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Empirical Investigation of the Impact of Export Diversification on Economic Growth: Evidence from Nigeria, 1980-2016

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Authors' contributions

This work was carried out in collaboration between the two authors. Both authors read and approved the final manuscript.

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ABSTRACT

This study examined the impact of export diversification on economic growth in Nigeria from 1980 to 2016. The ARDL bound testing approach to cointegration was employed as a methodology for the study. The results showed that export diversification had a positive and insignificant relationship with economic growth in Nigeria. However, exports of goods and services and the growth rate of exports had a positive and statistically significant effect on the country's economic growth, whereas openness to trade had a negative and insignificant influence. Furthermore, investment proxied by gross fixed capital formation exerted a positive and statistically significant relationship with economic growth. Nevertheless, the study concluded that trade openness was not a determinant of economic growth in Nigeria. The findings had important policy implications for economic policy and recommended that constructive attention should be given to exports of primary products which have persistently suffered from declining terms of trade in order to enhance economic growth. In addition, the current government should sustain the Economic Recovery and Growth Plan (ERGP), an export-led economic growth and development strategy. However, the country is encouraged to create the institutional capacity to ensure adherence to International Export Quality Assurance

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Standards, embark on value-addition to exportable goods through investment in technologies for the processing of primary export commodities to boost export quality and revenues and diversify the economy away from primary exports production for the ERGP to bear fruits. Furthermore, the enabling environment for the attraction of foreign direct investment in the export sector should be created by encouraging independent power supply providers through further liberalization of the power sector, for the country to realize its economic growth and development aspirations.

Keywords: Exports diversification; economic growth; ARDL; Nigeria.

1. INTRODUCTION

Since the emergence of petroleum as the major export product and revenue earner in Nigeria and the relegation of agriculture to the background, the country has been battling with the dilemma of near total dependence on a mono-product. Decades of military rule, corruption, political unrest, economic mismanagement and bad governance in its nascent democracy have made it impossible for the desired level of economic growth and development to be attained with exports as engine after five decades of oil exploration activities. Export diversification as a tool of structural economic transformation has generated a lot of debate in trade discussions among development economists, policymakers, scholars and development partners on whether specialization or diversification in export production should be adopted in order to enhance economic performance.

Exports diversification is a crucial aspect of the development process that has been viewed by experts in development economics as a potential engine that can help Low-income Countries (LICs) to enhance their macroeconomic performance, achieve higher income, sustain national competitive advantage, enhance macroeconomic stability, accelerate and sustain economic growth, reduce the deterioration of terms of trade, reduce the degree of vulnerability to external shocks, reduce dependence on primary products, acquire new technology, create new industries through backward and forward linkages that results from export diversification production and motivation for improving the composition of exports. The successful economic experiences of East Asian countries, such as China, Korea, and Taiwan replicate these submissions [1]. The relevance of export diversification to LICs led to a policy shift to it in the 2012 African Union Summit to promote sustainable economic growth in Africa [1].

[2] stated that diversification in exports and in domestic production are conducive to faster

economic growth in LICs. Export diversification laid the foundation for the political and economic success of Botswana and Mauritius that metamorphed to their becoming political and economic powerhouses in a continent notorious for its long history of political unrest, setting bad political precedence and economic mismanagement [3]. The achievements of these two countries have been labeled as political and economic miracles. As comprehensively documented by [4, p.462], Botswana's economic turnaround was so remarkable that it has been termed the "African miracle". Other countries in Sub-Saharan Africa with important success stories in terms of structural transformation and exports diversification are Burkina Faso, Rwanda, Uganda, and Togo. These country experiences show how an enabling environment, political and macroeconomic stability, and in some cases policies that effectively tackle specific constraints contribute to economic diversification [5].

The narrow export base of the Nigerian economy created export instability, low and volatile economic growth, poor performance of the non-oil export sector, low capacity utilization in the industries, excessive dependence on crude oil, poverty, low productivity, inflation, relegation of other sectors of the economy to the background and high budget deficit. In order to resolve the problems created in Nigeria in the early 1970s when oil became the main revenue earner and contributor to the overall Gross Domestic Product (GDP), reforms were embarked upon to improve economic performance. There was a shift in paradigm from import-substitution industrialization (ISI) to an outward-oriented development strategy with exports as the engine of economic growth. The Structural Adjustment Programme (SAP) was adopted in 1986 and market-friendly reforms were implemented to restructure and diversify the productive base of the economy.

Export diversification was one of the key targets of SAP aimed at reducing the near total

dependence of the country on crude oil and prevent macroeconomic volatility. Furthermore, it is worth noting that diversification of the economy was a high priority in the nation's Third National Development Plan (1975-1980) that coincided with the oil boom [6]. Trade liberalization policies, export promotion policies, and export expansion incentives were also put in place to encourage exports of non-oil products and ensure diversification. Agencies such as the Nigerian Export Promotion Council (NEPC) and the Nigerian Export-Import Bank (NEXIM) were established to encourage exports in the non-oil sector of the economy. Furthermore, decree No.34 of 1991 was promulgated with a view to expanding exports and ensuring diversification of the economy. It designed and established the Export Processing Zone (EPZ) as areas in the country for domestic and foreign firms to manufacture and assemble goods for export without customs barriers, duties and formalities required in export and import activities [7]. In spite of the shift in paradigm from ISI to outward orientation after the 1980s, market-friendly reforms, important policy changes, existing trade policies and incentives, there is no noticeable shift of dominance in export composition from oil-exports to non-oil exports and exports diversification has been limited and inadequate to enable Nigeria attain continuously a high and positive growth rates of exports, particularly in terms of non-oil exports that can guarantee diversification and contribute meaningfully to Gross Domestic Product (GDP) as expected.

Despite the successive reforms initiated and implemented, there was no shift in dominance of crude oil in export composition occasioned by an increase in the share of crude oil exports in total exports. For instance, between 1960 and 1970, the economy was predominantly agrarian in structure as revealed by the composition of the Gross Domestic Product (GDP) by economic activity. The contribution of agriculture to GDP in these periods was 64.1 and 47.6 percent respectively. In the mid-1970s, when petroleum became the major revenue earner, the share of agriculture to overall GDP plummeted, resulting in 33.6 percent in 1981. The share of agriculture to GDP was 37.9 and 42.1 percent respectively between 1990 and 2002 but from 2003 to 2010, it hovered around 41.0 percent [8]. Crude oil exports accounted for about 93.0 percent of total exports from 1970-1985 and increased to 96.0 percent from 1986-1998. This is disturbing because, in the Prebisch-Singer thesis, [9] and [10] argued that any country that concentrates on

exports of primary products will experience income volatility, decreasing growth rates and deteriorating terms of trade. In addition, as stated by [11], less broad-based and sustainable growth may be the outcome of focusing on primary commodities sectors with limited scope for productivity growth and quality upgrading. However, the share of non-oil exports in total export declined from an average of 7.0 percent from 1970-1985 to 4.0 percent between 1986 and 1998 and dropped further to 2.4 percent from 1999-2006. This development is disturbing sending very little hope of economic growth with export diversification as an engine.

Previous studies on export diversification and economic growth have shown diverse results, with some supporting the export diversification-led growth hypothesis [12,13,14,15,16,17,18,11, 19,20,21,22,7,23,24,25], while others did not support the export diversification-led growth hypothesis [26,27,28,29]. Despite this large body of empirical literature that had investigated the connection between export diversification and economic growth, results remain mixed and the study inconclusive and open to discussion. To the best of our knowledge, this study is among the first few efforts to explore the export diversification-led growth hypothesis in Nigeria.

The above scenarios, therefore, raise the research question: What is the impact of export diversification on economic growth in Nigeria? It is against this backdrop that this study intends to examine the relationship between export diversification and economic growth in Nigeria. The paper is structured as follows: Section 2 reviews the literature. Section 3 describes the methodology. Section 4 dwells on data presentation, analysis, and discussions while section 5 would focus on conclusion and policy recommendations.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Empirical Literature

There has been a plethora of literature over the years on the relationship between export diversification and economic growth. Some of these studies focused on diversification and the others on specialization. For instance, [27], one of the most quoted work on export diversification and economic growth used the Ordinary Least Square estimation technique to explore the

relationship between export diversification and economic growth in Jordan and other selected ARAB countries from 1975-2010. The results showed that there is no significant relationship between export diversification and economic growth.

In addition, [30] in a related study employed a descriptive method of analysis to provide possible ways of diversifying the productive base of the Nigerian economy. Considering the success recorded in Nigeria before the discovery of oil and the unusual situation in the country, they stated that there is a need for diversification if Nigeria is to free itself from problems that characterize a mono-product economy with near total dependence on oil that is subject to unfavourable quota arrangements, international price shocks, and depletion.

