AN EMPIRICAL ANALYSIS OF THE IMPACT OF NON-OIL EXPORTS ON THE ECONOMIC DEVELOPMENT OF NIGERIA

나이지리아 경제 성장에 미치는 비(非) 석유 수출 영향 실증 분석.

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Advisor: Prof. Utai Uprasen

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Abstract

With the rapid dwindling of crude oil prices, countries that depend solely on oil exports constantly experience economic instability. As a result, most countries seek to diversify their export products to stimulate growth. Existing literature on the impact of non-oil exports on economic development and growth in Nigeria ignored the fact that foreign direct investment (FDI) and government expenditure (GEXP) are necessary economic variables that influence growth in the economy. Their results therefore do not adequately explain the magnitude of the impact of non-oil exports due to omitted variable bias. In order to find a solution to this problem, this study improves previous studies by adding these variables in a simultaneous equation to reduce the omitted variable bias. Annual time-series from 1981-2017 was analysed by employing the Auto-Regressive Distributed Lag (ARDL) model for the estimation. The empirical results indicate a significant impact of non-oil exports on the economic growth of Nigeria on the long run and short-run. It indicated that a 1 percent *increase in non-oil exports increases GDP by 0.48* percent *at 1* percent *significant level. The Toda-Yamamoto Granger causality test also confirms a unidirectional causal relationship indicating that non-oil export causes an increase in the economic growth of Nigeria.*

Keywords: Export, Endogenous Growth Model, Economic Growth, Autoregressive Distributed Lag (ARDL) Model, Toda-Yamamoto Granger Causality, Nigeria.

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국문초록

원유가격의 급속한 하락으로 석유수출에만 의존하는 국가들은 끊임없이 경제불안을 겪고 있습니다. 그 결과, 대부분의 나라들은 성장을 촉진하기 위해 수출 상품의 다양화를 추구합니다. 비석유 수출이 나이지리아의 경제성장에 미치는 영향에 대한 기존 문헌은 외국인 직접투자(FDI)와 정부지출(GEXP)이 경제 성장에 영향을 미치는 필수 경제 변수라는 사실을 무시했습니다. 따라서 그들의 결과는 누락된 변동 편향으로 인한 비석유 수출의 영향의 크기를 적절하게 설명하지 못합니다. 이 연구는 이 문제를 해결하기 위해 이러한 변수를 동시 방정식에 추가하여 생략된 변수 치우침을 줄임으로써 이전 스터디를 개선합니다. 1981~2017년의 연간 시계열은 추정에 ARDL (Auto-Regressive Distributed Lag) 모델을 사용하여 분석되었습니다. 경험적 결과는 석유가 아닌 수출이 나이지리아의 경제 성장에 장기적으로 단기적으로 큰 영향을 미친다는 것을 보여줍니다. 그것은 비석유 수출이 1 퍼센트 증가하면 GDP가 1 퍼센트 유의미한 수준에서 0.48 퍼센트 증가한다는 것을 나타냈습니다. 토다-야마모토 그레인저 인과관계 검사에서도 비석유 수출이 나이지리아의 경제성장 증가를 유발한다는 단방향 인과관계가 확인되고 있습니다.

키워드: 수출, 경제성장, 내생적 성장 모델, 자기 회귀 분산 지연(ARDL) 모델, 토다-야마모토 그레인저 인과관계, 나이지리아.

Declaration

I Ekeke Uchenna Stephen, declare that to the best of my knowledge, this work is an original representation my research and analysis, and as such has not been published and or submitted for any other degree awarded by any other university.

……..

Ekeke Uchenna Stephen Ejike

Dedication

This thesis is dedicated to my family and friends for their support, care, guidance and encouragement. This work is also dedicated to my supervisor, Prof. Utai Uprasen for having faith in me, being there for me from the first day I contacted him when I was in Nigeria, his constant guidance to help me complete this research and also inspiring me to want to do more in the area of international studies.

Acknowledgement

My deepest gratitude goes to Professor Utai Uprasen my most amiable and hardworking supervisor, who gave all his time and effort to guide me at every stage of this thesis. I am especially thankful to him for all he did to make me focused on completing my research. I am thankful also to the members of the faculty and Department of International and Area Studies.

In addition, my deepest gratitude goes to God, my family who were always there for me and my fellow colleagues and friends who supported and helped to build this research. Lastly, my gratitude goes to those who created avenues for me to relax and unwind. However, I take full responsibility any errors made in the research.

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Chapter One

Introduction

1.1. Background of Study

Trade has over the years, been regarded as an important component required to increase economic growth. Economic theories postulated that through foreign trade, foreign capital can flow into a country (Ricardo, 1817). The argument for this is that as long as the value of exported goods in an economy supersedes the value of imported goods, there would exist a positive trade balance, which invariably boosts economic development.

This basic idea has led many economists and policy makers to constantly investigate the impact of exports and how best to draw up policies necessary for further economic growth. For some, exports will encourage technical knowledge transfer through suggestions and experiences shared by foreign buyers (Grossman and Helpman, 1991). It will drive a rise in the economies of scale, creating an increase in the import of capital goods as well as intermediate goods and promote industrialization (Chenery and Stout, 1966; Krugman, 1985). The foreign exchange earnings generated from a positive trade balance would create more employment for the domestic market and as such, export-promotion strategies should be preferred to stimulate economic development (Xu, 1996).

Exports are so important to an economy that the efficiency of the factors of production intensifies, due to competition from international trade partners (Balassa, 1978; Krueger, 1980). This is why many empirical studies have been conducted to identify the causal relationship and

impact between exports and economic growth. Yet, when we talk of exports, a particular notice is to identify the kind of goods necessary for exports. This is because of the theory of comparative advantage postulated by Ricardo (1817) which suggests that countries will trade with one another only when they both have goods that they each have a relative advantage in productivity. Upon this theory, many economists have argued that exported goods need to be diversified in order to generate more income from trade. The World Trade Organization (2010) suggested that when the export base of a country diversifies, it would increase the level of local production of different goods at the same time creating more income and employment for the people as well as further increase economic growth.

Exports, generally has been divided into Oil exports and Non-oil exports by many scholars. The reason for this classification holds to the fact that Crude oil is regarded as an essential commodity in the world. According to the Independent Petroleum Association of America (IPAA, 2015), crude oil exports will produce economic benefits, lower trade deficits, reduce and stabilize fuel prices which invariably stimulates the economic activity and increase growth as well as development. About 80 percent of the export revenue generated from countries who make up the Organization of Petroleum Exporting Countries (OPEC), come from Oil and Gas exports. However, following the economic progress reported from the four Asian Tigers (South Korea, Singapore, Taiwan and Hong Kong) as a result of export promotion, it suggested that economic growth through exports relies heavily away from Crude oil but on diversification and expansion of non-traditional exports (Dunn and Mutti, 2004). This therefore promoted the argument for Non-oil exports.

Nigeria, Africa's largest economy is the 52nd largest export economy in the world according to 2017 statistics. This ranking generated over USD 40.8 Billion in exports for the nation and accounted for 24.4 percent of the country's GDP (CIA Fact book, 2017). For a country like Nigeria, exports and generating foreign capital is needed to accelerate and stabilize the economic growth of the country because of its low level of investment (Adenugba and Dipo, 2013). It is a requirement for countries to export in order to increase revenue and allow for economic growth and development. Export therefore, is a necessary catalyst for overall development of an economy (Abou-Strait, 2005). This invariably causes a rise in income earnings for the government as well as provide the right platform for growth and development, which can be reflected in better infrastructure, a rise in employment and a better GDP per capita.

Nigeria's economy from its export perspective shows that its export is basically from two goods: Oil exports and Non-oil exports. As a developing country, the economy of the nation has constantly been unstable and unpredictable due to its over dependence on Oil exports (Machi, 2011). Being the largest exporter of crude oil in Africa, the country is constantly susceptible to economic shocks that results from the fluctuation and volatility of oil prices in the international market (Olayungbo and Olayemi, 2018). The International Energy Agency (IEA, 2015) reported that Nigeria earned over USD 77 Billion in 2014 from crude oil exports but generated only over USD 41.33 Billion of the same product in 2015 according to the OPEC's Annual Statistical Bulletin (2016). This drop resulted solely because of the fall in crude oil prices recorded in 2015.

The economy has been a mono-product economy ever since the exploration of crude oil started in the 1970s. During the 1960s before the discovery of crude oil, almost 70 percent of Nigeria's rural population engaged in agricultural activities and this contributed to as much as 65

percent of Gross Domestic Product (Yesufu, 1996). Annual reports over the years and data show the dominance of oil exports as the major source of export earnings in the Nigerian economy started around the oil boom of 1973/74 (Audu, 2012). In recent times, Oil exports accounts for about 90 percent of total export in Nigeria, while non-oil account for less than 10 percent (Riti *et. al.,* 2016). With constant dwindling of crude oil prices, (a revenue that the country is highly dependent on), and an under-performing non-oil export sector, the country continues to experience after-shocks that causes ripple effects in the economy, making businesses to shut down, investors and foreign companies to depart the Nigerian markets, and many household incomes and expenditure to drastically decrease.

There is extreme poverty in Nigeria even though the country is the largest exporter of crude oil in Africa and the biggest economy in the continent. Empirical studies on the subject matter indicates that non-oil exports indeed influence economic growth and development in most developing countries including Nigeria. However, there are also some conflicting results. Some works found evidence that Non-oil exports positively influenced economic growth (Onuorah, 2018; Hosseini and Tang, 2014; Kromtit *et. al.*, 2017; Adewale *et. al.*, 2016; Nwodo and Asogwa, 2017; Ojide *et. al.*, 2014). On the other hand, Adenugba and Dipo (2013) found a negative evidence of such impact on economic growth in the case of Nigeria. To support the view that exports are necessary for economic growth, Riti *et. al.,* (2016); Olayungbo and Olayemi (2018) found evidence to support the positive impact of diversification on economic growth.

Non-oil exports are regarded as those commodities other than petroleum products (Crude Oil and Gas products) which are sold in the international market for generation of revenue (Kromtit *et. al.,* 2017). Many economists have argued that even though export is relevant for economic

growth, it is pivotally concentrated on non-oil exports in many countries around the world (Opara, 2010). As seen in the successes of the Asian Tigers and the volatility of the crude oil market, export diversification is therefore, regarded to have an important role in reducing the variability of export earnings of developing countries and raising the growth rates of both exports and domestic outputs (Lyakurwa, 1991). This diversification of a country's export base will greatly help countries to maintain and achieve economic growth (Lewis, 1980). Upon these various studies and discoveries have the question of the influence of non-oil exports on the economic growth and development continue to arouse the community of economists and policy makers and also upon which this research looks at the case of the Nigerian economy.

The non-oil export sector of Nigeria is pivotal in contributing to continuous economic growth for the country but with less attention in terms of funding, investment opportunities as well as policies implemented to grow the sector, the sector has continued to weather the storm and show signs for great importance to the Nigerian economy. Looking inwardly and outwardly for where lies the hope of this economy, it is of no doubt that the non-oil exports of Nigeria can bring to it the much needed stability and growth it requires. It is therefore in this light that this study examines the economic impact of non-oil export on the development of Nigeria, using time series data examined from 1981-2017 and employing the Auto-Regressive Distributed Lag (ARDL) co-integration technique for our empirical methodology. This is basically because the ARDL model can offer reliable outcomes when the size of the sample is not so much due to the availability of more dataset. Bounds test is conducted on the variables involved in this research and the long and short run estimates are obtained. Various diagnostic tests are then conducted to test the validity and authenticity of our research.

1.2. Research Objectives

This study's objective is to examine and estimate the impact of Nigeria's non-oil exports on its economic growth. They are:

Firstly, to examine the impact of non-oil exports on the economic development and growth of Nigeria.

Secondly, to empirically test the causal relationship between non-oil exports (NOX) on the economic growth of Nigeria.

1.3. Research Questions

Diversification of the export sector of the economy to get more out of the non-oil products of Nigeria and most especially for the nation's export sector to generate more income is believed by many economists and analysts to be best possible solution to solve this problem. Therefore, we ask in this study:

What is the relationship between non-oil exports (NOX) and the economic growth of Nigeria?

1.4. Research Hypothesis

Non-oil exports have a positive impact on the economic growth and development of Nigeria.

1.5. Research Structure

This study is structured into six chapters. The first chapter expatiates and introduces the background to the research discussion. It also states the objective of the study and its underlying

question. Furthermore, the hypothesis of the research and its structure is explained. The second chapter shows an overview of the Nigerian economy and its export structure. In chapter three, the study addresses the literature review, which consists of the theoretical and empirical studies related to this research. Chapter Four, looks at the model specification, estimation techniques and data descriptions are represented. The fifth chapter extrapolates the empirical results gotten from the quantitative analysis of the data used in this research. Finally, in chapter six, the study concludes and gives possible policy recommendations based on the results of the empirical analysis.

Chapter Two

An Overview of the Nigerian Economy

This chapter illustrates the current situation of the Nigerian economy, its export structure and policies implemented by the government to diversify its exports.

2.1. Overview of the Nigerian Economy

Nigeria (capital - Abuja), is a country located in Western Africa. It has a diverse geography and climates that ranges from arid to humid equatorial. However, the country's most diverse feature is its people. Boasting of a population of about 203 Million people, the nation is home to hundreds of languages, spoken within the country, consisting of the major three languages, which are, Yoruba, Igbo, and Hausa. Other languages include Fulani, Edo, Ibibio, Tiv, and English, which is the official language of the country. The country has abundant arable lands and natural resources that are notable for large deposits of petroleum and natural gas (Ade-Ajayi *et. al.*. 2020)

Since the early 1970's, the economy has been based primarily on the petroleum industry. Culminating with the end of the Biafran war from 1965-1973, a series of increases in world oil price gave the country the impetus to reap instant riches from its oil production. From this, rapid economic growth was experienced in various sectors like in transportation, construction, telecommunication, manufacturing, and government services was achieved throughout the country (Ade-Ajayi *et. al.*, 2020). According to the Nigerian National Petroleum Corporation (NNPC Industry profile, 2020), in the late 1960's and early 1970's, the country had attained a production

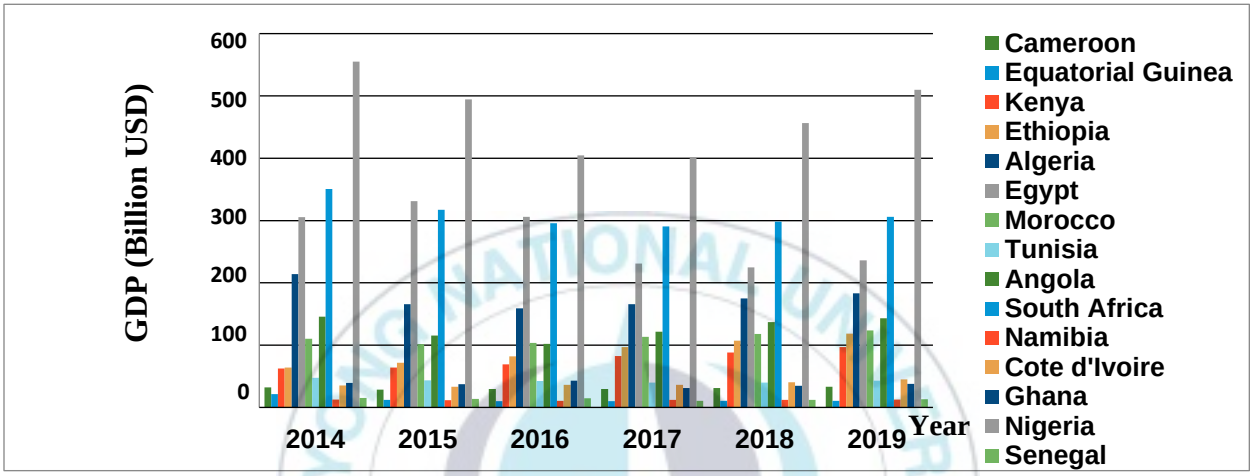
level of over 2 Million crude oil barrels per day. This generated large revenue for the country and caused a paradigm shift from Agriculture, which was the traditional export product of the nation. In the wake of the seventies, a great influx of rural people have begun to move into the larger urban centres, and agricultural production began to stagnate to an level that valuable export crops such as groundnuts (peanuts), palm oil, and cotton which were the major products were no longer significant export commodities (Ade-Ajayi *et. al.*, 2020).

Nigeria's economy is the largest in Africa. It is a mixed economy and its market is an emerging one with many middle-income earners. It has expanding manufacturing, technology and entertainment sectors as well as financial, service and communications sectors. Ranked as 27th in the world in terms of largest economies based on nominal GDP of about USD 446.5 Billion, and 23rd when it comes to the purchasing power parity of the economy worth about USD 1.271 Trillion (IMF Economic Outlook, 2019). Its re-emergent manufacturing sector became the largest on the continent in 2013, and believed to be the largest proportion of goods and services producer in the West African subcontinent (KPMG Sector Report, 2015).

As presented in <Figure 2.1> below, the nominal gross domestic product (GDP) of Nigeria was 33 percent more than second placed South Africa at around USD 550 Billion and USD 350 Billion respectively and roughly 42 percent more than third placed Egypt at around USD 300 Billion in 2014. The economy continued to experience growth in the economy but saw a drop in the total output of the economy. In 2016 and 2017, the GDP of Nigeria fell by over 25 percent valued at about USD 400 Billion. This was due to the economic recession in 2016, partly because of the fall in global crude oil prices and massive corruption because of the mishandling of public funds by government officials and politicians. Due to various economic policies and the rise of

crude oil prices, the GDP of the Nigeria recovered within the next couple of years and currently sits at a little over USD 500 Billion in 2019, which is almost 8 percent lower than its current value in 2014.

<Figure 2.1>: Gross Domestic Product (GDP) of Some Top African Countries, 2014-2019

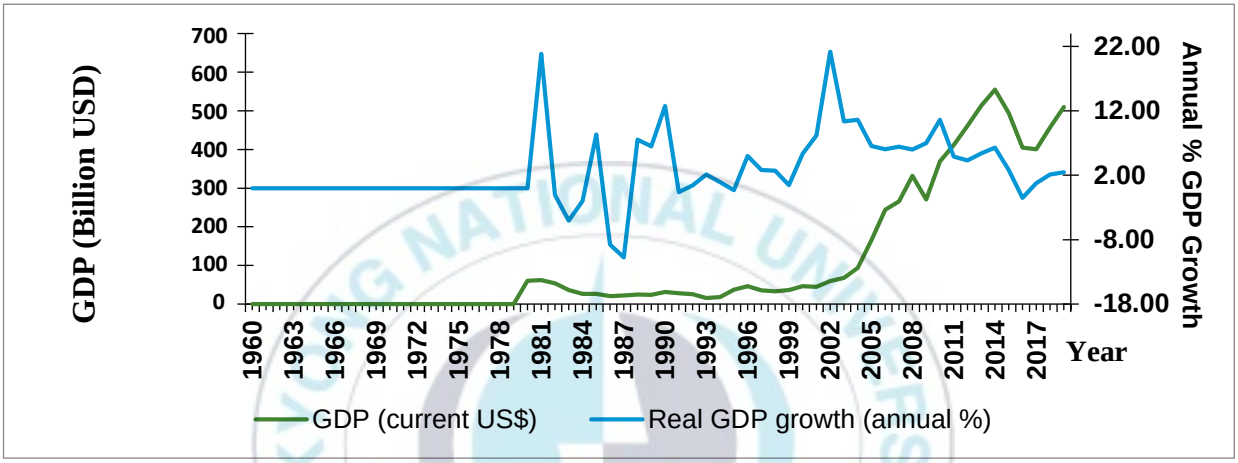


Source: Africa Development Bank Group (AFDB Socio-Economic Database 1960-2019)

In <Figure 2.2> below, Nigeria's real GDP growth showed significant growth over the years. Within 1978 to 1981, the GDP of the country saw steady growth from a meagre 2 percent to over 20 percent. A lot of this can be attributed to the growth the country experienced due to its increased exports mainly crude oil (Kromtit *et. al.*, 2017). At the turn of the early 1980's, the economic growth began to dwindle. The discovery of crude oil had made the economy to be dependent on crude oil exports. When global prices began to fall from 1981, it inevitably affected GDP growth (Riti *et. al.*, 2016). As seen in the figure below, the real GDP growth fell from over 12 percent annually to less than -8 percent in 1984 and continued to maintain a steep growth up until the years around 1998 when the international oil prices increased again. By 2002, the real GDP was about 21 percent the highest ever recorded. There on, it continued to fall and maintain a

shaky growth because of the volatility of the price of crude oil globally. Consequently, the total gross domestic product of Nigeria began to increase from around 1978, maintaining a steady rise from the early 2000's until today where it rests at about 12 percent and valued at over USD 500 Billion in 2019.

