CBN Journal of Applied Statistics (JAS)

Volume 9 | Number 1 Article 2

6-2018

Macroeconomic Implications of Trade Diversification in Nigeria

Lukman O. Oyelami
University of Lagos

Philip O. Alege
Covenant University, Ota, Ogun State

Macroeconomic Implications of Trade Diversification in Nigeria

Lukman O. Oyelami[1] and Philip O. Alege[2]

This study seeks to examine the effects of trade diversification on macroeconomic performance in Nigeria. To achieve this, the study employs bound test of ARDL to determine the existence of cointegration between trade diversification and key macroeconomic variables. We further estimate the short-run and long-run effects of Intensive and Extensive trade diversification on Economic growth and exchange rate movements. The results from bound tests confirm co-integration between trade diversification and economic growth on one hand and trade diversification and exchange rate movements on the other hand. Similarly, the results from our estimations show that trade diversification can propel economic growth in the country. Also, the trade diversification can reduce movements in exchange rate especially extensive diversification thus preventing it from substantial movement that can derail this important variable from its long run equilibrium. The study recommends that policy makers should pursue vigorously both intensive and extensive trade diversification to propel economic growth and guarantee stable exchange rate for the Nigerian currency.

Keywords: ARDL; Diversification; Macroeconomics; Trade.

JEL Classification: F13; F1; C22; E00.

1.0 Introduction

Several scholars have examined the concept of economic diversification but it seems the concept will still continue to receive attention especially in many resource dependent economies including Nigeria. According to Imbs and Wacziarg (2003), Economic and trade diversification is not only about significant changes in type of goods produced and exported but as well as the quality. In some cases, it includes a range of products and trading partners. This broad definition is crucial because a successfully diversified economy is expected to reduce the economy exposure to adverse external shocks and macroeconomic instability (Mobarak, 2005).

Generally, in the economic literature, economic measures of diversification can be

[1]Corresponding Author (Economics Unit) Distance Learning Institute, University of Lagos; loyelami@yahoo.com.

[2]Department of Economics and Development Studies, Covenant University, Ota, Ogun State, Nigeria.

captured in trade and domestic sectors. Though, domestic and trade diversification are closely related and interlinked but while trade diversification involves the external sector, the domestic sectors diversification involves diversification in production process across sectors of the economy (Hesse, 2009). There are dimensions through which Trade diversification can be achieved. This includes diversification across products or trading partners. It may also involve the introduction of new product lines which can be referred to as extensive margin or a more balanced mix of existing exports and this is known as intensive margin. While trade diversification focuses on all the aforementioned, domestic diversification basically entails diversification in sectoral output and allocation of labour.

In trade literature, trade diversification (intensive and extensive) has been argued to be of serious macroeconomic importance. Ghosh and Ostry (1994) and Jansen (2004), for instance argue that diversification makes country less vulnerable to term of trade shocks and this positive terms-of-trade shocks can be channeled into economic growth. Also, Moore and Walkes (2010) argued that diversified production structures tend to have lower volatility on output, consumption, and investment which ultimately ensure macroeconomic stability. More directly, several studies (Al-Marhubi , 2000; Hasan and Toda ,2004; and Herzer and Nowak-Lehnmann 2006) have argued that trade diversification has potential to increase economic growth though without a clear cut consensus as regard the channel(s) by which trade diversification transmits to growth . It could be that it is growth that propels diversification.

Also of serious importance to the Nigerian economy is the issue of exchange rate movement and its volatility. To this effect, export diversification has been put forward in several policy documents and debates as antidote without any empirical investigation. Unfortunately, research findings are controversial on the effect of exchange rate movement on trade flow and this controversy extends to trade diversification. But, study by Agosin, Álvarez, and Bravo-Ortega (2011) has reported insignificant positive effect of exchange rate volatility on export concentration and this constitute about a major study in this direction. Other studies like Lin (2007), Berthou and Fontagné (2008) and Cavallari and D'Addona (2013) focus on effect

of export diversification on exchange rate regime. This introduces element of dynamic interaction between the two variables and economic growth.

Consequently, the motive of this study is to examine the dynamic interaction between trade diversification and macroeconomic performance in Nigeria with particular attention to economic growth and exchange rate movements. This is critical because many studies in this area have removed oil rich countries like Nigeria in the analyses of export diversification and macroeconomic performance nexus. Also, many of these studies are panel in nature and most times African countries are not properly captured, thus, there is a need to investigate if the results from panel studies can be replicated in Nigeria. More importantly, many studies in this area focused attention on the nexus of export diversification and economic growth without looking at the channels through which export diversification impacts on economic growth. Based on this, the study does not only examine the link between trade diversification and economic growth but exchange rate movement as the intermediate channel of transmission.

Apart from this introductory section, the paper is divided into four sections. Section two x-rays the Nigerian economy and its efforts towards economic diversification. Section three discusses both theoretical and empirical issues on trade diversification while section four focuses on methodology. The last section of the paper gives attention to the results from the analysis and policy implications.

2.0 Stylized Facts on Economic Diversification in Nigeria

Pre-independent and earlier Post-independent era of Nigerian economy was a relatively diversified economy. Each region of the country specialized in different range of products which they exported to earn foreign exchange. There was groundnut in the North, cocoa in the West and Palm oil in East. In spite of fluctuation in world price during this era, agriculture contributed about 65 per cent of total GDP, 70 per cent of total exports and almost 80 per cent of foreign earnings (Amuzegar, 1983). During this period, Nigerian was one of the leading producers of many of these products especially cocoa and groundnuts.