Furthermore, [31] in another similar study examined the relationship between export diversification and economic growth as a result of progress in non-traditional export diversification in Tanzania. He explored the causal relationship between exports growth and growth rate of aggregate non-traditional products using time series data from 1980-2012. For the purpose of comparison, the growth rate of aggregate traditional products was included in the study. The results revealed that there is a statistically significant relationship between growth rate of aggregate non-traditional products and overall exports growth in the short run whereas aggregate traditional products had an insignificant impact. On the other hand, there is no relationship between the two variables in the long-run. However, a bi-directional short-run relationship which runs from non-traditional products to exports growth and vice-versa exists.

On the same subject and employing the Cointegration and Granger causality tests methodologies, on a model containing real GDP, the degree of specialization and diversification, capital expenditure and the number of people employed, [32] investigated the impact of export diversification on economic growth in Malaysia using times series data from 1980-2007. The results revealed the existence of a unique cointegrating vector among the four variables. Furthermore, in line with the submissions of previous studies in Malaysia, the results showed that export diversification has a significant impact on economic growth.

In another similar study, [7] utilized a generalized production function specification framework and Granger causality methodology to investigate the relationship between export diversification and economic growth in Nigeria from 1972-2012. Agricultural share of total exports, oil share of total exports, and manufactured products share of total exports was utilized as explanatory variables and per capita income was utilized as a measure of economic growth for the study. The Granger causality results revealed the presence of a uni-directional relationship between per capita income and all the variables with the exception of an agricultural share of total exports that showed a bi-directional relationship. This showed that export diversification had a positive and significant impact on economic growth in Nigeria.

Using the system Generalised Method of Moments (GMM) methodology and three different measures of diversification, [23] in a related study investigated the relationship between export diversification and economic growth using panel data of forty-two (42) Sub-Saharan African (SSA) countries. The results showed that export diversification had a significant effect on economic growth in SSA. The results do not, however, support a hump-shaped (non-linear) relationship between export diversification and economic growth in SSA. [24] investigated the relationship between export diversification and economic growth with a view to confirming the export diversification-led growth hypothesis on a sample of eighty-eight (88) countries from 1962-2009. Employing the system GMM estimator of dynamic panel model, the results provided evidence on the positive impact of export diversification on countries income per capita growth, with the stronger effect on developing countries, thereby confirming the export diversification led-growth hypothesis.

Similarly, [33] utilized the Vector Autoregressive (VAR) analysis and Granger causality tests methodologies to examine the relationship between export geographical diversification and economic growth among the Association of South East Asian Nations (ASEAN) countries from 1980-2014. Using a sample of five ASEAN countries of Singapore, Philippines, Thailand, Indonesia, and Malaysia, they computed for the geographical diversification of countries using the Herfindahl index (HHI). The results revealed a uni-directional relationship from export geographical diversification to economic growth for the Philippines. It showed a bi-directional

relationship for Malaysia. However, the results revealed no causality for Singapore, Thailand, and Indonesia. The non-causality results are indicative of the fact that the variables are independent for these countries. It is worthy of note that the HHI values revealed a decreasing trend for all 5 countries.

In Africa, [34], used a sample of cross-section data from 1998 to 2009 to investigate the impact of export diversification on economic growth. Employing the Ordinary Least Square and GMM methodologies on an augmented Solow growth model containing Gross Domestic Product (GDP) per capita growth rate, human capital growth, population growth rate, gross capital formation, export diversification, export growth rate, trade openness, industry, domestic credits, initial GDP per capita, inflation and life expectancy, the results revealed that there is faster economic growth in countries with more diversified exports. The study concluded that differences in export diversification levels account for the observed growth variations across Africa. In addition, it was evident from the results that both export diversification and export growth had strong impacts on economic growth rates across the region. However, the results showed that trade openness was not a strong determinant of economic growth in Africa.

It is evident from the literature review above that while an avalanche of empirical studies has been undertaken to examine the relationship between export diversification and economic growth, the findings have been mixed and inconclusive. [see 12,13,14,15,16,17,18,11,19,20,21,22,7,25,26,27, 28,29]. Studies on the relationship between export diversification and economic growth in Nigeria is sparse, has received limited attention and calls for further studies. These confer the justification for this study as the non-diversification of exports has been a disturbing issue in Nigeria. This study contributes to the existing literature by exploring this relationship in the context of Nigeria.

2.2 Theoretical Framework

Raul Prebisch and Hans Singer are the earliest scholars that advanced a theoretical argument for the relationship between export diversification and economic growth [34]. This culminated in the "Prebisch-Singer Hypothesis", where [9] and [10] vigorously propounded that concentration on exports of primary products by developing countries would impede their growth. In addition, it leads to declining terms of trade and escalates

the instability of income. The theoretical framework is couched on the relationship between export diversification and economic growth and hinged on the endogenous growth theory. The endogenous growth theory emerged during the late 1980s and early 1990s and as observed by [35], was led by [36,37,38].

The inability of the neoclassical theory to account for the variations in national income between developing and developed countries led to the growth of the endogenous growth theory. The endogenous growth framework provides a model-based strategy for examining the association between export diversification and GDP per capita growth. Rather than dwelling on the principle of diminishing marginal returns to scale of the inputs to the level of output that was an integral part of the neoclassical growth theory, it argued that the inputs of production exhibit constant marginal returns to productivity and capital formation [39].

The major area of focus of the endogenous growth theory was shaped by the relationship between international trade and economic growth. This growth model endogenizes growth since it sees internal production processes as the source of GDP growth. Unlike the neoclassical growth theories which assume technology to be given [40, p.44], endogenous models as noted by [41, p.147], argued that the level of technology in the economy stems from international capital transfers between Less Developed Countries (LDCs) and developed countries. Therefore, the endogenous growth theory emphasized international capital movements as the avenue for the role of international trade (imports and exports) to become more pronounced [39].

As comprehensively documented by [42, p.2], this theory emphasizes on the desirability of vertical diversification that entails a shift in a country's production and export structure from primary commodities to manufactured goods. This shift occurs when commodities that were previously exported in raw form is now processed before export. [19, p. 1825] provided evidence of manufactured trade having better prospects for spillover effects than primary commodity trade. [43, p.790] stated that spillover effects resulted from technological upgrading (learning-by-exporting and learning-by-doing) and skills which have more positive externalities than in primary commodity production. Learning-by-exporting will make Nigeria be more

productive in order to attain a high level of growth.

The choice of this theory was informed by the fact that Nigeria, like many other developing countries, depends heavily on a narrow range of traditional primary exports and have shifted from ISI to an outward-oriented trade policy. In order to compete in the international arena, trade was liberalized and emphasis shifted from production of primary products to specialization in production in the areas of comparative advantage which entails horizontal diversification. This shift was based on the premise that resource allocation will be more efficient through specialization in production and exports leading to increases in welfare and economic growth for the country [44]. However, the degree of vulnerability to external shocks will be increased by concentrating and exporting a small number of products. For economic growth to be sustained, a shift from horizontal diversification to vertical diversification is required. Success in vertical diversification entails that the trade-growth transmission mechanism must involve technology. This can only be guaranteed by the endogenous growth theory. Furthermore, in the contention of endogenous growth theory, long-run economic growth can only be achieved through export diversification because of its emphasis on the role of dynamic spillover effects and increasing return to scale.

Finally, it can be argued that the major theoretical discussions on the role of export

diversification in engendering and maintaining steady economic growth in developing countries are linked to the endogenous growth theory. Therefore, it is obvious in terms of national expectations, that the success of export diversification is assessed, by the degree to which a country shifts from the production of traditional primary commodities to the manufacture of goods that it possesses the most comparative advantage over the others. In addition, trade liberalization should be used to achieve higher and more diversified exports [45]. This is the position of this study.

