CBN Journal of Applied Statistics (JAS)

Volume 5 | Number 1 Article 7

6-2014

# Foreign Trade-Economic Growth Nexus: Evidence from Nigeria

Nosakhare L. Arodoye
*University of Benin, Benin City*

Milton A. Iyoha
*University of Benin, Benin City...*

# Foreign Trade-Economic Growth Nexus: Evidence from Nigeria

**Nosakhare L. Arodoye and Milton A. Iyoha**[1]

*This study examines the nexus between foreign trade and economic growth in Nigeria using quarterly time-series data for 1981Q1 through 2010Q4. In order to fully account for feedbacks, a vector autoregressive model is utilized. The results show that there is a stable, long- run relationship between foreign trade and economic growth. The variance decomposition results show that the predominant sources of Nigeria economic growth variation are due largely to "own shocks" and foreign trade innovations. The study therefore recommends adoption of trade expansion policies as a means of accelerating economic growth in Nigeria.*

**Keywords**: Foreign Trade, Economic Growth, VAR and Nigeria.

**JEL Classification:** F14, O41

## 1.0 Introduction

Economists have long been interested in identifying factors which cause different countries to grow at different rates over time. One of such factors is foreign trade. In the 19th century, Alfred Marshall declared that "The causes which determine the economic progress of nations belong to the study of international trade", Marshall (1959). D. H. Robertson (1938) famously described exports as an "engine" of growth while Minford *et al.* (1995) hailed foreign trade as an "elixir" of growth. This subject has continued to elicit responses from trade and growth theorists. For some recent studies on this issue, see Obiora (2009), Omoke and Ugwuanyi (2010), Iyoha and Adamu (2011), Obadan and Okojie (2010), and Safdari and Delqua-Niri (2012).

Foreign or international trade concerns the study of the causes and consequences of the international exchange of goods and services, and of the international movement of factors of production. Although Alfred Marshall had no doubts about the beneficent effects of foreign trade, the foreign trade-economic growth nexus has remained controversial. Economists have found that foreign trade is often favorable to growth and may well be a necessary condition for rapid growth for small countries.

[1] Department of Economics and Statistics University of Benin, Benin City, Nigeria. Corresponding author's email: iyohama@yahoo.com or iyohama@gmail.com

However, it is not a sufficient condition for economic growth and development. For sustained economic growth and development to occur, the gains from trade must be complemented by autonomous productivity increases in the particular economy, savings and investment must rise, and economic policy must be favorable to private initiative, capital inflows and the efficient use of resources. Because of the heterogeneity of country size, natural resources, differences in the external environment and variations in domestic policy, it has been difficult to obtain a simple and unambiguous empirical relationship between foreign trade and economic growth/development.

In recent years, researchers have started to investigate the trade and growth nexus by using the powerful technique of vector autoregressions pioneered by Sims (1986). The VAR technique is attractive because it facilitates the study of the interrelationship among non-stationary time-series variables, treating all as endogenous. VARs have also been shown to be powerful for time-series forecasting, for the analysis of short- and long-run dynamics, inpulse response functions, and forecast error variance decomposition.

This study will therefore adopt this versatile tool to explicate the complex link between foreign trade and economic growth for Nigeria. In this study, foreign trade is captured by using 3 proxies, namely, exports, foreign direct investment and exchange rate. This is an improvement on many previous studies which simply used exports to proxy foreign trade. It is expected that this multivariate approach will produce richer and more robust results which would be of greater benefit to macroeconomic policymakers in Nigeria, which is an open and oil-dependent economy.

## 2.0 Stylized Facts about Foreign Trade and Economic Growth in Nigeria

Nigeria's economic performance between Independence in 1960 and 2000 was decidedly unimpressive, with the growth rate of real Gross Domestic Product (GDP) averaging less than 4 percent per annum. It is estimated that Nigeria received over $228 billion from oil exports between 1981 and 1999 (Udeh, 2000), and yet the number of Nigerians living in abject poverty—subsisting on less than $1 a day—more than doubled between 1970 and 2000, and the proportion of the population living in poverty rose from 36 percent to 70 percent over the same period, Iyoha (2010, p. 165).

Although the rate of economic growth has improved since 2000, averaging about 7 percent per annum between 2000 and 2010, Nigeria may still be considered as a striking example of what Sachs and Warner (2001) have labeled the "natural resource curse": the systematic tendency for narrowly specialized primary commodity exporters to grow more slowly than countries with more diversified exports.

In Nigeria, proceeds from exports were not effectively channeled to economic growth as a result of corruption, rent seeking and a pervasive lack of accountability, particularly under the military dictatorships between 1966 and 1999. Above all, serious mistakes were made in macroeconomic management, including a Dutch disease–generating syndrome in which policy makers erroneously treated favorable but transitory oil shocks as permanent, Iyoha (2010, p. 166). This contributed to an important feature noticeable in the macroeconomic landscape before the return to civilian rule in 1999, namely, the "boom and bust" cycles generated by the volatility of world oil export prices. A typical example was the oil boom in the 1970s caused by the quadrupling of oil prices by the OPEC countries in November 1973 and the deep recession consequent on the collapse of oil prices in the early 1980s.

However, since 2003, steps have been taken to "de-couple" aggregate government spending from oil price volatility (and oil export revenue) by the establishment of the "Excess Crude Oil" Account and more recently, the "Sovereign Wealth Fund". These will now facilitate the proper conduct of counter-cyclical macroeconomic policy and permit exports to contribute more effectively to rapid economic growth in Nigeria.

## 3.0 Foreign Trade and Economic Growth: Theory and Empirics

As originally proposed in the orthodox theories of trade, the theory of comparative advantage is static; hence it can be questioned whether trade has any relevance to the dynamic issue of economic development. A consensus has subsequently emerged that the classical and neoclassical theories could be used to address the issue of economic development, utilizing the technique of comparative statics. Haberler (1988) and others have stressed that the traditional trade theories confer both static gains (direct benefits) and dynamic gains (also called indirect benefits) on trading countries.