The discovery of crude oil in commercial quantity altered the structure of this relatively stable Nigerian economy and this created an expanded national wealth that saw the federal government witnessing annual revenue increment of 26 per cent between 1970 and 1980. During the same period, the average growth of expenditures and net loans was 21 per cent (Amuzegar, 1983) .This development renders a serious blow to agriculture. While Nigeria had attained some level of self-sufficiency in stable food production in the earlier stage of post-independence, by 1980 and onward, Nigeria degenerated to a position of being largest food importer in the Africa couple with the destruction of agricultural export production (Watts and Bassett, 1986). Precisely during this period, food importation rose by 700 per cent and real food output per capita reduced by 1.5 per cent annum, also per capita food production in 1981 was 18 percent lower than 1967-70 (Hunt and D'Silva, 1981). This ushered in the era of food insufficiency in the country.

According to the 2016 British Petroleum report, Nigeria had proven oil reserves of 37.1 billion barrels at the end of 2015 and that is roughly 2.2% of the world's reserves. In addition, the country has proven natural gas reserves of 5.1 trillion cubic meters which contributes to 2.7% of the world total at the end of 2015. On the average in 2015, Nigeria oil production stands at 2.1 million barrels per day with refining capacity of 407,800 barrels per day. Also, the value of petroleum exports stood at 41,818 million dollars out of 45,365 million dollars total export value (OPEC annual statistical report 2016). This sector generates about 91% of foreign earnings and contributes 82% of government revenue. Despite its huge impact on foreign earning and government revenue, this sector merely contributes 8.26 per cent to total real GDP as at 2016. This suggests that the sector has not been adequately connected along its value chains to other sectors of Nigerian economy for the benefits of the Nigerian populace.

2.1 Domestic Diversification

Figure 1 shows the sectoral distribution of Real Gross Domestic Products from 1981 to 2015. It is clear from the figure that while the contributions of some sectors to RGDP are declining, some are increasing and some are static. Specifically, industrial sector has declined tremendously. As at 1981, the sector contributed almost 45 per cent to Real GDP making the sector largest contributor to RGDP, the position it maintained till 1999 albeit some fluctuations. By 2015, the sector barely contributed 16 per cent making it third largest contributor to GDP. This is an unfortunate development to Nigerian economy because of the implication of this shrinking sector on unemployment and balance of payment. The problem of the sector might not be unconnected with poor availability of infrastructural facilities, especially electricity. In an attempt to ensure proper diversification of Nigerian economy, the industrial sector must be put back to full operation with modern day competitive technology that give room for development of new products and improve the quality of the existing ones.

In the same figure, the contribution of agriculture has been relatively steady until 1999 when there was a remarkable increase in the contribution of the sector. As at 1981, the sector contributed just 15 per cent to RGDP and average of 18 per cent afterward. This is relatively small given the huge number of labour the sector employs. In 1999, the sector's contribution increased to about 26 per cent from average of 18 per cent in the previous decade but this has not been sustained afterward. Despite the increased contribution in this sector, Nigeria still remains the largest importer of food and consumables in the continent and this reflects low labour productivity in the sector and weak link between the agricultural sector and industrial sector of the Nigerian economy.

In addition, in the same figure, the construction sector has remained stagnant in term of its contribution to RGDP. The sector barely contributed 5 per cent in 1981 and it has not surpassed it since then. This basically reflects low activities in infrastructural provision; and this sector is very important for optimum performance of other sectors of the economy. Despite poor performance in the real sector of the economy, the trade and services sector has been doing well. As at 2015, the

service sector was the leading contributor to RGDP while trade moved up from 11 per cent contribution in 1981 to 17 per cent in 2015. This shows a big distortion in the structure of the Nigerian economy. As it is, the Nigerian economy is not well diversified and more balanced mix of existing structure is required. The ideal structure should be industrial sector led follow by agriculture.

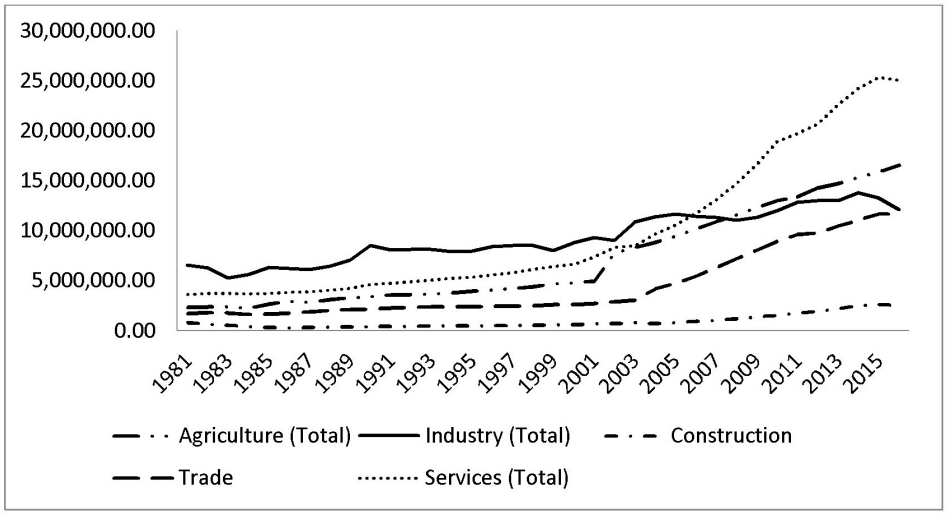

Figure 1: Sectoral Contributions to Real GDP in Naira Million (1965-2015)

2.2 Trade Diversification

Figure 2 shows the trend in number of trading partners with Nigeria from 1965 to 2015. From the figure, no doubt Nigeria has been able to increase the number of trading partners tremendously from about 50 partners in 1965 to about 130 partners in 2015. This is a remarkable progress as far as number of trading partners is concerned and this can afford the country the opportunity to replace partners with unfavourable conditions of trade which Nigeria has demonstrated in recent time with United State of America. In fact, Figure 3 shows that Nigeria is actually shifting attention from developed countries to emerging and developing countries. Unfortunately, the country's trade relations with other African countries have not witnessed any remarkable progress. From 2014 to 2015, Nigerian volume of trade with emerging and developing countries has surpassed that of developed nations though this might basically due to improved trade relations between Nigeria and China on one hand and Nigeria and India on the other in terms of crude oil export.