3. METHODOLOGY

3.1 Sources of Data

This study used time series data from 1980 to 2016. The data needs were identified on the basis of objectives of the study. The data for this study were derived from World Bank's (WB), World Development Indicators (WDI) database, International Monetary Fund's (IMF), World Economic Outlook (WEO) database, and United Nations Conference on Trade and Development (UNCTAD) database. The choice of a thirty six years period was informed by the intention to critically address the country's specific dimension to the export diversification-led growth debate. In addition, the choice of the period was informed by the developments in the Nigerian economy. The official change in policy direction towards the import-substitution strategy and an outward oriented strategy, which became the government

Table 1. Variable definitions, measures and sources of data

Variable	Description	Source of data
Dependent variable		
GDP per capita growth rate	Annual percentage growth rate of GDP per capita (%) (Constant 2010 US\$)	WB, WDI
Independent variables		
Export growth rate	Annual growth rate of exports of goods and services (Constant 2010 US\$)	WB, WDI
Openness to trade	Exports plus imports divided by GDP	UNCTAD
Export diversification	Normalised Herfindahl-Hirschman Index (HHI)	IMF and UNCTAD
Population growth rate	Annual population growth rate (%)	WB, WDI
Life expectancy	Average of life expectancy at birth, total (years)	WB, WDI
Domestic credits	Domestic credits provided by the financial (banking) sector (% of GDP)	WB, WDI
Gross fixed capital formation	Gross fixed capital formation (% of GDP)	WB, WDI
Exports of goods and services	Exports of goods and services (% of GDP)	WB, WDI

Source: Authors Compilation

policies from the late 1960s and mid-1980s respectively was in 1986 with the introduction of the Structural Adjustment Programme (SAP). The SAP had diversification of the economy away from oil as one of its cardinal objectives. Therefore, the period of export diversification is covered by the scope of this study.

3.2 Model Specification

The theoretical foundation for this model specification is provided by the endogenous growth models for economic growth equation. Based on the endogenous growth framework employed for this work, technology was postulated to be an important factor in economic growth. The analytical framework for examining the impact of export diversification on economic growth specifies technology and other conventional determinants of economic growth proposed in the growth literature. Thus, following [46], the analytical framework for estimating the export diversification-growth nexus is based on the Cobb-Douglas production function below:

$$Y = AK^aL^b \tag{3.1}$$

$$GDPpc_t = \alpha_0 + \alpha_1 GROWREXP_t + \alpha_2 OPEN_t + \alpha_3 EXPD_t + \alpha_4 POPG_t + \alpha_5 LE_t + \alpha_6 DC_t + \alpha_7 GFCF_t + \alpha_8 EXPGS_t + \varepsilon_t \tag{3.3}$$

Where:

$\alpha_0, \alpha_1, \alpha_2, \dots, \alpha_8$ = Parameters in the model

$GDPpc_t$ = Real GDP per capita growth rate

$GROWREXP_t$ = Growth rate of exports

$OPEN_t$ = Openness to trade

$EXPD_t$ = Export diversification

$POPG_t$ = Annual population growth rate

LE_t = Life expectancy (average of life expectancy at birth)

DC_t = Domestic credits provided by the banking sector

$GFCF_t$ = Gross fixed capital formation

$EXPGS_t$ = Exports of goods and services

ε_t = error term

Y denotes the output level of Gross Domestic Product, A is the exogenous state of technology or the efficiency of production, K is the amount of capital and L denotes labour. The model revealed that output is determined by the productivity parameter and its inputs of labour and capital.

The model used in this study was adapted from [34]. Assuming that the production function will take a linear form, the general form of the model estimated in this paper has the following form:

$$Growth\ Rate\ of\ GDP = \alpha_t + \beta X_t + \varepsilon_t \tag{3.2}$$

where X is a set of independent variables which affect Real Gross Domestic Product (RGDP). t captures the time dimension of 1980-2016 and ε is the error term.

Based on the insights provided by this author with reference to the expected relationship between export diversification and some causal variables, a general empirical model of export diversification on Nigeria's economic growth can be put as:

The choice of variables in this study was based on the frequency of their citations in previous theoretical and applied economics research. The variables added to the model were the gross fixed capital formation and exports of goods and services. The variables discarded from the model were initial GDP per capita, human capital, industrial share of GDP, gross capital formation, and inflation. The export growth rate is hypothesized to exert a direct relationship ($\alpha_1 > 0$) with GDP per capita growth rate. This is because they allow for diffusion of technology across countries by exposing them to more advanced methods of production and new ideas. As a standard in the literature, the trade openness variable was approximated by the ratio of total trade to GDP. The competitiveness of host countries exports will be enhanced through foreign direct investment. Because of the multiplier process, there would be an increase in GDP as a result of an increase in exports and investments. In addition, foreign exchange for the importation of capital goods could be generated through increased exports and investments. Alternatively, an increase in the trade openness of a country would lead to an increase in foreign direct investment and then, economic growth. Consequently, direct relationship ($\alpha_2 > 0$) is expected between trade openness and real GDP per capita growth rate.

Export diversification is proxied by HHI index. The HHI index value ranges between $0 \leq H \leq 1$. A high degree of concentration of exports (extreme low diversification) is depicted by an index closer to 1 whereas a low concentration of exports (high diversification) is depicted by an index value close to 0 [see 34]. The HHI shows the degree of concentration of exports and not diversification. As observed by [34], the HHI is interpreted indirectly and in opposite ways regarding concentration and diversification; the higher the concentration, the lower the diversification. [34,20,47,45,48,19,25] included

export diversification in their growth equation and found a positive relationship. Based on theoretical predictions and these empirical findings, we expect a direct link ($\alpha_3 > 0$) between the two variables. However, since the Herfindahl index is a measure of export concentration, we expect it to be negatively related to GDP per capita growth. As observed by [49], the constant position level of capital for each unit of labour will be depressed once the population increases faster than the level of growth in capital output. Hence, there would be a reduction in economic growth occasioned by a reduction in the constant position level of output per unit of labour. Therefore, an inverse relationship ($\alpha_4 < 0$) between population growth rate and GDP per capita growth rate is expected.

Life expectancy is included in the model as a measure of the health of the population which indirectly affects the participation of the working population in economic activities. The coefficient is expected to be positive ($\alpha_5 > 0$). The coefficient of domestic credits is expected to be positive ($\alpha_6 > 0$) because a high level of domestic credits ensure that more funds are available for investment in the economy. The importance of investment to economic growth is proxied by Gross Fixed Capital formation. It is expected to bear a positive relationship to economic growth ($\alpha_7 > 0$). This is because a rise in the capital as a factor of production should translate to a rise in economic growth. As far as exports of goods and services in the economy is concerned, once the competitiveness of local firms is boosted through exports, the competitiveness of host countries exports would be enhanced leading to an increase in GDP per capita growth rate and vice versa. Hence, the coefficient for exports of goods and services is expected to be positive ($\alpha_8 > 0$).

Restating equation 3.3 as an ARDL model in line with the framework of [50], we have:

$$\begin{aligned}
 \Delta GDPpc_t &= \alpha_0 + \sum_{i=1}^n \alpha_{1,i} \Delta GDPpc_{t-i} + \sum_{i=1}^n \alpha_{2,i} \Delta GROWREXP_{t-i} \\
 &+ \sum_{i=1}^n \alpha_{3,i} \Delta OPEN_{t-i} + \sum_{i=1}^n \alpha_{4,i} \Delta EXPD_{t-i} + \sum_{i=1}^n \alpha_{5,i} \Delta POPG_{t-i} \\
 &+ \sum_{i=1}^n \alpha_{6,i} \Delta LE_{t-i} + \sum_{i=1}^n \alpha_{7,i} \Delta DC_{t-i} + \sum_{i=1}^n \alpha_{8,i} \Delta GFCF_{t-i} \\
 &+ \sum_{i=1}^n \alpha_{9,i} \Delta EXPGS_{t-i} + \alpha_{10} GDPpc_{t-1} + \alpha_{11} GROWREXP_{t-1} \\
 &+ \alpha_{12} OPEN_{t-1} + \alpha_{13} EXPD_{t-1} + \alpha_{14} POPG_{t-1} + \alpha_{15} LE_{t-1} + \alpha_{16} DC_{t-1} \\
 &+ \alpha_{17} GFCF_{t-1} + \alpha_{18} EXPGS_{t-1} \\
 &+ \varepsilon_t \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots 3.4
 \end{aligned}$$

export diversification and economic growth, the application of inappropriate methodology would lead to biased and inconsistent estimates.

The econometric problems of residual serial correlation and endogeneity bias can be corrected through the ARDL technique of cointegration [see 54,52]. Furthermore, as stated by [55], the ARDL approach to cointegration is better than other Vector Autoregressive (VAR) techniques. This view was expanded further by [52] and [50] who demonstrated using small sample size and concluded that the ARDL technique outclasses other techniques like the Phillip and Hansen's fully modified OLS. [61] advocated that the ARDL approach is robust when testing small and large sample sizes as opposed to previous cointegration techniques that were sensitive to small samples. Finally, as was advocated by [62], once the omitted variable bias and autocorrelation problems have been addressed, estimates of both short-run and long-run components of the equations can be obtained simultaneously. The concepts of Vector Autoregressive Models (VAR), Vector Error Correction Models (VECM), cointegration, stationarity and unit roots underpinned the building of bounds test [see 51]. We employed the Augmented Dickey-Fuller (ADF) test to check the time series properties of the data before estimating the growth equation. Our specification

was also subjected to diagnostic tests in order to ascertain the goodness of fit and model adequacy. The computation of the above statistical techniques was carried out using version 9 of the Eviews econometric software.