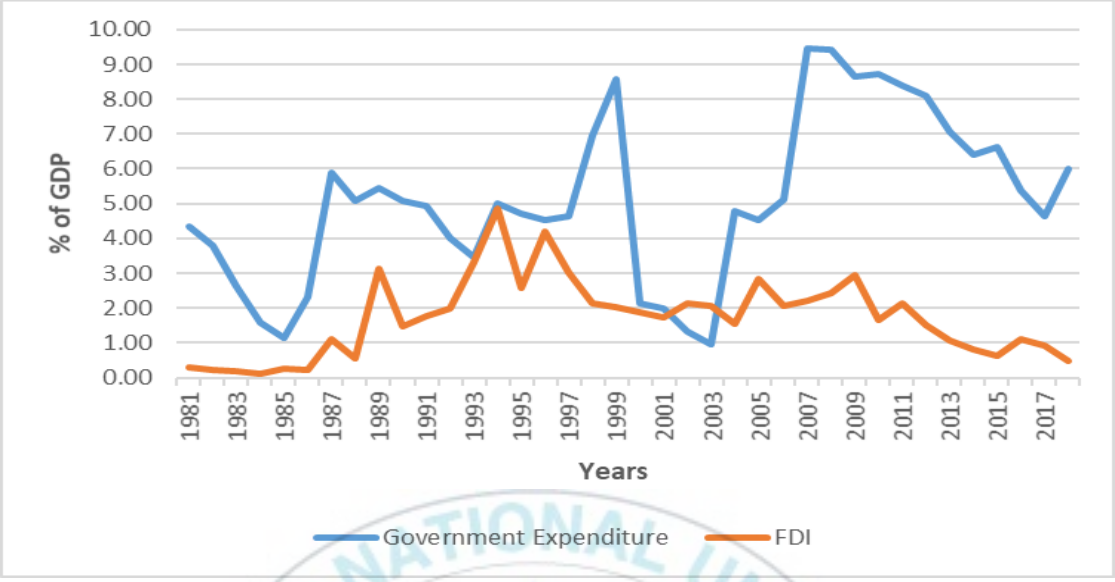
<Figure 2.2>: Nigeria's GDP and Annual Percentage Growth of Real GDP, 1960-2019



Source: African Development Bank, 2019

Foreign Direct Investment and Government Expenditure contributed to the growth of Nigeria's GDP. The country heavily relies on government expenditure and foreign direct investment to boost economic activities in the country. <Figure 2.3> shows the percentage of FDI and government expenditure to the increase of Nigeria's GDP.

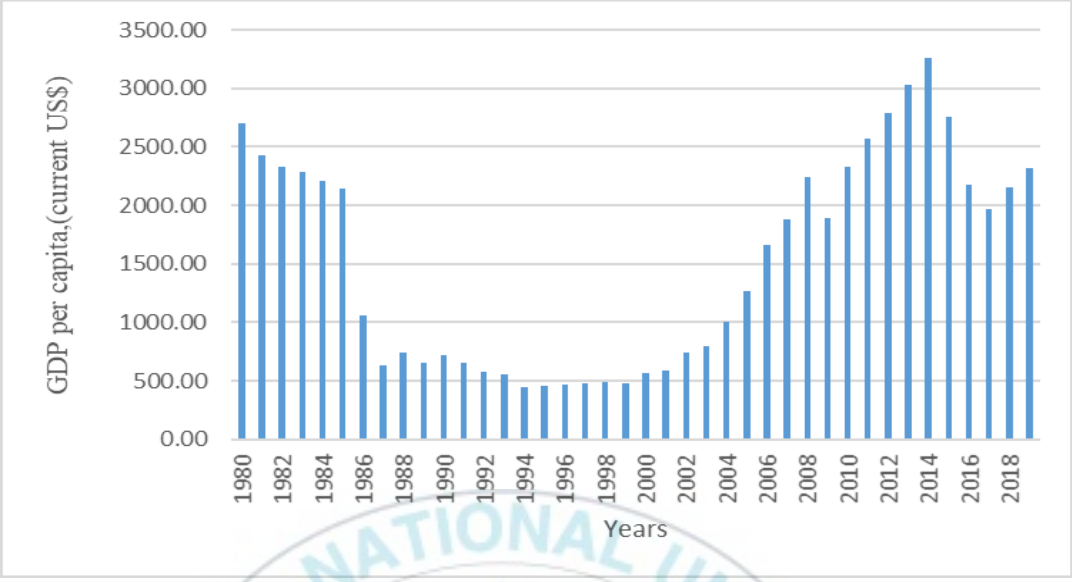
<Figure 2.3> Foreign Direct Investment and Government Expenditure as Percentage of GDP



Source: International Monetary Fund (IMF), 2019

Although the GDP of the country continues to rise, Nigeria is still regarded as a poor country because of the standard of living and infrastructure in the country. The economy is very volatile to crude oil prices. This constant instability of the Nigerian economy has affected the nation badly. Nigeria's economy is highly dependent on oil and makes it very vulnerable to fluctuations in crude oil prices and production. In 2019, Nigeria recorded a growth of 2.3 percent according to the International Monetary Fund (IMF). This growth is expected to reach 2.5 percent in 2020 and remain at this level in 2021. However, the country's inflation rate reached 11.3 percent in 2019, and the authorities failed to bring the overall deficit below 4 percent. The GDP-to-Debt ratio in 2019 was at 29.8 percent (Nordea, 2020). There is a need to stabilize the economy to achieve future growth. <Figure 2.4> shows the rate of GDP per capita from 1980-2019.

<Figure 2.4> GDP Per Capita From 1980-2019



Source: African Development Bank, 2019

In 2017, under the current leadership of President Muhammed Buhari, the government implemented the Economic Recovery and Growth Plan (ERGP 2017-2020). According to the country's Ministry of Budget and National Planning, this recovery plan is the Government's strategy for achieving its vision of sustainable and inclusive growth. The Plan aimed at economic recovery in the short-term and structural reforms were aimed at diversifying the economy to set it on a path toward sustainable and inclusive growth over the medium to long-term (ERGP, 2017-2020). Three broad strategic objectives piloted this plan, which are: 1) Restore growth; 2) Invest in human capital; 3) Build a globally competitive economy (ERGP, 2017-2020). The aim for these strategies were to stabilize the macroeconomic environment, achieve agriculture and food security, ensure energy sufficiency (power and petroleum products), improve transportation infrastructure, and drive industrialization, with a focus on small and medium-size enterprises (ERGP, 2017-2020). This plan highlighted the need to strengthen the non -oil sector growth most especially in

agriculture, manufacturing, and services. The target was to achieve 7 percent real GDP growth by 2020.

However, there are many obstacles to growth in Nigeria. One of which is widespread corruption. Nigeria was estimated to have lost over USD 40 Billion to corruption since independence (Okoye, 2012) and was ranked 144 out of 180 countries listed in the Corruption Index compiled by Transparency International. Corruption is the bane of the society. It has eaten through every sector of the economy. Part of the reasons for corruption in the country is because the discovery of crude oil and natural gas which inevitable led to an oil-boom for the country. Another major reason is a high level of tribalism, which has led to greed, unworthy lifestyle, ridiculous customs and attitudes (Akindola, 2017). This misinformed perception of life has led many Nigerians seeking favour from officials, to impose less pressure on the ethical values of government officials. This is because many people from the same tribe as corrupt government officials see them as profitable avenues for personal survival and gain (Wraith and Simpkins, 1983). These corrupt practices and ineptitude of the citizenry has made many sectors of the economy under-perform because of looted funds and inappropriate policies. The country currently suffers from unappropriated and insufficient energy supply, deficient transport infrastructures, inefficient judiciary system, and high inflation (Nordea, 2020).

<Table 2.1>: Current Key Indicators of the Nigerian Economy, 2017 - 2021

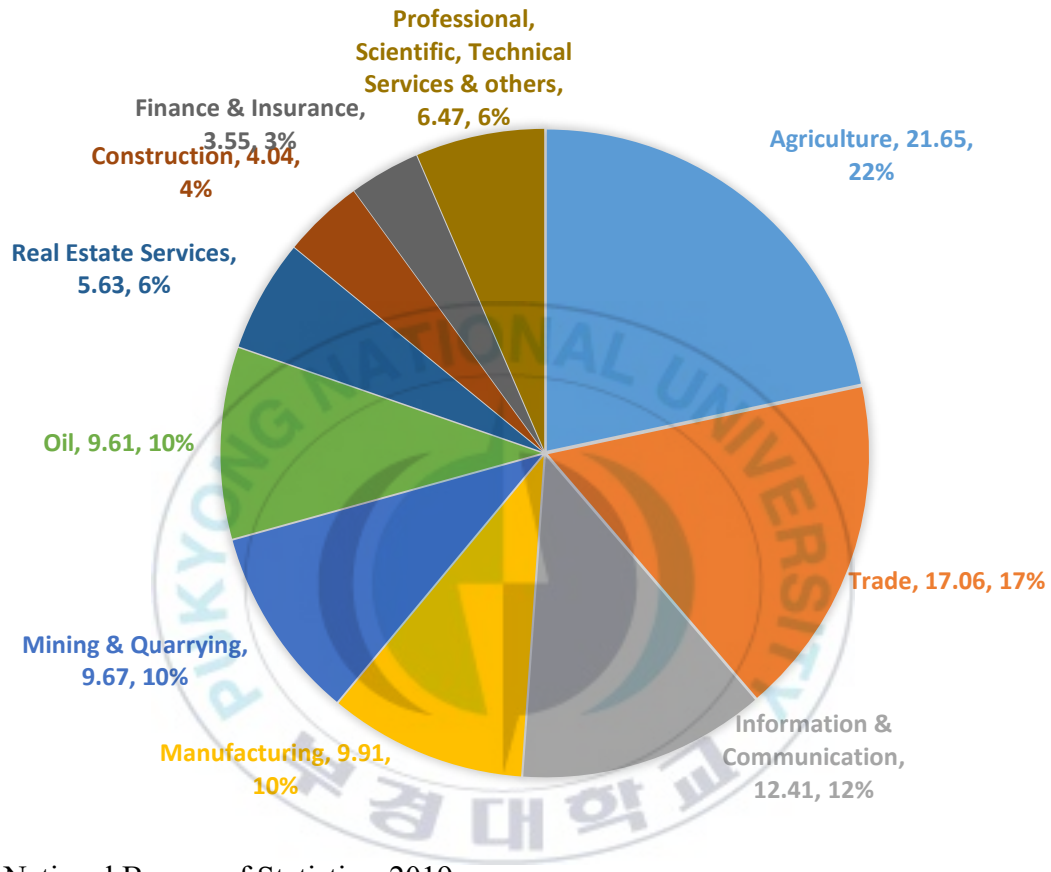
Main Indicators	2017	2018	2019	2020 (e)	2021 (e)
GDP *(*Billions *USD)*	376.4	398.2	446.5	494.8	550.1
GDP *(Constant Prices, Annual* percent *Change)*	0.8	1.9	2.3	2.5	2.5
GDP per Capita *(USD)*	1,972	2,033	2,222	2,400	2,602
General Government Gross Debt *(in* percent *of GDP)*	25.3	27.3	29.8	31.4	32.6
Inflation Rate *(*percent*)*	16.5	12.1	11.9	12.1	11.3
Unemployment Rate *(*percent *of the Labour Force)*	17.5	22.6	23.1	33.5	31.4
Current Account *(*Billions *USD)*	10.38	5.33	-1.00	-0.43	-0.73
Current Account *(in* percent *of GDP)*	2.8	1.3	1.0	2.3	1.5

Source: International Monetary Fund – World Economic Outlook Database, 2019.
Note: (e) Estimated Data

In 2019, the unemployment rate was capped at 23.1 percent, which ranked Nigeria as the 172nd out of 180 countries with the highest unemployment rate in the world (Trading Economics, 2020). With a large population and a failing manufacturing and industrial sector, many youths in the country find it hard to get jobs. The GDP growth for 2019 was 2.28 percent and ranked the country at 86th out of 183 countries. This due to a growth in the oil production sector experienced in the third quarter of the fiscal year (NBS, 2020). Government debt rose by 2.5 percent from 27.3

percent in 2018 to 29.8 percent in 2019. The inflation rate decreased by 0.2 percent to 11.9 percent in 2019 from its previous year, which was 12.9 percent.

<Figure 2.5> GDP Sectoral Composition, 2018



Source: National Bureau of Statistics, 2019

According to <Figure 2.5>, the Services is the largest sector of the economy. It accounted for about 50 percent of total GDP. The fastest growing segments in the Services sector are Information and Communication, which accounted for about 12 percent of the total output. Agriculture, which previously was the biggest sector, now weights around 22 percent. Crude Petroleum and Natural Gas constitute only 10 percent of total GDP, although the product remains

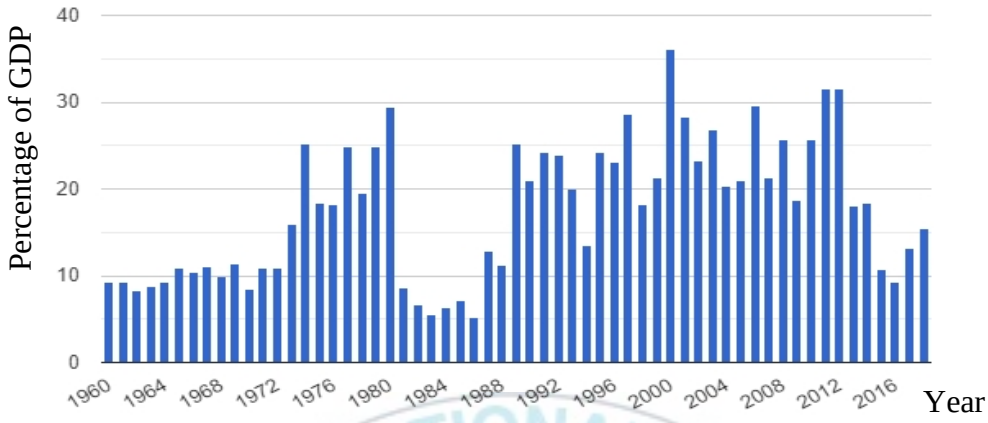
the main exports of the economy. Industrial sector as well as the construction sectors accounted for the remaining 16 percent of GDP.

2.2. Export Structure of Nigeria

The Nigerian export sector is basically divided into two main sectors: The Oil sector and the Non-oil sector. The Oil export sector includes all the industries related to petroleum and gas exploration, production, distribution and sales. The Non-oil export sector, on the other hand, includes all other sectors or economic activities that are not directly linked to the petroleum and gas industry. This includes: The Telecommunications sector; the Financial services sector (banking and insurance); Tourism (hotels, restaurants, parks and recreational centres etc.); Wholesale and retail trade; Health services; Agricultural sector; Mining sector; Power sector (power generation, distribution and supply both renewable and non-renewable); Manufacturing sector; Environmental services sector; Research and Development services; Information technology services, etc. (Adulagba, 2011; Onwualu, 2012).

In <Figure 2.6>, the exports sector of the Nigerian economy accounted to 15.49 percent of the GDP in 2018. The average value for Nigeria's export from 1960-2018 was 17.56 percent with a minimum of 5.25 percent in 1986 and a maximum of 36.02 percent in 2000 (The GlobalEconomy.com, 2020).

<Figure 2.6> Nigeria's Exports as Percentage of GDP, 1960-2018

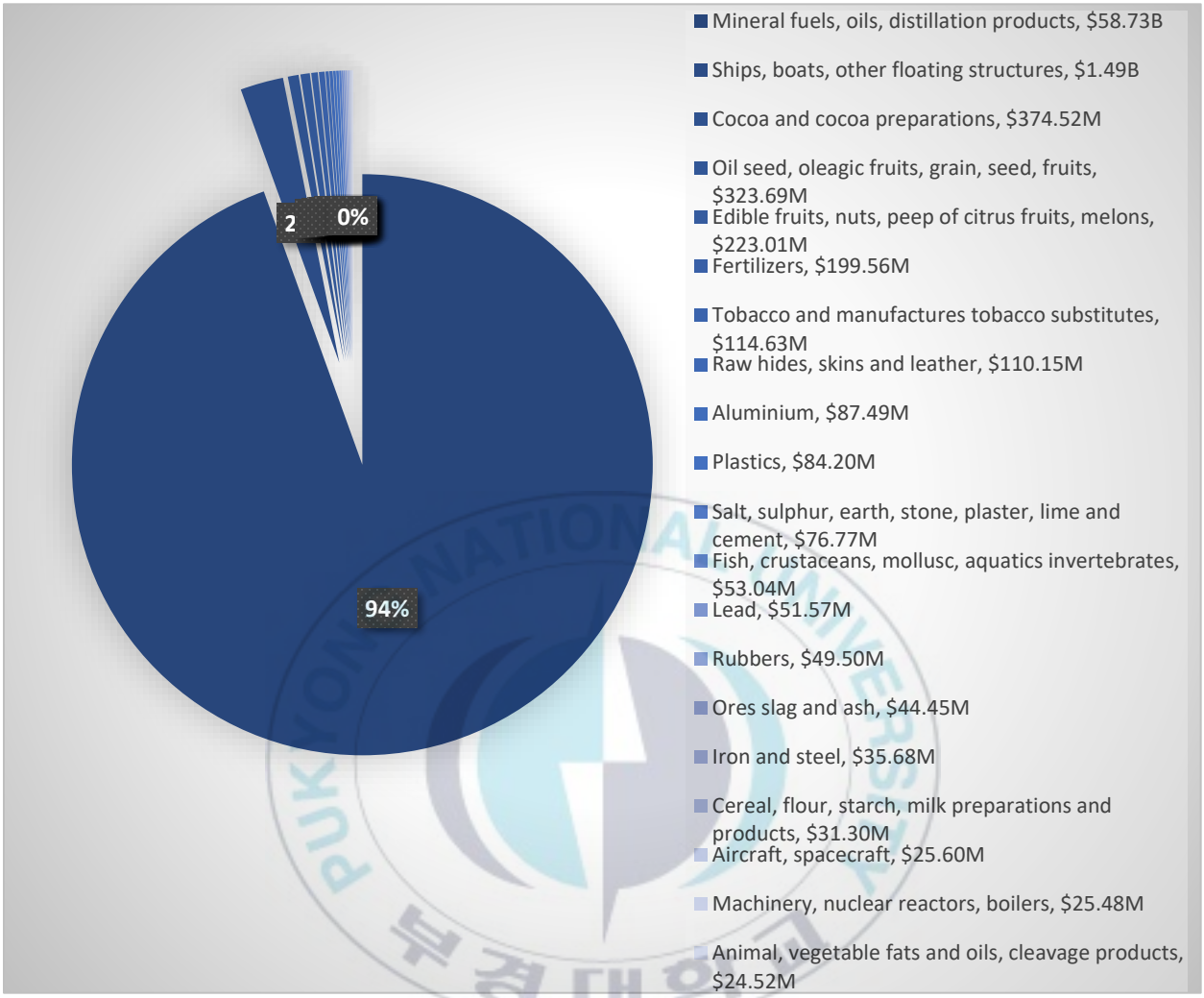


Source: The GlobalEconomy.com; The World Bank, 2019

Oil and gas related products are the major exports of Nigeria. It accounts to about 90 percent of the foreign exchange earnings of the country. The company in charge of this operation is the Nigerian National Petroleum Cooperation. Oil exploration began in 1907 but the first discovery of crude oil was in 1956 and production began in 1957 (NNPC, 2019). Since the advent of crude oil discovery, the sector has been one the most important sectors in Nigeria. Besides petroleum, the country also possesses other natural resources like natural gas, tin, lead, zinc, as well as iron ore, coal, limestone, niobium, and a vast arable land.

According to <Figure 2.7>, the oil exports generated a total of about USD 58.7 Billion out of total earnings of USD 62.1 Billion. This accounted to about 94 percent of the top 20 export products of the country. Other exported products like ships, boats, manufactured and industrial products, as well as agricultural products accounted for the remaining 6 percent of the exports.

<Figure 2.7> Nigeria's Top 20 Exports Composition, 2018

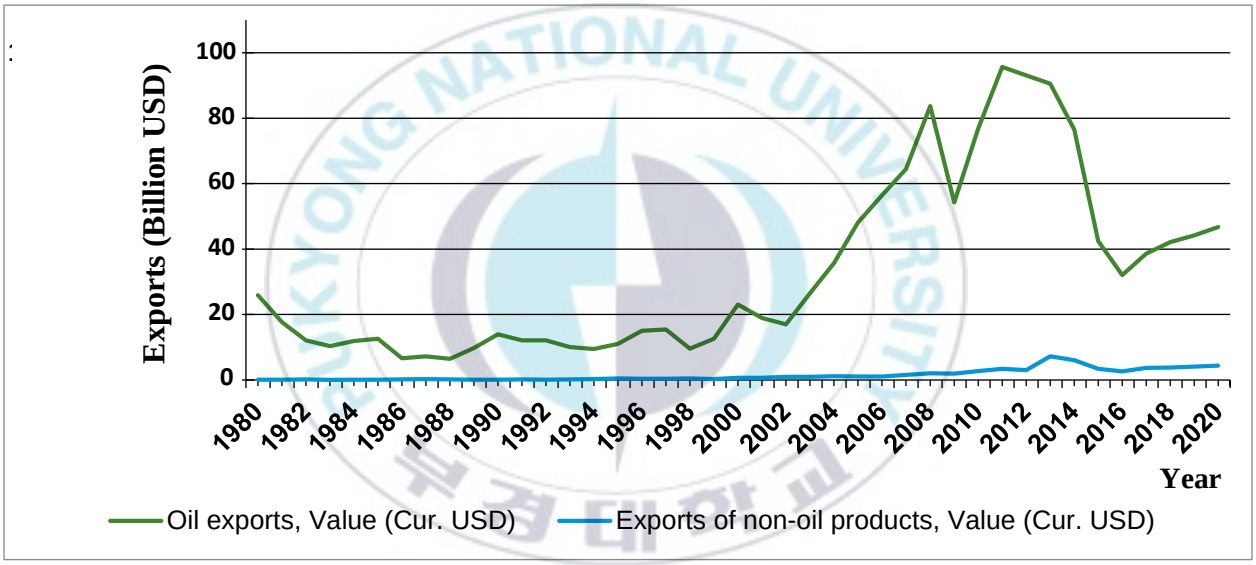


Source: The UN COMTRADE Database, 2019

According to OPEC Annual Statistical Bulletin (2019), key indicators for the oil sector of Nigeria are an oil reserve of 36.9 Billion barrels and a natural gas reserve of 5.68 Trillion cubic meters. Oil production in the country is about 1.6 Million barrels per day, while oil demand is 445,500 barrels per day. Crude oil exports was capped at 1.98 Million barrels per day, while petroleum products exports was 21,000 barrels per day, and natural gas exports was 28.6 Billion cubic meters.