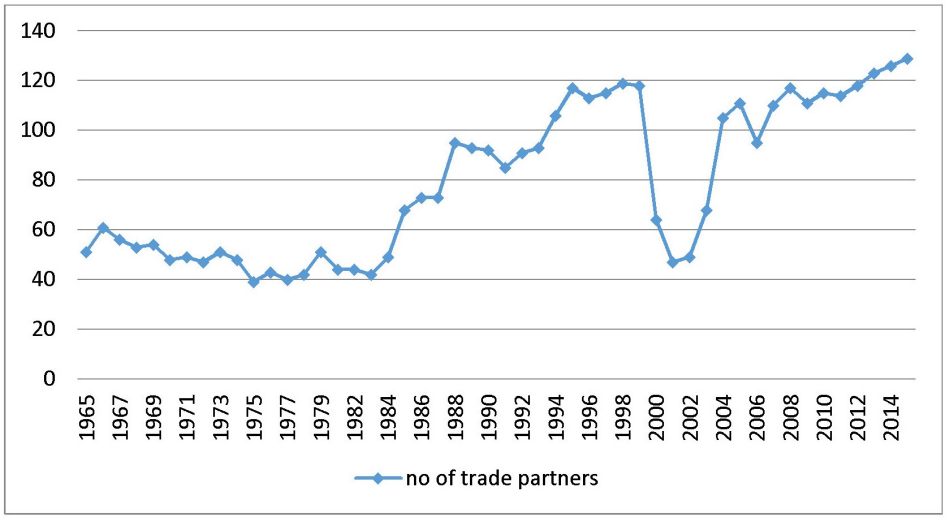

Figure 2: Number of countries as trading partner countries (1965-2015)

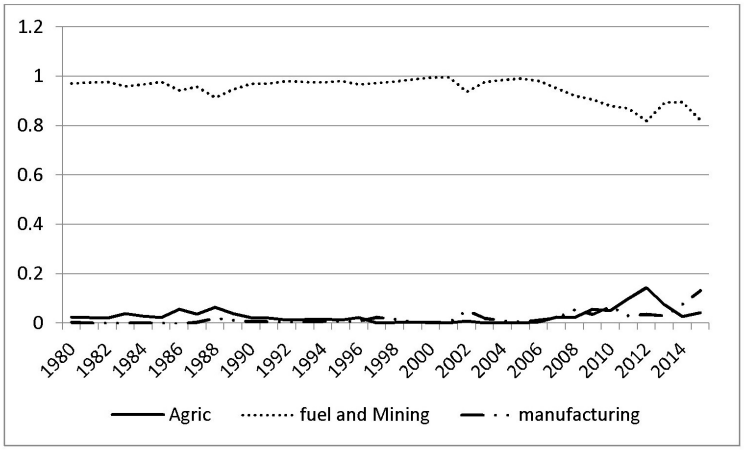

Figure 3: Percentage contribution of three leading export products (1980-2015)

Figure 3 shows the percentage contribution of three leading export products from Nigerian export. From the figure, it is clear that Nigeria has performed well in term of bridging the gap between crude oil export which is the leading product and other tradable products. As at 1981, oil sector contributed over 90 per cent of total export, Agriculture sector contributed mere 0.2 per cent and manufacturing contributed 0.4 per cent. In 2012, there was a sign of resurgence in agricultural products export but this seems not be sustained in subsequent years ditto for manufacturing sector. This might basically be due to decrease in the price of crude oil

at the international market which caused decline in government revenue and necessitated a shift of attention to other tradable sector of Nigerian economy. Given this situation, Nigerian economy will continue to be vulnerable to shocks in crude oil price due to over reliance on the export of the product to finance her economy. Conclusively, the number of trading partners a country relates with might not be very important but the range of tradable products involved in the trade.

3.0 Literature Review

3.1 Theoretical Framework

A thorough review of theory of trade diversification will kick starts from the discussion of classical theory of trade that comprises of Mercantilism, theory of absolute advantage by Adam Smiths and its refined form known as theory of comparative advantage by David Ricardo. Discussing these theories in details will not be of great relevance in this study, thus we will succinctly present them and move to move relevant sections. Basically, Mercantilism is a theory that promotes exportation at the detriment of importation. The theory encourages country to amass big trade surplus from trading activities by exports more than imports. Mercantilism as a theory has not been given serious attention as trade theory however, many countries still indulge in the doctrine directly or indirectly. As a result of this, theories of absolute advantage by Adam Smiths and comparative advantage by David Ricardo have over the years served as foundation theories of trade. Basically, the two theories argue that specialization by countries engaging in international trade will increase the world outputs. However, the theories disagree on how country should specialize. While absolute advantage by Adam Smith contends that country specialise on commodity which they can produce more given the available resource, comparative advantage by David Ricardo contend that country should specialise on commodity where they have least opportunity cost given the available resources.

In comparative advantage trade theory, open economies are generally speculated to specialize in producing a specific range of goods where they have comparative advantage and this is also extended in Heckscher–Ohlin's two factors general equilibrium model. But in recent time, other trade scholars have argued that export

instability is one of the major reason for export diversification, which is similar to the portfolio diversification in finance (Brainardand Cooper,1968; Kemp and Liviatan, 1973 and Ruffin ,1974). This position is somewhat contradictory to classical trade theory but in modern time commodity products are often subjected to very volatile market prices so that countries that are dependent on these commodities may suffer from export instability (Bleaney and Greenaway, 2001). Export instability could increase risk factor in such an economy, thus discourage necessary investments by risk-averse investors. Export diversification could therefore help to stabilize export earnings in the longer run (Ghosh and Ostry, 1994).