4. DATA PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

4.1 Results of Augmented Dickey Fuller (ADF) Unit Root Test on Series

The ADF test results of the variables included in the export diversification-growth model were depicted in Table 3. Based on the results, the variables were either I(0) or I(1) justifying the application of the ARDL methodology to our model.

4.2 Results of Diagnostic Tests for ARDL Model

The diagnostic tests help us to ascertain the goodness of fit and model adequacy. The results in Table 4 revealed that equation 3.4 passed the diagnostic test. The null hypothesis cannot be rejected at the 95% confidence level in the Ramsey Regression Equation Specification Error Test (RESET) model, Jarque-Bera normality test, heteroskedasticity test ARCH and Breusch-Godfrey Serial Correlation LM Test.

Table 3. Results of the unit root tests

Variables	Levels	First difference	Inference
Real GDP per capita growth rate	-4.5311 (-2.9458)	-	I (0)
Growth rate of exports	-8.1567 (-2.9458)	-	I (0)
Openness to trade	-1.1211 (-2.9458)	-5.0944 (-2.9484)	I (1)
Export diversification	-0.3590 (-2.9458)	-5.8796 (-2.9484)	I (1)
Annual Population growth rate	-6.2305 (-2.9719)	-	I (0)
Life expectancy	-2.9712 (-2.9571)	-	I (0)
Domestic credits	-2.2635 (-2.9458)	-5.4881 (-2.9540)	I (1)
Gross fixed capital formation	-3.2643 (-2.9458)	-	I (0)
Exports of goods and services	-2.4341 (-2.9458)	-8.7782 (-2.9484)	I (1)

*Numbers in parenthesis are 5% critical values based on the [63]
Source: Authors Compilation*

Table 4. Diagnostic results for ARDL Model

Test	Test statistic	P-value	Null Hypothesis	Conclusion
Breusch-Godfrey Serial Correlation LM Test	2.438850	0.1261	H ₀ : No serial correlation	Cannot reject H ₀
Ramsey RESET test	1.814770	0.0910	H ₀ : Correctly specified	Cannot reject H ₀
Jarque-Bera normality test	1.768675	0.412988	H ₀ : Normal distribution	Cannot reject H ₀
Heteroskedasticity Test: ARCH	0.842685	0.6426	H ₀ : Homoskedasticity	Cannot reject H ₀

Source: Authors Compilation

The results showed that the model is linear or correctly specified. This was evident from the Ramsey RESET result that revealed a p-value of 0.0910 which was greater than the chosen 5% level of significance. We concluded that the series was normally distributed since the Jarque-Bera p-value of 0.4130 was greater than the 5% level of significance. The Breusch-Pagan-Godfrey test for heteroskedasticity showed that the p-value of the F-Statistic was greater than 5% level of significance. Hence, we accepted the null hypothesis of constant variance of the error term. The Breusch-Godfrey Serial Correlation LM Test was carried out to check if the specified model suffers from autocorrelation problem with a view to ascertaining the validity or otherwise of the estimates. Since the p-value of 0.1261 was greater than 5% level of significance, we accepted the null hypothesis of no serial correlation in the residuals and as such the estimates are valid.

4.3 Results of the Bounds Test for Cointegration

The results of the bounds tests for the existence of cointegration between economic growth and its determinants was presented in Table 5. The results from the table revealed that the computed F-statistic for the joint test of the coefficients α_{10} , α_{11} , α_{12} , α_{13} , α_{14} , α_{15} , α_{16} , α_{17} , and α_{18} was 10.7014. The critical value bounds at the 95 percent level were 2.55 and 3.68. The null hypothesis of no cointegration between the variables in the model cannot be accepted since the computed F-statistic was above the 95

percent upper bound I(1) of the critical value band computed by [64] and [50]. The null hypothesis was rejected. In other words, a long run relationship exists among the variables in our model. Once the existence of a long-run relationship among the variables in the model had been established, the ARDL cointegration method was used to estimate the long-run and short-run parameters of the growth equation.

4.4 Results of the Long-run Relationship

The results in Table 6 revealed that most of the variables were significant and had the expected signs. All the variables were significant with the exception of population growth rate, export diversification, and domestic credits. The outcome of the results for most of the variables was in line with theoretical expectations. Openness to trade and domestic credits were the only variables that defied expectations. This showed that the variables included in the model had a significant long-run impact on economic growth in the case of Nigeria.

The growth rate of exports included in the long-run equation was positive and significant with the expected sign. It exerted a positive effect on the growth rate of real GDP. This implies that a unit increase in growth rate of exports would increase growth by 0.14 percent. This had some implications to trade policies that diversification in the export structure should go along with policies to promote growth in exports to achieve long-run economic growth across the region.

Table 5. Bounds tests for the existence of cointegration

Test statistic	Value	Lag	Significance level	Bound critical values*	
				Lower bound	Upper bound
F-statistic	10.7014	2	1%	I(0)	I(1)
			5%	3.15	4.43
			10%	2.55	3.68
				2.26	3.34

Critical value bounds for the F-statistic at 95% confidence level from [50].

Source: Authors compilation

Table 6. Results for estimated long-run coefficients

Dependent Variable: GDPpc				
Variable	Coefficient	Std. error	t-statistic	Prob.
C	-255.266885	61.778098	-4.131997***	0.0009
GROWREXP	0.135924	0.039696	3.424131***	0.0038
OPEN	-0.000333	0.000070	-4.777946***	0.0002
EXCON (HHI)	-0.260219	0.549004	-0.473983	0.6423
POPG	-14.717890	14.016890	-1.050011	0.3103
LE	6.254950	1.664082	3.758799***	0.0019
DC	-0.055700	0.077833	-0.715638	0.4852
GFCF	0.326780	0.184312	1.772976*	0.0965
EXPGS	0.326849	0.108261	3.019081***	0.0086

Note: EXCON signifies exports concentration (HHI)

Note: *** and * denote significance at 1%, and 10% respectively.

Source: Extract from E-views econometric software

The result showed that openness to trade or trade liberalization exerted a negative and significant relationship with real output growth contrary to expectation. The result revealed that a 1 percent increase in openness to trade could reduce growth by 0.0003 percent. This implies that the continuing efforts of the government at liberalizing international trade on a multilateral basis to contribute to better market access and rates of growth of international current account transactions were not yielding the desired result. This conflicting result for the Nigerian economy was quite implausible since the standard in the literature was that trade promotes growth through inflows of foreign direct investment, transfer of technology and knowledge. This was not consistent with the results of [65,66,67,68]. This argument finds an advocate in [69,70]. These results stress the importance of variations in export and import prices on per capita Gross Domestic Product (GDP) growth. These variations are a major source of instability in less developed countries, especially in Africa, where the bulk of export earnings is from primary commodities.

Export diversification results are not given a direct interpretation. It is worthy of note that the Normalised Herfindahl-Hirschman Index (HHI), used as a proxy for export diversification measures exports concentration. Hence, the coefficient of export diversification in Table 6 reflects the degree of exports concentration. It has far reaching implications for export diversification. Therefore, a high concentration of exports reflects a low export diversification. On the other hand, a low concentration of exports indicates a high export diversification. Hence, the negative sign exhibited by the export diversification coefficient means that the higher

the concentration of exports, the lower the growth rate of GDP per capita. Alternatively, the lower the diversification of exports, the lower the growth rate of GDP per capita. Based on foregoing, there was a positive and insignificant relationship between export diversification and growth rate of GDP per capita. The negative sign revealed that a high export diversification or a lower concentration (specialization) leads to a high growth rate of GDP per capita. This results also imply that a 1 percent increase in exports concentration would lead to a 0.26 percent decrease in growth rate of real GDP per capita. The implications of this result are that a higher rate of economic growth would be experienced in countries with a higher rate of export diversification (less concentration), in line with the earlier theoretical prediction and empirical results of [45,47].

Surprisingly, export diversification had a positive relationship with the growth rate of real GDP in Nigeria. The justification for this unexpected result is the efforts of the current government on economic diversification through agriculture. The suggested plausible reasons for the non-significance of the export diversification variable were limited and inadequate export diversification and the oscillation of primary commodities prices in the international market, especially severe shocks from price fluctuation in the international crude oil market. This finding was consistent with the submissions of [20,24,18,25,23,34]. However, it was contrary to the findings of [26,27,28,29].