In this context, static gains refer to the increase in income which arises from greater efficiency in allocating resources along a fixed and given production

possibilities frontier while the "dynamic benefits" of trade refer to the cumulative increases in income that arise from outward shifts of the production possibilities frontier brought about by a trade-induced movement along the original frontier. These dynamic benefits have been dubbed the "growth effects" of trade.

According to Harbeler (1988), there are four vital points regarding the "dynamic" benefits of trade on participating less developed countries (LDCs):

> First, trade provides material means (capital goods, machinery and raw and semi-finished materials) indispensable for economic development. Secondly, and even more important, trade is the means and vehicle for the dissemination of technological knowledge, the transmission of ideas, for the importation of know-how, skills, managerial talents and entrepreneurship. Thirdly, trade is also the vehicle for the international movement of capital especially from the developed to the underdeveloped countries. Fourthly, free international trade is the best anti-monopoly policy and the best guarantee for the maintenance of a healthy degree of free competition (Haberler, 1988, p. 7).

Ideally, international trade leads to an increase in income, in the level of investment and in the state of technical knowledge in the country. The increase in investment and improvements in innovations and technological progress then lead to increased productivity and competitiveness, and trigger a further increase in trade and in income. This positive feedback continues and brings about a "virtuous circle" of increased trade, rising income, and economic development. Nevertheless, experience has shown that successful export performance requires a broadly supportive policy environment including macroeconomic stability, public investment in infrastructure and human capital, and policies that provide adequate incentives for investment in the export sector. Above all, these policies should be consistent, transparent and steadily maintained over a long period of time.

Finch and Michalopoulos have recently provided a valuable insight into the nature of the link between external trade and development. According to them, it is not solely, or perhaps even mainly, a demand-driven link, whereby export growth stimulates incomes and output in the rest of the economy.

Rather, effective participation in international trade permits economies of scale not open to small protected economies. By introducing greater market competition, trade encourages a more efficient utilization of resources and greater growth in productivity in the whole economy. Moreover, open trading policies permit quicker adaptation to new technologies and greater flexibility in responding to international economic developments. Finch and Michalopoulos (1988, p.132).

### 3.1 Foreign Trade and Economic Growth: The Empirical Evidence

Using exports as a proxy for trade and growth in income per capita or GNP as a measure of development, many researchers over the years have attempted to test the hypothesis of a significant positive relationship between trade and growth. Many of the studies have been bivariate, comparing exports and growth but a few others have been multivariate. Many of the studies have adopted a cross-country approach while some others have used time series data to study the relationship for selected countries. Most of the empirical results reported have supported the proposition that exports do indeed stimulate growth and development.

Among the important cross-country studies, we may mention those undertaken by Massell *et al.* (1972), Voivodas (1973), Michaely (1977), Balassa (1978), Tyler (1981), Salvatore (1983), and Ram (1985). Using a sample of 11 Latin American countries, Massell *et al.* (1972) found that export earnings had a greater impact on output growth than other sources of foreign exchange earnings such as public external debt and foreign direct investment. The Voivodas (1973) study concerned 22 LDCs while Michaely (1977) used correlation analysis to study 41 countries. Balassa (1978) on his part used the technique of rank correlation and pooled data for 11 countries covering 1960-73 to study this question.

All these researchers found a strong relationship between exports and economic growth. Using data for 55 countries, Tyler (1981) also found strong evidence in favor of the proposition that exports act as a stimulus to growth. Since most of these studies used bivariate statistical and single equation regression techniques, they were naturally subject to the criticism of not allowing for feedback. Salvatore (1983) took care of this by specifying a simultaneous equations model of trade and development. He estimated it using a sample of 52 countries and also undertook dynamic simulations. His simulations revealed that exports in fact stimulate growth. He however

interpreted the results as suggesting that trade is a handmaiden of development rather than an "engine" of growth. Finally, Ram (1985) investigated the relationship between exports and growth using a sample of 73 LDCs and data for 1960-1977. He found the coefficient of exports to be statistically significant -- thus, once more, confirming the findings of the previous researchers that trade stimulates economic growth.

Among the more important time series studies, the following studies may be mentioned: Emery (1967), Severn (1968), Krueger (1978), Fajana (1979), and Ekpo and Egwaikhide (1994). Emery (1967) and Severn (1968) used bivariate regression analysis to investigate the export-growth nexus and found evidence in favor of exports acting as a stimulus for economic growth. Krueger (1978) used a simple log-linear specification to analyze the impact of exports on growth for each of 10 countries using data for 1954-71. She found GNP to depend more on export earnings than total foreign exchange availability. Fajana's (1979) study and that of Ekpo and Egwaikhide (1994) used Nigerian data. Like the other studies, they found exports to be a key determinant of economic growth. Similarly, Iyoha's (1998) study on Nigeria and Fosu's (1990) study on African countries also found evidence for a systematic relation between foreign trade and economic growth.

Hassan (2007) used Vector Auto-Regression (VAR), Impulse Response Function (IFR) and Granger-causality test to determine the long-term relationship between exports and domestic economic growth in Saudi Arabia from 1970 to 2005, and found that the export sector had a significant effect on economic growth and a positive influence on other economic activities in the long run.

Obiora (2009) used VAR models to examine the magnitude and sources of growth spillovers in Nigeria from key trading partners, as well as from the country's exchange rate. The results debunked the "decoupling theory", and confirmed the existence of significant cross-country spillovers from the US and other major trading partners to Nigeria.

Omoke and Ugwuanyi (2010) used Granger causality and cointegration tests to investigate the relationship between export, domestic demand and economic growth in Nigeria. The results from Trace and Maximum Eigen Value test conducted showed that the variables do not have long-run relationship, but the Pair-wise Granger Causality test showed that economic

growth Granger causes both export and domestic demand, while a bilateral causality exists between export and domestic demand.

Mustafa (2011) analyzed the relationship between foreign trade and economic growth in Turkey using VAR and VECM, and employed quarterly data of GDP, export and import for 1987 through 2007. He found that, in the short run, GDP growth did not significantly depend on the export growth.