Also, the study by Imbs and Wacziarg (2003) and Aditya and Roy (2007) found another perspective to the issue by arguing that country should first domestically diversify and then specialize. This is based on the outcome of their investigation of the relationship between domestic sectoral concentration and per capita income patterns across countries with conclusion that there exist U-shaped patterns such that countries in their early stages of economic development diversify production and specialize when higher income levels have been attained. In a more technical manner, Agosin (2007) aligns with this position in his model of export diversification and growth where he argues that countries below the technological frontier widen their comparative advantage by imitating and adapting existing products. By implication, producing an increasing set of export products can be seen as a dynamic effect of export diversification which can translate to higher per capita income growth.

3.2 Empirical Literature

Empirically, several studies have examined the nexus between trade diversification and growth and few studies extend to other macroeconomic variables but the focus of this brief review is on developing countries, especially African countries. Starting with study of dePiñeres and Ferrantino (2000), using panel data, find that export diversification is associated with income growth in Latin America. This position is closely corroborated by Feenstra and Kee (2004) in their study where they found that export product variety explains 13 percent of productivity gains in 34 industrial and developing countries though their study capture more countries.

Similarly, country specific studies by Hasan and Toda (2004), Herzer and Nowak-Lehnmann (2006) and Zaharieva (2016) provided evidence in the same direction for Bangladesh, Chile and Bulgeria, respectively.

In Sub Saharan African (SSA) as well, study by Hammouda, Karingi, Oulmane and Jallab (2008) found that deepening diversification has been associated with increases in total factor productivity in SSA. Similarly study by Naudé and Rossouw (2008) argued that export diversification Granger cause growth in GDP per capita in South Africa. But study by Songwe & Winkler (2012) implied that export concentration in a few products where countries have a high comparative advantage yields more benefits than product diversification in goods in which they have less comparative advantage. This position can be refuted with more recent study by Hodey, Oduro, & Senadza (2015), which argued that export diversification has a positive and significant effect on economic growth in SSA. Apart from these general studies in SSA, studies have not seriously explored diversification-growth nexus on the merit of each country. Thus, there is crucial need to consider such especially for a resourced based economy like Nigeria.

There is an extensive debate on the relationship between economic diversification and exchange rate in the literature. This discussion has been expanded around different concepts of economic diversification with a lot of controversy. One of the earliest study by McKinnon (1963) and Kenen (1969) focused on product diversification and exchange rate regime. Specifically, Kenen (1969) argued that product diversification makes fixed exchange rates most appropriate to well-diversified economies. McKinnon (1969) presents the same idea in a more subtle manner that the more diversified an economy, the stronger the case for fixed exchange rates.

However, subsequent empirical investigations produced mixed results. Studies by Rizzo (1998), Poirson (2001) Markiewicz (2006) and Frieden et al (2010) produced empirical evidences that a more diversified economy is more likely to adopt a fixed exchange rate regime. To the contrary, studies by Heller (1978), Melvin (1985), Jin (2009) and Chowdhury et al (2014) presented evidences that a more diversified economy is more likely to adopt a flexible exchange rate regime. Apart from this

basic controversy, more recent study by Liu and Zhang (2015) found that when export diversification is classified into extensive and intensive margins, there is evidence that higher level of product diversification at the extensive margin supports adoption of fixed exchange rate regime, while intensive margin does not support fixed exchange regime. Another recent study by Tran, Phi and Diaw (2017) which focused on causality, presented evidence to support bi-directional causality between export diversification and real exchange rate in emerging Latin America and Asia.

4.0 Research Methodology

4.1 Model Specification

To empirically estimate the relationship between export diversification and real GDP per capita, we adapted a simple augmented Solow growth model as employed in similar study (Hesse, 2009). Specifically, we estimated this model within the framework of Autoregressive Distributed Lag (ARDL) using annual data between 1965 and 2015.This gives room for large observations required for the model estimation and it also provides opportunity to cater for both the period of agriculture dominated export and oil dominated export.

$$\Delta \ln RGDP_t = \lambda_0 + \sum_{j=1}^{n1} a_{ji}\Delta RGDP_{t-j} + \sum_{j=1}^{n2} b_{ji}\Delta INTEN_{t-j} + \sum_{j=1}^{n3} c_{ji}\Delta EXTEN_{t-j} + \sum_{j=1}^{n4} d_{ji}\Delta OPEN_{t-j} + \theta_1 INTEN_{t-1} + \theta_2 INV_{t-1} + \theta_3 OPEN_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta \ln Exch_t = \lambda_0 + \sum_{j=1}^{n1} e_{ji}\Delta Exch_{t-j} + \sum_{j=1}^{n2} f_{ji}\Delta INTEN_{t-j} + \sum_{j=1}^{n3} g_{ji}\Delta EXTEN_{t-j} + \sum_{j=1}^{n4} h_{ji}\Delta OPEN_{t-j} + \theta_1 INTEN_{t-1} + \theta_2 EXTEN_{t-1} + \theta_3 OPEN_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta \ln OutVOL_t = \lambda_0 + \sum_{j=1}^{n1} k_{ji}\Delta outVOL_{t-j} + \sum_{j=1}^{n2} l_{ji}\Delta INTEN_{t-j} + \sum_{j=1}^{n3} o_{ji}\Delta EXTEN_{t-j}$$

$$+\sum_{j=1}^{n4} p_{ji}\Delta OPEN_{t-j} + \theta_1 INTEN_{t-1} + \theta_2 INV_{t-1} + \theta_3 OPEN_{t-1} + \varepsilon_t \quad (3)$$

$$\Delta \ln EXCHVOL_t = \lambda_0 + \sum_{j=1}^{n1} r_{ji}\Delta EXCHVOL_{t-j} + \sum_{j=1}^{n2} s_{ji}\Delta INTEN_{t-j}$$

$$+\sum_{j=1}^{n3} t_{ji}\Delta EXTEN_{t-j} + \sum_{j=1}^{n4} u_{ji}\Delta OPEN_{t-j} + \theta_1 INTEN_{t-1} + \theta_2 INV_{t-1} +$$

