table 2: Correlation Matrix

	RGDP	FDIN	EXDS	TRPN	EXCR
RGDP	1.000				
FDIN	0.752	1.000			
EXDS	0.567	0.128	1.000		
TRPN	0.941	0.827	0.574	1.000	
EXCR	0.926	0.616	0.797	0.895	1.000

Source: Output Extracted from EViews 10 Software Package

Given the correlation matrix in Table 2, we observe that all the variables correlate positively with the dependent variable. This implies that as FDIN, EXDS, TRPN and EXCR rises, RGDP also increases. Both trade openness and exchange rate exhibit the highest degree of correlation as captured by their correlation coefficient of 0.941 and 0.926 respectively. Meanwhile, the correlation between RGDP and FDIN is also high (0.752) while that of RGDP and EXDS is fair (0.567). Foreign direct investment and

trade openness exhibits high correlation (0.827) as well as trade openness and exchange rate (0.895). All the variables correlate highly, giving rise to the correlation coefficient of 1.

##### 4.3 Granger Causality Test

The nature of the causal relationship between external sector variables and economic growth is analysed using the Pairwise Granger causality test. This result is shown in Table 3.

Table 3: Pairwise Granger Causality Test result

Null Hypothesis:	F-Statistic	Probability	Nature of Relationship
FDIN does not Granger Cause RGDP	4.61664	0.0173**	Unidirectional causality
RGDP does not Granger Cause FDIN	1.96730	0.1564	
EXDS does not Granger Cause RGDP	0.50387	0.6089	Unidirectional causality
RGDP does not Granger Cause EXDS	5.93053	0.0064**	
TRPN does not Granger Cause RGDP	5.81113	0.0070**	Bidirectional causality
RGDP does not Granger Cause TRPN	2.80076	0.0757*	
EXCR does not Granger Cause RGDP	2.70644	0.0820*	Bidirectional causality
RGDP does not Granger Cause EXCR	3.37691	0.0467**	
EXDS does not Granger Cause FDIN	1.76423	0.1876	No causality
FDIN does not Granger Cause EXDS	0.77004	0.4714	
TRPN does not Granger Cause FDIN	3.40297	0.0457**	Unidirectional causality
FDIN does not Granger Cause TRPN	0.34576	0.7103	
EXCR does not Granger Cause FDIN	1.26991	0.2946	No causality
FDIN does not Granger Cause EXCR	0.07043	0.9321	
TRPN does not Granger Cause EXDS	2.44311	0.1029	Unidirectional causality
EXDS does not Granger Cause TRPN	5.12510	0.0117**	
EXCR does not Granger Cause EXDS	3.20396	0.0539*	Unidirectional causality
EXDS does not Granger Cause EXCR	0.49451	0.6145	
EXCR does not Granger Cause TRPN	10.7285	0.0003***	Bidirectional causality
TRPN does not Granger Cause EXCR	2.77012	0.0777*	

Note: \*, \*\* and \*\*\* denotes significance at 10%, 5% and 1% respectively.

The result of the Granger causality test reveals that a unidirectional causality flows from (i) foreign direct investment to real gross domestic product; (ii) RGDP to external debt stock; (iii) trade openness to foreign direct investment; (iv) trade openness to external debt stock; and (v) exchange rate and external debt stock. Meanwhile, a bidirectional causality flows between trade openness and RGDP; exchange rate and RGDP; and exchange rate and trade openness. However, no causality exists between (i) external debts stock and foreign direct investment, and (ii) between exchange rate and foreign direct

investment. For the fact that some of the external sector variables exhibits a bidirectional causality with RGDP, we therefore utilized the VAR model to track the response of the variables to shocks in other variables using the Akaike Information Criteria (AIC).

#### 4.4 Vector Autoregressive (VAR) Estimate

The VAR result is presented in Table 4 to showcase how each of the variables in the model is explained by the variation in other variables.



