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The Impact of Oil Price Volatility on Economic Growth in Nigeria: Evidence from ARDL and NARDL Cointegration Approach

MUJAHID ISA

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THE IMPACT OF OIL PRICE VOLATILITY ON ECONOMIC GROWTH IN NIGERIA: EVIDENCE FROM ARDL AND NARDL COINTEGRATION APPROACH

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DEDICATION

This research work is dedicated to my beloved mother **MARIYA ISA** and my father **ADAMU HUSSAINI ISA.**

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ABSTRACT

THE IMPACT OF OIL PRICE VOLATILITY ON ECONOMIC GROWTH IN NIGERIA: EVIDENCE FROM ARDL AND NARDL COINTEGRATION APPROACH

This research thesis seeks to analyze the influence of volatile oil prices on Nigeria's economic growth with annual time series data covering a time frame of 39 years from 1981 to 2019. The major contribution of this research to the existing literature of oil prices and Nigeria's economic growth is in its methodological approach in which the Autoregressive Distributed Lags (ARDL) model was used to test for the symmetric impact of oil prices on economic growth and Non-Linear Autoregressive Distributed Lags (NARDL) model was also employed where oil prices were further decomposed using partial sums of positive and negative changes so as to test for the asymmetrical impacts of volatile oil prices on Nigeria's economic growth. Real GDP which was the explained variable was used to capture economic growth and global oil prices was used as independent variable while Real Effective Exchange rate and Inflation rate were used as control variables in the regression model. The findings of the ADF unit root test and the Phillips Perron test indicate all the series are stationary at levels or first difference which is a prerequisite for employing the ARDL and NARDL models. The empirical findings of the ARDL reveal a positive relationship between volatile oil prices and Nigeria's economic growth both contemporaneously and in the long run. The results of the long run NARDL reveal a significant influence of negative oil price shocks on Nigeria's economic growth because a decrease in oil prices reduces government income from the oil sector which hinders the proper execution of government projects and economic policies thereby leading to a decline economic growth while there is an insignificant influence of positive oil price shocks on Nigeria's economic growth which is attributed to corruption and mismanagement of oil revenue. The empirical results of the short run NARDL indicate a significant influence of a rise in oil prices on economic growth while there is no significant effect of negative oil price shocks on economic growth in Nigeria. Therefore this study recommends the diversification of the Nigerian economy into other sectors of the economy like agriculture, industry, services, tourism etc. so as to minimize the impacts of volatile oil prices on the economy of Nigeria which will also bring about short term and long term sustainable economic growth.