While crude oil exports generated a lot of revenue for the exports sector, the same cannot be said of the non-oil sector. Before the discovery of crude oil in 1956 and pre-independence era, solid minerals and agriculture drove the economy (Kromtit, *et. al.*, 2017). According to Ogun (2004), the non-oil exports rose at an average of 2.3 percent within 1960-1990, but its total exports share declined from about 60 percent in 1960 to 3 percent in 1999. Because of Nigeria's over-dependence on crude oil exports, the non-oil exports have relatively dwindled in recent years.

<Figure 2.8> Nigeria's Oil Exports and Non-Oil Exports, 1980-2020



Source: African Development Bank, 2019

According to <Figure 2.8>, the non-oil exports generated a total of about USD 2.0 Billion in 2018. The export sector is highly reliant on crude oil. The apparent reason for this according to Bature (2012) is what is termed the "Dutch Disease". The Dutch Disease is believed to be the cause and effect relationship that occurs when there is an increase in the economic growth and development of a particular sector (in Nigeria's case - natural resources) and a decline in other

sectors (for this we mean the non-oil sector). According to Harberger (1983), the Dutch disease phenomenon, is evaluated based on the "resource movement" effects and the "spending" effects, by analysing the effects of commodity booms. From the figure above, while the oil exports grew exponentially, the non-oil sector did not experience that much growth. The over dependency on oil trade and the inevitable disruptions to the growth level of the economy has increased the need for the Nigerian economy to diversify from crude oil exports to non-oil exports. Izuchukwu (2011) noted that the non-oil sector of the economy of Nigeria has the potentials of providing employment to the large labour force of the country and consequently significantly influencing the growth of the economy. Onwualu (2012) affirmed that the non-oil sector holds the key for sustainable economic growth. He identified the value chain approach to agriculture and concluded that it has the potentials to increase economic growth, create jobs and enhance the industrial sector. Therefore, expanding the sector as a way to diversify the economy from one product has been identified as a probable solution for economic development in many oil-producing countries like Nigeria (Imoughele and Ismaila, 2015).

There are many potentials of the Non-oil export sector of Nigeria, which can lead to profitable benefits. According to Akeem (2011), four broad constituents namely the agricultural exports, solid minerals exports, manufactured exports and services exports can be structured from the sector. Other constituents in the non-oil sector that have the potentials to grow the economy include the building and construction sector, the health sector, financial sector, power sector, ICT and telecommunications sector (Riti *et. al.*, 2016). The telecom market is the largest in Africa (Alabi, 2011). This can be an avenue for more revenue. Udoh (2012) noted that direct employment in the non-oil export companies is estimated to be about 200,000 workers, while at the same time

indirect employment in the agriculture sector boasts of about 10 Million workers. This provides some amount of human capital needed for the sector. With the right funding and policies, the sector could grow to its full potentials.

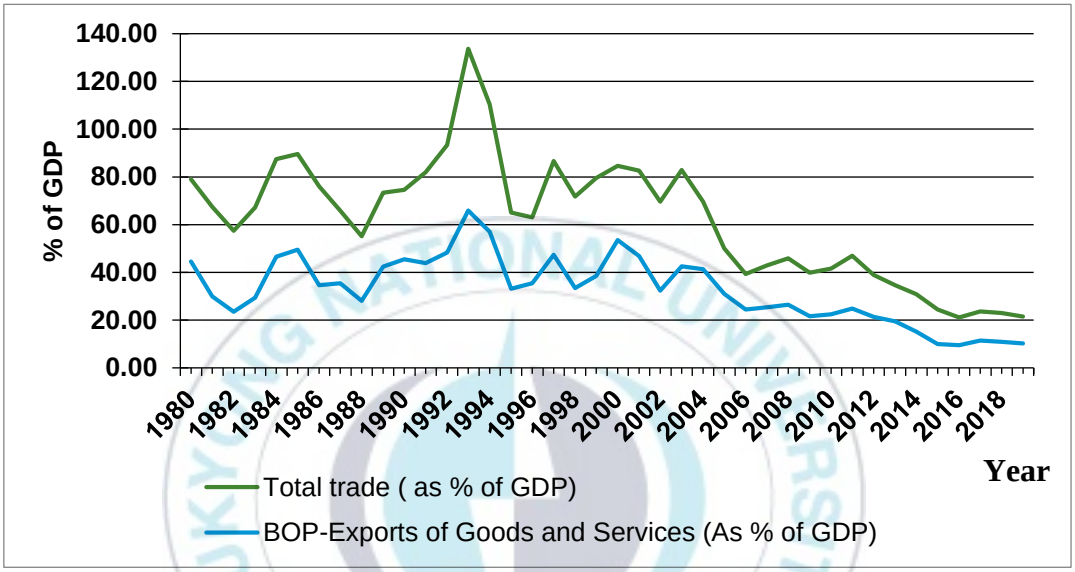
Opara (2010) noted that the benefits that could accrue to firms within the non-oil export sector are by extension beneficial to the economy at large. He affirmed that diversification of the export base of the economy would in effect have a positive spread on not just the exporting country but also the importing country and to the incomes of the citizens of both countries. According to the Nigerian Export Promotion Council (NEPC), the benefits that could come from the sector include, firstly an increase in the foreign exchange earnings of the country, which helps to finance other economic sectors. Secondly, creation of employment and reduction of unemployment. Thirdly, increase in sales and profits to firms within the sector. Other benefits include improved product quality and cost reduction in production because of increased exports; export marketing leading to business expansion for firms within the sector; and enhancement of the reputation and recognition of the firms within the sector because export marketing would increase and improve the product quality and quantity thereby giving reliability to the firms in the sector.

2.3. Government Strategies and Policies to Grow the Non-Oil Exports of Nigeria

In <Figure 2.7> Nigeria's total trade as well as the balance of payments has been dwindling down the slope most notably from around 2004. Since the economy is solely dependent on crude oil, its foreign exchange revenue is bound to fall whenever the price of crude oil dips. From the figure, Nigeria's total trade is falling because its economy is a monolithic economy since the start of crude oil exploration, which is threatened by fluctuation in prices (Olayungbo and Olayemi, 2018). This inevitable leads to a fall in the balance of payments accrued from the exports of goods

and services, because of a reduction of crude oil exports. This can lead to certain economic effects like depreciation of the country's currency and reduction of the potentials of the country for foreign investors by signaling to them that the country lacks international competitiveness.

<Figure 2.9> Total Trade and Balance of Payments as Percentage of GDP, 1980-2018



Source: African Development Bank, 2019

<Figure 2.9> indicated that both the total trade and balance of payments began a downward trend from around 2003. In 1993, both variables experienced growth due to the increase of crude oil prices recorded in that year (NNPC, 1995). To stabilize the economy, the government adopted the following policies and strategies:

a) The Nigerian Export Promotion Council (NEPC)

In order to solve the problem of diversification, the government of Nigeria enforced the Decree No. 26, which created the Nigerian Export Promotion Council in June 1976 with a later amendment by a Decree No. 72 in 1979 (Onuorah, 2018). This agency was mandated to administer

the export incentives designed to encourage the meaningful diversification of the Nigerian economy. The goal was to adopt an export-led policy for economic growth that supports businesses in the non-oil export sector. According to Abebefe (1995), the mandate of this agency were firstly, to spearhead the nation's effort in export promotion and development by creating ideas and measures with the aim to improve Nigeria's export trade. Secondly, to advise the government as well as assist them to identify firms within the non-oil sector that are export oriented and help stimulate the diversification of the exports to non-oil exports. Thirdly, to assist the government in creating infrastructures necessary for diversification such as services for better trade information and incentives for firms looking to export their goods.

According to Obalolu (2015) and Onuorah (2018), the council reported and income valued at about USD 2.7 Million in 2014. This income rose by about 30 percent in 2018 to the tune of about USD 3.5 Million. The council also proffered ways it hoped to create 1.5 Million jobs in the small and medium enterprises sector by 2023.

b) Trade Liberalisation Policy (Structural Adjustment Programme)

On July 11th 1986, the then military government of Nigeria enforced the Export Incentives and Miscellaneous Provisions Decree No. 18. This lead to the establishment of the Structural Adjustment Programme (SAP). This programme was established to tackle problems that arose from imbalances in the economy and pave way for sustainable and stable economic growth and development (Riti *et. al.*, 2016). Onodugo *et. al.* (2013), pointed out that aim of this policy was sustainable economic growth achieved by deregulating, privatizing and commercializing the private sectors of the economy most especially the small and medium enterprises (SME's) as well as the agro-allied industries. The policy also aimed at liberating and developing this sector

financially by integrating the sector with world power economies to withstand the challenges that occurs because of imbalances (Onuorah, 2018). Through the decree, the establishment of three funds was achieved: Export Development Fund, Export Expansion Grant Fund and Export Adjustment Scheme Fund (Adenugba and Dipo, 2013). Analogbei (2000) noted that the agricultural sector as well as the telecommunication and business sectors recorded significant growth as a result of the supports gotten from this policy.

c) The Nigerian Export-Import Bank (NEXIM)

As part of the Nigerian government's effort to grow the non-oil export sector, the NEXIM bank was established in 1991. This bank is an export credit agency charged with the mandate to diversify the composition and destination of Nigerian exports as well as structure its balance in order to achieve overall export growth. Three main services are provided by the bank to firm who have the desire to export. These services are; providing credit, bearing risks and offering services for trade information that also includes export advisory. Onuorah (2018) noted that the bank's major concentration is to harmonize deposit money banks (DMBs) by creating jobs and assisting the exportation of made-in-Nigeria goods and services. The bank also seeks to structure the appropriate financing of the non-oil sector markets through a financial process it terms as "syndication". The bank identified the agricultural, manufacturing, services and solid minerals sectors as the areas that needs special focus because they possess the potentials for growth in the economy.

Consequently, in the same year the government established the Export Processing Zones (EPZ) by the Decree No. 34 (Adenugba and Dipo, 2013). This is a special zone outside of the main custom zones, which allows firms both foreign and domestic to manufacture and assemble goods for export. These zones allow such companies the right not to be subjected to custom duties

because of the imported raw materials they need for production. It also exempts them from industrial regulation concerning foreign ownership, profit repatriation, assess to foreign exchange, employment of nationals, etc. (Afeikhana, 1996).

Although the government had created policies and agencies to grow the non-oil export sector, fifteen years after the establishment of this bank, Ogunkola (2006) observed that 90 percent of the total exports was still derived from the oil export sector. The non-oil export sector accounted for 9 percent of the total foreign exchange earnings (NBS, 2018). This meant that most of the government's effort to diversify the export base of the economy were yet to materialize. Onwualu (2009) noted that some key impediments to these policies as well as growth of the sector were; corruption, weak infrastructure, supply side constraints because of low technological levels notably in the agricultural sector, a derailed and weak institutional framework, low level of human capital and poor access to finance. The deposit money banks as well as the NEXIM bank and other financial institutions still gave preferential treatment by offering services to firms that were in the oil sector.

Chapter Three

Literature Review

Related studies on the impact of non-oil exports on the economic growth and development of a country, were informed by earlier economic theories that highlighted the impact of exports on economic growth. One of these earliest theories was expressed Keynes (1936), where the total output of an economy is a function private consumption, investment, government spending and foreign trade. According to Ojide *et. al.* (2014), they noted that the Keynesian framework of an economy maintained that a rise in export will produce positive multiplier effect on the national revenue. However, most developing countries who are reliant on a single major export product tend to have limitations to their growth projections even though they have abundant mineral and natural resources. Data has shown that a country should not be dependent on a single export product because fluctuations in world prices could alter the growth and development of the affected economy. Models that have proven economic growth highlight the importance of export diversification, human capital, foreign investment and an improved and standard technological process. With the foregoing, I will review three theories on economic growth as well as empirical literatures related to the impact of non-oil exports on economic growth and development.

3.1. Review on Theoretical Foundation

a) The Export-Led Growth Hypothesis (ELGH)

The export-led growth hypothesis postulates exports are the main determinants of economic growth. The argument is that exports generate positive externalities on non-export

sectors through efficient management styles and improved production techniques (Feder, 1983). Helpman and Krugman (1985); Krugman (1997), contended that by offering the potential for scale economies, productivity is increased through export expansion. Another argument is that exports mitigates foreign exchange limitations by providing greater access to international markets (Olayiwola, 2000). According to Grossman and Helpman (1991; 1995) and Alisana and Rodrik (1999), the arguments for the export-led growth extended the literature on the endogenous growth theory that supports the role of exports on the long-run growth of an economy through knowledge from abroad that informs and influences technological innovation.

The export-led growth hypothesis hinges upon two notable international trade theories – *Theory of Absolute Advantage and Theory of Comparative Adva*ntage. Adam Smith (1776) propounded the former when he contended that countries should export the products that they produce more and import those that they produce less. He noted that this would lead to specialization, increase world output and cost effective trade (Carbaugh, 2004). David Ricardo (1817) propounded the latter when he presented the important and vital role that exports play in the growth of any economy. He contended that foreign trade is highly beneficial to a country because when two countries come to trade and, one nation has a disadvantage in the production of any goods necessary for trade to occur, there still exist something that can form a basis for a trade that could be beneficial to both parties involved. This would lead to efficiency. The less efficient nation can choose to specialize in the manufacturing and exportation of any goods that it is disadvantaged at while the more efficient nation specializes in the manufacturing and exportation of the product that it is more dominant and productive. Kromtit *et. al.* (2017) in their study on the contribution of non-oil exports to Nigeria's economic growth argued that the theories of absolute

advantage and comparative advantage holds for Nigeria because the country possesses vast agricultural, mineral and natural resources that can aid export diversification from crude oil.

Ojide *et. al.* (2014) in their study on the export-led growth hypothesis in Nigeria, found that in Nigeria there is evidence of sustainable growth in the non-oil exports. Their study applied the Auto-Regressive Distributed Lag (ARDL) and co-integration analysis on GDP, non-oil exports and exchange rate time series data from 1970-2011 to evaluate the economic growth impact of non-oil exports and the sustainability of such exports compared to growth in Nigeria. Singh (2010) in his study on international trade and economic growth observed that trade is one of the basic catalysts of productivity and growth and for him he opined that its contribution lies on its impact in the main economic activity. For Singh, macroeconomic evidence supported the positive and significant effects trade has on growth and productivity output of any economy. However, microeconomic evidence gave larger support to the outside effects of productivity on trade, when compared to the effects of trade on productivity. For Todaro and Smith (2011), export promotion strategies or policies encourage exports in a greater way. This is because they enhance of the free movement of investment, labour, and even research and development avenues of which this could be a welcome incentive for multinational corporations and can open communications between two intending trade partners. Abou-Strait (2005) noted that an export led growth strategy is important because it helps provide incentives to producers to export their goods using various economic and governmental policies. The policies whose sole aim is to increase the level of national output in turn facilitate the increase of the volume of exports the nation produces yearly. Governments should therefore encourage and help investors and businesses to enhance their domestic industry output so that it surpasses their domestic demand and create a surplus that can be sold to the

international market for an inflow of more foreign exchange revenue. This is highly needed in the Nigerian export and economic sectors.

Dunn and Mutti (2004) in their study observed that in the 1970s, some published studies showed that developing countries that choose to pursue an export-led approach gained far more rapid economic growth than countries that had a more "protectionist" policy. The notable "Asian Four Tigers" – namely South Korea, Hong Kong, Singapore and Taiwan, were the subject of most of this research, yet another set of newly industrialized Asian countries like Indonesia, Thailand, Malaysia, and China have also been very successful in pursuing export markets most especially in non-oil goods. Nevertheless, these countries have grown rapidly. In addition, countries like India, Mexico, and Brazil are new entrants to this export-led approach. Morton and Tullock (1976) noted that international trade is a plausible way to generate more gains to a nation and so acts as a stimulant to growth.

The World Trade Organization (WTO, 2010) in support of an export-led growth approach to economic growth concluded that diversification of any countries' export base would increases local production, employment, income, wealth and economic growth. Developing countries that export a large amount of a small number of products had export revenues that were quite volatile to many analysts. Since majority of the OPEC countries, generate many of their export revenues from oil and gas, the evident cause being because of the reduction and instant changes of crude oil prices and its resultant effect being a reduction in export earnings.

Dunn and Mutti (2004) using the "Asian Four Tigers" as a point of reference continued in their study to note that the export promotion strategy or approach to trade enhances economic

growth but this rests solely upon the diversification and expansion of non-oil exports. Abebefe (1995) in his study stated that Nigeria's over-reliance on crude oil is dangerous and unhealthy for the economy. He cited two reasons; one being that crude oil is an asset with a depleting reserve and one day it would become too little to provide for the nation (some unverified analysts based on recent crude oil exploration and sale of Nigerian crude oil, believe this to come true in about 47 years from today). Secondly, the unexpectedness of the oil market price changes have resulted in a decline to the foreign earnings because of factors beyond Nigeria's control.

Opara (2010) in his study went on to note that exports are the bed-rock of any serious economic development plan and this must be meaningfully centred on non-oil export as in the case in most countries of the world. He continued to note that promoting non-oil export products in Nigeria would bring about a reduction of the dependence on crude oil in the country. This he calls, "mono-cultural foreign trade product". He listed various benefits of diversification from oil exports to non-oil exports on the Nigerian economy. Medina-Smith (2000) investigated the export-led growth hypothesis (ELGH) and postulated that export-led growth serves as one of the various key determinants of economic growth using Costa Rica as a case study. Her study analysing annual data for the period 1950-1997, tested the hypothesis by analysing the case of Costa Rica. The study concluded that the ELGH is most likely probably beneficial to only a few number of developing countries, and only to some certain extent.

However, Onayemi and Ishola (2009) found that in the case of Nigeria, export promotion strategies have been ineffective in the non-oil export sector. This is because the economy of the country has been solely reliant on the crude oil exports. Their study supported that of Subasat

(2002) who contended that low-income countries like Nigeria have little or no impact on economic growth from export-led growth strategies.

b) The Neo-Classical Growth Model: Exogenous Growth Theory

The neoclassical growth came into existence with the economic models of Harrod-Domer (1946) and that of Solow-Swan (1956). Popularly known also as the exogenous growth theory, these models hold that the long growth rate of an economy is "exogenously determined" by savings rate (Harrod-Domer model) or by technical progress (Solow-Swan model). The model argued that, forces outside of capital investment and a growing working population is needed to continually grow the economy of a country.

The key assumptions of this model is that in a closed economy, capital is subjected to diminishing returns. The model assumed that the impact on accumulated capital would always be less than one because of a fixed labour stock. An economy ceases to grow due to lack of technological progress and growth of the labour force, which means that the economic growth per-capita converges because of diminishing returns leading to a "steady-state" growth. However, the per-capita output rate grows at the rate of the technological/productivity growth rate in the "steady-state".

According to this model, a sustained increase in capital investments temporarily increases the growth rate since capital labour ratio increases (Omojolaibi *et. al.*, 2015). When this happens, the marginal product of additional units is forced to the long-term growth path and the real gross domestic product rises at the same rate as the labour growth rate, which reflects an improvement in productivity (Omojolaibi *et. al.*, 2015).

Neo-classical economists stated that a sustained increase in the supply of labour and a higher level of productivity of capital and labour must exist to be able to raise the long-term trend rate of growth of an economy. They held the relative importance of free markets because it raises the domestic savings rate and enhances the capital growth ratio and capital income. Together with labour and an exogenously determined technology, which improves productivity, the growth rate of an economy is determined. Since countries have different technological change rate, this accounted for the variations in their growth rates. Solow-Swan's Model explained the long-run growth rate of total output by demonstrating total output produced by two factors of production - labour (L) which represents the rate of population growth, and capital (K) which represents the saving rate of an economy. These factors are represented in an aggregate production function, which demonstrates the rate of technological progress (A) that is independent of the saving rate. The model satisfies the Inada conditions that implied that the substitution's elasticity must be asymptotically equal to one.

$$Y_{(t)} = F(K^{\alpha}{}_{(t)} (A_{(t)}L_{(t)})^{1-\alpha})$$

Y= Total output

K= Capital investment

L = Labour stock

A= Technology (Exogenous) that augments labour

t= Time

$0 < \alpha < 1$= Output elasticity with respect to capital

The neoclassical growth model had some difficulties because it could not explain important facts about economic growth in various countries. One of the difficulty with this growth theory is that it implied that an increase in saving rate only temporarily affects the growth rate on the short-run but not on the long run. Another difficulty with this growth theory is that it implied that there existed a convergence of growth rates, which meant that countries who have the same population growth rate but with different saving rate would over time achieve the same economic growth rate. Lastly, the neoclassical growth model explained that for an economy to grow on the long run, such economy must be dependent on technology (total factor productivity) that is considered exogenous. This posed a threat to the theory because it could not explain the fundamental forces that determine long-run growth of nations and if technology is exogenous, it should mean the rate of technological progress must cause the long-run growth of different countries to converge. The endogenous growth theory or the new growth model extended this theory to factor human capital and an endogenous technology.

c) The New Growth Model: Endogenous Growth Theory

The new growth model or theory of endogenous growth is an economic growth theory stated that the growth of an economy depends on the improvement of its productivity. This growth theory identified international trade as a factor that could influence economic growth through technological spill over effects and external stimulation. Technology is learned through foreign trade that provides a broader market, frequent exchange of information and increased competition. This competition leads countries to develop new technologies and products that ensures growth on

the long run. Human capital is essential for economic growth because it is a factor of production, which nurtures innovation. The model argues that innovation and new technologies drive sustainable growth.

Economists, who support the endogenous growth model, assert that improvements in productivity can be linked directly to quicker innovations and more human capital investments. The theory argues that economic growth is generated from with an economy instead of without. This growth occurs as a result of internal process like research and development (R and D). Knowledge-based industries like telecommunication, software and other high tech industries, play very important roles to grow a country's economy because they are always evolving due to emerging and advanced technology. The implication of this growth model is that when economies embrace policies that supports openness, competition, change and innovation, such economy would inevitable promote growth.