Population growth rate had a negative and insignificant relationship with real GDP growth. This suggests that a 1 percent increase in population growth rate would lead to 14.72

percent decrease in economic growth. This result exerted a deleterious effect on economic growth. The plausible explanation for this is that the Nigerian economy was gradually returning to agro-based nature as a new revenue option away from oil as a result of the diversification drive of the current government. Hence, the agricultural sector relies heavily on a large population of smallholder farmers with far reaching implications for national output. Because of the low levels of mechanization in agriculture, the bulk of the country's agricultural output would be generated through manual labour. Therefore, a drop in the growth rate of the population would affect the population of smallholder farmers and agricultural output respectively. Once there is a drop in agricultural output, there will be a drop in real output growth. This result finds an advocate in [71].

Life expectancy had a positive and significant relationship with economic growth as expected. This implies that a unit increase in life expectancy would increase growth by 6.25 percent. The implication is that as the health of the population proxied by life expectancy improves, there would be an increase in real output and vice versa as a result of increased economic activities. This submission is sharply in agreement with the results of [34]. Domestic credits had a negative and insignificant relationship with economic growth contrary to expectation. This implies that a 1 percent increase in domestic credits would lead to 0.06 percent decrease in economic growth. This result suggests that the level of domestic credits in the Nigerian economy is low and reduces the funds available for investment. This result is in sharp contrast with the submissions of [34].

Gross fixed capital formation, which is a proxy for investment had a positive and significant relationship with economic growth as expected. The positive and significant relationship of the gross fixed capital formation employed as a proxy for investment with real output growth is suggestive of the fact that the investment in Nigeria encourages economic growth. This may be connected to the improvement in the investment climate in Nigeria as a result of the degrading of the Boko Haram militants that made the investment climate inimical to foreign investors by the Nigerian military. This finding is also consistent with existing literature on economic growth which emphasizes capital deepening. This result also implies that a unit

increase in gross fixed capital formation would increase growth by 0.33 percent.

Another intriguing result in the context of the Nigerian economy is the impact of exports of goods and services on economic growth. This is because the bulk of Nigeria's exports is on primary products. However, exports of goods and services had a positive and significant relationship with real GDP growth rate as expected. This implies that a unit increase in exports of goods and services would increase growth by 0.33 percent. This result is supported by an economic theory which states that exports are injections to the circular flow of income and increase in their levels would have a multiplier effect on aggregate demand and real output growth respectively. The implication of this result is that exports of goods and services have translated significantly to a meaningful increase in the growth rate of real GDP. This result is contrary to the submissions of [69] but in line with the findings of [72,73,74,75].

4.5 Results of the Short-run Dynamic Model

The results in Table 7 revealed that the overall performance of the model was satisfactory with some of the independent variables having the expected relation with the growth rate of GDP per capita. All the variables were significant except population growth rate. The outcome of the results for most of the variables was in line with theoretical expectations. Domestic credits, export diversification and exports of goods and services were the only variables that revealed contrary signs. This showed that the variables included in the model have a significant short-run impact on economic growth in case of Nigeria. The results of the estimated short-run error correction model provide estimates of short-run elasticities while the ecm_{t-1} coefficient shows the speed with which the system converges to equilibrium. Change in real GDP per capita growth rate had a positive and significant impact on the rate of real output growth in the short-run suggesting that improvement in the economy contributes to real output growth. Impact of the growth rate of exports of the previous year on the rate of growth of real output was positive and significant in the short-run. This means that economic growth would increase by 0.08 percent, should the growth rate of exports be increased by 1 percent. This is consistent with the result of the long run growth equation.

Table 7. Results of estimated short-run error correction model

Dependent Variable: GDPpc				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPpc(-1))	0.362051	0.105729	3.424333***	0.0038
D(GROWREXP)	0.084032	0.041005	2.049306**	0.0583
D(OPEN)	0.000216	0.000084	2.564437**	0.0216
D(OPEN(-1))	0.000938	0.000149	6.279997***	0.0000
D(EXPCON)	6.657267	1.264053	5.266605***	0.0001
D(EXCON(-1))	3.049395	1.112313	2.741489***	0.0151
D(POPG)	-26.547672	25.330822	-1.048038	0.3112
D(LE)	11.282485	3.222540	3.501115***	0.0032
D(DC)	-0.565376	0.133203	-4.244464***	0.0007
D(GFCF)	0.589435	0.317113	1.858753*	0.0828
D(EXPGS)	-0.334953	0.130629	-2.564166**	0.0216
D(EXPGS(-1))	-0.322246	0.151422	-2.128130**	0.0503
ECM _{t-1}	-1.803769	0.183896	-9.808633***	0.0000

$$ECM = GDPPCGR - 0.1359 * GROWREXP - 0.0003 * OPENNESS - 0.2602 * EXPD - 14.7179 * POPGR + 6.2550 * LIFEEXP - 0.0557 * DC + 0.3268 * GFCF + 0.3268 * EXPGS - 255.2669 * C - 0.2484 * D$$

Note: EXCON signifies exports concentration

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

Source: Extract from E-views econometric software

However, the short-run effect of openness to trade of the previous year on the rate of growth of real output was positive and significant. The results thus imply that if openness to trade goes up by 1 percent, economic growth would increase by 0.0009%. This result is in line with the submissions of [76]. Export diversification of the previous year exerted a negative and significant relationship with real output growth in the short run. Based on exports concentration coefficients of 6.6573 and 3.0494 respectively, it can be discerned that this variable had a deleterious effect on economic growth (see appendix 3). These coefficients reflected a high degree of exports concentration in Nigeria. In other words, this means a low level of export diversification in the short-run. This may be a reflection of the unstable pattern of growth of the Nigerian economy as a result of limited and inadequate exports diversification occasioned by overdependence on a single commodity export. Hence, a negative correlation was established between export diversification and economic growth for Nigeria in the short-run. This result is in sharp contrast with the submissions of [34,18,24,20,23,25] but sharply in agreement with the findings of [26,27,28,29].

Change in population growth rate maintained its negative and insignificant relationship with real output growth as in the long-run equation whereas life expectancy of the previous year maintained a positive and significant relationship with real output growth in the short-run consistent

with the long-run results. The coefficient of domestic credits in the dynamic growth equation maintained its negative coefficient as in the long-run growth equation. Furthermore, change in gross fixed capital formation maintained its positive and significant relationship with real output growth in the short-run consistent with the long-run results. This means that economic growth would increase by 0.60% percent, should investment be deepened by 1 percent. This result calls for the liberalization of the financial sector with a view to enhancing investment through the reduction of interest rates, provision of loans, which would eventually foster growth. Change in exports of goods and services exerted a deleterious effect on real output growth in the short-run. Alternatively, changes in exports of goods and services do not impact real output growth positively. The results indicate the need for constructive attention to be given to the exports sector of the Nigerian economy by putting in appropriate trade policies

The coefficient of the lagged error correction term or ecm_{t-1} for the growth equation was -1.8038, suggesting that real GDP per capita growth rate corrects about 180% of its past deviation from equilibrium every year. Alternatively, this means that divergence from short-run to long-run equilibrium in real GDP per capita growth rate was 180% within one year. Hence, more than 180% disequilibrium in the previous year was corrected in the current year as a result of the highly significant error

correction term. The speed of adjustment in real output growth was very high. The coefficient of the lagged error correction term was significant and in the view of Granger (1988), revealed that a long-run Granger causality runs from the independent to the dependent variables. Furthermore, the negative sign and high significance of the speed of adjustment to long-run stable equilibrium based on the estimated ecm_{t-1} further confirms the existence of a long-run relationship between real GDP per capita growth rate and the explanatory variables.

5. CONCLUSION AND RECOMMENDATIONS

The relationship between export diversification and economic growth in Nigeria was investigated by this study. The HHI was employed for the measurement of export diversification. The Autoregressive Distributed Lag (ARDL) bound testing approach to cointegration was employed for the estimation of the empirical analysis. The results revealed that export diversification had a positive and insignificant relationship with economic growth in Nigeria implying that a higher rate of economic growth would be experienced in Nigeria because of a higher rate of export diversification (less concentration). The non-significance of the export diversification variable indicates the need for constructive attention to be given to exports of primary products which have persistently suffered from declining terms of trade in order to enhance economic growth.