Keywords: Oil Price Volatility, Economic Growth and Nigeria

ÖZ

THE IMPACT OF OIL PRICE VOLATILITY ON ECONOMIC GROWTH IN NIGERIA: EVIDENCE FROM ARDL AND NARDL COINTEGRATION APPROACH

Bu araştırma tezi, 1981'den 2019'a kadar olan 39 yıllık bir zaman dilimini kapsayan yıllık zaman serisi verileriyle Nijerya'nın Nijerya'daki ekonomik büyümesi üzerindeki uçucu petrol fiyatlarının etkisini analiz etmeyi amaçlamaktadır. Bu araştırmanın mevcut petrol fiyatları literatürüne ve Nijerya'nın ekonomik durumuna en büyük katkısı Büyüme, petrol fiyatlarının ekonomik büyüme üzerindeki simetrik etkilerini test etmek için Otoregresif Dağıtılmış Gecikmeler (ARDL) modelinin kullanıldığı metodolojik yaklaşımında ve petrol fiyatlarının daha fazla ayrıştırıldığı yerde Doğrusal Olmayan Otoregresif Dağıtılmış Gecikmeler (NARDL) modelinin de kullanıldığı bir modeldir. Uçucu petrol fiyatlarının Nijerya'nın ekonomik büyümesi üzerindeki asimetrik etkilerinin varlığını test etmek için olumlu ve olumsuz değişikliklerin kısmi toplamlarını kullanmak. Regresyon modelinde ekonomik büyümeyi yakalamak için açıklanan değişken olan reel GSYİH ve bağımsız değişken olarak küresel petrol fiyatları, kontrol değişkenleri olarak Reel Efektif Döviz Kuru ve Enflasyon kullanılmıştır. ADF birim kök testi ve Phillips Perron testinin bulguları, tüm serilerin, ARDL ve NARDL tahmin yönteminin kullanılması için bir ön koşul olan düzeyde veya birinci farkta durağan olduğunu göstermektedir. ARDL'nin ampirik bulguları, uçucu petrol fiyatları ile Nijerya'nın ekonomik büyümesi arasında eş zamanlı ve uzun vadede pozitif bir ilişki olduğunu ortaya koymaktadır. Uzun vadeli NARDL'nin sonuçları, negatif petrol fiyatı şoklarının Nijerya'nın ekonomik büyümesi üzerinde önemli bir etkisi olduğunu ortaya koymaktadır, çünkü petrol fiyatlarındaki bir düşüş, hükümet projelerinin ve ekonomik politikaların uygun şekilde yürütülmesini engelleyen petrol sektöründen devlet gelirini azaltarak ekonomik bir düşüşe yol açmaktadır. Nijerya'nın ekonomik büyümesi üzerinde pozitif petrol fiyat şoklarının önemsiz bir etkisi varken, yolsuzluk ve petrol gelirlerinin yanlış yönetimine atfedildi. Kısa vadeli NARDL'nin ampirik sonuçları, petrol fiyatlarındaki artışın ekonomik büyüme üzerinde önemli bir etkisi olduğunu gösterirken, düşüşün ani etkisini hafifletmek için uygulanan hükümet politikalarından kaynaklanan negatif petrol fiyatı şoklarının önemli bir etkisi yoktur. petrol fiyatlarında. Bu nedenle bu çalışma Nijerya ekonomisinin tarım, sanayi, hizmetler, turizm vb. gibi ekonominin diğer sektörlerine doğru çeşitlendirilmesini ve böylece petrol fiyatlarındaki dalgalanmaların Nijerya ekonomisi üzerindeki etkilerini en aza indirerek kısa vadeli ve uzun vadeli ekonomik getiriler getirmesini önermektedir. dönem sürdürülebilir ekonomik büyüme.

Anahtar Kelimeler: Petrol Fiyatı Oynaklığı, Ekonomik Büyüme ve Nijerya

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ABBREVIATIONS

ARDL: Auto Regressive Distributed Lags

CBN: Central Bank f Nigeria

GDP: Gross Domestic Product

GMM: Generalized Method of Moments

INF: Inflation rate

NARDL: Non Linear Auto Regressive Distributed Lags

NEEDS: National Economic and Empowerment Development Strategy

OECD: Organization for Economic Co-operation and Development

OLS: Ordinary Least Squares

OPEC: Organization for Petroleum Exporting Countries

REER: Real Effective Exchange Rate

RGDP: Real Gross Domestic Product

ROIL: Oil Prices

SVAR: Structural Vector Auto regressive

TVAR: Threshold Vector Auto regressive

VAR: Vector Auto regressive

VECM: Vector Error Correction Model

WDI: World Development Indicators

CHAPTER ONE: INTRODUCTION

INTRODUCTION

This chapter entails a brief background of the research thesis, research hypothesis, research questions, objectives of the research, significance of the research, scope of the study as well as limitations of the research.

1.1 Background of the study

Oil is a very important mineral resource and a major source of energy to different countries around the world. Given the importance of oil to countries around the world, there has been a lot of research conducted to analyze the impacts of fluctuating oil prices in different countries around the world. The price of oil has been extremely volatile after World War II and has gotten even worse in the past few years. This oil price shocks has ramifications for both oil importing and oil producing countries, particularly for an oil dependent country like Nigeria (Okoro, 2014). Also, volatility in the prices of oil is a serious issue in many other countries considering how pronounced these fluctuations in oil prices have become in the past few years (Chuku et al, 2011). A rise or fall in oil prices has huge consequences on important macroeconomic variables like economic growth, employment, exchange rate, inflation rate etc. (Boheman and Maxen, 2015). Therefore, volatility in oil prices has become an important topic of research for policy makers.