Rahmaddi and Ichihashi (2011) investigated the relationship between exports and economic growth in Indonesia during the period 1971-2008, using a VAR model. Based on the analysis conducted in a VECM framework, the authors found that exports and economic growth exhibit bi-directional causal structure, and concluded that both exports and economic growth are significant to the economy of Indonesia.

Sarbapriya Ray (2011) examined the relationship between foreign trade and economic growth in India, using annual data over the period 1972 – 2011. The cointegration and Granger causality tests confirmed that economic growth and foreign trade are cointegrated, implying the existence of a long-run equilibrium relationship between the two, and the presence of bi-directional causality which runs from economic growth to foreign trade and vice versa.

Safdari, Mehrizi and Dehqan-Niri (2012) investigated the long-run relationship between foreign trade and economic growth in Iran between 1975 and 2008 using a Vector Autoregressive model (VAR) and data for real gross domestic product, total population, trade volume, gross capital formation and tariffs. Their results showed that total population, trade volume, gross capital formation and tariffs have positive effect on economic growth.

Our study builds on the more recent time series study of trade and growth. Basically, we use (growth in) real GDP as a proxy for economic growth while we utilize exports, foreign direct investment and the nominal exchange rate as proxies for foreign trade. In order to properly analyze the interrelationships among these non-stationary time-series variable, we elected to use the new, powerful and versatile tool of vector autoregressions.

## 4.0 Methodology

Like many studies which have recently investigated the relationship between foreign trade and economic growth, this study utilizes the technique of Vector Autoregressions (VARs). Use of the VAR technique has become attractive

since the Nobel Laureate, Christopher Sims (1986), demonstrated that Vector Autoregression models are particularly powerful tools for investigating the inter-relationships among non-stationary time-series variables and for obtaining reliable forecasts. VARs have indeed made it possible for researchers to address both the relative importance and the dynamic effects of various shocks on macroeconomic variables.

This study will carry out Unit roots tests of all variables and Pair-wise Granger Causality tests. Forecast Variance Decomposition and Impulse Response Functions are applied to examine dynamic interrelationships between the variables in the VAR system. This study posits a 4-variable VAR model in which real gross domestic product, exports, foreign direct investment and the exchange rate are simultaneously interrelated. In order to obtain more meaningful insights, logarithmic transformations of the variables were utilized. Thus, the VAR model specified is:

$$V_t = \alpha + \sum_{i=1}^{k} A_i V_{t-1} + \mu_t$$

$V_t$= (R, XPORT, FDI, EXRT), the vector of real gross domestic product, exports, foreign direct investment and exchange rate
$\alpha$ = intercepts of autonomous variables
$A_i$ = matrix of coefficients of all the variables in the model.
$V_{t-1}$ = vector of the lagged variables.
$\mu_t$ = vector of the stochastic error terms.

### 4.1 Data Issues

This study employs quarterly time-series data on four key macroeconomic variables, namely, real gross domestic product (RGDP), exports (XPORT), foreign direct investment (FDI) and exchange rate (EXRT). Three of the variables, exports, foreign direct investment and exchange rate, are used as proxies for foreign trade. Since Nigeria is a small open economy, the exchange rate is expected to play an important role in the macroeconomy. As a developing country keen to grow rapidly, Nigeria is bound to need and rely on foreign direct investment. Finally, as an OPEC country highly dependent on oil exports, use of total exports (which are strongly dominated by oil exports) is warranted. The data set used was sourced from various issues of the Statistical Bulletin of the Central Bank of Nigeria.

## 5.0 Econometric Results

Below we present the descriptive statistics, unit root tests, Johansen co-integration test, Pairwise Granger Causality Tests, Forecast Error Variance Decomposition and the Impulse Response Functions. The unit root test provides information on the stationarity properties of the variables and it was conducted using the Augmented Dickey- Fuller (ADF) test. The co-integration test provides information on the existence of a long run relationship between the dependent and explanatory variables and was performed using the Johansen methodology. The Granger causality test examines the causal relationships between the logarithm of real gross domestic product, log of exports, log of foreign direct investment and log of exchange rate in Nigeria. To analyze the short-run dynamic properties of the variables, we employ the forecast error variance decomposition and generalized impulse response analysis.

### 5.1 Summary of Descriptive Statistics Results

Table 1: Summary of Descriptive Statistics

| | LRGDP | LXPORT | LFDI | LEXRT |
|---|---|---|---|---|
| Mean | 11.30 | 11.44 | 8.80 | 2.90 |
| Median | 11.19 | 12.16 | 9.91 | 3.09 |
| Maximum | 12.34 | 14.91 | 12.18 | 5.02 |
| Minimum | 10.70 | 6.98 | 4.15 | -0.60 |
| Std. Dev. | 0.44 | 2.48 | 2.69 | 1.90 |
| Skewness | 0.64 | -0.30 | -0.50 | -0.54 |
| Kurtosis | 2.28 | 1.66 | 1.87 | 1.97 |
| Jarque-Bera | 10.67 | 10.88 | 11.29 | 11.15 |
| Probability | 0.00 | 0.00 | 0.00 | 0.00 |
| Sum | 1356.31 | 1373.39 | 1046.92 | 348.25 |
| Sum Sq. De | 23.00 | 733.13 | 851.09 | 428.37 |
| Observation | 120 | 120 | 119 | 120 |

**Source:** Authors' computation using EViews 7.0

Summary descriptive statistics of the log of real GDP, log of exports, log of foreign direct investment, and log of exchange rate are reported in Table 1. Normality test uses the null hypothesis of normality against the alternative hypothesis of non-normality. If the probability value is less than the Jacque Bera chi-square at the 5% level of significance, the null hypothesis of the regression is not rejected. Given the results in Table, it is apparent that the hypothesis that all the variables are normally distributed cannot be rejected

since all the probabilities are less than the Jarque Bera chi-square distribution. They pass the significance test at the 1 percent level.