One key conclusion of this study is that despite the efforts of the current government on economic diversification, especially through agriculture, there is no econometric evidence to suggest that export diversification is significantly driving economic growth for Nigeria. But it is necessary to stress that this conclusion does not imply that export diversification does not play an important role in the Nigerian economy. It is possible that export diversification has contributed to a certain degree to economic growth, but their contributions are the traditional ones associated with diversification of primary exports. The findings of this study have important policy implications for socio-economic development policy in Nigeria. The key policy recommendations that can be drawn from this study are as follows:

For export diversification and export-led growth strategy to be meaningful, investment by the government in technologies for the processing of

primary export commodities for the purpose of value-addition, boosting of export quality and revenues accruable from them is crucial. Besides, the lack of institutional capacity to adhere to International Export Quality Assurance Standards which reduces the export revenue of Nigeria as a result of exports of substandard and unprocessed products should be addressed immediately. Since exports of goods and services contributed positively and significantly to economic growth based on the results of this study, export promotion policies should be encouraged to achieve growth. In addition, since there is a strong empirical evidence in support of the current government's Economic Recovery and Growth Plan (ERGP), an export-led economic growth and development strategy, it should be sustained. In order to promote exports, the government should provide subsidies to export-oriented producers especially smallholder farmers and Small and Medium Scale Enterprises (SMEs) who drive the economy.

The enabling environment for the attraction of foreign direct investment in the export sector should be created. The conscious provision of necessary infrastructures, which would lower the cost of doing business in Nigeria is one way to improve the business environment. Since value-addition to primary exports commodities depends heavily on a reliable supply of energy, there is a need for heavy investment in the energy sector by the government. Since the erratic power supply is a key disincentive for foreign investment in Nigeria, there may be need to encourage independent power supply providers through further liberalization of the power sector. This is expected to complement the efforts of the Nigeria Electricity Distribution Companies whose inability is apparent in constant power failures and attendant high cost of providing electricity. Furthermore, the study revealed that economic growth would be attained in Nigeria if promotion of exports was supported by increased investments in capital formation and improvements in quality of life expectancy since these two variables had a positive and significant relationship with real GDP growth.

Greater emphasis should be placed on export diversification in Nigeria's trade policy. There is a need for the diversification of the revenue base of the economy away from heavy dependence on oil. Because of reliance on one major export product and limited diversification, export price volatilities had been the bane of the Nigerian

economy. But, with the fluctuation in prices in the international crude oil market and search for alternative sources of energy led by developed countries of the world, reliance on crude oil for the attainment of economic growth through export is surely a risky decision that could make Nigeria the poverty capital of the world. Nigeria, as a matter of urgency, needs to find a feasible alternative to crude oil and indeed diversify her export composition. One viable alternative is the optimal exploitation of the solid mineral sector.

Our empirical findings showed that openness to trade exerted a negative and insignificant relationship with economic growth suggesting that trade openness was not a determinant of economic growth in Nigeria. Accordingly, Nigeria needs to consider lowering her domestic currency value relative to foreign currencies. This would make the purchase of foreign goods expensive for Nigerians as a result of the undervalued domestic currency. On the other hand, it makes it cheaper for foreigners to purchase Nigeria's exports, thereby promoting exports. There is a need for appropriate fiscal and monetary policies that can ensure stability in the foreign exchange rate for the inflow of foreign direct investment and encouragement of exports-led growth. Furthermore, State-owned development banks should be encouraged by the government to provide domestic credits to export-oriented industries more especially Small and Medium Scale Enterprises (SMEs).

6. LIMITATIONS OF THE STUDY

This study encountered some limitations ranging from non-availability of data to the calculation of HHI of export concentration from two different datasets. Data on some of the variables utilized for this study were not available for some years. For instance, data on the growth rate of exports and Gross Fixed Capital Formation were not available for 1980. In addition, there were no data for the growth rate of exports, Gross Fixed Capital Formation, life expectancy and exports of goods and services for 2016. Due to our inability to get data on these variables, extrapolation was utilized to bridge the gap. Furthermore, the export diversification index was collected from two different datasets. The data from 1980-2010 was collected from the IMF export diversification database. The data from 2011-2016 was derived from the UNCTAD annual product concentration and diversification indices of exports and imports.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. United Nations Economic Commission for Africa. Unleashing Africa's Potential as a Pole of Global Growth; 2012.
2. International Monetary Fund. Sustaining long-run growth and macroeconomic stability in low-income countries: The role of structural transformation and diversification; 2014.
3. Armah R. Botswana and Mauritius: A comparative analysis of a political and economic success story in the most unlikely Region. An Unpublished Master's Degree Thesis in Public Administration of the Minnesota State University, Mankato Mankato, Minnesota; 2015.
4. Cook A, Sarkin J. Is Botswana the miracle of Africa? Democracy, the rule of law, and human rights versus economic development; 2010. (Accessed 15 April 2018) Available:<http://www.uiowa.edu/~tlcp/TLCP%20Articles/192/sarkin.finalfinal.mlb.042210.pdf>
5. International Monetary Fund. The regional economic outlook: Sub-Saharan Africa fiscal adjustment and economic diversification; 2017.
6. Igberaese T. The effect of oil dependence on Nigeria's economic growth. An Unpublished Master of Arts in Development Studies of the International Institute of Social Studies. The Hague, The Netherlands; 2013.
7. Olasode OS, Femi E, Babatunde TS. Export diversification and economic growth in Nigeria: An empirical test of the relationship using the granger causality test. *Journal of Emerging Trends in Economics and Management Sciences*. 2013;5(1):70-79.
8. Mordi CNO, Englama A, Adebunsi BS, Editors. The changing structure of the Nigerian economy. Atisele Vanessa Cards Co., Ikeja, Lagos; 2010.
9. Prebisch R. The economic development of Latin America and its principal problems. New York: United Nations; 1950.
10. Singer H. The distributions of gains between investing and borrowing

- countries. *American Economic Review*. 1950;473-85.
11. Papageorgiou C, Spatafora N. Economic diversification in LICs: Stylized facts and macroeconomic implications. IMF Staff Discussion Notes 12/13, International Monetary Fund; 2012.
 12. Hausmann R, Hwang J, Rodrik D. What you export matters. *Journal of Development Economics*. 2007;12(1):1-25.
 13. Matthee M, Naude W. Export diversity and regional growth in a developing country context: Empirical evidence. *Regional Studies Association International Conference*, Prague; 2007.
 14. Malizia EE, Ke S. The influence of economic diversity on unemployment and stability. *Journal of Regional Science*. 1993;33:221–235. DOI: 10.1111/j.1467-9787.1993.tb00222.x
 15. Lederman D, Maloney WF. Trade structure and growth. *World Bank Policy Research Working Paper*. 2003;3025.
 16. Wagner JE, Deller S. Measuring the effects of economic diversity on growth and stability. *Land Economics*. 1998;74(4): 541-556.
 17. Saviotti P, Frenken K. Export variety and the economic performance of countries. *Journal of Evolutionary Economics*. 2008;18(2):201–218.
 18. Hesse H. Export diversification and economic growth. *Commission on Growth and Development Working Paper No.21*, Commission on Growth and Development, Washington DC: New York; 2008.
 19. Herzer D, Novak-Lehmann F. What does export diversification do for growth? An econometric analysis. *Applied Economics*. 2006;38(15):1825–1838.
 20. Al Marhubi FA. Export diversification and growth: An empirical investigation. *Applied Economics Letters*. 2000;7(9):559-562.
 21. Misztal P. Export diversification and economic growth in European Union Member States. *Oeconomia*. 2011;10(2): 55-64.
 22. Carere C, Cadot O, Strauss-Kahn V. Trade diversification: Drivers and impacts. *Review of Economics and Statistics*. 2011;93(2):590-605.
 23. Hodey LS, Oduro AD, Senadza B. Export diversification and economic growth in Sub-Saharan Africa. *Journal of African Development*. 2015;17:67-81.
 24. Kadyrova A. The effect of export diversification on country growth. An Unpublished Master of Arts Thesis in Economics of the Central European University, Budapest, Hungary; 2011.
 25. De Ferranti DG, Perry D, Maloney W. From natural resources to the knowledge of the world economy. *American Economic Review*. 2002;89(5):1234–58.
 26. Pineres AGD, Ferrantino. *Export dynamics and economic growth in Latin America*. Burlington, Vermont: Ashgate Publishing Ltd; 2000.
 27. Spetan KAA, Saqfalhait N. Export diversification and economic growth: The case of Jordan and other selected ARAB countries. *International Research Journal of Finance and Economics*. 2013;1(1):22-37.
 28. Sachs J, Warner A. Natural resource abundance and economic growth. *NBER Working Paper*. 1995;5398.
 29. Maloney W. Missed opportunities: Innovation and resource-based growth in Latin America. *Policy Research Working Paper*. 2002;2935.
 30. Eko SA, Utting CA, Onun EU. Beyond oil: Dual-imperatives for diversifying the Nigerian economy. *Journal of Management and Strategy*. 2013;4(3):81-93.
 31. Lwesya F. Export diversification dynamics in Tanzania non-traditional products approach. *Journal of Economics and Sustainable Development*. 2016;7(13).
 32. Arip MA, Yee LS, Karim BA. Export diversification in Malaysia. *Munich Personal RePEc Archive*, MPRA Paper. 2010;20588. (Accessed 15 March 2018) Available:<http://mpra.ub.uni-muenchen.de/20588/>
 33. Hinlo JE, Aranguiz GIS. Export geographical diversification and economic growth among ASEAN Countries. *Munich Personal RePEc Archive*, MPRA Paper. 2017;81333:1-16. (Accessed 15 December 2017) Available:<http://mpra.ub.uni-muenchen.de/81333/>
 34. Lugeiyamu EJ. Is export diversification a key force to Africa's economic growth? cross-country evidence. An Unpublished M.Sc Economics Thesis of the International Business School of Jonkoping University; 2016.
 35. Baldwin RE. Openness and growth: What's the empirical relationship?" *NBER Working Paper*. 2003;W9578:1-34. (Accessed 8 May 2018)