$$\theta_3 OPEN_{t-1} + \varepsilon_t \quad (4)$$

This equation includes both short-run (first-differenced) and long-run (one-period-lagged level) variables. For the short-run coefficients, each lag length n is chosen by minimizing the Akaike Information Criterion (AIC), and each model is estimated at these optimum lags. In the model, $RGDP_t$ is the real gross domestic products per capita, Exchange rate movement is defined as the movement in the rate at which naira exchanges for a unit of US dollar. $INTEN_t$ and $EXTEN_t$ are Intensive margin and Extensive margin of export diversification using Theil diversification or concentration index, $OPEN_t$ is the trade openness which is measured by total trade divided by GDP while Exchange rate and Output volatilities are obtained using ARCH & GARCH model. Data were gathered from different sources including United Nation Conference Trade and Development (UNCTAD), World Trade Organization (WTO) and Central Bank Nigeria.

Majorly, three different measures have been employed to represent volatility of exchange rates. Dell'Ariccia (1999) employs the standard deviation of the first difference of the log real exchange rate while Fernandez and Klassen (2004) measures exchange rate volatility using the moving average standard deviation of the monthly logarithm of real exchange rate. In more recent time, ARCH/GARCH modelling has been popularly employed for modelling volatility, study by Sauer and Sauer and Bohara (2001), and DeVita and Abbott (2004) provide good treatment of the model. In applying the GARCH models to capture the volatility of exchange rates, two steps have been generally considered to be very important. The first step borders on stationarity of the data employed for the GARCH model while the second step focuses on optimal lag selection of the GARCH model. All

of these were appropriately addressed before extracting volatility series from our GARCH model.

In an effort to build our ARDL and VEC on sound econometric foundation and as part of the requirement for these techniques, we subjected our data to unit root tests in order to determine their order of integration and the results are presented in Tables 1 and 2. The results indicate that our variables have a mixed stationarity. The result from Augmented Dickey Fuller unit test in Table 1 shows that all our variables are integrated of order one I(1) excerpt per capita GDP which was stationary at levels. Also, the results from DF-GLS unit root test in Table 2 shows that our variables are of different level of integration I(0) and I(1). Based on this unit root result, ARDL and Vector Error Correction (VEC) model seem to be an appropriate method of model estimation.

After the determination of the stationarity status of our variables, we carried out ARDL bound testing as proposed by Pesaran and Shin (1999) to test for cointegration. According to him, there are two asymptotic critical values: the lower value which assumes that all variables are I(0) and the upper value which assumes that all variables are I(1). If the calculated test statistic goes beyond the upper critical value, then the null hypothesis of "no cointegration" is rejected. If it falls below the lower bound, the null cannot be rejected.

Table 1: Augmented Dickey Fuller unit test

Variables	Level			First Difference		
	Constant	Constant and Trend	None	Constant	Constant and Trend	none
Extensive	-1.579	-4.127	-0.792	-10.660***	-10.554***	-10.683
Intensive	-2.283	-1.119	0.445	-6.1316***	-7.005***	-6.123***
Exchange	1.273	1.078	2.383	-6.221	-6.736***	-5.692***
Per capita	-5.204***	-5.185***	-5.111***			
Openness	-2.250	-1.997	-0.529	-9.8147	-10.026***	-9.913***
CV 1%	-3.4907	-4.0436	-2.5861	-3.4907	-4.0436	-2.586
CV 5%	-2.88790	-3.45118	-1.9437	-2.8879	-3.4511	-1.943
CV 10%	-2.58090	-3.15098	-1.6148	-2.5809	-3.1509	-1.614

Note: *** Significant at 1%,**Significant at 5% and * significant 10%

Table 2: DF-GLS Test Equation

Variables	Level		First Difference	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
Extensive	1.428	-2.021	-2.295**	-4.677***
Intensive	-1.119	-2.021	-2.295**	-4.677***
Exchange	-1.274	-1.767	-8.033***	-8.232***
Per capita	-2.673***	-2.875*	-7.662***	-8.229***
Openness	0.396	-1.493	-2.354**	-3.110**
CV 1%	-2.593	-3.648	-2.593	-3.648
CV 5%	-1.944	-3.087	-1.944	-3.087
CV 10%	-1.614	-2.794	-1.614	-2.794

Note: *** Significant at 1%,**Significant at 5% and * significant 10

Also, if the statistic falls within the respective bounds, it makes cointegration test inconclusive. The results, as presented in Table 3 show that there is co-integration in the four models estimated for economic growth, Output volatility, exchange rate and exchange rate volatility which make them conformable for ARDL and VEC estimation.

Table 3: Bounds tests Cointegration

Product	F-Statistics	Lower critical value 5%	Upper critical value 5%	Cointegrated
Exchange	10.856	3.79	4.85	Yes
Per capita	8.424	3.79	4.85	Yes
Exchange Vol.	12.9	3.79	4.85	Yes

4.0 Results and Discussions

The results from ARDL model estimation as presented in Tables 4a and 4b have economic growth, exchange rate movement, exchange rate volatility and output volatility as dependent variables. Starting with economic growth in Table 4a, the results show that in the short run both Intensive and Extensive concentration has contemporaneous positive effects on economic growth but only intensive concentration is statistically significant. At lag, both Intensive and Extensive concentration shows statistically significant negative effect on economic growth which basically reaffirms common position in the literature. In long run, the two variables also show statistically significant negative effect on economic growth. This implies that a quarter lag of Export concentration can be inimical to economic growth in Nigeria thus suggests the need for export diversification in the country.

The results from Table 4b show that Intensive concentration will decrease Exchange Rate Movement while Extensive Concentration will increase it contemporaneously. At one period lag, Extensive Concentration show the ability to reduce exchange rate movement and it is statistically significant. In the long run, the two variables demonstrate negative effect on Exchange rate movement but they are not statistical significance and thus suggest export diversification might not be very important to exchange rate movement in Nigeria and this might not be unconnected with management of exchange rate in the country. Also, trade openness shows evidence that it can increase exchange rate movement thus the need for strategic openness.