Table 2: ADF Unit Root Test Results (1st differences)

| *Variables* | *ADF Test Statistics* | *95% Critical Value of ADF* | *Order of integration* | *Remarks* |
|---|---|---|---|---|
| dLGDP | -3.963 | -2.886 | I(1) | Difference Stationary |
| dLFDI | -6.012 | -2.886 | I(1) | Difference Stationary |
| dLEXRT | -9.1147 | -2.886 | I(1) | Difference Stationary |
| dLXPORT | -11.317 | -2.886 | I(1) | Difference Stationary |

Source: Authors' Computation Using E-Views 7.0

Table 3: Johansen Cointegration (Or Johansen VAR Cointegration Approach)

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.338983 | 100.8058 | 47.85613 | 0.0000 |
| At most 1 * | 0.206515 | 56.51043 | 29.79707 | 0.0000 |
| At most 2 * | 0.170885 | 31.75915 | 15.49471 | 0.0001 |
| At most 3 * | 0.103644 | 11.70768 | 3.841466 | 0.0006 |

Trace test indicates 4 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 * | 0.338983 | 44.29532 | 27.58434 | 0.0002 |
| At most 1 * | 0.206515 | 24.75128 | 21.13162 | 0.0148 |
| At most 2 * | 0.170885 | 20.05147 | 14.26460 | 0.0055 |
| At most 3 * | 0.103644 | 11.70768 | 3.841466 | 0.0006 |

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors' calculations using E-Views 7.0

We utilize the mean based coefficient of skewness and kurtosis to check the normality of all the variables used. Skewness measures the direction and degree of asymmetry. The Skewness coefficient indicates normal curves for all the variables with the values ranging between -3 and +3. The positive

Kurtosis indicates too few cases at the tail of the distribution. These results suggest that the use of a VAR model is justified since the hypothesis that the error vector is Gaussian white noise cannot be rejected.

### 5.2 Unit Root Test Results

Unit root testing of the variables indicates that all the variables are I(1) series. Given the results reported in Table 2**,** we are justified to conduct co-integration and Granger causality tests between LGDP, LXPORT, LFDI, and LEXRT.

### 5.3 Johansen Co-integration Test Results

The results of the multivariate co-integration test based on Johansen's co-integration technique reveal that both the trace statistic and maximum Eigen-value statistic confirm the existence of co-integrating equations among the variables. Since the variables are co-integrated, the existence of a stable long-run relationship between the log of real GDP, log of exports, log of exchange rate, and log of foreign direct investment is confirmed. See Table 3.

Table 4: Pairwise Granger Causality Tests (Lags: 4)

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| LXPORT does not Granger Cause LRGDP | 116 | 0.89699 | 0.4685 |
| LRGDP does not Granger Cause LXPORT | | 0.62379 | 0.6465 |
| LFDI does not Granger Cause LRGDP | 111 | 2.03388 | 0.0952 |
| LRGDP does not Granger Cause LFDI | | 1.39573 | 0.2408 |
| LEXRT does not Granger Cause LRGDP | 116 | 2.86161 | 0.0268 |
| LRGDP does not Granger Cause LEXRT | | 0.27057 | 0.8964 |
| LFDI does not Granger Cause LXPORT | 111 | 5.89386 | 0.0003 |
| LXPORT does not Granger Cause LFDI | | 3.00155 | 0.0219 |
| LEXRT does not Granger Cause LXPORT | 116 | 4.92650 | 0.0011 |
| LXPORT does not Granger Cause LEXRT | | 1.91074 | 0.1139 |
| LEXRT does not Granger Cause LFDI | 111 | 2.32644 | 0.0613 |
| LFDI does not Granger Cause LEXRT | | 0.92531 | 0.4524 |

*Source: Authors' calculations using E-Views 7.0*

### 5.4 Results of Pair-wise Granger Causality Tests

Table 4 presents the results of the Granger Causality tests. An examination of the results shows that bi-directional causality exists only between LFDI and LXPORT. However, there is strong uni-directional causality from LEXRT to

LRDGP and from LFDI to LRGDP. Similarly, there is strong uni-directional causality from LEXRT to LXPORT and from LEXRT to LFDI.

Table 5: Vector Autoregression Estimates
Sample (adjusted): 1981Q3 2010Q4
Standard errors in ( ) & t-statistics in [ ]

| | LRGDP | LXPORT | LEXRT | LFDI |
|---|---|---|---|---|
| LRGDP(-1) | 0.924776 | 0.210769 | -0.052859 | -0.360270 |
| | (0.09926) | (0.28477) | (0.19329) | (0.33474) |
| | [ 9.31678] | [ 0.74013] | [-0.27347] | [-1.07628] |
| LRGDP(-2) | 0.011156 | -0.106554 | -0.000921 | 0.397713 |
| | (0.10206) | (0.29279) | (0.19874) | (0.34417) |
| | [ 0.10932] | [-0.36392] | [-0.00464] | [ 1.15558] |
| LXPORT(-1) | -0.019100 | 0.650523 | -0.085220 | -0.065709 |
| | (0.03450) | (0.09899) | (0.06719) | (0.11636) |
| | [-0.55358] | [ 6.57181] | [-1.26839] | [-0.56473] |
| LXPORT(-2) | 0.002992 | 0.034005 | 0.052224 | 0.069677 |
| | (0.03167) | (0.09086) | (0.06167) | (0.10680) |
| | [ 0.09449] | [ 0.37425] | [ 0.84681] | [ 0.65240] |
| LEXRT(-1) | -0.029353 | 0.365781 | 1.099966 | 0.287486 |
| | (0.05158) | (0.14798) | (0.10044) | (0.17395) |
| | [-0.56908] | [ 2.47176] | [ 10.9510] | [ 1.65271] |
| LEXRT(-2) | 0.039700 | -0.249726 | -0.101233 | -0.103369 |
| | (0.05432) | (0.15583) | (0.10577) | (0.18318) |
| | [ 0.73088] | [-1.60250] | [-0.95707] | [-0.56431] |
| LFDI(-1) | 0.000175 | 0.118582 | 0.081413 | 0.889458 |
| | (0.02794) | (0.08017) | (0.05441) | (0.09423) |
| | [ 0.00625] | [ 1.47921] | [ 1.49622] | [ 9.43908] |
| LFDI(-2) | 0.019219 | 0.073164 | -0.052710 | -0.037022 |
| | (0.02853) | (0.08186) | (0.05556) | (0.09622) |
| | [ 0.67360] | [ 0.89380] | [-0.94869] | [-0.38476] |
| C | 0.723767 | 0.467948 | 0.773765 | 0.361519 |
| | (0.44824) | (1.28599) | (0.87287) | (1.51162) |
| | [ 1.61469] | [ 0.36388] | [ 0.88646] | [ 0.23916] |
| R-squared | 0.965159 | 0.990744 | 0.992648 | 0.988923 |
| Adj. R-squared | 0.962530 | 0.990046 | 0.992093 | 0.988087 |
| Sum sq. resids | 0.770135 | 6.338995 | 2.920414 | 8.758592 |
| S.E. equation | 0.085237 | 0.244544 | 0.165985 | 0.287451 |
| F-statistic | 367.0502 | 1418.268 | 1788.925 | 1182.895 |
| Log likelihood | 124.6741 | 3.469255 | 48.03146 | -15.12136 |
| Akaike AIC | -2.011723 | 0.096187 | -0.678808 | 0.419502 |
| Schwarz SC | -1.796902 | 0.311008 | -0.463987 | 0.634323 |
| Mean dependent | 11.32051 | 11.57491 | 2.999592 | 8.928240 |
| S.D. dependent | 0.440338 | 2.451028 | 1.866639 | 2.633594 |
| Determinant resid covariance (dof adj.) | | 8.94E-07 | | |