Table 4: Vector Autoregression Result

	RGDP	FDIN	EXDS	TRPN	EXCR
RGDP(-1)	0.9149 (0.0383) [23.8940]***	-89841.73 (44699.4) [-2.0099]	0.0179 (0.0276) [0.6486]	-0.0002 (0.0001) [-1.1556]	0.0017 (0.0007) [2.6509]*
FDIN(-1)	5.74E-07 (1.9E-07) [3.0984]**	0.4644 (0.2161) [2.1489]	-2.20E-07 (1.3E-07) [-1.6454]	7.91E-10 (6.6E-10) [1.1932]	-6.36E-11 (3.1E-09) [-0.0202]
EXDS(-1)	0.2736 (0.2668) [1.0256]	-483661.4 (311394) [-1.5532]	0.5907 (0.1925) [3.0685]**	-0.0002 (0.0001) [-0.2487]	0.0011 (0.0045) [0.2412]
TRPN(-1)	43.4936 (45.8291) [0.9490]	1.10E+08 (5.3E+07) [2.0556]	-39.4397 (33.0707) [-1.1926]	0.6310 (0.1642) [3.8439]**	-1.3234 (0.7789) [-1.6991]
EXCR(-1)	3.3293 (10.5897) [0.31439]	19064384 (1.2E+07) [1.54217]	16.9077 (7.6416) [2.2126]	0.0999 (0.0379) [2.6335]*	0.8800 (0.1799) [4.8896]**
C	1367.243 (684.895) [1.9963]	1.88E+09 (8.0E+08) [2.3526]	-14.6716 (494.226) [-0.0297]	2.0319 (2.4533) [0.8283]	-19.9161 (11.6405) [-1.7109]
R-squared	0.9982	0.8439	0.9203	0.9656	0.97496
Adj. R-squared	0.9279	0.8195	0.9078	0.9602	0.9710
F-statistic	3511.925	34.5999	73.8559	179.3740	249.1603

Note: \*, \*\* and \*\*\* denotes significance at 10%, 5% and 1% respectively; Standard errors are enclosed in normal brackets ( ) while the t-statistics are enclosed in square brackets [ ].

The VAR result, with respect to RGDP, indicate that RGDP is strongly endogenous in predicting itself since its lag value is statistically significant at 1% level. Based on the coefficient, the past realization of RGDP is associated with 0.9149% increase in RGDP ceteris paribus. Among all the external sector variables, only foreign direct investment is strongly exogenous in predicting RGDP as its t-statistic is significant at the 5% level. Thus, a unit percentage increase in FDIN is associated with a 5.74E-07% increase in RGDP. External debt stock, trade openness, and exchange rate are all weakly exogenous in predicting RGDP. We can therefore say that external sector shocks relating to foreign direct investment will have a significant impact on the growth of the Nigeria

economy. The adjusted R-squared indicates that the 92.79% of the total variations in the RGDP can be explained by variations in foreign direct investment, external debt stock, trade openness and exchange rate.

It is also observed that foreign direct investment (FDIN) is weakly endogenous in predicting itself since the coefficient of its past realization is not statistically significant. Also, all the variables are also weakly exogenous in predicting foreign direct investment. Meanwhile, 81.95% of the variations in FDIN is explained by the variations in real GDP, external debt stock, trade openness, and exchange rate.

External debt stock (EXDS) is strongly endogenous in predicting itself as its t-statistic (3.0685) is statistically significant at

the 5% level. Hence, the past realization in external debt stock is associated with 0.5907% increase in external debt stock. All other variables are weakly exogenous in predicting external debt stock. The R-squared indicates that the explanatory variables explain 90.78% of the variation in external debt stock.

Trade openness (TRPN) strongly predict itself as its t-statistic is statistically significant hence, TRPN is strongly endogenous. The implication is that the past realization in TRPN is associated with 0.6310% increase in trade openness. Also, exchange rate is statistically significant in predicting trade openness at the 5% level. Thus, a unit percentage increase in exchange rate will lead to a 0.0999% increase in trade openness. Real GDP, foreign direct investment, and external debt stock are all statistically insignificant in predicting trade openness hence, they are all weakly exogenous. From the R-squared, 96.02% of

the total variations in TRPN is accounted for by the variations in the explanatory variables.