In the same table, the results show that Intensive Concentration can increase volatility in the short run and long run and this suggests that Intensive margin diversification can reduce exchange volatility in the country. Contrary to this, the results indicate that extensive concentration will reduce exchange rate volatility both in the short run and long while the opposite (Extensive margin Diversification) will increase it. This implies that Nigeria should focus more on its area of comparative advantage and diversify within this area of strength to reduce exchange rate volatility. Also in the results, intensive diversification does not reduce output volatility as expected but extensive diversification does contemporarily in

the short-run but not in the long-run. In addition, openness reduces exchange rate volatility though it is not statistically significant however; the variable contributes significantly to output volatility.

4.1 Model Estimation and Results Discussion

Table 4a: Short run and Long Co-efficient of Economic growth

	$D(GDP_{t-1})$	$D(Inten_t)$	$D(Inten_{t-1})$	$D(Exten_t)$	$D(Exten_{t-1})$	Constant	Inten	Exten	Open
Per Capita Growth	-0.54 (0.01)	13.7*** (0.01)	-15.3*** (0.008)	85.09 (0.53)	-419.6*** (0.03)	325.6*** (0.06)	-1.8 (0.35)	-404.2*** (0.08)	-19.8*** (0.06)

Note: *** Significant at 1%,**Significant at 5% and * significant 10. () Probability value

Table 4b: Short run and Long Co-efficient of Exchange rate Movement, Exchange rate and Output Volatility

	$D(Exch_{t-1})$/ $D(Evol_{t-1})$ & $D(Ovol_{t-1})$	$D(Inten_t)$	$D(Inten_{t-1})$	$D(Exten_t)$	$D(Exten_{t-1})$	Constant	Inten	Exten	Open
Exchange rate movement	-1.04 (0.04)	-1.32 (0.53)	-	208.24 (0.10)	-885.2** (0.0)	-0.83 (0.91)	-1.14 (0.5)	-132.21 (0.6)	30.0*** (0.0)
Exchange rate volatility	-0.04 (0.00)	0.20** (0.08)	-	-20.37*** (0.01)	-	15.3*** (0.01)	1.20** (0.06)*	-20.3*** (0.01)	-0.9 (0.14)
Output Volatility	-0.14 (0.06)	-0.43 (0.3)	-0.6** (0.06)	9.1** (0.09)	-	-	-0.06 (0.3)	-10.3 (0.2)	8.2*** (0.02)

Note: *** Significant at 1%,**Significant at 5% and * significant 10%. ( ) probability value

4.2 Robustness Check

To perform a robustness check on the ARDL model estimated, VECM estimation was performed based on the results obtained from our Bound Co-integration Tests. In this case, our estimation focuses on economic growth and exchange rate movement which are core variables of interest in this study. Also, this robustness check is important to settle some contentious issues in diversification literature. To determine direction of causality between economic growth and trade diversification, VAR Granger Causality was performed. This is very important because of the position of Imbs and Wacziarg (2003) that argued that the level of economic development dictates whether a country would benefit from diversification or not.

The results in Table 5a revealed uni-direction causality between trade diversification (Extensive) and economic growth and the direction is from diversification to growth thus suggesting that a country can always benefit from trade diversification

regardless of their level of economic growth and development. This suggests that the nature of trade diversification has a role play in determining whether the level growth counts for the realization of benefits inherent in diversification. This finding support the position of Olaleye, Edun and Taiwo (2014) and Esu & Udonwa , 2015.

Similarly, the results from VAR Granger Causality as contained in Table 5a show that there is uni-directional Causality between the exchange rate movement and Trade Concentration/Diversification (Extensive) and the direction is from trade diversification to exchange rate movement. This shows that the level of a country's diversification can help in explaining or predicting the movement in exchange rate.

Table 5a: VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: D(GROWTH)			
Excluded	Chi-sq	df	Prob.
D(EXTENSIVE)	4.838409	2	0.0890*
D(EXCHANGE)	1.031075	2	0.5972
D(OPEN)	5.522900	2	0.0632*
All	10.34841	6	0.1107
Dependent variable: D(EXTENSIVE)			
Excluded	Chi-sq	df	Prob.
D(GROWTH)	0.822039	2	0.6630
D(EXCHANGE)	2.892781	2	0.2354
D(OPEN)	4.782905	2	0.0915*
All	10.37409	6	0.1098
Dependent variable: D(EXCHANGE)			
Excluded	Chi-sq	df	Prob.
D(GROWTH)	1.429040	2	0.4894
D(EXTENSIVE)	29.98286	2	0.0000***
D(OPEN)	2.764142	2	0.2511
All	35.73947	6	0.0000***

Note: *** Significant at 1%,**Significant at 5% and * significant 10%

The results as presented in Table 5b show bi-directional causality between economic growth and trade diversification (Intensive). This implies that as much as trade diversification can bring about economic growth, the level of economic growth and development can also determine if a country will benefit substantially from trade diversification.