Source: Authors' calculations using E-Views 7.0

It follows therefore that the nominal exchange rate is the most strategic variable in the study as it Granger causes the other 3 variables, viz, real GDP, foreign direct investment and exports. Conclusively, it can be stated that both the exchange rate and foreign direct investment have direct impact on real GDP and thus, economic growth. The exchange rate and FDI also have direct

impact on exports. However, exports affect real GDP through foreign direct investment. All in all, using our proxies for foreign trade, it can be concluded that foreign trade leads to economic growth in Nigeria.

## 5.5 Results of Forecast Error Variance Decompositions

To further examine the short run dynamic properties of the log of GDP, log of exports, log of foreign direct investment and log of exchange rate in Nigeria, we examined the forecast error variance decomposition. The forecast error variance decomposition for the four variables was obtained and is reported in Table 6. By definition, the variance decomposition shows the proportion of forecast error variance for each variable that is attributable to its own innovation and to innovations in the other endogenous variables.

An examination of the variance decomposition of LGDP in Table **6(i)** shows that the lion's share of the variation experienced by LGDP is attributed to its own shock. The contribution of "own shock" is 100% in the first period and falls to 95.76 at the end of the 10-period horizon. The contribution of the other 3 variables is quite marginal. The highest is by LFDI, which contributes 2.23 % in the tenth period. A similar pattern is displayed by LEXRT where own shocks also account for a disproportionate share of the total variation. The contribution of "own shock" is 98.5 % in the first period and falls to 96.4 % in the tenth period. The contribution of the other 3 variables is marginal with RGDP accounting for 2 % of the variation.

Table 6: Variance Decomposition of LRGDP, LXPORT, LEXRT, LFDI

FEVD (i) - Variance Decomposition of LRGDP

| Period | S.E. | LRGDP | LXPORT | LEXRT | LFDI |
|---|---|---|---|---|---|
| 1 | 0.085237 | 100.0000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.115507 | 99.62877 | 0.196456 | 0.174758 | 1.83E-05 |
| 3 | 0.136432 | 99.37317 | 0.331059 | 0.200705 | 0.095065 |
| 4 | 0.152160 | 99.05023 | 0.467231 | 0.168976 | 0.313561 |
| 5 | 0.164596 | 98.64526 | 0.591296 | 0.149257 | 0.614185 |
| 6 | 0.174738 | 98.17771 | 0.697023 | 0.174816 | 0.950452 |
| 7 | 0.183193 | 97.65713 | 0.783736 | 0.265929 | 1.293201 |
| 8 | 0.190358 | 97.08383 | 0.853290 | 0.436430 | 1.626448 |
| 9 | 0.196515 | 96.45350 | 0.908238 | 0.696131 | 1.942127 |
| 10 | 0.201872 | 95.76053 | 0.951075 | 1.051880 | 2.236518 |

FEVD (ii) – Variance Decomposition of LXPORT

| Period | S.E. | LRGDP | LXPORT | LEXRT | LFDI |
|---|---|---|---|---|---|
| 1 | 0.244544 | 5.103811 | 94.89619 | 0.000000 | 0.000000 |
| 2 | 0.309369 | 6.414189 | 87.94032 | 4.471720 | 1.173773 |
| 3 | 0.351574 | 6.175041 | 78.82613 | 8.818078 | 6.180749 |
| 4 | 0.388428 | 5.458117 | 69.09512 | 13.32052 | 12.12625 |
| 5 | 0.423635 | 4.730948 | 60.13330 | 17.95030 | 17.18545 |
| 6 | 0.457724 | 4.103026 | 52.49031 | 22.61078 | 20.79589 |
| 7 | 0.490760 | 3.584814 | 46.15616 | 27.22220 | 23.03683 |
| 8 | 0.522820 | 3.161377 | 40.93060 | 31.71847 | 24.18955 |
| 9 | 0.554024 | 2.815335 | 36.59389 | 36.04289 | 24.54788 |
| 10 | 0.584494 | 2.532696 | 32.96000 | 40.15002 | 24.35728 |