Exchange rate is also strongly endogenous in predicting itself hence, the past realization of EXCR is associated with a 0.88% increase in exchange rate. Meanwhile, real GDP is also strongly exogenous in predicting exchange rate. Thus, a unit percentage increase in RGDP will lead to a 0.0017% increase in exchange rate. Other explanatory variables are weakly exogenous in predicting exchange rate. The R-squared indicates that 97.10% of the total variation in exchange rate is as a result of the variation in the explanatory variables.

**4.5 Variance Decomposition**

For the variance decomposition, we split the analysis into short run (Period 1 to Period 2) and long run (Period 3 to Period 5). The result over the five-year period is presented in Table 5.

Table 5: Variance Decomposition of the Variables

Variance Decomposition of RGDP						
Period	Standard Error	RGDP	FDIN	EXDS	TRPN	EXCR
1	928.81	100.00	0.00	0.00	0.00	0.00
2	1416.42	78.95	18.13	2.20	0.65	0.08
3	1899.10	56.46	35.13	4.24	1.51	2.66
4	2427.73	38.99	45.21	5.97	1.34	8.50
5	2998.41	27.34	48.89	7.32	0.88	15.57
Variance Decomposition of FDIN						
Period	Standard Error	RGDP	FDIN	EXDS	TRPN	EXCR
1	1.08E+09	0.33	99.67	0.00	0.00	0.00
2	1.38E+09	0.94	93.07	0.58	2.72	2.69
3	1.59E+09	1.83	87.90	0.59	3.26	6.41
4	1.75E+09	2.51	83.82	0.50	2.89	10.28
5	1.88E+09	2.91	80.36	0.44	2.53	13.76
Variance Decomposition of EXDS						
Period	Standard Error	RGDP	FDIN	EXDS	TRPN	EXCR
1	670.24	0.44	15.13	84.43	0.00	0.00
2	980.69	0.43	25.81	64.58	5.00	4.18
3	1252.59	0.35	31.66	50.32	12.58	5.10
4	1478.13	1.03	35.93	41.06	17.79	4.19
5	1653.39	2.38	39.17	35.09	20.01	3.35

Variance Decomposition of TRPN						
Period	Standard Error	RGDP	FDIN	EXDS	TRPN	EXCR
1	3.33	1.33	12.36	0.90	85.41	0.00
2	4.29	2.47	23.80	4.77	61.34	7.62
3	5.11	2.94	26.48	7.82	43.34	19.41
4	5.85	2.67	24.64	9.64	34.52	28.53
5	6.46	2.21	21.84	10.63	31.74	33.58
Variance Decomposition of EXCR						
Period	Standard Error	RGDP	FDIN	EXDS	TRPN	EXCR
1	15.79	2.04	0.26	27.70	13.52	56.48
2	22.39	1.02	0.41	25.20	23.53	49.84
3	26.76	1.40	1.40	23.36	30.25	43.59
4	29.65	2.88	2.57	22.13	33.92	38.51

Source: Output Extracted from EViews 10 Software Package.

For RGDP, the short run period is characterized by the forecasted error variance being explained by RGDP itself amounting to 78.95 percent in the second period. This further prove that RGDP is strongly endogenous in predicting itself in the short run. But in the long run, we observed that foreign direct investment also played a crucial role in explaining the forecasted error variance in RGDP. FDIN explained up to 48.89 percent along with exchange rate explaining about 15.57 per cent of the forecasted error variance in RGDP. In the long run, RGDP seems to be weakly endogenous with just 27.34 per cent of the forecasted error variance being explained by itself; while foreign direct investment is strongly exogenous in predicting RGDP. Meanwhile, external debt stock and trade openness remains weakly exogenous in explaining RGDP both in the short run and in the long run.