Nigeria's economy is a mono-cultural economy, with crude oil sales accounting for most of the country's foreign exchange earnings (Chikwe et al, 2016). The oil sector constitutes more than 90% of Nigeria's foreign exchange revenue and 80% of its budget. In 2019 Nigeria's total export income was US$ 64.9 billion, with petroleum export revenue accounting for US$10.4 billion, or 83.9% of total export revenue (CBN Statistical Bulletin)

The Nigerian economy is peculiar to other economies around the world because of its large volume of imports and exports. Nigeria's imports and exports in 2019 were estimated to be worth $47.3 billion and $53.6 billion, respectively. Nigeria's main export is crude oil which represents almost 74.3% of total exports while refined oil accounts for 15% of all imports (Statista, 2021). As a result, shocks in oil prices will have a greater economic impact on Nigeria's economy as an oil exporting nation. As a country that imports oil, an increase in oil prices would raise production costs, causing inflation and slowing the economic growth rate of Nigeria (Mordi & Adebiyi, 2010). Nonetheless, even though a higher oil price is more profitable for the Nigerian economy as an oil exporter because it generates more income, it may be limited by the Dutch disease syndrome.

Since Nigeria exports oil, higher oil prices could to lead more savings which will stimulate a rise in investments and long term growth (Chuku et al, 2011). Furthermore, (Iwayemi and Fowowe ,2011) explained that since Nigeria is a large supplier of crude oil, positive oil price shocks can directly cause rapid economic growth. Chuku et al (2011) points out that, since Nigeria is an oil exporter as well as an oil importer, he therefore argued that the actual impact of oil price volatility requires a careful analysis of the situation. The majority of Nigeria's technology-related items like home appliances, televisions, cars etc. are imported. Because these products are primarily made in oil-intensive plants, they may become costlier as oil prices rise. An increase in oil prices is associated with imported inflation and a drastic decline in external reserves as a result of currency depreciation, all of which will cause a decrease in Real GDP growth rate. These higher oil prices have capacity to cause boom in the oil industry which will result in the deterioration of the output of other sectors of the economy which makes the economy to be caught up in a bad situation known as the Dutch disease syndrome (a paradoxical situation where huge influx of foreign exchange from the exploration of large deposits of a natural resource such as crude oil or other natural resource in a country, results in a decline in the revenues generated by the non-oil sectors.)

Volatility in oil prices has always had an impact on important macroeconomic variables like foreign reserves, exchange rate (appreciation or depreciation), inflation rate etc. Therefore, a thorough examination of the extent to which oil price volatility affects Nigeria's economy is required.

1.2 Oil Price Volatility

The term oil price volatility refers to instability, changes, a rise or fall in oil prices in the international oil market. The rise in the prices of oil can be termed positive (i.e. an increase in oil prices) or negative (i.e. a decrease in oil prices) (Okoro, 2014). Shocks in oil prices are defined regarding price fluctuations caused by changes from the demand side or supply side of global oil market. These fluctuations are unexpected and unpredictable and were traditionally explained via supply side disruptions

1.2.1Causes of Oil Price Volatility

Supply and Demand

Just like any other commodity, the law of supply and demand also affects global oil prices. Assuming a state of equilibrium, if the demand for crude oil exceeds the supply of crude oil, the global price of oil will rise while if the supply of crude oil exceeds the demand for crude oil, the global price of oil will fall (Seth, 2015).