The new growth model factored increasing returns to scale from capital investments especially in infrastructure, education and telecommunication. Government policies aimed at raising the growth rate of a country show focus on these sectors to stimulate product innovation that creates competition and influence international trade. Thus, the Romer-Mankiew-Weil (1992) model presented four factors of production – labour (L) represents the working population, capital (K) represents investment, technology (A) gotten endogenously and represents investments in research and development, policies and other factors that aid, human capital (H) and thereby influencing the growth of an economy.

$$Y_{(t)} = F(A\, K^{\alpha}{}_{(t)}\, H^{\beta}{}_{(t)} L_{(t)})^{1-\alpha-\beta}$$

Y= Total output

K= Capital investment

L = Labour stock of a working population

A= Technology (Endogenous)

H = Human capital which complements capital investment

t= Time

Although, the new growth model explain the importance of human capital and technology gotten from within an economy, it still have its shortcomings. One of such is its failure to explain conditional convergence that have been reported in various empirical literature. Paul Krugman (1995) criticized this theory by stating that it was impossible to verify by empirical evidence as he noted that the theory made too many assumptions of how unmeasurable things affected other unmeasurable things. Stephen Parente (2001) also noted that the endogenous growth theory does not explain the difference in income between developed and developing countries. However, literature review on the impact of non-oil exports on the economic development of Nigeria support the new growth model because it factors human capital and endogenous technological inputs.

3.2. Review on General Empirical Evidence

The general empirical evidence on the impact of non-oil exports on the economic growth and development of a country show two groups of results. Most studies showed a positive impact

while others showed a negative on the economic growth rate of some countries. This study analysed countries that have a significant oil exports sector like Nigeria.

Firstly, this research looked at studies that show a positive impact of non-oil exports on the economic growth of a country. Hosseni and Tang (2014) in their study examined the role of oil and non-oil exports on Iran's economic growth by making a case study using annual time-series data spanning from 1970-2008. The study employed multivariate co-integration and Granger causality methods. The empirical results indicated that both the oil exports (*OX*) and non-oil exports (*NOX*) are co-integrated and the Granger causality test results revealed the unidirectional causal effect from oil and non-oil exports to economic. The results also showed an inverse effect by oil export on economic growth and suggested policies that encouraged non-oil export to stimulate long-term economic growth in Iran.

The results was also similar to the study of Khayati (2019) who investigated the effect of oil and non-oil exports on Bahrain's economic growth over the period 1977-2015. The Johansen co-integration analysis and the Vector Error Correction Model (VECM) showed that the economic growth of Bahrain was positively and significantly related to non-oil exports (*NOX*) and oil exports (*OX*) on the long run. However, non-oil exports showed no effects on the short-run while oil exports had impacts on the short-run. Long run causality however, showed that although oil exports increased the economic growth in Bahrain, the country would suffer a decrease in economic growth due low international prices in crude oil. The study argued for further encouragement of non-oil sectors and more exports diversification to lead to positive effects on the economy.

Mohsen (2105) study examined the role of non-oil exports and oil exports in the growth of the Syrian economy within 1975-2010. The co-integration test indicated that GDP is positively related to both non-oil and oil exports and this relationship is significant, while the Granger causality test indicated bidirectional short-run causality relationships between GDP, non-oil exports and oil exports. However, the study also indicated a bidirectional causality relationship on the long run between non-oil exports and GDP. The empirical research of Merza (2007) investigated the relationship of non-oil exports and oil exports with the economic growth of Kuwait by examining the export-led growth hypothesis of annual time series data spanning from 1970-2004. The results of the co-integration test found long run relationship among GDP, non-oil exports and oil exports. It also found a unidirectional causal relationship from non-oil exports to GDP growth.

Aljebrin (2017) confirmed in his study on the impact of non-oil exports on non-oil economic growth in Saudi Arabia, the positive impact of non-oil exports on GDP increase. The empirical findings of the analysis showed a positive relationship between the non-oil economic growth and non-oil exports in both short run and long run. There is also a positive and significant relationship between non-oil economic growth and capital in both long run and short run. On the other hand, a significantly positive relationship between non-oil economic growth and labour exist on the long run but positive and insignificant in the short run.

Some studies show a negative impact of non-oil exports on economic growth. Mehrara (2014) examined the causality effect between non-oil international trade and the economic growth by analysing panel data of 11 selected petroleum-exporting countries within the period of 1970-2011. Employing oil revenues as the conditioning third variable, the results of the study showed

non-oil trade to have no significant effects on GDP growth on both short-run and long run. The results however showed a strong causal relationship flowing from oil revenues and economic growth to trade in the selected countries. Tabari and Nasrollahi (2010) also confirmed this in their study about the effects of non-oil exports on Iranian economy using time series data from 1980-2007. Employing an augmented neoclassical production function, the study performed the Johansen co-integration tests as well as the Vector Error Correction Model. The results showed a negative and statistically significant impact of non-oil exports on economic growth.

3.3. Review on Nigeria's Empirical Evidence

This research analysed empirical studies that investigated the impact of non-oil exports on the Nigerian economy. Various studies conducted show three groups of results mainly positive, negative and insignificant or weak.

Studies That Showed Positive Impact

The study of Adewale *et. al.* (2016) adapting the endogenous growth model, investigated the impact of non-oil exports on the economy of Nigeria. The study employed the OLS technique on annual time series data of non-oil exports (NOX), oil exports (OX), exchange rate (EXR), non-oil imports (NOM), trade openness (OPN) and gross domestic product (GDP) spanning from 1970-2014. The Johansen co-integration test indicated that a long run relationship exists among economic growth (GDP), non-oil exports and the other variables under study. The Ordinary Least Square (OLS) test result showed that non-oil exports exacted significant impact on GDP on the long run, but average impact was negative. They also found that trade openness and exchange rate

individually exact positive impact on GDP over the period under review, but trade openness does not show any significant impact.

Nwodo and Asogwa (2017) whose call idea of theory is the endogenous growth model investigated the effects of global integration, non-oil exports and economic growth in Nigeria. The study employed the Auto-Regressive Distributed Lag (ADRL) technique on quarterly data gotten from 1986-2014. They found that non-oil exports show positive impact on economic growth of Nigeria in both the short-run and long run. For the impact of trade and financial openness on economic growth, it showed a negative effect. Even though, their results recorded a negative impact of the interaction between trade openness and non-oil export on GDP, it further went on to show a positive impact of the interaction between financial openness and non-oil export on GDP.

Riti *et. al.* (2016) examined the growth of the Non-oil sector as a key to diversification and economic performance in Nigeria. The call idea of theory was the endogenous growth model. The study employed the ARDL and VECM Granger causality technique on sectoral time series data from 1981-2013. The result of the study indicated that the agricultural and telecommunication components positively contributed to the economic growth of Nigeria on the long run, while manufacturing component had a negative and significant impact on GDP. The Granger causality test reveals that all three components granger-caused GDP growth.

Kromtit, *et. al.* (2017), investigated the contribution of non-oil export to Nigeria's economic growth within the period of 1985-2015. The call idea of theory was the endogenous growth model. Using Augmented Dickey Fuller Test to ascertain the stationarity of the variables and employing the Auto-regressive distributed lag (ARDL) model to identify and analyse the

relationship between Nigeria's non-oil exports and GDP growth, their study found positive significant relationship between economic growth and non-oil exports. They revealed that exchange rate have a negative though insignificant relationship with GDP, which is in line with their economic theory.

Ojide, *et. al.*, (2014), studied the export-led growth hypothesis in Nigeria, using the ARDL model and co-integration analysis on data gotten from 1970-2011. They argued for sustainable diversification of national income sources using non-oil exports. Their results showed there exists an evidence of growth in Nigeria and it is sustainable meaning that non-oil export-led growth hypothesis holds in Nigeria. Onuorah (2018) investigated non-oil exports' role on economic growth of Nigeria. The study analysed data from the period of 1985-2017. Employing OLS technique, the study found that the agricultural export products used in the study had significant impact on GDP growth.

In examining the impact of aggregate non-oil sector and its determinant on Nigeria's economic growth, Aladejare and Saidi (2014) employed the bound test approach to examine the long and short run effects of the non-oil export and its ensuing determinants. The result revealed in both the long and short run, there is a significant effect of non-oil export on economic growth.

Studies That Showed Negative Impact

Adenugba and Dipo (2013) examined the resources gotten from the agricultural and mineral industries of the non-oil export sector of the Nigerian economy. They evaluated Nigeria's export performance and strategies to see whether they have been effective and productive in the diversification of the Nigerian Economy from Crude oil, which is currently the country's foreign

exchange major source. Their study revealed a negative impact of non-oil exports on GDP. They argued that the Nigerian Economy is still a bit far in terms of diversifying from crude oil exportation and this is the reason why the sector is the most important sector of the Nigerian economy.

Olayiwola and Okodua (2013) examined the contribution of foreign direct investment to the performance of non-oil exports and economic growth of Nigeria. Holding the export-led hypothesis in-view, they employed a causality analysis using variance decomposition concept and impulse response analysis on data spanning from 1980 - 2007. Their results showed a negative impact of non-oil exports on economic growth but provided a unidirectional causality from FDI to non-oil exports. They argued that for an effective FDI in Nigeria, non-oil exports must be encouraged.

Raheem and Busari (2013) examined non-oil exports and economic growth in Nigeria. Their study analysed data from 1970-2010 and employed both the Simultaneous Equation Model (SEM) and a single equation model. The results found that the non-oil exports and agricultural performance have negative relationship with the growth of the economy. They argued for more government participation in both sectors. Gatawa and Dalhatu (2017) suggested that the growth track determined by increase in the GDP is dependent upon oil exports, as non-oil exports contribution is very insignificant.

Studies That Showed Insignificant Impact

Omojolaibi et.al (2015) studied the impact of non-oil exports on domestic investment. The study adapted the Keynesian model for investment and the endogenous growth model. The study

employed the Error Correction Model (ECM) to analyse data gotten from 1980 – 2011. The findings of the study revealed positive impact of non-oil export on domestic investment but also insignificant. They argued that this is because of the mono-cultural nature of the production sectors of the economy that is reliant on the oil sector. Yet, there are many prospects in the non-oil export sector.

Onodugo *et. al.* (2013) investigated the impact of Non-oil exports on the econometric growth of Nigeria by analysing time series data from 1989 – 2012. The call idea of theory was the endogenous growth model. The study employed Johansen co-integration analysis and the results revealed a weak and insignificant impact of non-oil exports on economic growth of Nigeria.

Studies on Economic Development of Nigeria

While making a sectoral analysis to study the impact of FDI on the performance of Nigeria's export performance, Okechukwu, *et. al.*, (2018) found a positive and significant long run impact on total exports from aggregate FDI. Using ARDL model, they disaggregated exports into oil and non-oil exports. They found the oil exports to have a positive co-integration relationship but when they disaggregated the primary and manufacturing sector, they found FDI had a positive and significant impact on the relationship between both total exports and oil exports. Unfortunately, their research reveal that the service sector did not show any significant influence on the economy of Nigeria.

Ezeji, et. al., (2015) investigated the influence of capital inflows on the growth of developing economies like Nigeria, Ghana and India from 1986-2012. Using the Ordinary Least

Square technique (OLS), their findings showed that in Nigeria, India and Ghana, FDI as well as total capital inflows had significant and positive impact on economic growth.

Employing annual time series data from 1975-2010, Chindo, *et. al.*, (2015) argued the evidence of human capital and technology on economic growth of Nigeria. They applied the ARDL model by first creating two proxies of human capital for two models. The co-integration results revealed that all the variables in the two models were co-integrated. The results also showed human capital had a significant and positive effect on economic growth. Also, technology showed significant positive impact on economic growth. They concluded that both human capital and technology are very important determinants of economic growth in Nigeria. They advocated for improvement of the educational sector and more funding to research and development.

Olayungbo and Olayemi (2018) studied the relationships among certain factors necessary for Nigeria's economic growth. They looked at government spending, non-oil revenue, and the economic growth rate in Nigeria being an oil-producing country by analysis data from 1981-2015. Using the error correction model, the impulse responses of their results showed negative impact of government spending on economic growth on both short run and long run estimates, while in the case of non-oil revenue it showed a positive effect on economic growth. They found also that, non-oil revenue has negative shocks on economic growth while government spending had a positive shock.

Aregbeyen and Kolawole (2015) investigated the relationships between oil revenue, public spending and economic growth of Nigeria. Using OLS technique and Vector Error Correction model (VECM), they analyzed data from 1980-2012. They found that oil revenue had a causality

effect on economic growth and government spending, while there existed no-causality effect between government spending and growth in the economy. They suggested however that government needs to do more to increase its spending when it comes to capital projects and also intensify efforts to increase the output to boost the economy.

Summary of Literature Review

According to the above literature review, careful analysis of data spanning from various empirical research reveal that the non-oil export sector contributed to the economic growth of Nigeria. Most research found this contribution positive and significant, while others found it to be either negative or insignificant.

However based on the literature review, there are certain factors that influence the economic growth of Nigeria. Ignoring these factors could result in an inadequate estimation of the effect of non-oil exports on the growth of Nigeria's economy because of Omitted Variable Bias (OVB). Wooldridge (2010) argue that omitted variable bias (OVB) could make the estimated size and magnitude of the variable coefficients to be inadequate. To determine omitted variable bias, the omitted variable must be determined by the dependent variable (Y) as well as correlated to the other independent variables. Another determinant of omitted variable bias is that the variable (X) already used in the regression analysis must be correlated with the omitted variable. According to the Gauss-Markov Theorem, a satisfactory linear regression model must be BLUE, meaning Best Linear Unbiased Estimator. Therefore, satisfying the basis OLS assumptions keeps the distribution of the sample closes correlated to avoid unbiased estimates.

In line with other studies, this study would adopt the Endogenous Growth Model (The New Growth Model). This theory justifies that total factor productivity (technology) comes from within the economy. The theory implies that sustainable growth is determined by policies governing the production process within an economy. It holds that persistent growth is due to investment in human capital that reduces the rate of diminishing returns. This theory indicates an active role for technological inputs, capital investment, labour in promoting economic development through investments in human capital (education), research and development, diversification and infrastructure to influence the desired level of output of an economy.

The limitations of previous empirical studies is that they did not factor in foreign direct investment (FDI), and government expenditure (GEXP) in their studies. The originality of this study is to add these variables to investigate the impact of Non-oil exports because they are important for the economic growth of Nigeria. This originality is based on the econometric argument that the estimation analysis conducted by previous studies neglected important variables required for Nigeria's economic growth. As such, the estimations of these studies are biased because of the omitted variables. By including these variables in one simultaneous equation, this study aims to improve the reliability of the estimation results in regards to the magnitude of the variable coefficients and thereby provide adequate explanations for the impact of non-oil exports on the growth and development of the Nigerian economy.

Chapter Four

Methodology and Data

4.1. The Model Specification

This study aims to investigate the impact of non-oil exports (NOX) on the economic growth of Nigeria from 1981-2017. The study adopts the endogenous growth theory, which emphasizes the role of technological output in promoting growth and development. It is derived from the macroeconomic theory that export is an injection into an economy and it is positively related to economic growth. The Auto-Regressive Distributed Lag (ARDL) model was executed with E-Views (version 9) to estimate the long run co-integration relationship of the variables and derive the error correction model (ECM) in order to determine the short run relationship.

According to Pesaran and Shin (1995), the ARDL method employs only one single reduced form of equation. This makes the model to be applied to variables irrespective if they are purely I(0) which means they are integrated at the level form or purely I(1) which means they are integrated at first difference, or even mixed (Sulaiman and Abdul-Rahim, 2014). The economic model used in the study consists of the dependent variable, which is gross domestic product (GDP). The independent variables are non-oil exports (NOX), foreign direct investment (FDI), and government expenditure (GEXP). The illustration of our model specification is as follows:

This study firstly adapts the Endogenous theoretical model used in the work of Chindo *et. al.* (2015) that shows the relationship between economic growth and the main factors of production

in the endogenous growth model. This model is derived from the Romer-Mankiew-Weil (1992) model that presented four factors of production.

$$Y_t = A_t K_t^{\alpha} H_t^{\beta} L_t^{1-\alpha-\beta} \quad (1)$$

Where Y is the output of the economy, K, H and L represents capital stock, labour force and human capital. A represent the factor productivity that facilitates investment and labour force to stimulate the rate of growth of an economy. This includes technology and other capital inflows like FDI. The values α and β refer to the elasticity of labour, capital and human capital to economic growth. However, Romer, Mankiew and Weil (1992) argued that there are more factors that ensure economic growth. They noted that the term A, reflects not just technology but resource endowments which differs across countries like non-oil exports, climate, institutions and so on. Olayiwola and Okodua (2013), Adewale *et. al.*. (2016), Olayungbo and Olayemi (2018) argued that non-oil exports, foreign direct investment, and government expenditure have positive impact on the economic development of Nigeria. Based on this argument, this study derives and expands the model propounded by endogenous growth theorist from the Cobb Douglas Production Function.

$$A_t = NOX_t^{\delta} FDI_t^{\rho} GEXP_t^{\varphi} \quad (2)$$

A refers to total factor productivity, NOX refers to non-oil exports, FDI refers to foreign direct investment, and GEXP refers to government expenditure. This production function assumes that the total factor productivity is a function of the externalities and spill over effects of the stated

variables that improve efficiency in factors of production. Substituting equation (2) into equation (1), the study derived the following equation.

$$Y_t = \left(NOX_t^{\delta} FDI_t^{\rho} GEXP_t^{\varphi}\right) K_t^{\alpha} H_t^{\beta} L_t^{1-\alpha-\beta} \tag{3}$$

The value Y signifies total output of the economy, which is represented by total gross domestic output (GDP), while according to Sulaiman *et. al.* (2015), H signifies human capital, which is represented by secondary and tertiary school enrolments (HC) in equation (4)

$$GDP_t = NOX_t^{\delta} FDI_t^{\rho} GEXP_t^{\varphi} K_t^{\alpha} HC_t^{\beta} L_t^{1-\alpha-\beta} \tag{4}$$

In order to capture the impact of non-oil exports on the economic development of Nigeria, this study takes the logarithms of equation (4) and derives equation (5). The natural logarithms of the variables is represented with "ln". The originality of this research is the addition of government expenditure, which is necessary for the economic growth of Nigeria. Based on theories to examine the impact of non-oil exports on economic growth, this study employs the Auto-Regressive Distributed Lag (ARDL) approach to co-integration by using time series data (1981 - 2017) executed with E-Views (version 9). Thus, the empirical model derived to analyse the impact of non-oil exports on the development and economic growth of Nigeria is specified as follows:

$$lnGDP_t = \beta_0 + \beta_1 lnNOX_t + \beta_2 lnFDI_t + \beta_3 lnGEXP_t + \beta_4 lnK_t + \beta_5 lnHC_t + \beta_6 lnL_t + \varepsilon_t \tag{5}$$

lnGDP: Gross domestic product (GDP) proxy for the output of the economy

lnNOX: Total Non-oil exports (NOX)

lnFDI: Foreign direct investment to capture the externalities in relation to Nigeria's economic growth and reduce omitted variable bias.

lnGEXP: Government expenditure to capture the externalities in relation to Nigeria's economic growth and reduce omitted variable bias.

lnK: Capital stock

lnHC: Human capital based secondary and tertiary school enrolments

ln: Labour stock

ε_t: error term.

β_0 is the constant intercept and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \ and \ \beta_6$ are estimated coefficients of the relevant variables and expected to be positive respectively.

4.2. The Empirical Model: The ARDL Model

According to equation (5) gross domestic product ($lnGDP_t$) based on assumption is seen to depend on the level of output of non-oil exports (NOX_t), the inflows of foreign direct investment (FDI_t), the amount of government expenditure ($GEXP_t$), the amount of capital investment (K_t), the level of human capital (HC_t) and labour stock (L_t). The various coefficients in equation (5) can be used to derive the long run relationship among the variables under study. Since it assumed that an increase in non-oil exports is expected to increase the gross domestic product of Nigeria, the expected sign of the coefficients β_1 will give a positive sign from the estimation.

Based on the literature review on the related dependent variable, foreign direct investment promotes economic growth by providing capital necessary to stimulate economic activities most especially in the private sectors. FDI is also notable to bring advanced technology to the sectors that utilize it and this lead to growth and development of the sectors. The expected coefficients is also positive. One of the arguments of the endogenous growth theories is the importance of government involvement in the economic activities. Promoting policies aimed at stimulating the growth of the economy is necessary. Based on both theoretical and empirical review, government expenditure is necessary for economic growth of Nigeria because it not only increase capital investment but also infrastructural development necessary for productivity and growth of the economy. The coefficient is also expected to be positive.

The ARDL methodology is important and significant because it offers reliability for the co-integration relationship between the variables to be studied that were tested. This is because of the limited number of observations in our study. Since the variables of our study are mixed with level order I(0) and first difference I(1), Equation (5) was changed into the ARDL bounds testing approach for co-integration. By applying the co-integration technique of Pesaran *et. al.,* (2001), this study's model was able to examine for co-integration and derive the empirical estimation simultaneously even though the variables involved were having a mix of both I(0) and I(1). This method has four advantages. Firstly, the method is simple to use the relationship of co-integration can be estimated once the Ordinary Least Square (OLS) selects the lag order. Another advantage of this method is that unlike that of Engle and Granger (1987), there is no need to pre-test the comprised variables in the model for unit root test. This is because the ARDL technique is

appropriate regardless if the model regressors I(0) or I(1). However, in the presence of I(2), the technique is refuted.