Table 5b: VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: D(GROWTH)			
Excluded	Chi-sq	df	Prob.
D(INTENSIVE)	6.522549	2	0.0383***
D(EXCHANGE)	0.201815	2	0.9040
D(OPEN)	5.168118	2	0.0755**
All	12.25434	6	0.0565**
Dependent variable: D(INTENSIVE)			
Excluded	Chi-sq	df	Prob.
D(GROWTH)	9.208962	2	0.0100***
D(EXCHANGE)	4.104314	2	0.1285
D(OPEN)	2.387542	2	0.3031
All	13.07243	6	0.0419**
Dependent variable: D(EXCHANGE)			
Excluded	Chi-sq	df	Prob.
D(GROWTH)	0.663178	2	0.7178
D(INTENSIVE)	1.870633	2	0.3925
D(OPEN)	3.396343	2	0.1830
All	5.211237	6	0.5170

Note: *** Significant at 1%, **Significant at 5% and * significant 10%. ( ) probability value

To investigate the differential effect of intensive and extensive trade diversification/ concentration, we examined variance decomposition component of our VECM and the results are presented in Table 6. As shown from the results, economic growth proxied by per capita growth explains largely its own variance decomposition in short term, medium term and long term which is traditionally expected. This is followed by intensive diversification or concentration in short term and medium term. In the long term, intensive diversification, openness and extensive diversification make substantial contributions but all through the period, Intensive diversification is the largest contributor to variance decomposition of economic growth apart from the growth itself. And, this underlines the importance of trade diversification in the area of comparative advantage for economic growth in Nigeria.

In the same table, the results show that exchange rate movement is largely responsible for its own variance decomposition in the short term, medium term and long term and this is not surprising. Apart from its own contribution, extensive diversification/concentration is about the only variable with substantial contribution to the Variance Decomposition of this important variable in the short term, medium

term and long term. Thus, it is safe to conclude that while Intensive Diversification is important for economic growth, extensive diversification is important exchange rate movement. The implication of this is that for Nigeria to fully benefit from diversification, it must look in both direction of extensive diversification and intensive diversification. With this, the country will be able to withstand external shocks.

Table 6: Variance Decomposition

Variance Decomposition of D (CAPITA)						
Period	S.E.	D(EXTENSIVE)	D(INTENSIVE)	D(CAPITA)	D(EXCHANGE)	D(OPEN)
1	9.764717	0.075449	16.01219	83.91236	0.000000	0.000000
2	10.04047	0.072379	16.11004	81.62371	0.126562	2.067310
5	12.72738	9.579283	12.43059	58.49949	7.815458	11.67517
6	13.05485	9.842857	12.84181	55.72123	10.40075	11.19335
9	13.41049	9.713893	13.15010	53.23974	12.56600	11.33026
10	13.51326	9.603592	12.95131	52.66612	12.46388	12.31510
Variance Decomposition of D (EXCHANGE)						
Period	S.E.	D(EXTENSIVE)	D(INTENSIVE)	D(CAPITA)	D(EXCHANGE)	D(OPEN)
1	10.17140	0.630140	1.665195	0.024723	97.67994	0.000000
2	13.96195	26.26889	0.984605	0.360373	72.23138	0.154750
5	19.53082	21.12986	3.383162	0.361152	74.44653	0.679296
6	20.56831	19.39102	3.770406	0.458984	75.64337	0.736219
9	24.25698	17.41251	3.877557	0.518322	76.58625	1.605366
10	24.98806	17.49389	3.680291	0.562270	76.74174	1.521808

5.0 Conclusion and Policy Implications

The major conclusion from the study is that the much established positive relationship of growth-trade diversification nexus is true for Nigerian economy despite being an oil-based economy. Also, the trade diversification can reduce movement in exchange rate especially extensive diversification thus preventing it from substantial movement that can derail it from long run equilibrium and this will go a long way in bringing about stability in Nigerian economy. This can be regarded as one of the channels through which trade diversification enhances growth. Also, the study confirms that the level of economic growth dictates the extent of benefits a country gets from trade diversification and this is in line with the assertion of (Imbs & Wacziarg, 2003; Olaleye, Edun & Taiwo 2014). The policy implication of

this finding is that intensive diversification in oil and gas can still help the economy to grow while extensive diversification will help to stabilize the exchange rate movement. Thus, the country must diversify in both directions to maximize the benefits inherent in trade diversification, which include stabilization of macroeconomic environment frequently disturbed by exchange rate movement.

Policy recommendations from the study includes first that policy makers should pursue vigorously both intensive and extensive trade diversification in other to propel economic growth. Second, trade diversification can guarantee stable exchange rate for Nigerian economy thus government should open up more sectors of the economy for international transactions and increase number of trading partners across regions of the world.

References

Aditya, A., and Roy, S. S. (2007). Export diversification and economic growth: Evidence from cross-country analysis. (pp. 1-25).Mimeo.

Agosin, M. R. (2007). Export diversification and growth in emerging economies. Santiago, Chile, University of Chile.

Agosin, M. R., Alvarez, R., and Bravo-Ortega, C. (2012). Determinants of export diversification around the world: 1962–2000. *The World Economy*, 35(3), 295-315.

Al-Marhubi, F. (2000). Export diversification and growth: an empirical investigation. *Applied Economics Letters*, 7(9), 559-562.

Amuzegar, J. (1983). Oil exporters' economic development in an interdependent world (No. 18). International monetary fund.

Berthou, A., and Fontagné, L. (2008). The Euro and the Intensive and Extensive Margins of Trade: Evidence from French Firm Level Data. CEPII research center.

Bleaney, M., and Greenaway, D. (2001). The impact of terms of trade and real exchange rate volatility on investment and growth in sub-Saharan Africa. *Journal of Development Economics*, 65(2), 491-500.

British Petroleum Statistical Review of World Energy (2016). 65th edition. London, United Kingdom: Author

Brainard, W. C., and Cooper, R. N. (1968). Uncertainty and diversification in international trade. *Food Research Institute Studies in Agricultural Economics, Trade, and Development*, 8(3), 256-285.

Cavallari, L., and d'Addona, S. (2013). Nominal and real volatility as determinants of FDI. *Applied Economics*, 45(18), 2603-2610.

Chowdhury, T. H., Mohammad, Prasad Sankar Bhattacharya, Debdulal Mallick, and Mehmet Ali Ulubaşoğlu. (2014). An Empirical inquiry into the role of sectoral diversification in exchange rate regime choice. *European Economic Review*, Vol. 67, 210-227.

Dell'Ariccia, G. (1999). Exchange rate fluctuations and trade flows: Evidence from the European Union. *IMF Economic Review*, 46(3), 315-334.