FEVD (iii) – Variance Decomposition of LEXRT

| Period | S.E. | LRGDP | LXPORT | LEXRT | LFDI |
|---|---|---|---|---|---|
| 1 | 0.165985 | 0.078342 | 1.391365 | 98.53029 | 0.000000 |
| 2 | 0.249501 | 0.062129 | 0.636666 | 98.45056 | 0.850645 |
| 3 | 0.312736 | 0.232680 | 0.405347 | 98.01767 | 1.344304 |
| 4 | 0.365839 | 0.447449 | 0.296217 | 97.70470 | 1.551636 |
| 5 | 0.412546 | 0.680238 | 0.232950 | 97.46405 | 1.622758 |
| 6 | 0.454703 | 0.928458 | 0.191758 | 97.25231 | 1.627474 |
| 7 | 0.493389 | 1.190651 | 0.162874 | 97.04857 | 1.597901 |
| 8 | 0.529292 | 1.465053 | 0.141571 | 96.84301 | 1.550362 |
| 9 | 0.562881 | 1.749799 | 0.125290 | 96.63114 | 1.493776 |
| 10 | 0.594488 | 2.043061 | 0.112522 | 96.41115 | 1.433264 |

FEVD (iv) – Variance Decomposition of LFDI

| Period | S.E. | LRGDP | LXPORT | LEXRT | LFDI |
|---|---|---|---|---|---|
| 1 | 0.287451 | 0.000174 | 1.025293 | 2.286458 | 96.68808 |
| 2 | 0.393188 | 0.719091 | 0.710787 | 6.009131 | 92.56099 |
| 3 | 0.463358 | 0.813090 | 0.690891 | 9.803657 | 88.69236 |
| 4 | 0.515544 | 0.785143 | 0.718627 | 13.91788 | 84.57835 |
| 5 | 0.558412 | 0.730624 | 0.744431 | 18.25096 | 80.27399 |
| 6 | 0.596135 | 0.678065 | 0.753731 | 22.68129 | 75.88691 |
| 7 | 0.630876 | 0.634714 | 0.746078 | 27.09158 | 71.52762 |
| 8 | 0.663802 | 0.602667 | 0.725428 | 31.38650 | 67.28541 |
| 9 | 0.695556 | 0.583079 | 0.696377 | 35.49608 | 63.22446 |
| 10 | 0.726495 | 0.577112 | 0.662787 | 39.37393 | 59.38617 |

Source: Authors' calculations using E-Views 7.0

The pattern is different in the case of LXPORT. Although the own shocks of exports account for 94.89 % of total variation in the first period, its contribution falls drastically to 32.96 % in the tenth period. In the tenth period, shocks in the exchange rate account for 40.15 % of the variation while shocks in foreign direct investment account for 24.36 % of the variation. The

pattern of LFDI is rather similar to this. While own shocks account for 98.68 % of the variation in the first period, its contribution falls sharply to 59.38 % in the last period while exchange rate shocks account for 39.37 $ of the variation. Summarily, we conclude that the predominant sources of variation in the rate of economic growth are due largely to own shocks and innovations in foreign direct investment while the predominant sources of variation in exchange rate are due mainly to own shocks and innovations in real GDP. The predominant sources of variation in foreign direct investment are due largely to own shocks and innovations in the exchange rate while the predominant sources of variation in exports are due mainly to own shocks and innovations in the exchange rate and in foreign direct investment.

## 5.6 Impulse Response Function Analysis

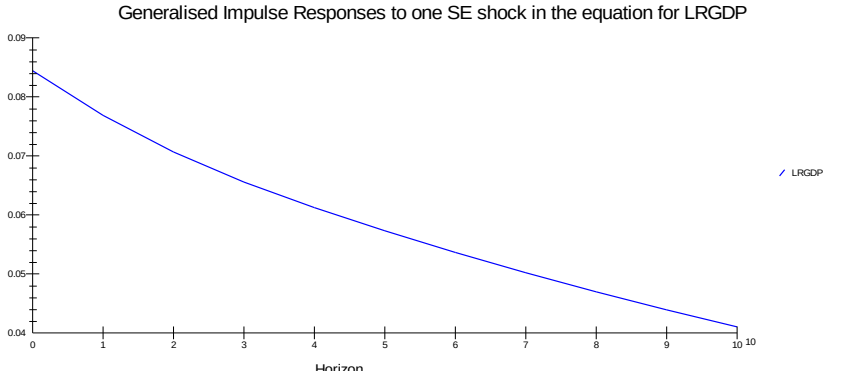
The Impulse Response function simulates over time the effect of a one-time shock in one equation on itself and on other equations in the entire equation system; hence it is used to detect interaction among variables. . Results of the estimated generalized impulse response functions (IRFs) are summarized in Table 7 and the accompanying Figures. Examination of the graphs for LRGDP, LXPORT and LFDI shows that their movement with respect to the identified shocks is consistent with the results of variance decomposition analysis.

Table 7. Generalised Impulse Response Functions

7.1 Generalised Impulse Responses to one SE shock in the equation for LRGDP

Unrestricted Vector Autoregressive Model

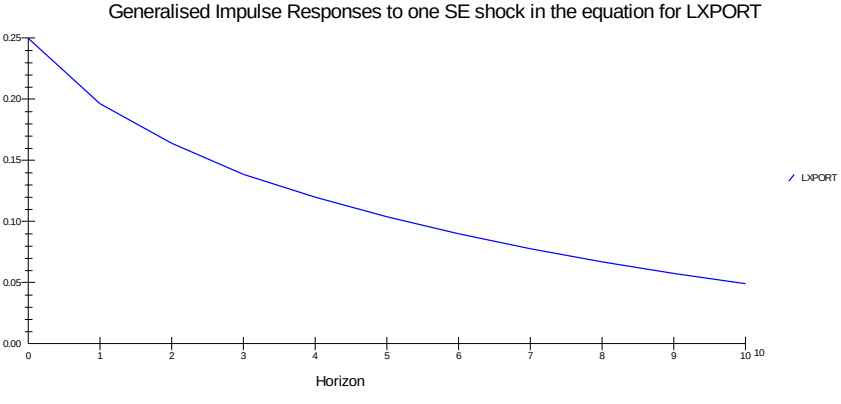
| Horizon | LRGDP | LXPORT | LFDI | LEXRT |
|---|---|---|---|---|
| 0 | .084412 | .053704 | -.050981 | .0068660 |
| 1 | .076847 | .055975 | -.043783 | .0052141 |
| 2 | .070647 | .044667 | .016347 | .9194E-3 |
| 3 | .065558 | .038786 | .032709 | -.9950E-3 |
| 4 | .061232 | .037116 | .037225 | -.0025956 |
| 5 | .057294 | .035952 | .036729 | -.0042329 |
| 6 | .053633 | .034588 | .035082 | -.0058544 |
| 7 | .050193 | .032889 | .032944 | -.0074172 |
| 8 | .046953 | .030907 | .030561 | -.0089070 |
| 9 | .043898 | .028707 | .028005 | -.010320 |
| 10 | .041016 | .026349 | .025332 | -.011654 |