The third advantage of method is that the estimation can be valid even for small sized data. This is consistent with our study because of the limitations of gathering a large sized data. Lastly, this techniques affords this study the luxury to derive the short run and long run dynamics simply by utilizing the Error Correction Method (ECM). This helps in correcting endogeneity bias because this study argues that non-oil exports (NOX) is endogenous. The ARDL Error Correction Model (ECM) used in the ARDL technique of this study is presented as below:

$$\Delta gdp_t = \alpha + \sum_{i=1}^{a} \beta_i \Delta gdp_{t-i} + \sum_{i=1}^{b} \gamma_i \Delta nox_{t-i} + \sum_{i=1}^{c} \kappa_i \Delta fdi_{t-i} + \sum_{i=1}^{d} \tau_i \Delta gexp_{t-i}$$
$$+ \sum_{i=1}^{e} \delta_i \Delta k_{t-i} + \sum_{i=1}^{f} \varsigma_i \Delta hc_{t-i} + \sum_{i=1}^{g} \eta_i \Delta l_{t-i} + \lambda gdp_{t-1} + \theta nox_{t-1}$$
$$+ \omega fdi_{t-1} + \chi gexp_{t-1} + \mu k_{t-1} + \psi hc_{t-1} + \pi l_{t-1} + \varepsilon_t \quad (6)$$

Where $\lambda, \theta, \omega, \chi, \mu, \psi, and\ \pi$ are long run multipliers and Δ shows the first difference operators. Consequently, the parameters *a,b,c,d,e,f* and *g* are the optimal lag lengths which were selected based on the minimum Akaike Information Criterion (AIC). From the F-test, this study detected if there is long-run relationships among the variables. Thereafter, this study analysed the joint significance of the lagged levels of the model's regressors. For simplicity and better understanding, the lowercase represents the natural logarithms of the variables in uppercase: $gdp_t = lnGDP_t$

4.3. The Augmented Dickey Fuller Unit Root Test for Stationarity

This study employs the ARDL technique to estimate time series data from 1981-2017 executed with E-Views (version 9). Although, the ARDL bounds technique is necessary to test for co-integration among variables, it is important to conduct the Augmented Dickey Fuller (ADF) unit root test to discover the stationarity of the variables. It is a rule of procedure that estimated variables to be integrated of order 1 as a requirement.

It is important to carry a unit root test to make sure that all variables used in the model are stationary by having a constant mean and variance. Doing this means that making future predictions for the values become sensible. Although most macroeconomic variables tend to be non-stationary, testing with the OLS technique becomes unlikely. The ARDL bounds test offers non-stationary variables to be tested for co-integration to evaluate the long run relationship.

When we consider a variable for example, Y, which has a time series represented by the first-order autoregressive AR (1):

$$Y_t = \alpha Y_{t-1} + \varepsilon_t$$

Where Y_t is the GDP at time t, ε_t is the error term that is generated from a process called white noise. It is assumed to have zero mean and constant variance as well as it is independently and identically distributed with its error terms uncorrelated across time. The assumption is that if the coefficient of GDP (Y) which is α, is less than one, then the time path is stationary, and the time path of GDP (Y_t) will fluctuate around a constant mean value. This would mean that the value of its mean trend will not have upward or downward trend. Conversely, if α is greater than one,

the series trend will be explosive and the time path would be non-stationary. However, if α is equal to one, the time path of GDP (Y_t) is non-stationary and the unit root exists.

Since most time-series data are non-stationary, different periods give new information about the mean, the variance, and covariance, which has to be finite and bounded. The variance and the covariance need to be finite, or they will not be bounded. This makes the time series data not to be stationary. When a time series variable Y_t have mean, variance, and auto-covariance that is finite and time independent, such variable is said to have a covariance stationarity (or weak stationarity). This means that its mean $\Sigma(Y_t) = \mu$, Variance $Var(Y_t) = \sigma^2$, and covariance $Cov (Y_t Y_{t+j}) = \gamma_j$ at lag j. Taking the first difference ($\Delta Y_t = Y_t - Y_{t-1}$), removes the trend in the series and makes the variable stationary. When the first difference is stationary, such variable is integrated of order 1, and its represented as I(1). The ADF unit root test is needed to guarantee that none of the variables exceed the first difference order I(1). If this happens, the ARDL technique cannot be used to execute the estimation procedure. Afzal *et. al.*. (2010) noted that the dependent variable must be integrated in order 1 so that the regressors are mixtures of I(0) and I(1).

The ADF test relies on the value of t-statistics for the coefficient of the lagged dependent variable when compared with special calculated critical values. Therefore, if the calculated value from the bounds test is greater than the critical value of the bounds test, the null hypothesis is rejected and the variable is stationary (Enders, 1995; Maddala, 1998; Greene, 2003; Gujarati, 2003). To ensure no auto-correlation, suitable number of lags must be included in the error term by using the Schwarz Information Criterion (SIC), which confirms the presence of autocorrelation.

4.4. The ARDL Co-Integration Bounds Test

The ARDL co-integration bounds test is useful for estimating the long run and short run estimates between the time series macroeconomic variables especially when the variables pass the ADF unit root test and are non-stationary at their levels. The ARDL co-integration bounds tests helps to confirm if there is a stationary long run relationship among the co-integrated variables. This approach estimates the equation using OLS technique and then computes the bound F-statistics. The F-statistics is performed on the null hypothesis so that coefficients of the lagged variables ($\delta_1 X_{t-1} \delta_1 Y_{t-1}$ or $\delta_1 Y_{t-1} \delta_1 X_{t-1}$) equal to zero. ($\delta_1 - \delta_2$) corresponds to the long run relationship, where ($a_1 - a_2$) represents the short run dynamic of the model.

The hypothesis of the long run connection is defined as follows:

H0: $\delta_1 = \delta_2 = 0$ (null, i.e. no long run relationship)

H1: $\delta_1 \neq \delta_2 \neq 0$ (Alternative, i.e. there is long run relationship)

Pesaren *et. al.* (2001) give two sets of critical values when employing the F-statistics. One set of critical values supposes that all estimated variables are I(0), which means they have a lower critical bound and shows that no co-integration exist among the underlying variables. The other set supposes that all estimated variables are I(1), which means that they have a upper critical bound implying that exist co-integration among the underlying variables. If the relevant calculated F-statistics for the significance of the variable level of the equation falls outside the band or is greater than the upper band's critical value, the null hypothesis (H0) is rejected. However, if the calculated

F-statistics is below or lower than the upper band's critical value, the null hypothesis (H0) is accepted. This means that no co-integration relationship exist among the variables.

It is necessary to decide on the optimum lag length by using appropriate model order selection criteria. It is necessary to decide from the Schwarz Bayesian Criterion (SBC), Akaike Information Criterion (AIC), or the Hannan-Quinn Criterion (HQC). A model performs better if estimates with any of the criterion are small standard errors and high R^2. This kind of model can provide the estimates of the Error Correction Model (ECM). Parameterization of the ARDL is also an important step in the estimation process. This helps to resolve the problem of spurious results and determine the long run behaviours of the parameters in the model. Parameterization helps to determine the speed of adjustment (ECM_t) and indicates how an economy adjusts to an economic shock on the short run and how much of such instability is being corrected. A positive coefficient shows a divergence of the parameters in the equation, while a union is indicated when a negative coefficient is gotten. If the estimate of $ECM_t = 1$, it is assumed that 100 percent of the adjustment to stability takes place within the period and is instantaneously full. On the other hand, if $ECM_t = 0.5$, the assumption is that 50 percent of the adjustment took place during the period. If $ECM_t = 0$, then the assumption is that there is no alteration and as such no long run relationship.

4.5. The ARDL Estimations

a) Long Run Estimates

In conducting the ARDL bounds test approach, this study estimated equation (6) to test the long run relationship among the estimated variables. This is achieved by conducting an F-test that shows the joint relativeness of the coefficients of the variables lagged levels. The null hypothesis

H_0: $\lambda = \theta = \omega = \chi = \mu = \psi = \pi = 0$ is tested against the alternative hypothesis H_1: $\lambda \neq 0 \; or \; \theta \neq 0 \; or \; \omega \neq 0 \; or \; \chi \neq 0 \; or \; \mu \neq 0 \;\; or \; \psi \neq 0 \; or \; \pi \neq 0$.

When the long run relationship is confirmed, this study derived Equation (6) to find the size of the relationship between Nigeria's economic growth and non-oil exports. Therefore, the conditional long run ARDL model can be obtained from the reduced form of the solution of equation (6), when the variables in first difference order are all equal to zero ($\Delta gdp = \Delta nox = \Delta fdi = \Delta gexp = \Delta k = \Delta hc = \Delta l = 0$). Thus,

$$gdp_t = \Omega_0 + \Omega_1 nox_t + \Omega_2 fdi_t + \Omega_3 gexp_t + \Omega_4 k_t + \Omega_5 hc_t + \Omega_6 l_t + v_t \qquad (7)$$

Where, $\Omega_0 = -\alpha/\lambda$, $\Omega_1 = -\theta/\lambda$, $\Omega_2 = -\omega/\lambda$, $\Omega_3 = -\chi/\lambda$, $\Omega_4 = -\mu/\lambda$, $\Omega_5 = -\psi/\lambda$, $\Omega_6 = -\pi/\lambda$ and v_t represents error term.

b) Short Run Estimates

The short run coefficients and the error correction term (speed of adjustment) can be derived by estimating an Error Correction Model (ECM) relating to the long run estimations of equation (7). Engle and Granger (1987) introduced the ECM model to obtain information on the causal factors that affect the variables in the model. To indicate the long run relationship among the variables, the Error Correction Term (ECT) sign of the ECM is used. Therefore, to understand the long-run relationship, a negative sign indicated convergence of the ECT and a positive sign

indicated divergence. It is important to derive a negative ECT sign because it indicates a significant long run relationship among the variables. It is stated as follows:

$$\Delta gdp_t = \alpha + \sum_{i=1}^{a} \beta_i \Delta gdp_{t-i} + \sum_{i=1}^{b} \gamma_i \Delta nox_{t-i} + \sum_{i=1}^{c} \kappa_i \Delta fdi_{t-i} + \sum_{i=1}^{d} \tau_i \Delta gexp_{t-i} + \sum_{i=1}^{e} \delta_i \Delta k_{t-i} + \sum_{i=1}^{f} \varsigma_i \Delta hc_{t-i} + \sum_{i=1}^{g} \eta_i \Delta l_{t-i} + \psi ECM_{t-1} + \varepsilon_t \quad (8)$$

Where ECM_{t-1} represents a one-period lagged error correction term, acquired from equation (7). The $\beta_i, \gamma_i, \kappa_i, \tau_i, \delta_i, \varsigma_i, \eta_i$ represent the short run dynamic coefficients of the model and ψ shows the speed of adjustment converging to the long run equilibrium.

To complete the ARDL Bounds test for co-integration, diagnostic and stability test must be carried out to evaluate the goodness of fit of the ARDL model used in the study. The diagnostic test examines the practical form, serial correlation, standard form and heteroskedacity connected with the model. The Breuch-Godfrey serial correlation LM test and the Ramsey's RESET assessment test was used in this study. The cumulative sum of recursive residuals (CUSUM)as well as the cumulative sum of squares of recursive residuals (CUSUMSQ) was carried out to evaluate the stability of the ARDL model used in the estimation. Once the diagnostic and stability tests are complete, it is necessary to conduct a causality test to evaluate the causal relationships among the variables. This study employs the Toda-Yamamoto approach to Granger Causality.

4.6. The Toda Yamamoto Approach to Granger Causality Test

The ARDL co-integration bounds test that shows the relationship of the variables on the short and long run, does not indicate the direction of the causation among the variables. This makes

the estimation results incomplete. Granger (1969) stated that the aim for estimation results to undergo the causality technique was not to find the relationship between the variables but to test the causality between them. This strengthens the results of the estimation because it verifies the causation effect among the variables.

For example, if non-oil exports (lnNOX) is positively related to economic growth (lnGDP), the Granger causality test is necessary to figure out what causality direction exist between them. What the causality test does is to determine if the causality runs from NOX to GDP (NOX →GDP); GDP to NOX (GDP→NOX); if NOX and GDP both caused each other (NOX↔GDP); and if the causality between NOX and GDP does not exist. To execute this Granger causality test, this study employs the version of Toda-Yamamoto because it is justifiable regardless of if the variables are not co-integrated or co-integrated at a random order or with the orders of I(0), I(1), respectively.

The Toda-Yamamoto Granger Causality approach adopted a revised Wald test for restriction on each parameters of the Vector Auto Regression VAR (k), where the lag length is k. The actual order of the system (k) is supplemented by the highest order of integration (d_{max}). The VAR ($k + d_{max}$) is estimated with the coefficients of the last lagged d_{max} vector being ignored. The Wald statistic adopted a chi-square allocation of a function with degrees of freedom that corresponds to the number of eliminated lagged variables. The empirical model in the Vector Autoregressive (VAR) system to execute Toda-Yamamoto's approach to Granger causality test is as follows:

$$gdp_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i}\, gdp_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i}\, gdp_{t-j} + \sum_{i=1}^{k} \beta_{1i}\, nox_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i}\, nox_{t-j}$$
$$+ \sum_{i=1}^{k} \gamma_{1i}\, fdi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i}\, fdi_{t-j} + \sum_{i=1}^{k} \delta_{1i}\, gexp_{t-i} + \sum_{j=k+1}^{dmax} \delta_{2i}\, gexp_{t-j}$$
$$+ \sum_{i=1}^{k} \rho_{1i}\, k_{t-i} + \sum_{j=k+1}^{dmax} \rho_{2i}\, k_{t-j} + \sum_{i=1}^{k} \sigma_{1i}\, hc_{t-i} + \sum_{j=k+1}^{dmax} \sigma_{2i}\, hc_{t-j} + \sum_{i=1}^{k} \mu_{1i}\, l_{t-i}$$
$$+ \sum_{j=k+1}^{dmax} \mu_{2i}\, l_{t-j} u_{1t} \qquad (9)$$

$$nox_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i}\, nox_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i}\, nox_{t-j} + \sum_{i=1}^{k} \alpha_{1i}\, gdp_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i}\, gdp_{t-j}$$
$$+ \sum_{i=1}^{k} \gamma_{1i}\, fdi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i}\, fdi_{t-j} + \sum_{i=1}^{k} \delta_{1i}\, gexp_{t-i} + \sum_{j=k+1}^{dmax} \delta_{2i}\, gexp_{t-j}$$
$$+ \sum_{i=1}^{k} \rho_{1i}\, k_{t-i} + \sum_{j=k+1}^{dmax} \rho_{2i}\, k_{t-j} + \sum_{i=1}^{k} \sigma_{1i}\, hc_{t-i} + \sum_{j=k+1}^{dmax} \sigma_{2i}\, hc_{t-j} + \sum_{i=1}^{k} \mu_{1i}\, l_{t-i}$$
$$+ \sum_{j=k+1}^{dmax} \mu_{2i}\, l_{t-j} u_{2t} \qquad (10)$$

$$fdi_t = \gamma_0 + \sum_{i=1}^{k} \gamma_{1i} fdi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i} fdi_{t-j} + \sum_{i=1}^{k} \alpha_{1i} gdp_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i} gdp_{t-j}$$
$$+ \sum_{i=1}^{k} \beta_{1i} nox_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i} nox_{t-j} + \sum_{i=1}^{k} \delta_{1i} gexp_{t-i} + \sum_{j=k+1}^{dmax} \delta_{2i} gexp_{t-j}$$
$$+ \sum_{i=1}^{k} \rho_{1i} k_{t-i} + \sum_{j=k+1}^{dmax} \rho_{2i} k_{t-j} + \sum_{i=1}^{k} \sigma_{1i} hc_{t-i} + \sum_{j=k+1}^{dmax} \sigma_{2i} hc_{t-j} + \sum_{i=1}^{k} \mu_{1i} l_{t-i}$$
$$+ \sum_{j=k+1}^{dmax} \mu_{2i} l_{t-j} u_{3t} \quad (11)$$

$$gexp_t = \delta_0 + \sum_{i=1}^{k} \delta_{1i} gexp_{t-i} + \sum_{j=k+1}^{dmax} \delta_{2i} gexp_{t-j} + \sum_{i=1}^{k} \alpha_{1i} gdp_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i} gdp_{t-j}$$
$$+ \sum_{i=1}^{k} \beta_{1i} nox_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i} nox_{t-j} + \sum_{i=1}^{k} \gamma_{1i} fdi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i} fdi_{t-j}$$
$$+ \sum_{i=1}^{k} \rho_{1i} k_{t-i} + \sum_{j=k+1}^{dmax} \rho_{2i} k_{t-j} + \sum_{i=1}^{k} \sigma_{1i} hc_{t-i} + \sum_{j=k+1}^{dmax} \sigma_{2i} hc_{t-j} + \sum_{i=1}^{k} \mu_{1i} l_{t-i}$$
$$+ \sum_{j=k+1}^{dmax} \mu_{2i} l_{t-j} u_{4t} \quad (12)$$

$$k_t = \rho_0 + \sum_{i=1}^{k} \rho_{1i}\, k_{t-i} + \sum_{j=k+1}^{dmax} \rho_{2i}\, k_{t-j} + \sum_{i=1}^{k} \alpha_{1i}\, gdp_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i}\, gdp_{t-j}$$
$$+ \sum_{i=1}^{k} \beta_{1i}\, nox_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i}\, nox_{t-j} + \sum_{i=1}^{k} \gamma_{1i}\, fdi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i}\, fdi_{t-j}$$
$$+ \sum_{i=1}^{k} \delta_{1i}\, gexp_{t-i} + \sum_{j=k+1}^{dmax} \delta_{2i}\, gexp_{t-j} + \sum_{i=1}^{k} \sigma_{1i}\, hc_{t-i} + \sum_{j=k+1}^{dmax} \sigma_{2i}\, hc_{t-j}$$
$$+ \sum_{i=1}^{k} \mu_{1i}\, l_{t-i} + \sum_{j=k+1}^{dmax} \mu_{2i}\, l_{t-j} u_{6t} \qquad (13)$$

$$hc_t = \sigma_0 + \sum_{i=1}^{k} \sigma_{1i}\, hc_{t-i} + \sum_{j=k+1}^{dmax} \sigma_{2i}\, hc_{t-j} + \sum_{i=1}^{k} \alpha_{1i}\, gdp_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i}\, gdp_{t-j}$$
$$+ \sum_{i=1}^{k} \beta_{1i}\, nox_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i}\, nox_{t-j} + \sum_{i=1}^{k} \gamma_{1i}\, fdi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i}\, fdi_{t-j}$$
$$+ \sum_{i=1}^{k} \delta_{1i}\, gexp_{t-i} + \sum_{j=k+1}^{dmax} \delta_{2i}\, gexp_{t-j} + \sum_{i=1}^{k} \rho_{1i}\, k_{t-i} + \sum_{j=k+1}^{dmax} \rho_{2i}\, k_{t-j}$$
$$+ \sum_{i=1}^{k} \mu_{1i}\, l_{t-i} + \sum_{j=k+1}^{dmax} \mu_{2i}\, l_{t-j} u_{7t} \qquad (14)$$

$$l_t = \mu_0 + \sum_{i=1}^{k} \mu_{1i}\, l_{t-i} + \sum_{j=k+1}^{dmax} \mu_{2i}\, l_{t-j} + \sum_{i=1}^{k} \alpha_{1i}\, gdp_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i}\, gdp_{t-j} + \sum_{i=1}^{k} \beta_{1i}\, nox_{t-i}$$
$$+ \sum_{j=k+1}^{dmax} \beta_{2i}\, nox_{t-j} + \sum_{i=1}^{k} \gamma_{1i}\, fdi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i}\, fdi_{t-j} + \sum_{i=1}^{k} \delta_{1i}\, gexp_{t-i}$$
$$+ \sum_{j=k+1}^{dmax} \delta_{2i}\, gexp_{t-j} + \sum_{i=1}^{k} \rho_{1i}\, k_{t-i} + \sum_{j=k+1}^{dmax} \rho_{2i}\, k_{t-j} + \sum_{i=1}^{k} \sigma_{1i}\, hc_{t-i}$$
$$+ \sum_{j=k+1}^{dmax} \sigma_{2i}\, hc_{t-j} u_{8t} \qquad (15)$$

According to equation (9), Granger causality from $gdp_t, nox_t, fdi_t, gexp_t,\ k_t, hc_t, to\ l_t$ implies $\alpha_{1i} \neq 0\ or\ \beta_{1i} \neq 0\ or\ \gamma_{1i} \neq 0\ or\ \delta_{1i} \neq 0\ or\ \rho_{1i} \neq 0\ or\ \sigma_{1i} \neq 0\ or\ \mu_{1i} \neq 0$ respectively. Equation (10) presents Granger Causality from $nox_t, gdp_t, fdi_t, gexp_t, k_t, hc_t, to\ l_t$ if $\beta_{1i} \neq 0\ or\ \alpha_{1i} \neq 0\ or\ \gamma_{1i} \neq 0\ or\ \delta_{1i} \neq 0\ or\ \rho_{1i} \neq 0\ or\ \sigma_{1i} \neq 0\ or\ \mu_{1i} \neq 0$. Equation (11) presents the Granger Causality flow from $fdi_t,\ gdp_t, nox_t, gexp_t, k_t, hc_t, to\ l_t$ if $\gamma_{1i} \neq 0\ or\ \alpha_{1i} \neq 0\ or\ \beta_{1i} \neq 0\ or\ \delta_{1i} \neq 0\ or\ \rho_{1i} \neq 0\ or\ \sigma_{1i} \neq 0\ or\ \mu_{1i} \neq 0$ respectively. With the same idea, equation (12), (13), (14), (15), show the Granger Causality from $(gexp_t, gdp_t, nox_t, fdi_t, k_t, hc_t, to\ l_t)$; $(k_t, gdp_t, nox_t, fdi_t, gexp_t,\ hc_t, to\ l_t)$; $(hc_t, gdp_t, nox_t, fdi_t, gexp_t, k_t, to\ l_t)$ and $(l_t, gdp_t, nox_t, fdi_t, gexp_t, k_t, to\ hc_t)$ respectively.