De Piñeres, S. A. G., and Ferrantino, M. J. (2000). Export dynamics and economic growth in Latin America: a comparative perspective. Ashgate Publishing.

De Vita, G., and Abbott, A. (2004). Real exchange rate volatility and US exports: an ARDL bounds testing approach. *Economic Issues*, 9(1), 69-78.

Esu, G. E., and Udonwa, U. (2015). Economic diversification and economic growth: Evidence from Nigeria. *J. Econ. Sustain. Dev*, 6(16), 56-69.

Feenstra, R. C., and Kee, H. L. (2004). Export Variety and Country Productivity (No. 10830). National Bureau of Economic Research, Inc.

Fernandez, D. G., and Klassen, S. (2006). Choice of currency by East Asia bond issuers. List of participants and authors from Korea, 28(15.8), 129

Frieden, J., Leblang, D., and Valev, N. (2010). The political economy of exchange rate regimes in transition economies. *The Review of International Organizations*, 5(1), 1-25.

Ghosh, A. R., and Ostry, J. D. (1994). Export instability and the external balance in developing countries. *Staff Papers*, 41(2), 214-235.

Hammouda, H. B., Karingi, S. N., Oulmane, N., and Jallab, M. S. (2008). The impact of industrial market access negotiations on African economies. *Oxford Development Studies*, 36(2), 187-208.

Heller, H. R. (1978). Determinants of exchange rate practices. *Journal of Money, Credit and Banking*, 10(3), 308-321.

Hasan, M. A., and Toda, H. (2004). Export diversification and economic growth: The experience of selected least developed countries. Development Paper, (24).

Herzer, D., and Nowak-Lehnmann D, F. (2006). What does export diversification do for growth? An econometric analysis. *Applied Economics*, 38(15), 1825-1838.

Hesse, H. (2008). Export Diversification and Economic Growth. World Bank Publications.

Hodey, L. S., Oduro, A. D., and Senadza, B. (2015). Export diversification and economic growth in sub-Saharan Africa. *Journal of African Development*, 17(3) 67-81.

Hunt, D. and D Silva, B. (1981). Go and stop: Agricultural development in Nigeria. Staff Report. Washington DC: USDA International Economic Division.

Imbs, J., and Wacziarg, R. (2003). Stages of diversification. *The American Economic Review*, 93(1), 63-86.

Jansen, M. (2004). Income volatility in small and developing economies: export concentration matters (No. 3). WTO Discussion Paper.

Jin, S. (2009). Discrete choice modeling with nonstationary panels applied to exchange rate regime choice. *Journal of Econometrics*, 150(2), 312-321.

Liu, X., and Zhang, J. (2015). Export diversification and exchange-rate regimes: Evidences from 72 developing countries. University Library of Munich, Germany.

Kemp, M. C., and Liviatan, N. (1973). Production and trade patterns under uncertainty. *Economic Record*, 49(2), 215-227.

Kenen, P. B. (1969). The Optimum currency area: An eclectic view w: R. Mundell, AK Swoboda (red.) Monetary Problems of the International Economy.

Markiewicz, A. (2006). Choice of exchange rate regime in transition economies: An empirical analysis. *Journal of Comparative Economics*, 34(3), 484-498.

McKinnon, R. I. (1963). Optimum currency areas. *American Economic Review*, Vol. 53, No. 4, 717-725.

McKinnon, R. I. (1969). Private and official international money: the case for the dollar (No. 74). International Finance Section, Department of Economics, Princeton University.

Melvin, M. (1985). The choice of an exchange rate system and macroeconomic stability. *Journal of Money, Credit and Banking*, 17(4), 467-478.

Mobarak, A. M. (2005). Democracy, volatility, and economic development. *Review of Economics and Statistics*, 87(2), 348-361.

Moore, W., and Walkes, C. (2010). Does industrial concentration impact on the relationship between policies and volatility?. *International Review of Applied Economics*, 24(2), 179-202.

Naudé, W., and Rossouw, R. (2008). Export diversification and specialization in South Africa: Extent and impact (No. 2008.93). Research paper/UNU-WIDER.

Olaleye, S. O., Edun, F., and Taiwo, S. B. (2014). Export Diversification and Economic Growth in Nigeria: An Empirical Test of Relationship Using a Granger Casualty Test. *Journal of Emerging Trends in Economics and Management Sciences*, 5(1), 70.

OPEC, O. (2016). Annual Statistical Bulletin 2016. Organization of Petroleum Exporting.

Pesaran, M. H., Shin, Y., and Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, 94(446), 621-634.

Poirson, M. H. (2001). How do countries choose their exchange rate regime? (No. 1-46). International Monetary Fund.

Rizzo, J. M. (1998). The economic determinants of the choice of an exchange rate regime: a probit analysis. *Economics Letters*, 59(3), 283-287.

Ruffin, R. J. (1974). Comparative advantage under uncertainty. *Journal of International Economics*, 4(3), 261-273.

Sauer, C., and Bohara, A. K. (2001). Exchange rate volatility and exports: regional differences between developing and industrialized countries. *Review of International Economics*, 9(1), 133-152.

Songwe, V., and Winkler, D. (2012). Exports and export diversification in Sub-Saharan Africa: A Strategy for Post-Crisis Growth. Africa Growth Initiative. Working paper 3. 2012.

Tran, T. A. D., Phi, M. H., and Diaw, D. (2017). Export diversification and real exchange rate in emerging Latin America and Asia: A South–North vs. South-South decomposition. *The Journal of International Trade and Economic Development*, 26(6), 649-676.

Watts, M. J. and T. J. Bassett (1986). Politics, the state and agrarian development: A comparative study of Nigeria and the Ivory Coast. *Political Geography Quarterly*, l5(2), 103-125.

Zaharieva, G. (2016). The relationship between export structure and economic development: the Bulgarian case, (4 (24)), 21-27.