- Available:<http://www.nber.org/Papers/W9578> (08/05/11)
36. Romer PM. Increasing returns and long-run growth. *Journal of Political Economy*. 1986;5(94):1002-1037.
 37. Lucas RE Jr. On the mechanics of economic development. *Journal of Monetary Economics*. 1988;1(22):3-42.
 38. Grossman GM, Helpman E. *Innovation and growth in the global economy*. Cambridge: MIT Press; 1991.
 39. Nyasulu T. Assessing the impact of exports and imports on economic growth: A case study of Malawi from 1970 to 2010. An Unpublished M.Econ Thesis in Development Studies of the Institute of Social Development, Faculty of Economics and Management Sciences, University of the Western Cape; 2013.
 40. Lal D, Editor. *Development economics*. Brookfield: Elgar Publishers; 1992.
 41. Todaro M, Smith P. *Economic development: 11th ed*. Massachusetts: Addison-Wesley-Longman; 2009b.
 42. Naude W, Rossouw R. Export diversification and specialization in South Africa: Extent and impact'. *World Institute for Development Economics Research Paper*. 2008;2008(93):1-32.
 43. Petersson L. Export diversification and intra-industry trade in South Africa. *South African Journal of Economics*. 2005;73(4): 785-802.
 44. Osakwe P. Foreign aid, resources, and export diversification in Africa: A new test of existing theories. *African Trade Policy Paper 61*, Economic Commission for Africa, Addis Ababa; 2007.
 45. Pineres SAG, Ferrantino M. Export diversification and structural dynamics in the growth process: The case of Chile. *Journal of Development Economics*. 1997; 52(2):375-91.
 46. Chartas V. The impact of foreign direct investment on economic growth in China. an unpublished M.Sc Thesis of the Erasmus School of Economics, Erasmus University Rotterdam; 2012.
 47. Dogruel S, Tekce M. Trade liberalization and export diversification in selected MENA countries; 2011.
 48. Lederman D, Maloney WF. Trade structure and growth. In: Lederman D, Maloney WF, editors. *Natural resources: Neither curse nor destiny*, Palo Alto: Stanford University Press; 2007.
 49. Solow R. A contribution to the theory of Economic growth. *Quarterly Journal of Economics*. 1956;16:65-94.
 50. Pesaran MH, Shin Y, Smith R. J. Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*. 2001;16(3):289–326.
 51. Manwa F. Impact of trade liberalization on economic growth: The case of the Southern African Customs Union (SACU) countries", Ph.D. thesis, Southern Cross University, Lismore, NSW; 2015.
 52. Pesaran MH, Shin Y. An autoregressive distributed lag modelling approach to cointegration analysis. *Econometrics and economic theory in the 20th century: the Ragnar Frisch Centennial Symposium*. Cambridge: Cambridge University Press, Chapter 11; 1999.
 53. Engle RF, Granger CWJ. Cointegration and error correction: Representation estimation and testing. *Econometrica*. 1987;55(2):251–76.
 54. Inder B. Estimating long-run relationships in economics: A comparison of different approaches. *Journal of Econometrics*. 1993;57(1–3):53–68.
 55. Banerjee A, Dolado J, Galbraith J, Hendry D. *Cointegration, error- correction, and the econometric analysis on non-stationary data*. Oxford: Oxford University Press, *Advanced Texts in Econometrics*; 1993.
 56. Johansen S. Estimation and hypothesis testing of cointegration vectors in gaussian vector autoregressive models. *Econometrica*. 1991;59(6):1551–80.
 57. Johansen S, Juselius K. Maximum likelihood estimation and inference on cointegration – with application to the demand for money. *Oxford Bulletin of Economics and Statistics*. 1990;52(2): 169–211.
 58. Trinh T. Foreign aid and economic growth: the impact of aid on determinants of growth – the case of Vietnam. an unpublished M.Sc Economics Thesis of the School of Business, Aalto University; 2014.
 59. De Vita G, Abbott A. Are saving and investment cointegrated? An ARDL bounds testing approach. *Economics Letters*. 2002;77(2):293-299.
 60. Fosu OAE, Magnus FJ. Bounds testing approach to cointegration: An examination of foreign direct investment trade and growth relationships. *American Journal of Applied Sciences*. 2006;3(11):2079-2085.

61. Odhiambo NM. Energy consumption and economic growth nexus in Tanzania: An ARDL bounds testing approach. *Energy Policy*. 2009;37(2):617-622.
62. Olkeba FD. The relative role of foreign aid and domestic resource mobilizations as a strategy to boost the economic growth of developing countries: The case of Ethiopia. An unpublished M.Sc International Cooperation Policy Thesis of the Asia Pacific University; 2013.
63. MacKinnon JG. Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics*. 1996;11:601–618.
64. Narayan PK. Reformulating critical values for the bounds F-statistics approach to cointegration: An application to the tourism demand model for Fiji. Melbourne: Department of Economics, Monash University; 2004.
65. Asiedu E. On the determinants of foreign direct investment in developing countries: Is Africa different? *World Development*. 2001;30(1):107-19.
66. Ayanwale AB. foreign direct investment and economic growth: Evidence from nigeria. AERC Research Paper 165 African Economic Research Consortium, Nairobi; 2007.
67. Li X, Liu X. Foreign direct investment and economic growth: An increasingly endogenous relationship. *World Development*. 2005;33(3):393-407.
68. Flexner N. Foreign direct Investment and economic growth in Bolivia 1990-1998. Central Bank of Bolivia Research Paper. La Paz April 2012; 2000.
69. Boakye PF. The impact of foreign aid on economic growth. an unpublished M.A Economics Degree of the Department of Economic, School of Graduate Studies, College of Arts and Social Sciences, Kwame Nkrumah University of Science and Technology, Kumasi; 2008.
70. Atoyebi KO, Akinde JO, Adekunjo FO, Edun F. Foreign trade and economic growth in Nigeria: An empirical analysis. *American Academic and Scholarly Research Journal*. 2012;4(5).
71. Akintunde TS, Olomola PA, Oladeji SI. *Population Dynamics and Economic Growth in Sub-Saharan Africa*; 2013.
72. Adelegan JO. Foreign direct investment and economic growth in Nigeria: A seemingly unrelated model. *African Review of Money, Finance and Banking, Supplementary Issues of "Savings and Development"*. 2000;5-25.
73. Chanthunya CI. Trade regime and economic growth: Special reference to Zambia and Malawi. Unpublished Ph.D. Thesis, University of Wales; 1992.
74. Matemvu B. Causal relationship between exports and economic growth in selected SADC countries" Unpublished M.A. Thesis, Chancellor College, University of Malawi; 1997.
75. Njikam O. Exports and economic growth in Sub-Saharan Africa: Is there a connection?' University of Yaoundé, Cameroon; 2003.
(Accessed 6 September 2017)
Available:<http://www.csae.ox.ac.uk/conferences/2004GPRaHDiA/papers/3fousmanouCSAE2004.pdf#search='Exports%20and%20economic%20growth%20in%20SubSaharan%20Africa%3A%20is%20there%20a%20connection%3F%E2%80%99>
76. Whitaker MT. The impact of foreign aid on economic growth. an unpublished B.A Economics Degree of the Department of Economic, McAnulty College of Liberal Arts, Duquesne University Pittsburgh, Pennsylvania; 2006.
77. United Nations. Economic Commission for Africa, & Unie, A. Unleashing Africa's potential as a pole of global growth. United Nations Economic Commission for Africa; 2012.