4.7. Data Description and Sources

This study applied time series data for economic variables necessary for the economic growth of Nigeria for the period 1981 to 2017 (36 years). In the estimation process, the E-views version 9 software is administered by means of an operative tool. Time series analysis comprises

of procedures for examining annual or quarterly data in order to derive meaningful statistical inference and other characteristics of the data. Due to its characteristics, time series data is distinct from panel data and cross-sectional data because it has a natural temporal ordering. Time series analysis takes note of the fact that data points gotten over time may have internal structure such as trend, variation or auto-correlation that must be accounted when conducting regression analysis. <Table 4.1> presents the variable data definitions and sources used for this study.

<Table 4.1> Variables Definition and Sources

Variables (Unit)	Definition	Expected Estimation Sign	Justification	Data Source
Gross Domestic Product (GDP, in Million Naira)	GDP is the sum total of gross value in monetary terms of all the finished goods and services made within a country over a specific period. The data of GDP is the total value added by all residents producers in the economy plus any product taxes and minus subsides not included in any product's value. The values are calculated in Million Naira.	N/A	N/A	African Development Bank (AFDB 1960-2019) Socio-economic Database
Non-oil Exports (NOX, in Million Naira)	This variable denotes the total non-oil exports value of Nigeria. Exports of non-oil products comprises of the total amount of exported general merchandise exported. This also includes movable goods with a few exceptions. The values are represented in Million Naira.	+	The "Export-Led Growth Hypothesis" (ELGH) held the notion that the increase of exports of a country leads to economic growth in such country. Exports become a key determinant for growth. By augmenting the traditional Cobb Douglas Production Function, the ELGH input exports as a third variable that describes the growth of total factor productivity (A) in the growth model. $Y = AL^{\beta}K^{\alpha}$	African Development Bank (AFDB 1960-2019) Socio-economic Database
Foreign Direct Investment	Foreign direct investment is a business investment made by a company in another country for the	+	FDI can generate technological transfers that stimulates growth (Lucas 1988; Barro 1991). This is	United Nations Conference on Trade and

(FDI, in Million Naira)	sake of establishing business operations, acquiring assets or utilizing countries natural resources. The data for FDI includes all the foreign direct inflows gotten by Nigeria from all International donors calculated based on current price, in Million Naira.		based on the Neoclassical growth theory that views FDI as a supplement of domestic investment.	Development Annual Database (UNCTAD)
Government Expenditure (GEXP, in Million Naira)	This variable consists of government spending in term of final consumption expenditure, which comprises of all current expenditure for purchases of goods and services by all levels of government. It also includes capital expenditure on national defence and security. The calculated values are represented in Million Naira	+	John Maynard Keynes's (1936) "General Theory of Employment, Interest and Money" argues that government expenditure is an exogenous factor that increases the aggregate demand for goods and thereby increasing economic growth by a multiplier effect. $Y = C + I + G + (X-M)$	United Nations Conference on Trade and Development Annual Database (UNCTAD)
Capital stock (K, in Million Naira)	This is proxy for gross capital formation (GCF) which is consists of the total value of the gross domestic capital formation plus net changes in the level of inventories and acquisitions. The calculated values are represented in Million Naira	+	The Romer-Mankiew-Weil (1992) "Endogenous Growth Model" presented four factors of production – Labour (L), capital (K), technology (A) gotten endogenously and human capital (H) that influence the growth of an economy. $Y_{(t)} = F(A\, K^{\alpha}{}_{(t)}\, H^{\beta}{}_{(t)} L_{(t)})^{1-\alpha-\beta}$	African Development Bank (AFDB 1960-2019) Socio-economic Database

Human Capital	Human capital is the economic value of a worker's experience and skills. It includes assets like education, training, health etc. Adopting Sulaiman *et. al.* (2015), the data for human capital was calculated based on the gross percentage of secondary and tertiary school enrolments.	+	The Romer-Mankiew-Weil (1992) "Endogenous Growth Model" presented four factors of production – Labour (L), capital (K), technology (A) gotten endogenously and human capital (H) that influence the growth of an economy. $Y_{(t)} = F(A\ K^{\alpha}{}_{(t)}\ H^{\beta}{}_{(t)}L_{(t)})^{1-\alpha-\beta}$	World Bank Database
Labour Stock (L, in Million People)	Labour refers to the economically active population who are either employed or unemployed but willing and able to work. It covers employers, self-employed workers, salaried employees, wage earners, unpaid workers assisting in a family, farm or business operations.	+	The Romer-Mankiew-Weil (1992) "Endogenous Growth Model" presented four factors of production – Labour (L), capital (K), technology (A) gotten endogenously and human capital (H) that influence the growth of an economy. $Y_{(t)} = F(A\ K^{\alpha}{}_{(t)}\ H^{\beta}{}_{(t)}L_{(t)})^{1-\alpha-\beta}$	The Penn World Trade Database (*PWT version 9.1*)

Chapter Five

Estimation Results

5.1. Descriptive Analysis

Before conducting the tests based on our study, we first made a descriptive analysis of our data from 1981-2017 that was used in this study. In order to explain the data used in this study meaningfully, the mean, median and other descriptive statistics of the data being was represented in <Table 5.1>. We also checked for correlation among the data that we used. <Table 5.1> below shows a summary of each series:

<Table 5.1> Summary of Descriptive Statistics for Each Series

Statistics	lngdp	lnnox	lnfdi	lngexp	lnk	lnhc	lnl
Mean	29.16	23.52	24.66	26.87	27.17	0.38	17.48
Median	29.30	24.10	25.41	26.85	27.09	0.36	17.48
Maximum	32.38	27.76	27.95	29.72	30.51	0.65	17.99
Minimum	25.45	17.17	18.79	24.44	23.26	0.18	17.11
Std. Dev.	2.36	3.25	2.94	1.85	2.36	0.17	0.27
Skewness	-0.23	-0.41	-0.66	0.13	-0.15	0.23	0.27
Kurtosis	1.65	1.88	2.16	1.60	1.71	1.57	1.87
Jarque-Bera	3.15	2.98	3.78	3.12	2.72	3.48	2.42
Probability	0.21	0.22	0.15	0.21	0.26	0.18	0.30
Sum	1078.85	870.21	912.29	994.23	1005.38	14.04	646.69
Sum Sq. Dev.	201.24	381.22	310.95	122.83	200.62	0.99	2.60
Observations	37.00	37.00	37.00	37.00	37.00	37.00	37.00

Source: Author's calculations for common samples.

5.2. The Augmented Dickey-Fuller Unit Root Test for Stationarity

After our descriptive analysis, we conducted the ADF-unit root test, because it is necessary to check for stationarity of each variable that was used for our analysis. The standard is either I(0) or I(1) and our test assures that no I(2) stationary variable exist in order to avoid spurious regression. The report is in <Table 5.2> below:

<Table 5.2> Augmented Dickey-Fuller Unit Root Test

Variables	Descriptions	Level$_{(prob.)}$ I(0)	1st- Difference$_{(prob.)}$ I(1)	I(n)
lngdp	Gross Domestic Product	-1.012$_{(0.739)}$	-4.753***$_{(0.000)}$	I(1)
lnnox	Non-oil Export	-1.188$_{(0.669)}$	-7.188***$_{(0.000)}$	I(1)
lnfdi	Foreign Direct Investment Inflows	-1.404$_{(0.570)}$	-9.018***$_{(0.000)}$	I(1)
lngexp	Government Expenditure	0.167$_{(0.967)}$	-3.793***$_{(0.008)}$	I(1)
lnk	Gross Capital Formation	-1.501$_{(0.518)}$	-4.484***$_{(0.001)}$	I(1)
lnhc	Human Capital Index	-3.237*$_{(0.094)}$	n/a	I(0)
lnl	Labor stock	2.806$_{(1.000)}$	-4.355***$_{(0.002)}$	I(1)

Note: The statistical significance is presented as follows: 1% (***), 5% (**) and 10% (*)
Estimation Results Source: E-views version 9

We can see that the variables gross domestic product, non-oil exports, foreign direct investment, government expenditure, gross capital formation and labour are integrated at first difference order I(1), while human capital integrated at level order I(0). The estimated variables therefore are integrated at both the level order I(0) and first difference order I(1). With the foregoing, it means the ARDL approach is adequate and the ARDL Bounds test for co-integration can be conducted in our model because none of the variables are integrated at second difference I(2) order.

5.3. Auto-Regressive Distributed Lag Bounds Test for Co-Integration

<Table 5.3> ARDL Bounds Test

ARDL Bounds Test Date: 05/21/20 Time: 20:00
Sample: 1984 2017 Included observations: 34
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	10.93761	6

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	1.75	2.87
5%	2.04	3.24
2.5%	2.32	3.59
1%	2.66	4.05

Test Equation:
Dependent Variable: D(LNGDP) Date: 05/21/20 Time: 20:00
Method: Least Squares Sample: 1984 2017 Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNNOX)	0.158733	0.044453	3.570766	0.0044
D(LNNOX(-1))	-0.206500	0.098762	-2.090880	0.0605
D(LNNOX(-2))	-0.075337	0.059887	-1.257990	0.2344
D(LNFDI)	-0.016752	0.037582	-0.445740	0.6644
D(LNFDI(-1))	-0.358311	0.087794	-4.081253	0.0018
D(LNFDI(-2))	-0.233400	0.051720	-4.512753	0.0009
D(LNGEXP)	0.425011	0.124769	3.406393	0.0059
D(LNGEXP(-1))	-0.233660	0.115252	-2.027374	0.0676
D(LNGEXP(-2))	-0.196662	0.116964	-1.681380	0.1208
D(LNK)	-0.024397	0.090089	-0.270811	0.7916
D(LNHC)	5.750300	12.71860	0.452117	0.6600
D(LNHC(-1))	-12.15177	10.37300	-1.171481	0.2662
D(LNHC(-2))	17.20561	7.450948	2.309184	0.0414
D(LNL)	1.160493	0.980887	1.183106	0.2617
D(LNL(-1))	1.570364	0.913760	1.718574	0.1137
D(LNL(-2))	3.003904	0.930802	3.227222	0.0081
LNNOX(-1)	0.426660	0.118972	3.586230	0.0043
LNFDI(-1)	0.226608	0.081415	2.783368	0.0178
LNGEXP(-1)	0.393557	0.250569	1.570651	0.1446

LNK(-1)	-0.450737	0.155385	-2.900786	0.0144
LNHC(-1)	0.358564	1.169561	0.306580	0.7649
LNL(-1)	0.680391	0.160521	4.238657	0.0014
LNGDP(-1)	-0.888026	0.178188	-4.983651	0.0004
R-squared	0.938686	Mean dependent var		0.199192
Adjusted R-squared	0.816058	S.D. dependent var		0.155193
S.E. of regression	0.066560	Akaike info criterion		-2.356956
Sum squared resid	0.048732	Schwarz criterion		-1.324418
Log likelihood	63.06826	Hannan-Quinn criter.		-2.004831
Durbin-Watson stat	1.842427			

Source: E-views version 9

Here, we presented the bounds test for co-integration of the variables which was based on the ARDL model that was derived in equation (6). The joint significance of the lagged levels is tested by utilizing the F-test according to equation (6). The null hypothesis of equation (6) is H_0: $\lambda = \theta = \omega = \chi = \mu = \psi = \pi = 0$ which shows that there exist no co-integration relationship among variables, while the alternative hypothesis is specified as $H_1: \lambda \neq 0 \; or \; \theta \neq 0 \; or \; \omega \neq 0 \; or \; \chi \neq 0 \; or \; \mu \neq 0 \; or \; \psi \neq 0 \; or \; \pi \neq 0$. Two critical values are important which are the lower bound and the upper bound values. If the calculated F-stats falls above the upper bound, the null hypothesis is rejected meaning there is no co-integration. If otherwise, we accept the null hypothesis.

<Table 5.4> Summary of the ARDL Bounds Test

Estimated Equation ***gdp = f(nox, fdi, gexp, k, hc, l)***	
Optimal lag	ARDL(1, 3, 3, 3, 1, 3, 3)
F-Statistics	10.94***

Note: The statistical significance is presented as follows: 1% (***), 5% (**) and 10% (*)
Estimation Results Source: E-views version 9

The ARDL bounds test for co-integration is necessary to ascertain the long run relationship among the variables. In <Table 5.5> the lower bound value at 1 percent is 2.66 while the upper bound value also at 1 percent is 4.05. Both critical values are below the calculated F-statistics value represented in <Table 5.4>, which is 10.94 and indicates that a long run relationship is existing between the dependent variable and independent variables.

<Table 5.5> Summary of the ARDL Bounds Test Critical Values

Significance	I(0) Bound	I(1) Bound
10%	1.75	2.87
5%	2.04	3.24
2.5%	2.32	3.59
1%	2.66	4.05

Note: The statistical significance is presented as follows: 1% (***), 5% (**) and 10% (*)
Estimation Results Source: E-views version 9

Since the result obtained from the bounds test proves that the calculated F-statistics is equal to 10.94, which exceeds the upper bound critical value of 4.05 at 1 percent significant level, therefore, the null hypothesis is rejected, and this indicates that a long run co-integration relationship exists among variables.

5.4. The ARDL Estimations

After conducting the ARDL Bounds test and confirming the calculated value is more than the upper bound value at 1 percent. It is necessary to further the analysis on the data by deriving the ARDL estimates for both the long run and the short run based on the OLS regression in

Equation (7) and the error correction model in Equation (8). <Table 5.6> presents the ARDL short run and long run estimates conducted by using the E-views analytical software version 9.

<Table 5.6> The ARDL Estimations

ARDL Cointegrating And Long Run Form Date: 05/21/20 Time: 19:56
Dependent Variable: LNGDP
Selected Model: ARDL(1, 3, 3, 3, 1, 3, 3)
Sample: 1981 2018 Included observations: 34

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNNOX)	0.158733	0.044453	3.570766	0.0044
D(LNNOX(-1))	-0.131163	0.052723	-2.487783	0.0302
D(LNNOX(-2))	-0.075337	0.059887	-1.257990	0.2344
D(LNFDI)	-0.016752	0.037582	-0.445740	0.6644
D(LNFDI(-1))	-0.124911	0.061298	-2.037764	0.0664
D(LNFDI(-2))	-0.233400	0.051720	-4.512753	0.0009
D(LNGEXP)	0.425011	0.124769	3.406393	0.0059
D(LNGEXP(-1))	-0.036998	0.102470	-0.361061	0.7249
D(LNGEXP(-2))	-0.196662	0.116964	-1.681380	0.1208
D(LNK)	-0.024397	0.090089	-0.270811	0.7916
D(LNHC)	5.750300	12.718602	0.452117	0.6600
D(LNHC(-1))	-29.357386	16.216879	-1.810298	0.0976
D(LNHC(-2))	17.205614	7.450948	2.309184	0.0414
D(LNL)	1.160493	0.980887	1.183106	0.2617
D(LNL(-1))	-1.433540	1.279816	-1.120114	0.2865
D(LNL(-2))	3.003904	0.930802	3.227222	0.0081
CointEq(-1)	-0.888026	0.178188	-4.983651	0.0004

Cointeq = LNGDP - (0.4805*LNNOX + 0.2552*LNFDI + 0.4432*LNGEXP - 0.5076*LNK + 0.4038*LNHC + 0.7662*LNL)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNOX	0.480459	0.080863	5.941676	0.0001
LNFDI	0.255182	0.117908	2.164246	0.0533
LNGEXP	0.443182	0.221304	2.002594	0.0705
LNK	-0.507572	0.170187	-2.982445	0.0125

LNHC	0.403777	1.349048	0.299305	0.7703
LNL	0.766184	0.241234	3.176100	0.0088

Source: E-views version 9

5.5. The ARDL Long Run Estimates

Since our bounds test showed that a long run co-integration relationship exist among the variables, equation (7) is regressed in order to get the long run estimates between economic growth and non-oil exports. The outcome from the <Table 5.6> imply that a 1 percent increase in non-oil exports increases the GDP by 0.48 percent at 1 percent significance. This outcome is in line with our general expectation. In addition, the results from the table stipulates that 1 percent increase in FDI increases the GDP by 0.26 percent at 10 percent significance. This means FDI is important for Nigeria's economic growth. A 1 percent increase of government expenditure also increases the GDP by 0.44 percent at 10 percent significance indicating the necessity of government expenditure for the economic growth. When labour is increased by 1 percent, Nigeria's GDP increases by 0.77 percent at 1 percent significance. This means that Nigeria has viable labour that can grow the economy. An increase in human capital relatively increases the country's GDP by 0.40 percent however, this increase did not seem to show any relative significance to the economic growth of Nigeria. This does not mean that human capital is not necessary for the country's economic growth but that more investment in education, health, and infrastructure as well as in specialized training is needed to equip the viable labour population with the resources needed to influence growth in the economy. Contrary to the consensus results gotten from other variables, gross capital formation indicated that a 1 percent increase decreases GDP by 0.51 percent at 5 percent significance. <Table 5.7> summarizes this analysis below:

<Table 5.7> Summary of the ARDL Long Run Estimates

Variable	Coefficient	t-Statistic	Prob.
nox	0.480***	5.942	0.000
fdi	0.255*	2.164	0.053
gexp	0.443*	2.003	0.071
k	-0.508**	-2.982	0.013
hc	0.404	0.299	0.770
l	0.766***	3.176	0.009

Note: The statistical significance is presented as follows: 1% (***), 5% (**) and 10% (*)
Estimation Results Source: E-views version 9

The supporting explanations for the above empirical results might rest on a few factors. Firstly, although the over export earnings from the non-oil sector is low compared to the oil sector, it still has a significant impact owing to the available resources championed to the sector. The basic assumption would be that if more resources are allocated to the sector as well as more policies set up to grow the sector, the non-oil exports of Nigeria could produce more export earnings to the GDP of the country and thereby improve the economic development of Nigeria. Secondly, diversification of the export sector of Nigeria can yield more growth for the economy. This is supported by the work of Ojide *et. al.* (2014) who implied that non-oil exports have a significant impact in the long run of the nation's growth. It also confirms the reports of Ekpo and Egwaikhide (1994) and that of Langley (1968) that the export-led growth hypothesis also holds in Nigeria as exports is seen in the findings to contribute to the growth of the economy. Following the findings of Soderbom and Teal (2002), we agree that the government of Nigeria need to further and promote more export-oriented firms after reviewing their current incentive schemes and making them more efficient and effective.

The significant impact of FDI on the economic development of Nigeria can be attributed to the straightforward policies currently implemented in the country. Although the impact to the economy is relatively low which indicates the country is not attracting more FDI inflows. This can be said to the fact that most of the sectors are not properly managed coupled with the bureaucracy of government agencies and high level of corruption from government officials. According to Okechukwu *et. al.* (2018), the Nigerian government still need to create incentives to attract FDI that has more impact on non-oil exports, mainly primary sector FDI and manufacturing sector FDI especially. This would help to reduce over dependency on the oil sector and put more interest in export diversification by creating incentives and avenues that allows integration of various non-oil export sectors with the manufacturing and industrial sectors. This invariably increase production and export of non-oil goods.

With Nigeria's growing population, it is expected that labour play a significant role the growth of the economy. The result gotten affirms the theoretical assumption of the endogenous growth model used in the analysis. The significant of government expenditure to increase economic growth of Nigeria is expected based on the Keynesian economic theory that factors government as an institution that caters for the welfare of the nation. Since most of the agencies are government run in Nigeria and they control the spending of most statutory bodies and agencies, it is expected to see the significance in the economic growth. However, the impact of government expenditure is below average. This is due to high level of corruption and misappropriation of allocated funds. This result is contrary to the view of Olayungbo and Olayemi (2018) where they found the short run and long run results of their research on government expenditure, to have no impact on economic growth of Nigeria. However, like this study, they suggested that proper

allocation of government spending would produce a positive impact on Nigeria's economic growth both on the long and short run.

Human capital has a positive yet insignificant impact on Nigeria's economic growth. It can be argued that because of the poor education system of Nigeria, the literacy rate of Nigeria is very low and as such do not offer much needed assistance in growing the economy of Nigeria. This is line with Chindo *et. al.*, (2015) who found human capital based on secondary and tertiary school enrolments, to have no impact on economic growth on the short run, although our results find no impact on both long run and short run. Consequently, the Nigerian government is a very corrupt government and majority of funds are not utilized for capital projects like improving the healthcare sector, education sector, or infrastructures needed to improve the economy. These funds are looted and used for personal gratification. The possible solution is for the government to invest more in education and create an avenue for graduates to take part in the decisive areas of the non-oil sectors by creating and infusing new ideas and technology to grow the sector. Our results have shown that enrolment in just tertiary education alone does not guarantee that there would be a positive impact on the economy. Rather, more avenues for capacity development, training, research and development, would make graduates more productive to the economy.

Gross capital formation showed a negative significance to the economic growth of Nigeria. This study supports the basis Keynesian and Endogenous growth theories that proposes that capital influences an economy's growth. However, in the case of Nigeria, the basic Harrod-Domer economic growth assumption is that as savings and labour increases, economic growth also increases. According to <Figure 2.4> in Chapter 2, the GDP per capital has been on a constant decline. This means that the available capital for business to do business is very low. This argument

is in line to that of Shikha (2018) who argued that in the case of India, the volume, ability and willingness to save is low. India and Nigeria share large population indexes. The study also attributed the negative impact to the low profit generated from public sector enterprises and some certain market conditions.

In the case of Nigeria, this position is also imperative. According to Onyinye *et. al.,* (2017), they also found that gross capital formation also have negative significance on GDP. The study argues that while it is easy to generate public capital investments, in Nigeria it is difficult to organise the information because of the inefficiencies in public institutions responsible for data collation. In addition, the business environment in Nigeria has many negative practises. One of such practise is falsification of records by public officials and business owners in order to evade taxes. A reason for this is because certain factors. One is the endemic corruption in the country, which leads to inflation of capital investments. Another reason is the effects and tribal discrimination that is because of the civil war from 1967-1970. The government as a way to suppress tribal influence and prevent another civil war targets businesses owned by certain ethnic tribes. This study argues that capital formation is necessary for economic growth. By this assumption, it is imperative for the Nigerian government to adopt right practises and eradicate corruption in order to influence economic growth. The ease of doing business index ranks Nigeria at 131 out of 190 countries based on the 2020 World Bank Doing Business Index. This indicates why gross capital formation negatively affects the country. Nigeria needs to therefore, address the issues of its public sector and its facilities to investment and finance. The country needs to also, address it income tax policies as a way to attract potential investors. In addition, a way to control

capital formation, the country needs to implement the right monetary policies as a way to attract and influence the right capital investment.