7.2 Generalised Impulse Responses to one SE shock in the equation for LXPORT

Unrestricted Vector Autoregressive Model

| Horizon | LRGDP | LXPORT | LFDI | LEXRT |
|---|---|---|---|---|
| 0 | .018158 | .24966 | .18364 | .025591 |
| 1 | .013116 | .19615 | .099100 | .012128 |
| 2 | .012939 | .16378 | .13779 | .0069507 |
| 3 | .012258 | .13837 | .12543 | .0045362 |
| 4 | .011916 | .11968 | .11242 | .0024244 |
| 5 | .011566 | .10366 | .097609 | .4766E-3 |
| 6 | .011191 | .089750 | .084405 | -.0012822 |
| 7 | .010773 | .077528 | .072645 | -.0028493 |
| 8 | .010318 | .066773 | .062294 | -.0042399 |
| 9 | .0098362 | .057297 | .053166 | -.0054721 |
| 10 | .0093355 | .048941 | .045113 | -.0065628 |




## 5.7 Vector Autoregression estimates

The results are provided in Table 5. Note that all coefficient estimates are elasticities. Examination of the results shows that the single most important determinant of each variable is its one-period lagged value. The elasticity of real GDP with respect to its lagged value is 0.92; the elasticity of exchange rate with respect to its lagged value is 1.1; the elasticity of FDI with respect to

its lagged value is 0.89; and the elasticity of exports with respect to its lagged value is 0.65. The exchange rate is also an important determinant of exports (the elasticity of exports with respect to lagged exchange rate is 0.3) and of foreign direct investment (the elasticity of FDI with respect to lagged exchange rate is 0.29). All in all, the import and implications of these results coincide with those of IRF and Variance Decomposition analyses.

7.3 Generalised Impulse Responses to one SE shock in the equation for LFDI

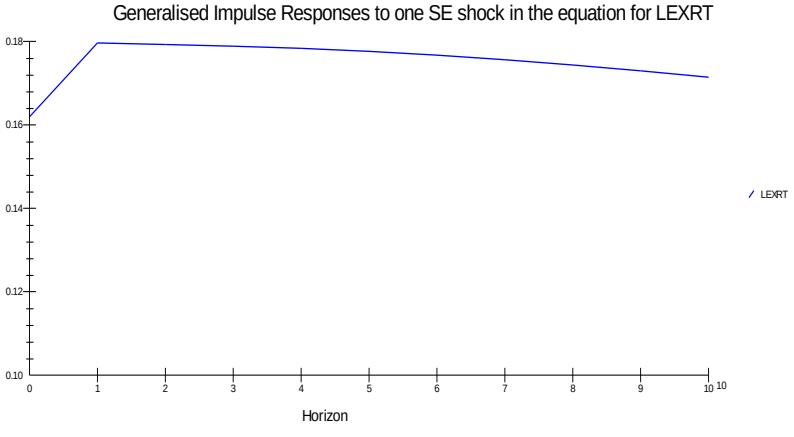
Unrestricted Vector Autoregressive Model

| Horizon | LRGDP | LXPORT | LFDI | LEXRT |
|---|---|---|---|---|
| 0 | -.0050839 | .054161 | .84648 | .020328 |
| 1 | -.6179E-3 | .089546 | .30553 | .039023 |
| 2 | .0056864 | .12611 | .19683 | .038688 |
| 3 | .0075387 | .12295 | .13405 | .035737 |
| 4 | .0084463 | .11412 | .11602 | .033422 |
| 5 | .0088226 | .10413 | .10408 | .031656 |
| 6 | .0090491 | .095122 | .095308 | .030147 |
| 7 | .0091902 | .087127 | .087603 | .028789 |
| 8 | .0092748 | .080077 | .080811 | .027543 |
| 9 | .0093124 | .073843 | .074776 | .026393 |
| 10 | .0093104 | .068319 | .069412 | .025326 |

7.4 Generalised Impulse Responses to one SE shock in the equation for LEXRT

Unrestricted Vector Autoregressive Model

| Horizon | LRGDP | LXPORT | LFDI | LEXRT |
|---|---|---|---|---|
| 0 | .0035795 | .039459 | .10627 | .16191 |
| 1 | -.0017175 | .098117 | .13490 | .17964 |
| 2 | .1423E-3 | .11411 | .14199 | .17925 |
| 3 | .0029010 | .12732 | .15475 | .17884 |
| 4 | .0054614 | .13876 | .16486 | .17834 |
| 5 | .0078815 | .14869 | .17405 | .17763 |
| 6 | .010166 | .15723 | .18197 | .17670 |
| 7 | .012320 | .16457 | .18876 | .17561 |
| 8 | .014347 | .17084 | .19452 | .17435 |
| 9 | .016249 | .17616 | .19936 | .17295 |
| 10 | .018029 | .18064 | .20337 | .17142 |



## 6.0 Summary, Conclusion and Policy Recommendations

This paper has analyzed the nexus between foreign trade and economic growth in Nigeria using the Vector Autoregressive methodology. The results of the Unit root tests showed that the four variables: real GDP, XPORT, FDI and EXRT are difference stationary. The Johansen Cointegration test showed a stable long run relationship between the variables. The Granger causality tests showed that there is bi-directional causality only between log of exports and log of FDI while there is uni-directional causality from LEXRT to LRGDP and from LFDI to LRGDP. Also, it was found that LEXRT Granger causes LXPORTS and also Granger causes LFDI.