With respect to foreign direct investment (FDIN), the variable remains strongly endogenous in predicting itself both in the short term and in the long term, explaining up to 80.36 per cent of its forecasted error variance in the long run. Though exchange

rate showed some degree of influence in the long run by explaining up to 13.76 percent of the forecasted error variance in FDIN, other variables remain weakly exogenous in predicting FDIN.

External debt stock (EXDS) explains about 84.43 percent of its forecasted error variance in the short run, implying that the variable was strongly endogenous, but such influence diminishes in the long term since the variable was only able to predict about 35.09 per cent of its forecasted error variance. Variables like foreign direct investment and trade openness exhibit strong exogeneity in predicting EXDS as they jointly explain about 59.18 of the forecasted error variances, with foreign direct investment explaining 39.17 percent while trade openness explained 20.01 percent. Foreign direct investment and trade openness therefore becomes strongly exogenous in predicting EXDS in the long run but were weakly exogenous along with exchange rate and RGDP in the short run.

Trade openness (TRPN) exhibits strong endogeneity in the short term by explaining about 85.41 per cent of its forecasted error variance in the short run but its effect diminished in the long run as it was only able

to explain only 35.29 percent of its forecasted error variance. Foreign direct investment, external debt stock, and exchange rate gained long term momentum in predicting TRPN. FDIN explained about 21.84 per cent of the forecasted error variance in TRPN; external debt stock explained about 10.63 per cent; while exchange rate explained 33.58 percent. Over all, the three variables jointly explain 66.05 per cent of the forecasted error variance in trade openness hence, they were strongly exogenous in the long term. However, RGDP exhibits weak exogeneity in predicting trade openness both in the short term and in the long term.

Finally, exchange rate (EXCR) maintained weak endogeneity both in the short run and in the long run explaining up to 49.84 percent of its forecasted error variance in the short run (period 2) and just 34.89 percent in the long run. It is observed that both external debt stock and trade openness have been maintaining both short run and long run influence on EXCR. In the short run, the two variables jointly explain up to 78.73 percent of the forecasted error variance in EXCR but explain up to 56.68 percent in the long term. Meanwhile, RGDP and FDIN maintain both short term and long term weak exogeneity.