5.6. The ARDL Short Run Estimates

According to <Table 5.6>, this study present the short run relationship among the variables to show the impact of non-oil exports on the economic development of Nigeria. The results show two out of three positive significance effects for non-oil exports, FDI, and human capital on GDP. It also showed that one out of three positive significance effects for government expenditure and labour on GDP. Gross capital formation however, also shows no significance effect on GDP. <Table 5.8> summarizes this analysis below:

<Table 5.8> Summary of the ARDL Short Run Estimates

Variable	Coefficient	t-Statistic	Prob.
Δnox_t	0.159***	3.571	0.004
Δnox_{t-1}	-0.131**	-2.488	0.030
Δnox_{t-2}	-0.075	-1.258	0.234
Δfdi_t	-0.017	-0.446	0.664
Δfdi_{t-1}	-0.125*	-2.038	0.066
Δfdi_{t-2}	-0.233***	-4.513	0.001
$\Delta gexp_t$	0.425***	3.406	0.006
$\Delta gexp_{t-1}$	-0.037	-0.361	0.725
$\Delta gexp_{t-2}$	-0.197	-1.681	0.121
Δk_t	-0.024	-0.271	0.792
Δhc_t	5.750	0.452	0.660
Δhc_{t-1}	-29.357*	-1.810	0.098
Δhc_{t-2}	17.206**	2.309	0.041
Δl_t	1.160	1.183	0.262
Δl_{t-1}	-1.434	-1.120	0.287
Δl_{t-2}	3.004***	3.227	0.008
Δecm_{t-1}	-0.888***	-4.984	0.000

Note: The statistical significance is presented as follows: 1% (***), 5% (**) and 10% (*)
Estimation Results Source: E-views version 9

The short run estimates connected to the long run relationship was obtained from equation (8). The coefficients of the different terms ($\beta_i, \gamma_i, \kappa_i, \tau_i, \delta_i, \varsigma_i, \eta_i$) show the parameters on the short run, while the coefficient parameter of the ECM term (ψ) indicates the speed of adjustment flowing from the equilibrium among the variables from the short run to the long run. Our empirical results in <Table 5.8> show that the short run impacts of non-oil exports on economic development of Nigeria are in line with the long run impact. The first period showed positive impact but later periods showed negative impacts. However, the equilibrium correction coefficient (-0.89) is statistically significant and this is a correct sign. This means that the disequilibrium would be corrected with an adjustment speed of 89 percent.

5.7. Diagnostic and Stability Test of the ARDL Model

The varieties of diagnostic tests are performed in order to confirm the efficiency of the ARDL model. <Table 5.9> presents the results of this test. The Breuch-Godfrey serial correlation LM test indicates that the probability value of the F-statistics is 0.74 and therefore is insignificant in the ARDL model at degree of freedom (1, 10). This means our model is free from auto-correlation. The probability F-statistics value based on the Ramsey's RESET assessment test is also insignificant at 0.65 with degree of freedom at (1, 10). This indicates that our model is properly defined. The R^2 value that measures the goodness of fit according to <Table 5.3> is 0.93 of the estimated regression line and this shows the goodness of fit overall measure.

<Table 5.9> Diagnostic Tests of the ARDL Model

ΔECM_{t-1}		R^2	LM (F-Statistics)	RESET (F-Statistics)
Coefficient	Prob.	0.93	0.74	0.65
-0.89***	0.00			

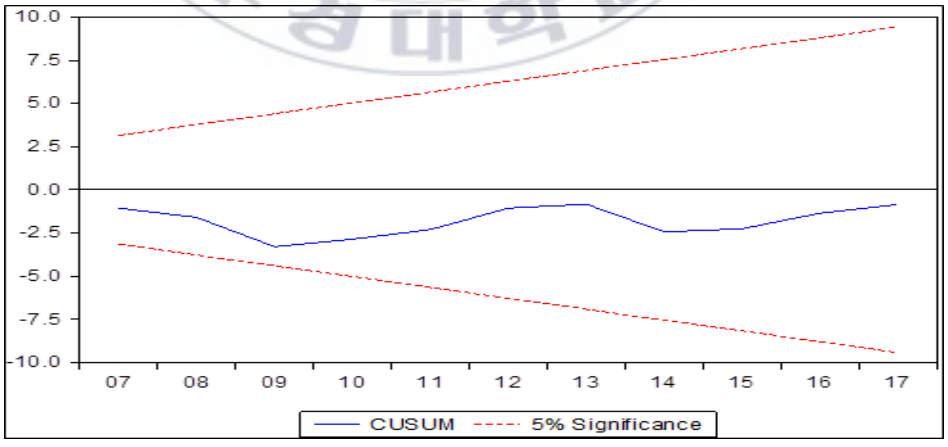
Note: The statistical significance is presented as follows: 1% (***), 5% (**) and 10% (*)
Estimation Results Source: E-views version 9

Stability Tests of the ARDL Model

The stability of the model in terms of both the short run and the long run is investigated by conducting the CUSUM or cumulative sum of recursive residuals and the CUSUM of Squares or cumulative sum of squares of recursive residual tests. The results in <Figure 5.1> and <Figure 5.2> confirm that all estimates of the model are stable at a 5 percent significance level over the sample period.

<Figure 5.1> Plot of CUSAM (Stability test)

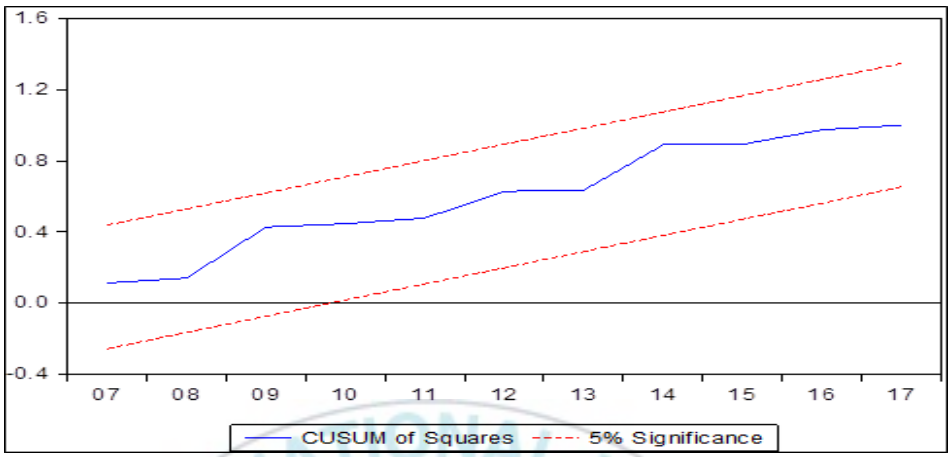
The Plot of Cumulative Sum of Recursive Residuals



Note: The Blue line in the middle of the two red lines indicates that all estimates are stable a significant level of 5 percent.
Estimation Results Source: E-views version 9

<Figure 5.2> Plot of CUSAMSQ (Stability test)

The Plot of Cumulative Sum of Squares of Recursive Residuals



Note: The Blue line in the middle of the two red lines indicates that all estimates are stable a significant level of 5 percent.
Estimation Results Source: E-views version 9

5.8. The Toda-Yamamoto Approach to Granger Causality Test

Performing the co-integration tests and the diagnostic test is not sufficient to describe the direction of the causality flow among the variables. For the Toda-Yamamoto test for Granger causality, we determined the maximum order of integration (d_{max}) by use of the ADF unit root test. Once this was obtained, we generated a VAR representation of equations to obtain the optimal lag (k) of the variables. Adopting the procedure of Lutkepohl (2005), we added the maximum order of integration and the optimal lag to determine the lag length of the variables. By means of ordinary least squares, we connected this lag length number to the number of endogenous variables in the VAR sample size represent in Equation (9) through to Equation (15). This thereby analyse the variables as exogenous variables. The null hypothesis of each variable (gross domestic product, non-oil exports, foreign direct investment, government expenditure, gross capital formation,

human capital and labour) to that of gross domestic product (GDP) is rejected at 10 percent significant level.

From the Toda-Yamamoto Granger causality test conducted in this study, <Table 5.10> shows that our results reveal a unidirectional causality from non-oil exports (NOX) of gross domestic product (GDP). The same causal relation is identified between foreign direct investment (FDI) and GDP; labour (L) and GDP; gross capital formation (K) and NOX; NOX and government expenditure (GEXP); FDI and GEXP; FDI and capital; government expenditure and capital; human capital (HC) and capital; labour and capital; nonoil exports and human capital; and FDI and human capital. The tests also revealed a bi-directional causality from government expenditure and GDP; human capital and GDP; human capital and government expenditure; and capital and human capital. The tests also revealed no causal relationship between GDP and NOX as well as from capital to GDP.

<Table 5.10> Toda-Yamamoto Granger Causality Test Results

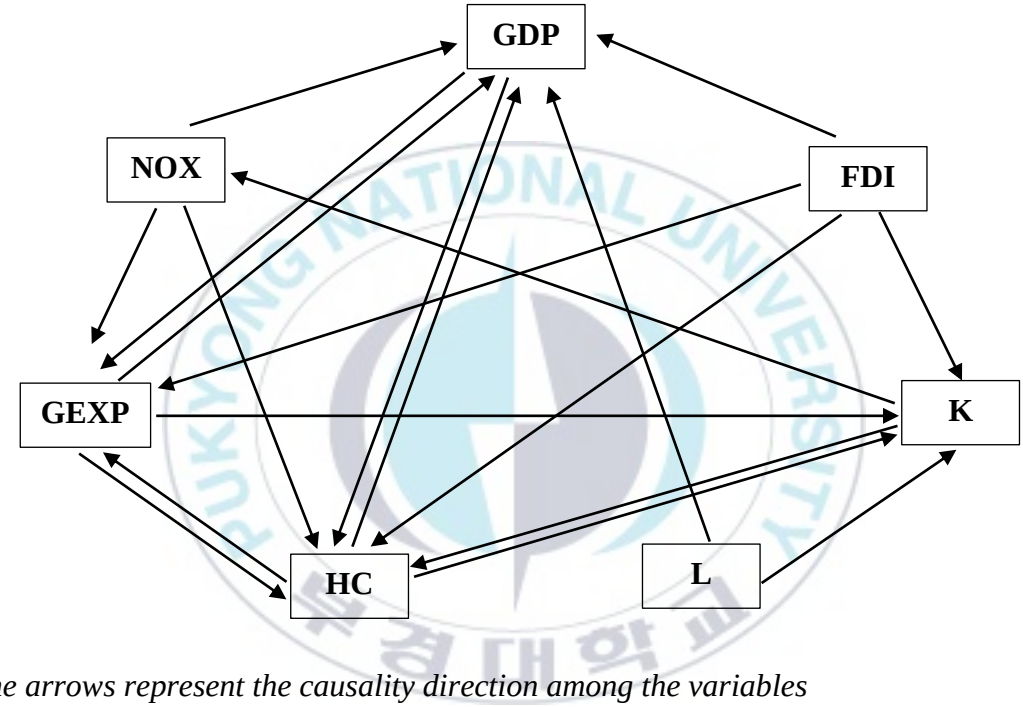
Independent Variable→Dependent Variable	Wald Statistics	Probability Value	Causality Direction
LNNOX→LNGDP	4.885*	0.087	Unidirectional
LNFDI→LNGDP	8.685**	0.013	Unidirectional
LNGEXP→LNGDP	5.883*	0.053	Bi-directional
LNK→LNGDP	2.32	0.313	
LNHC→LNGDP	6.771**	0.034	Bi-directional
LNL→LNGDP	6.851**	0.033	Unidirectional
LNGDP→LNNOX	1.468	0.480	
LNFDI→LNNOX	1.167	0.558	
LNGEXP→LNNOX	0.601	0.741	
LNK→LNNOX	4.656*	0.098	Unidirectional
LNHC→LNNOX	0.136	0.934	
LNL→LNNOX	0.732	0.693	
LNGDP→LNFDI	1.150	0.563	
LNNOX→LNFDI	0.747	0.688	
LNGEXP→LNFDI	0.900	0.638	
LNK→LNFDI	1.814	0.404	
LNHC→LNFDI	2.726	0.256	
LNL→LNFDI	3.757	0.153	
LNGDP→LNGEXP	6.271**	0.044	Bi-directional
LNNOX→LNGEXP	11.354***	0.003	Unidirectional
LNFDI→LNGEXP	9.625***	0.008	Unidirectional
LNK→LNGEXP	2.182	0.336	
LNHC→LNGEXP	10.666***	0.005	Bi-directional
LNL→LNGEXP	1.508	0.471	
LNGDP→LNK	0.035	0.983	
LNNOX→LNK	0.83	0.660	
LNFDI→LNK	8.290**	0.016	Unidirectional
LNGEXP→LNK	4.807*	0.090	Unidirectional
LNHC→LNK	4.639*	0.098	Bi-directional
LNL→LNK	7.587**	0.023	Unidirectional
LNGDP→LNHC	11.732***	0.003	Bi-directional
LNNOX→LNHC	18.644***	0.000	Unidirectional
LNFDI→LNHC	11.695***	0.003	Unidirectional
LNGEXP→LNHC	21.197***	0.000	Bi-directional
LNK→LNHC	4.706*	0.095	Bi-directional
LNL→LNHC	0.528	0.768	
LNGDP→LNL	0.401	0.818	
LNNOX→LNL	2.594	0.273	
LNFDI→LNL	3.653	0.161	
LNGEXP→LNL	0.426	0.808	
LNK→LNL	3.393	0.183	
LNHC→LNL	0.665	0.717	

Note: The statistical significance is presented as follows: 1% (***), 5% (**) and 10% (*)
Estimation Results Source: E-views version 9

The above test results reveals the unidirectional causal relationship between non-oil exports and gross domestic product (GDP) growth. This means that in Nigeria, the non-oil exports

increases the economic growth of the country. The results also affirmed that foreign direct investment, government expenditure, human capital and labour increase the total output of the economy of Nigeria. The tests found bidirectional relationships between government expenditure, human capital and GDP. <Figure 5.3> summarizes the results gotten from Granger causality test.

<Figure 5.3> Summary of Toda-Yamamoto Granger Causality Test



Note: The arrows represent the causality direction among the variables
Source: Author's graphic representation

The results in <Table 5.10> and <Figure 5.3> reveal that Non-oil export impact the economic growth of Nigeria and this impact can be explained using the Endogenous growth model. Five out of six variables affect GDP. This means that FDI, government expenditure, human capital and labour all play a role in the impact of non-oil exports on the economic development and growth of Nigeria.

Chapter Six

Conclusion and Policy Recommendation

6.1. Conclusion

Previous studies on the impact of non-oil exports on the economic development of Nigeria neglected important variables in their estimation leading to omitted variable bias. However, based on empirical studies, foreign direct investment and government expenditure show to have significant impact on Nigeria's economic growth. Omitting these variables causes an inadequacy of the results of previous studies to explain the size of the magnitude of impact, non-oil exports exert on the economic development of Nigeria. This study sort to improve other studies by including these variables in one simultaneous equation and therefore reduce the omitted variable bias.

From the estimations and tests, it is evident that non-oil exports have an impact on the economic development of Nigeria and this is significantly almost average. The results supports the findings of Adewale *et. al.,* (2016); Nwodo and Asogwa (2017); Riti *et. al.* (2016); Kromtit, *et. al.* (2017); Ojide, *et. al.,* (2014); Onuorah (2018) who employed time series analyses to show that non-oil exports have a positive impact on Nigeria's economic growth. These studies argued that there is the need for government policies aimed at increasing the sector. The Toda-Yamamoto approach to Granger Causality test shows that non-oil exports impact on Nigeria's economic growth can be explained using the Endogenous Growth Model.

The empirical results from this study found that a 1 percent increase in non-oil exports increases the GDP by 0.48 percent at 1 percent significance. The findings indicated a long run and short run relationship between non-oil exports and the growth of Nigeria's economy. This outcome is in line with our general expectation. The results also stipulates that 1 percent increase in FDI increases the GDP by 0.26 percent at 10 percent significance. This means FDI is important for Nigeria's economic growth. A 1 percent increase of government expenditure also increases the GDP by 0.44 percent at 10 percent significance indicating the necessity of government expenditure for the economic growth. When labour is increased by 1 percent, Nigeria's GDP increases by 0.77 percent at 1 percent significance. This means that Nigeria has viable labour that can grow the economy. An increase in human capital relatively increases the country's GDP by 0.40 percent although it shows no relative significance to the economic growth of Nigeria. Gross capital formation indicated that a 1 percent increase decreases GDP by 0.51 percent at 5 percent significance. The Toda-Yamamoto Granger Causality test also reveals a unidirectional causal relationship between non-oil exports and the economic growth of Nigeria.

The results further attests to the argument that exports is a requirement for effective economic growth. It also affirms that export diversification is needed to expand the export base of any country. The evidence reported in this study confirms that in the case of Nigeria, theories that claim that non-oil exports can stimulate economic growth can be supported.

6.2. Policy Recommendations

The golden key is policy: Nigeria should adopt policies to liberalize the operating environment for industrial take-off and an export-led economy. The BRICS countries and the

Asian Tigers have signposted the way: Brazil shifted from exports of raw commodities like cocoa and coffee beans to processing and heavy industries and is today a major exporter of aircraft, refined petroleum, cars and semi-finished iron. India's top exports include machinery, pharmaceuticals, vehicles and electrical equipment. Like the Asian Dragons and Tigers, Nigeria should pursue and sustain policies to promote high job-creating sectors and sub-sectors like mining, textiles, steel, pharmaceuticals and food processing while harnessing the full potential of its agricultural and hydrocarbon and gas reserves. India, Indonesia and Bangladesh pursued policies that have today made them top textiles producers after China.

More funding is required to stimulate various sectors of the economy. The inflow of FDI to the country is slowing declining. This is because of government policies that scare investors away. The government cannot achieve this alone with the total output of oil decreasing on the daily and the current output of the non-oil export sector is still minimal. There is need for the government to seek out new ways to source funds. Government expenditure should target improving capital projects, infrastructure and job creation. A lot of value is wasted in the non-oil sector because the government fail to create jobs. The non-oil export sector needs to be privatised to create competition and more jobs. The country needs measures to ease the state of doing business. Taxation and corrupt practises affect the business practises of companies.

Start-ups and small and medium scale enterprises are the tonics for job creation and exports. Existing policies have not delivered and therefore need to be reviewed. Finally, Nigeria has 36 states, but the responsibility of the production of the different sectors of the economy rests on the backs of the federal government. States and local governments should be given autonomy to develop the productive sectors and exports of the economy while eradicating corruption and

bureaucracy. This would promote private sector-led economies by leveraging their competitive advantages and target job creation and exports.

6.3. Limitations of the Research

As it is the case with various research studies, this study also has its limitations. One of such limitation is the availability of necessary data to conduct an in-depth analysis if the impact of the non-oil exports. Various time series or quarterly data of the various non-oil exports are limited or simply unavailable. Another limitation of the study is the size of the data used. Most national and international database have data for the variables from the 1980's. The problem with this is that this time-period culminates the advent of crude oil exploration and sales boom in the country. Therefore, the study could not make an in-depth analysis before the advent of crude oil except by drawing assumptions.

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Appendix

Table A.1: Summary on General Empirical Evidence

NOX→GDP	Author	Data Set	Dependent Variable	Independent Variable	Technique	Findings
Positive	Hosseni and Tang (2014)	Time series: Iran (1970-2008)	GDP growth rate	Capital investment, labour force participation, total oil exports, total non-oil exports, total imports and error term, which is assumed to be spherically distributed.	Lagrange Multiplier test, Johansen-Juselius Co-integration test, Granger causality test	The study found a unidirectional causality of non-oil exports on Iran's economic growth
	Khayati (2019)	Time series: Bahrain (1977-2015)	GDP growth rate	Technology which is constant, Capital investment, labour stock, oil exports, non-oil exports, imports and error term.	Johansen Co-integration test, VECM, Granger test	The study found that the economic growth of Bahrain was positively and significantly related to non-oil exports (*NOX*) and oil exports (*OX*) on the long run
	Mohsen (2015)	Time series: Syria (1975-2010)	Real GDP growth rate	Real non-oil exports, real oil exports and error term	Johansen Co-integration test, Granger test, VD test	The study indicated that GDP is positively and significantly related to both non-oil and oil exports and a bidirectional causality relationship between GDP and non-oil exports on both the short-run and long run.
	Merza (2007)	Time series: Kuwait (1970-2004)	Real GDP growth rate	Oil exports (OILX), non-oil exports (NONOILX) and error term	Johansen Co-integration test, ECM,	The study found a long-run relationship between non-oil exports and GDP. It also found

					IRF, Granger test	unidirectional causality from non-oil exports to GDP growth.
	Aljebrin (2017)	Time series: Saudi Arabia (1988-2014)	Non-oil GDP	Capital represented by gross capital formation, labour stock, non-oil export and error term	OLS, ECM	The empirical results of the study revealed that there is positive and significant relationship between the non-oil economic growth and non-oil exports in both short run and long run
Negative	Mehrara (2014)	Panel Data: 11 Selected Petroleum-exporting countries (1970-2011)	Non-oil international trade	Gross Domestic Product, Oil revenue and error term	Johansen Co-integration test, Granger test	The results of the study revealed that non-oil trade does not have any significant effects on GDP growth on both short-run and long run
	Tabari and Nasrollahi (2010)	Time series: Iran (1980-2007)	Net aggregate non-oil export output which is total output (GDP) minus total non-oil exports (NOX)	Capital formation, labour force growth, non-oil exports and error term	Johansen Co-integration test, VECM	The results showed a negative and statistically significant impact of non-oil exports on economic growth.