The results of the forecast error variance decomposition analysis showed that innovations in the variables are mostly explained by their own shocks. The impulse responses of the log of gross domestic product, log of export and log of foreign direct investment with respect to the identified shocks (innovations) are consistent with the results of variance decomposition analysis. Based on the results obtained, the hypothesis of a positive relationship between foreign trade and economic growth in Nigeria is validated.

We therefore recommend that trade policies in favor of export expansion should be encouraged because exports are a driver of economic growth. The nominal exchange rate also revealed itself as a strategic and versatile variable for influencing economic growth, Therefore, an exchange rate policy favorable to export expansion and consistent with Nigeria's status as a small open economy is recommended.

## References

Balassa, B (1978). "Exports and Economic Growth: Further Evidence". Journal of Development Economics. 5:181-189, June.

Central Bank of Nigeria. Statistical Bulletin and Annual Report and Statement of Accounts. Various issues.

Ekpo, A.H. and F. O. Egwaikhide (1994). "Export and Economic Growth in Nigeria: A Reconsideration of the Evidence". Journal of Economic Management. 1(1):100-115.

Emery, R.F. (1967). "The Relation of Exports and Economic Growth". Kyklos. 20(4):470-486, November.

Fajana, O. (1979). "Trade and Growth: The Nigerian Experience". World Development. 7(1):73-78, January.

Finch, D. and C Michalopoulos (1988). "Development, Trade, and International Organizations". In A. O. Krueger ed., *Development with Trade*. San Francisco, CA: ICS Press

Fosu, A. K. (1990). "Exports and Economic Growth: The African Case". World Development. 18(6):831-835, June.

Haberler, G. (1988). International Trade and Economic Development. San Francisco, CA: International Center for Economic Growth.

Hassan Alhajhoj, (2007). "Exports and Economic Growth in Saudi Arabia: A VAR Model Analysis". Journal of Applied Sciences, 7:3649-3658.

Iyoha, M. A. and P. A. Adamu (2011). "The Impact of External Trade on Economic Growth in Nigeria: A Roadmap for the Twenty-First Century". West African Social and Management Sciences Review. 2(1):1-30, January.

Iyoha, M.A. (2010). "Leadership, policy making, and economic growth in African countries: The case of Nigeria". Chapter 6: In D. Brady and M. Spence (Eds.), Leadership and Growth. Washington, D.C.: World Bank.

Iyoha, M. A. (1998). "An Econometric Analysis of the Impact of Trade on Economic Growth in ECOWAS Countries". Nigerian Economic and Financial Review. 3(1):25-42, December.

Krueger, A.O. (1978). Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences. Cambridge: National Bureau of Economic Research and M.A. Ballinger Publication Co.

Marshall, A. 1959. Principles of Economics. 8th Edition, Macmillan for the Royal Economic Society.

Massell, B.F., S.R. Pearson and J.B. Fitch (1972). "Foreign Exchange and Economic Development: An Empirical Study of Selected Latin American Countries". Review of Economics and Statistics, 54(2), May.

Michaely, M. (1977). "Exports and Growth: An Empirical Investigation". Journal of Development Economics, 4(1):49-53, February.

Minford, P., J. Riley and E. Nowell (1995). "The Elixir of Growth: Trade, Non-traded Goods and Development". Centre for Economic Policy Research Discussion Paper No. 1165.

Mohamed M.R, Chung-Yee Liew and S.S Mazee (2012)."Export Trade and Economic Growth in Tanzania: A Disaggregated Approach" Journal of Economics and Sustainable Development. 3(12).

Mustafa, K. (2011)."An analysis of the Relationship between Foreign Trade and Economic Growth in Turkey over the period (1980–2009)" Lund University School of Economics and Managemnet.

Obadan, M.I and E.I. Okojie (2010). "An Empirical Analysis of the Impact of Trade on Economic Growth in Nigeria". Jos Journal of Economics. 4(1).

Obiora, K. I. (2009). "How Much Do Trading partners Matter for Nigeria's Growth? A Contribution to the Debate on Decoupling and Spillovers". Journal of Economic and Monetary Integration, 9(1).

Omoke Philip Chimobi and Ugwuanyi Charles Uche (2010). "Export, Domestic demand and Economic Growth in Nigeria: Granger Causality Analysis". European Journal of Social Sciences, 13(2).

Rahmaddi, R. and M. Ichihashi, 2011. "Exports and Economic Growth in Indonesia". A Causality Approach based on Multi-Variate Correction Model". Journal of International Development and Coorperation, 17(2):53-73.

Ram, R. (1985). "Exports and Economic Growth: Some Additional Evidence". Economic Development and Cultural Change. 33(2):415425, January.

Robertson, D.H (1938). "The Future of International Trade". Economic Journal, 48(189), March.

Sachs, J., and A. Warner (2001). "Natural Resources and Economic Development: the Curse of Natural Resources." European Economic Review 45:827-38.

Safdari M, M.A Mehrizi and M-R Dehqan-Niri (2012)."The Relationship between Foreign Trade and Economic Growth in Iran" American Journal of Scientific Research.

Salvatore, D. (1983). "A Simultaneous Equations Model of Trade and Development with Dynamic Policy Simulations". Kyklos. 36(1):66-90, February.

Sarbapriya, R. 2011. "Explaining Cointegration and Causality between Foreign Trade and Economic Growth: Econometric Evidence from India". International Journal of Contemporary Business Studies, vol. 2, no. 10, October 2011.

Severn, A.K (1968). "Exports and Economic Growth: Comment". Kyklos. 21(3):546-548.

Sims, Christopher.A. (1986). "Are Forecasting Models Usable for Policy Analysis?" Federal Reserve Bank of Minneapolis *Quarterly Review*, vol. 10 (Winter 1986): 2–16.

Tyler, W.G. (1981). "Growth and Export Expansion in Developing Countries: Some Empirical Evidence". Journal of Development Economics. 9(1):121-130, August.

Udeh, J. (2000). "Petroleum Revenue Management: The Nigerian Perspective." Paper presented at World Bank/IFC Petroleum Revenue Management Workshop, Washington, DC, October 23–24.

Voivodas, C. (1973). "Exports, Foreign Capital Inflow and Economic Growth". Journal of International Economics. 3(4):337- 34.