**Response to closely One S.D. (df adjusted) innovations 2 S.E.**

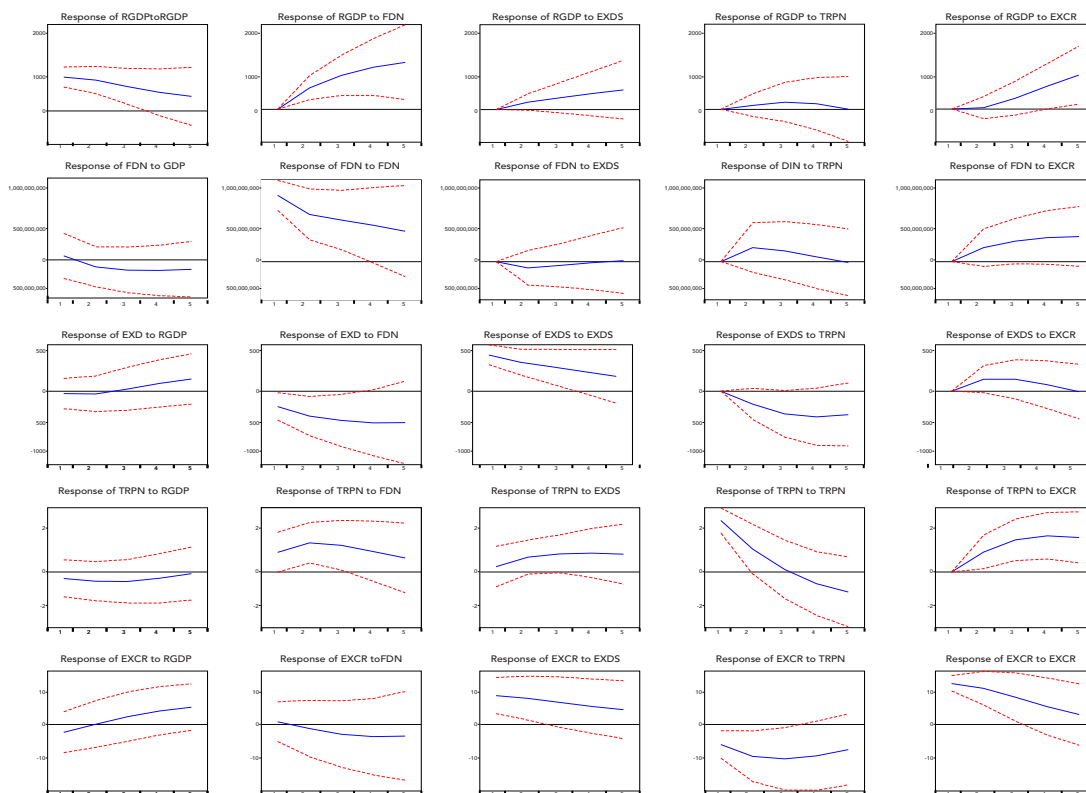


Figure 1: Impulse Response Functions

The impulse response functions indicate that a one standard deviation shock in foreign direct investment will cause RGDP to rise continuously in the short term but such effect diminishes in the long term as RGDP starts to decline steadily. Similarly, a one standard deviation shock in external debt stock will

lead to steady decline in RGDP over time. Meanwhile, a one standard deviation shock in trade openness will lead to a steady decline in RGDP in the short run but such shocks will be speedy in the long term. However, a one standard deviation shock in exchange rate will cause RGDP to decline very sharply in the

short term but starts rising in the long term. The findings of this study is similar to the works of Umme and Manni (2012) and Herath (2010), in that it captures the effect of trade liberalization on economic growth. Further, it is similar to the works of Khan (2007) and Ray (2012) as it examines the influence of foreign direct investment on economic growth. The key point of difference is that this study does not only centres on imports and exports as they affect economic growth. Rather, the study also considers external debt as a key external variable that can affect economic growth.

## **5.0 CONCLUSION AND POLICY RECOMMENDATIONS**

### **5.1 Conclusion**

A modern economy is characterized with interaction with other economies of the world hence, it is likely that external sector shocks will have an impact on the local economy. In this paper, we examined the impact of external sector shocks on the real sector of the Nigerian economy. Key external sector variables of interest were foreign direct investment, external debt stock, trade openness, and exchange rate. The study utilized the correlation analysis, Granger causality, vector autoregressive (VAR) model, variance decomposition, and the impulse response function.

From the correlation analysis, all our selected external sector variables were positively correlated with economic growth, indicating that an increase in any of them will prompt economic growth to be on the rising. Out of

the four external sector variables of interest, it is observed from the Granger causality test that foreign direct investment, trade openness, and exchange rate causes economic growth in Nigeria. Our result from VAR estimate revealed that only foreign direct investment has a significant impact on the growth of the Nigerian economy. Meanwhile, the variance decomposition indicated that there exists some degree of long-term effect of exchange rate on real GDP. Further, the impulse response function indicated that a one standard deviation shock in foreign direct investment will cause a short-term increase in real GDP but the effect will diminish in the long term where RGDP will tend to decline. Moreover, a one standard deviation shock in exchange rate will cause a short-term decline in RGDP but will cause RGDP to rise in the long term.

### **5.2 Policy Recommendations**

The fact that foreign direct investment showcases a significant positive impact on the growth of the Nigerian economy calls for a conducive environment to attract such investment to the domestic economy. For this to have a long-term impact on the Nigerian economy, foreign direct investment should be intense in the tradeable sector, especially in export-based activities such as manufacturing and infrastructural development so as to facilitate positive trade effects. Nigeria's exports should encompass more of manufactured goods rather than primary goods. In this light, industrialization should be encouraged and stimulated.

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