Table A.2: Summary on Nigeria's Empirical Evidence

NOX→GDP	Author	Data Set	Dependent Variable	Independent Variable	Technique	Findings
Positive	Adewale *et. al.*, (2016)	Time series: Nigeria (1970-2014)	GDP growth rate	Non-oil exports, Oil exports, Exchange rate, Non-oil imports, Trade openness and error term.	Johansen Co-integration test, OLS, Pairwise Granger causality test	The study found that non-oil exports had significant impact on economic growth of Nigeria. Trade openness and exchange rate also had positive impact on the growth rate of the economy.
	Nwodo and Asogwa, (2017)	Quarterly data: Nigeria (1986-2014)	Real GDP growth rate	Government final consumption expenditure, Credit to Private Sector, Non-oil Export, Size of Labour force, Financial Openness, Trade Openness and error term.	ARDL	The study found that non-oil exports show positive impact on economic growth of Nigeria in both the short-run and long run. Trade and financial openness showed negative effect. Government expenditure showed negative effect on Real GDP.
	Riti *et. al.* (2016)	Sectoral Time series: Nigeria (1981-2013)	Real GDP growth rate	Agricultural component of Non-oil, Manufacturing component of Non-oil, Telecommunication component of Non-oil and error term.	ARDL, VECM	The study indicated that the agricultural and telecommunication components positively contributed to the economic growth of Nigeria on the long run, while manufacturing component had a negative and significant impact on GDP. The Granger causality test reveals that all three components granger-caused GDP growth.

	Kromtit, *et. al.* (2017)	Time series: Nigeria (1985-2015)	GDP growth rate	Non-oil exports (NOL), Exchange rate (EXG) and error term	ARDL	The study found positive significant relationship between economic growth and non-oil exports. It also revealed that exchange rate have a negative though insignificant relationship with GDP, which is in line with their economic theory.
	Ojide, *et. al.*, (2014)	Time series: Nigeria (1970-2011)	GDP growth rate	Non-oil exports, Exchange rate and error term	ARDL	Their results showed there exists an evidence of growth in Nigeria and it is sustainable meaning that non-oil export-led growth hypothesis holds in Nigeria.
	Onuorah (2018)	Time series: Nigeria (1985-2017)	GDP growth rate	Cassava export, Groundnut exports, Millet exports, Yam exports, Maize exports and error term	OLS	The results of the study showed that agricultural export products used in the study had significant impact on GDP growth.
Negative	Adenugba and Dipo (2013)	Time series: Nigeria (1981-2010)	GDP growth rate	Non-oil exports, Exchange rate and error term.	OLS	Their study revealed a negative impact of non-oil exports on GDP. They argued that the economy of Nigeria needs to diversify from crude oil.
	Olayiwola and Okodua (2013)	Time series: Nigeria (1980-2007)	Real GDP growth rate	Foreign Direct Investment inflows, Non-oil exports and error term	Johansen co-integration, VECM	Their results showed a negative impact of non-oil exports on economic growth but provided a unidirectional causality from FDI to non-oil exports. They argued that for an effective FDI in Nigeria,

						non-oil exports must be encouraged.
	Raheem and Busari (2013)	Time series: Nigeria (1970-2010)	Per Capital income	Fixed capital formation, Growth of Non-oil export, Industrial Production, Agricultural production, Population growth and error term	Simultaneous Equation Model (SEM)	The results found that the non-oil export and agricultural performance have negative relationship with the growth of the economy. They argued for more government participation in both sectors.
Insignificant	Omojolaibi et.al (2015)	Time series: Nigeria (1980-2011)	Gross capital formation (GCF)	Non-oil export, Inflation rate, Interest rate, Exchange rate, Total labour force and error term	ECM, Granger Causality	The findings of the study revealed positive impact of non-oil export on domestic investment but also insignificant. They argued that this is because of the mono-cultural nature of the production sectors of the economy that is reliant on the oil sector.
	Onodugo *et. al.* (2013)	Time series: Nigeria (1989-2012)	GDP growth rate	Non-oil export, Oil export, The index of Trade Openness, Labour force, Capital Stock and error term	Johansen Co-integration	The results revealed a weak and insignificant impact of non-oil exports on economic growth of Nigeria.

Table A.3: Data Representation of Variables in Logarithmic Values from 1981-2017

Years	lngdp	lnnox	lnfdi	lngexp	lnk	lnhc	lnl
1981	25.45	17.87	19.63	24.44	24.26	0.18	17.17
1982	25.52	18.63	19.49	24.47	24.08	0.18	17.18
1983	25.60	17.17	19.39	24.56	23.82	0.18	17.15
1984	25.65	18.29	18.79	24.49	23.26	0.19	17.11
1985	25.80	18.29	19.89	24.54	23.44	0.19	17.12
1986	25.79	19.44	19.64	24.56	23.85	0.19	17.12
1987	26.14	20.82	21.62	24.55	24.07	0.19	17.15
1988	26.44	20.75	21.26	24.78	24.05	0.20	17.19
1989	26.82	19.62	23.35	24.86	24.72	0.20	17.21
1990	27.03	20.74	22.81	24.99	25.25	0.20	17.24
1991	27.18	21.33	23.13	25.09	25.38	0.22	17.26
1992	27.64	21.16	23.72	25.57	25.89	0.24	17.29
1993	27.85	22.24	24.45	25.87	26.21	0.25	17.31
1994	28.11	22.71	24.64	26.01	26.26	0.27	17.33
1995	28.83	23.11	24.05	26.37	26.55	0.29	17.35
1996	29.15	22.96	24.59	26.51	26.91	0.31	17.38
1997	29.19	22.93	24.31	26.81	27.09	0.32	17.41
1998	29.14	23.15	24.00	26.85	27.09	0.34	17.45
1999	29.30	24.10	25.41	26.32	27.04	0.36	17.49
2000	29.66	24.94	25.62	26.85	27.40	0.38	17.48
2001	29.70	25.08	25.68	26.87	27.51	0.40	17.49
2002	30.07	25.52	26.23	27.04	27.81	0.42	17.51
2003	30.27	25.51	26.36	26.98	28.36	0.44	17.51
2004	30.56	25.75	26.37	27.54	28.36	0.46	17.58
2005	30.80	25.62	27.21	27.78	28.29	0.48	17.61
2006	31.04	25.63	27.17	28.03	28.94	0.50	17.64
2007	31.15	26.02	27.36	28.54	29.16	0.52	17.67
2008	31.31	26.24	27.61	28.84	29.22	0.53	17.70
2009	31.33	26.39	27.88	28.97	29.62	0.55	17.73
2010	31.65	26.75	27.54	29.21	29.89	0.56	17.76
2011	31.79	26.98	27.95	29.32	29.97	0.58	17.77
2012	31.92	26.90	27.75	29.41	30.01	0.59	17.79
2013	32.03	27.76	27.51	29.39	30.12	0.60	17.83
2014	32.13	27.59	27.34	29.39	30.29	0.62	17.85
2015	32.19	27.22	27.10	29.36	30.32	0.63	17.91
2016	32.26	27.24	27.75	29.34	30.39	0.64	17.96
2017	32.38	27.75	27.70	29.72	30.51	0.65	17.99

Source: Author's calculations for common samples.

Table A.4: ADF Unit Root Test for LNGDP

Null Hypothesis: D(LNGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.752936	0.0005
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDP,2)
Method: Least Squares
Date: 05/31/20 Time: 15:51
Sample (adjusted): 1983 2017
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	-0.807062	0.169803	-4.752936	0.0000
C	0.158242	0.042007	3.767036	0.0006

R-squared	0.406372	Mean dependent var	0.001270
Adjusted R-squared	0.388384	S.D. dependent var	0.196371
S.E. of regression	0.153574	Akaike info criterion	-0.853829
Sum squared resid	0.778300	Schwarz criterion	-0.764952
Log likelihood	16.94201	Hannan-Quinn criter.	-0.823149
F-statistic	22.59041	Durbin-Watson stat	2.020895
Prob(F-statistic)	0.000038		

Source: E-views version 9

Table A.5: ADF Unit Root Test for LNNOX

Null Hypothesis: D(LNNOX) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.188376	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNNOX,2)
Method: Least Squares
Date: 05/31/20 Time: 16:00
Sample (adjusted): 1983 2017
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNNOX(-1))	-1.212851	0.168724	-7.188376	0.0000
C	0.317590	0.110263	2.880304	0.0069

R-squared	0.610264	Mean dependent var	-0.007250
Adjusted R-squared	0.598454	S.D. dependent var	0.938999
S.E. of regression	0.595022	Akaike info criterion	1.855007
Sum squared resid	11.68367	Schwarz criterion	1.943884
Log likelihood	-30.46262	Hannan-Quinn criter.	1.885687
F-statistic	51.67275	Durbin-Watson stat	1.721662
Prob(F-statistic)	0.000000		

Source: E-views version 9

Table A.6: ADF Unit Root Test for LNFDI

Null Hypothesis: D(LNFDI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.018330	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFDI,2)
Method: Least Squares
Date: 05/31/20 Time: 16:01
Sample (adjusted): 1983 2017
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFDI(-1))	-1.420590	0.157523	-9.018330	0.0000
C	0.332293	0.107523	3.090426	0.0040

R-squared	0.711363	Mean dependent var	0.002652
Adjusted R-squared	0.702616	S.D. dependent var	1.097011
S.E. of regression	0.598232	Akaike info criterion	1.865770
Sum squared resid	11.81010	Schwarz criterion	1.954647
Log likelihood	-30.65097	Hannan-Quinn criter.	1.896450
F-statistic	81.33027	Durbin-Watson stat	1.808943
Prob(F-statistic)	0.000000		

Source: E-views version 9

Table A.7: ADF Unit Root Test for LNGEXP

Null Hypothesis: D(LNGEXP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.958715	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGEXP,2)
Method: Least Squares
Date: 05/31/20 Time: 16:04
Sample (adjusted): 1983 2017
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGEXP(-1))	-1.050881	0.176360	-5.958715	0.0000
C	0.157159	0.043746	3.592505	0.0011

R-squared	0.518292	Mean dependent var	0.010062
Adjusted R-squared	0.503695	S.D. dependent var	0.303287
S.E. of regression	0.213663	Akaike info criterion	-0.193392
Sum squared resid	1.506507	Schwarz criterion	-0.104515
Log likelihood	5.384354	Hannan-Quinn criter.	-0.162711
F-statistic	35.50628	Durbin-Watson stat	1.960165
Prob(F-statistic)	0.000001		

Source: E-views version 9

Table A.8: ADF Unit Root Test for LNK

Null Hypothesis: D(LNK) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.484430	0.0011
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNK,2)
Method: Least Squares
Date: 05/31/20 Time: 16:09
Sample (adjusted): 1985 2017
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNK(-1))	-0.913671	0.203743	-4.484430	0.0001
D(LNK(-1),2)	0.023451	0.155478	0.150833	0.8812
D(LNK(-2),2)	-0.346114	0.125076	-2.767225	0.0097
C	0.204529	0.049797	4.107275	0.0003

R-squared	0.719223	Mean dependent var	0.020779
Adjusted R-squared	0.690177	S.D. dependent var	0.320546
S.E. of regression	0.178421	Akaike info criterion	-0.496125
Sum squared resid	0.923191	Schwarz criterion	-0.314730
Log likelihood	12.18607	Hannan-Quinn criter.	-0.435091
F-statistic	24.76156	Durbin-Watson stat	1.837221
Prob(F-statistic)	0.000000		

Source: E-views version 9

Table A.9: ADF Unit Root Test for LNHC

Null Hypothesis: LNHC has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.236939	0.0939
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNHC)
Method: Least Squares
Date: 05/31/20 Time: 16:11
Sample (adjusted): 1983 2017
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHC(-1)	-0.061450	0.018984	-3.236939	0.0029
D(LNHC(-1))	0.758735	0.084751	8.952551	0.0000
C	0.007943	0.002076	3.826363	0.0006
@TREND("1981")	0.000986	0.000313	3.149332	0.0036

R-squared	0.879728	Mean dependent var	0.013509
Adjusted R-squared	0.868089	S.D. dependent var	0.006567
S.E. of regression	0.002385	Akaike info criterion	-9.132037
Sum squared resid	0.000176	Schwarz criterion	-8.954283
Log likelihood	163.8106	Hannan-Quinn criter.	-9.070676
F-statistic	75.58293	Durbin-Watson stat	2.187677
Prob(F-statistic)	0.000000		

Source: E-views version 9

Table A.10: ADF Unit Root Test for LNL

Null Hypothesis: D(LNL) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on AIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.355157	0.0017
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNL,2)
Method: Least Squares
Date: 05/31/20 Time: 16:14
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNL(-1))	-0.942125	0.216324	-4.355157	0.0002
D(LNL(-1),2)	0.019341	0.183972	0.105130	0.9171
D(LNL(-2),2)	0.200204	0.171991	1.164034	0.2546
D(LNL(-3),2)	0.321539	0.143217	2.245119	0.0332
C	0.025079	0.005856	4.282201	0.0002

R-squared	0.551459	Mean dependent var	0.000717
Adjusted R-squared	0.485009	S.D. dependent var	0.019902
S.E. of regression	0.014282	Akaike info criterion	-5.517012
Sum squared resid	0.005507	Schwarz criterion	-5.287991
Log likelihood	93.27220	Hannan-Quinn criter.	-5.441098
F-statistic	8.298796	Durbin-Watson stat	1.908022
Prob(F-statistic)	0.000168		

Source: E-views version 9

Table A.11: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.119721	Prob. F(1,10)	0.7365
Obs*R-squared	0.402237	Prob. Chi-Square(1)	0.5259

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 05/21/20 Time: 20:01
Sample: 1984 2017
Included observations: 34
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP(-1)	-0.013733	0.189969	-0.072292	0.9438
LNNOX	-0.011485	0.057006	-0.201465	0.8444
LNNOX(-1)	0.004400	0.040697	0.108120	0.9160
LNNOX(-2)	-0.003191	0.055736	-0.057244	0.9555
LNNOX(-3)	-0.002244	0.062773	-0.035740	0.9722
LNFDI	0.001582	0.039448	0.040102	0.9688
LNFDI(-1)	0.006215	0.050731	0.122515	0.9049
LNFDI(-2)	-0.001643	0.064085	-0.025636	0.9801
LNFDI(-3)	-0.003111	0.054667	-0.056905	0.9557
LNGEXP	-0.031703	0.159111	-0.199248	0.8461
LNGEXP(-1)	0.008392	0.138570	0.060563	0.9529
LNGEXP(-2)	0.003884	0.107422	0.036159	0.9719
LNGEXP(-3)	-0.000363	0.121950	-0.002975	0.9977
LNK	0.010557	0.098757	0.106902	0.9170
LNK(-1)	0.014991	0.130148	0.115184	0.9106
LNHC	-0.001784	13.26024	-0.000135	0.9999
LNHC(-1)	0.473786	19.75723	0.023980	0.9813
LNHC(-2)	0.345796	16.93701	0.020417	0.9841
LNHC(-3)	-0.633328	7.980986	-0.079355	0.9383
LNL	-0.017689	1.023936	-0.017275	0.9866
LNL(-1)	0.017692	1.442040	0.012269	0.9905
LNL(-2)	-0.046874	1.341179	-0.034950	0.9728
LNL(-3)	0.068726	0.990560	0.069381	0.9461
RESID(-1)	0.166122	0.480110	0.346008	0.7365

R-squared	0.011831	Mean dependent var	1.48E-06
Adjusted R-squared	-2.260959	S.D. dependent var	0.038428
S.E. of regression	0.069394	Akaike info criterion	-2.310034
Sum squared resid	0.048156	Schwarz criterion	-1.232603
Log likelihood	63.27058	Hannan-Quinn criter.	-1.942599
Durbin-Watson stat	1.934171		

Source: E-views version 9

Table A.12: Ramsey RESET Test

Ramsey RESET Test Equation: UNTITLED
Specification: LNGDP LNGDP(-1) LNNOX LNNOX(-1) LNNOX(-2) LNNOX(-3) LNFDI LNFDI(-1) LNFDI(-2) LNFDI(-3) LNGEXP LNGEXP(-1) LNGEXP(-2) LNGEXP(-3) LNK LNK(-1) LNHC LNHC(-1) LNHC(-2) LNHC(-3) LNL LNL(-1) LNL(-2) LNL(-3)
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.467147	10	0.6504
F-statistic	0.218227	(1, 10)	0.6504

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.001041	1	0.001041
Restricted SSR	0.048732	11	0.004430
Unrestricted SSR	0.047691	10	0.004769

Unrestricted Test Equation:
Dependent Variable: LNGDP
Method: ARDL Date: 05/21/20 Time: 20:01 Sample: 1984 2017 Included observations: 34
Maximum dependent lags: 2 (Automatic selection) Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic):
Fixed regressors:

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNGDP(-1)	0.114548	0.184961	0.619310	0.5496
LNNOX	0.230228	0.159846	1.440316	0.1803
LNNOX(-1)	0.089827	0.071944	1.248561	0.2403
LNNOX(-2)	0.193591	0.144399	1.340664	0.2097
LNNOX(-3)	0.114518	0.104382	1.097113	0.2983
LNFDI	-0.031523	0.050202	-0.627916	0.5441
LNFDI(-1)	-0.176694	0.140348	-1.258963	0.2366
LNFDI(-2)	0.177051	0.128463	1.378233	0.1982
LNFDI(-3)	0.348039	0.251201	1.385502	0.1960
LNGEXP	0.636653	0.471185	1.351176	0.2064
LNGEXP(-1)	-0.384883	0.290116	-1.326654	0.2141
LNGEXP(-2)	0.043687	0.107278	0.407230	0.6924
LNGEXP(-3)	0.294370	0.241817	1.217328	0.2514
LNK	-0.014691	0.095753	-0.153422	0.8811
LNK(-1)	-0.613757	0.419371	-1.463517	0.1740
LNHC	10.02210	16.05490	0.624240	0.5464
LNHC(-1)	-28.19048	30.06957	-0.937509	0.3706
LNHC(-2)	44.56130	36.63836	1.216247	0.2518
LNHC(-3)	-24.81447	18.02943	-1.376331	0.1988
LNL	1.525661	1.283277	1.188879	0.2620
LNL(-1)	1.709857	1.953461	0.875296	0.4019
LNL(-2)	2.075533	1.910995	1.086101	0.3029
LNL(-3)	-4.681203	3.718128	-1.259021	0.2366
FITTED^2	-0.008208	0.017570	-0.467147	0.6504

R-squared	0.999699	Mean dependent var	29.47851
Adjusted R-squared	0.999005	S.D. dependent var	2.189383
S.E. of regression	0.069059	Akaike info criterion	-2.319721
Sum squared resid	0.047691	Schwarz criterion	-1.242290
Log likelihood	63.43525	Hannan-Quinn criter.	-1.952286
Durbin-Watson stat	1.752743		

*Note: p-values and any subsequent tests do not account for model selection.

Source: E-views version 9

Table A.13: Toda-Yamamoto Granger Causality Test

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 05/21/20 Time: 20:08
Sample: 1981 2017
Included observations: 34

Dependent variable: LNGDP

Excluded	Chi-sq	df	Prob.
LNNOX	4.885011	2	0.0869
LNFDI	8.684918	2	0.0130
LNGEXP	5.883462	2	0.0528
LNK	2.320425	2	0.3134
LNHC	6.770825	2	0.0339
LNL	6.851103	2	0.0325
All	44.47534	12	0.0000

Dependent variable: LNNOX

Excluded	Chi-sq	df	Prob.
LNGDP	1.468024	2	0.4800
LNFDI	1.167100	2	0.5579
LNGEXP	0.600706	2	0.7406
LNK	4.655534	2	0.0975
LNHC	0.136381	2	0.9341
LNL	0.732353	2	0.6934
All	15.27255	12	0.2269

Dependent variable: LNFDI

Excluded	Chi-sq	df	Prob.
LNGDP	1.150125	2	0.5627
LNNOX	0.747189	2	0.6883
LNGEXP	0.899950	2	0.6376
LNK	1.813898	2	0.4038
LNHC	2.725847	2	0.2559
LNL	3.756891	2	0.1528
All	11.59564	12	0.4787

Dependent variable: LNGEXP

Excluded	Chi-sq	df	Prob.
LNGDP	6.271333	2	0.0435
LNNOX	11.35404	2	0.0034
LNFDI	9.625050	2	0.0081
LNK	2.181984	2	0.3359
LNHC	10.66618	2	0.0048
LNL	1.507613	2	0.4706
All	32.90870	12	0.0010

Dependent variable: LNK

Excluded	Chi-sq	df	Prob.
LNGDP	0.034863	2	0.9827
LNNOX	0.829914	2	0.6604
LNFDI	8.289552	2	0.0158
LNGEXP	4.806959	2	0.0904
LNHC	4.638613	2	0.0983
LNL	7.586779	2	0.0225
All	42.53048	12	0.0000

Dependent variable: LNHC

Excluded	Chi-sq	df	Prob.
LNGDP	11.73217	2	0.0028
LNNOX	18.64392	2	0.0001
LNFDI	11.69499	2	0.0029
LNGEXP	21.19696	2	0.0000
LNK	4.705975	2	0.0951
LNL	0.528318	2	0.7679
All	70.46779	12	0.0000

Dependent variable: LNL

Excluded	Chi-sq	df	Prob.
LNGDP	0.400811	2	0.8184
LNNOX	2.594185	2	0.2733
LNFDI	3.653036	2	0.1610
LNGEXP	0.425535	2	0.8083
LNK	3.392816	2	0.1833
LNHC	0.665266	2	0.7170
All	7.845022	12	0.7971

Source: E-views version 9