APPENDICES

APPENDIX 1

Technical notes on the Measurement of Export Diversification

Diverse measures and indexes such as the Herfindahl-Hirschman Index, the Ogive Index, Manufacturing Value-Added Gini (the Gini Index), the Hirschman Index, IMF Export Diversification Index, the Entropy Index and some others can be employed for the estimation of export concentration. The Normalised Herfindahl-Hirschman Index (HHI) was utilized to measure export diversification. Evidence from the literature [see 18, 77, 34, 48] showed that the HHI is the most commonly used measures of export concentration. The HHI formula is stated as:

$$HHI = \frac{\sqrt{\sum_{i=1}^N \left(\frac{X_i}{\sum_{i=1}^N X_i} \right)^2} - \frac{1}{\sqrt{N}}}{1 - \frac{1}{\sqrt{N}}}$$

Where:

X_i = denotes the export of product i

N = represents the number of products measured

The value of the HHI ranges from 0 to 1 ($0 \leq H \leq 1$). The HHI measures the degree of export concentration, which is the opposite of export diversification. Based on this premise, the HHI is not given a direct interpretation. Hence, concerning export concentration and export diversification, HHI is given an indirect and opposite interpretation. An HHI closer to zero suggests a low concentration of exports (high diversification). The implication of this result is high export diversification and not export concentration in a narrow range of products. However, an HHI closer to 1 implies a high concentration of exports (low diversification). The result suggests a low export diversification and export concentration on a narrow range of products. The Africa Development Bank Group dataset created by the IMF Export Diversification and Quality Database was employed for the estimation of the normalized Herfindahl-Hirschman Index.

APPENDIX 2**Data Set****Table 2. Data used for the study**

Year	EXPD	GDPpc	Growrexp	GFCF	DC	LE	POPG	EXPGS	OPEN
1980	6.15207	1.269317	9.758958	33.5873	21.34852	45.32756	2.857502	29.375174	27071
1981	6.13258	-15.4548	-9.06302	35.22126	30.50503	45.63166	2.715063	22.187518	18771
1982	6.21621	-3.59523	-10.4549	31.95333	40.11763	45.86276	2.602676	17.833838	12657
1983	6.08976	-7.42755	-7.67113	23.0065	47.80231	46.01834	2.535412	14.536161	10758
1984	6.10608	-4.46862	10.27426	14.22397	47.36878	46.10193	2.529287	15.705433	12289
1985	6.14782	5.582075	8.464987	11.96524	43.40376	46.12198	2.562732	17.385204	13430
1986	6.1101	-11.0988	-8.91026	15.15382	48.67183	46.09546	2.603203	13.316029	5335
1987	6.05648	-13.0645	5.412287	13.60753	36.01997	46.0429	2.625639	26.941856	7784
1988	5.88982	4.750048	3.010679	11.87108	34.30533	45.98429	2.630931	22.854625	7239
1989	5.9778	3.721842	29.82911	11.74232	20.14459	45.93266	2.612415	43.981317	8423
1990	5.98931	9.894914	-4.44508	14.25014	21.90187	45.89463	2.579037	35.34425	14550
1991	6.00349	-3.1158	8.062911	13.73268	21.457	45.86978	2.545611	41.701081	13140
1992	6.07703	-2.0668	-26.5185	12.74817	30.7989	45.85266	2.521242	37.509377	12844
1993	5.98492	-0.4332	18.6482	13.55003	39.23953	45.8408	2.502971	33.829862	11073
1994	5.89997	-1.57481	2.261426	11.16543	46.43969	45.83971	2.492996	24.310228	9830
1995	5.72404	-2.75861	-8.57627	7.065756	23.61694	45.85132	2.489435	35.761493	12342
1996	5.93685	2.413317	-10.878	7.289924	13.25739	45.87705	2.488365	32.238568	16850
1997	5.94163	0.275909	47.90399	8.356764	12.58747	45.92129	2.488183	41.774597	15994
1998	5.78685	0.188875	2.086617	8.60161	18.19661	45.99246	2.490724	29.69152	9855
1999	5.8333	-2.00238	-10.7527	6.994108	19.08104	46.10002	2.495813	33.869533	13856
2000	6.0379	2.714291	13.25302	7.017881	10.0059	46.26444	2.503397	51.730361	20965
2001	5.88211	1.821728	-23.6196	7.579868	19.30146	46.50573	2.511214	45.448071	19645
2002	5.76466	1.200834	11.62738	7.009923	19.54912	46.82995	2.521106	35.965691	18137
2003	5.844153	7.589887	31.36121	9.904054	21.1969	47.23463	2.53684	39.7879	27449
2004	5.96388	30.35658	-0.95472	7.39337	11.70138	47.71078	2.559239	30.160752	38102

Year	EXPD	GDPpc	Growrexp	GFCF	DC	LE	POPG	EXPGS	OPEN
2005	6.00521	0.804665	12.37454	5.458996	8.600411	48.23837	2.585222	31.656971	56994
2006	5.99347	5.422785	60.21778	8.265865	4.909406	48.79285	2.610391	43.11133	59233
2007	5.9371	4.053715	-17.6522	9.249637	19.19983	49.34627	2.631654	33.728521	67494
2008	5.85034	3.492157	28.76531	8.323477	26.55391	49.87756	2.648967	39.883129	88024
2009	5.83494	4.126187	-30.7018	12.08816	37.10522	50.37573	2.661221	30.768616	58385
2010	5.78232	4.999833	53.52364	16.5552	18.79768	50.83727	2.668747	25.264116	82699
2011	0.803	2.119094	25.79272	15.53394	22.14949	51.26968	2.674755	31.329805	102438
2012	0.801	1.524086	-3.58897	14.16254	22.48619	51.69049	2.677659	31.438748	98524
2013	0.821	2.614626	-21.7365	14.16873	22.47713	52.11271	2.672919	18.049907	99419
2014	0.816	3.519624	24.08503	15.08353	21.88651	52.54134	2.659551	18.435126	83903
2015	0.839	-0.02224	-0.26891	14.82718	23.1437	52.97793	2.640357	10.631935	50079
2016	0.844	-4.16011	11.90806	14.95536	26.55513	52.75964	2.619034	14.533531	38312

Source: World Bank, World Development Indicators, International Monetary Fund, World Economic Outlook Database, African Development Bank Group Dataset and United Nations Conference on Trade and Development Database (Various Years)

APPENDIX 3

Concentration Degrees of the Herfindahl index Scores

Table 8. Herfindahl index score and their degrees of concentration

HHI	Degree of concentration
≤0.01	Highly diversified
0.01-0.15	Unconcentrated/diversified
0.15-0.25	Moderately concentrated
≥0.25	Highly concentrated

Source: U.S. Department of justice/federal trade commission, 2010

APPENDIX 4

Graph of Diagnostic Test

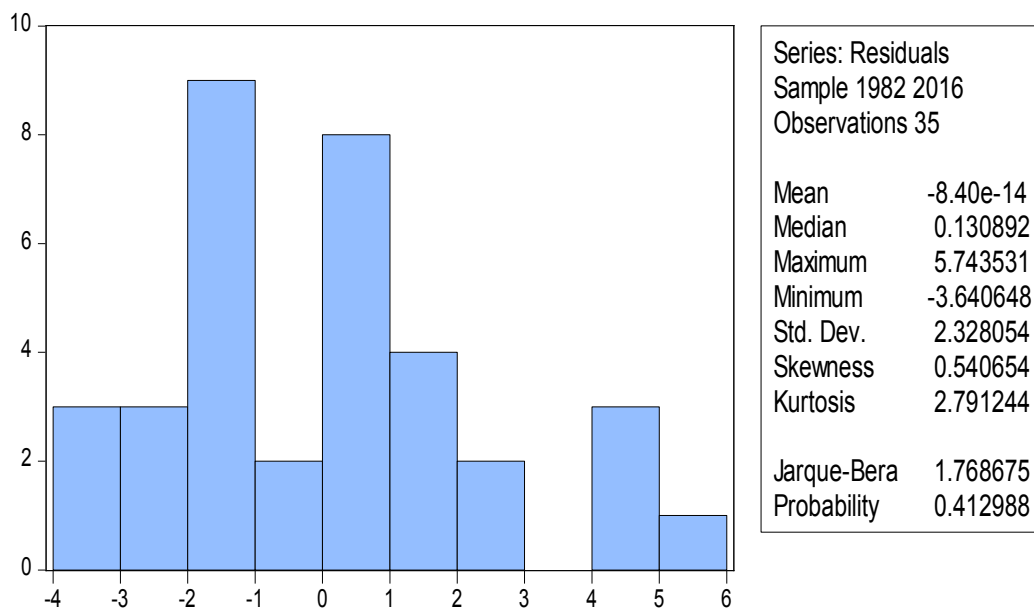


Fig. 1. Histogram for normality of residuals

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