International Organizations/ Production

The amount of crude oil produced also determines the global price of crude oil. However, there are a number of factors that determine the production of crude oil prices. These factors include the activities of international organizations such as OPEC and IEA. OPEC accounts for about 42% of the world total oil production and 73% of total oil reserves in the world (Happonen, 2009). An example of an oil price shock caused by OPEC could be traced back to the 1970's when oil restriction in oil price production led to a spike in oil prices. Therefore, the activities of oil international organizations determine the total amount of crude oil that is being produced also serves as a cause for volatilities in oil prices.

Futures Market

An oil futures contract is a contract that provides an individual with the right to buy oil at an agreed price and date in the future in order to hedge against changes in oil prices (Kosakowski, 2016). Future prices that are more than oil spot prices cause speculations of increase in oil prices in the future can make oil producers to halt production so as to gain more profit from higher prices in the future. This can lead to a decrease in current supply of oil resulting in an increase in oil prices (Olimb and Ødegård, 2010)

Speculators and Brokers

A speculator is a person that tries to predict the price of oil in the future but has no plan in actually buying the oil. For example in 2008, speculators were believed to be bidding up oil prices causing an unsustainable price rise. However, because there was insufficient demand to support the inflated price level, prices plummeted to $30 per barrel by late 2009 (Anon, 2012).
Also expectations about an increase in the demand of oil in the future can cause a rise in the current prices of oil because speculators try to hedge against increased oil prices in the future. (Anon, 2012)

Exchange Value of the Dollar

Crude oil prices are traded in the global market in terms of US Dollars while consumers use local currencies to purchase crude oil products. Nations with non-dollar appreciating currencies profit more from cheap oil when the US dollar depreciates against other currencies, while customers in US Dollar-pegged countries spend more for the same barrel of oil. As a result, fluctuations in the US dollar have an effect on global oil demand. The cost of purchasing a dollar will reduce as the US Dollar depreciates in comparison to other currencies. This would boost demand for crude oil in currencies other than the US Dollar, resulting in price rises. As a result, a negative correlation between volatility in the rate of exchange of the US Dollar and fluctuations in crude oil prices is predicted. (Olimb and Ødegård, 2010)

Political Tensions

King et al (2011) explained that political unrest such as war, terrorism, guerilla activities etc. in oil producing regions cause an increase in crude oil prices. These political unrests can be as a result of conflicts between countries, ethnic group, religious communities etc. For example, the highest oil prices recorded in history have been linked to political conflicts in Middle Eastern countries especially those involving Iran, and as these conflicts were resolved, the prices of oil also dropped. Following a statement by an Israeli cabinet minister that Israel might invade Iran, the highest nominal increase in oil prices occurred on June 6, 2008.

Natural events

Natural occurrences such as hurricanes, tsunamis, pandemics affect the price of global oil prices. If these natural occurrences happen in oil producing regions it decreases the amount of supply of oil leading to an increase in prices. On the other hand, if these events occur in oil importing countries or regions, it decreases the demand of oil causing a decline in the prices of oil (Anon, 2012)

1.2.2 Effects of Oil Price Volatility

Oil price volatility affects oil exporting and oil importing countries in different ways. This can be discussed below:

1.2.2.1 The Effect of Oil Price Volatility on Oil-Exporting Economies

Majority of oil producing economies depend on oil income as their primary source of income. Therefore a rise in global oil prices directly boosts the Real Gross Domestic Product by generating more revenue from higher export earnings. In other words, increasing oil prices leads to the movement of income from oil importing economies to oil producing economies. However, some of this extra revenue derived from higher oil prices can be later offset by losses as a result of lower demand for exports caused by economic recessions suffered by oil importing countries. Also an increase in oil prices contributes to larger exploration, research and development budgets for countries all over the world. The more oil is discovered, the production and supply of oil will rise and prices will fall, which will further affect the growth rate of oil producing economies. Increasing oil prices also encourages industrial oil importing nations to research and develop other sources of energy in order to make their products more affordable, thus reducing demand for oil (Ghalayini, 2011)

On the other hand, declining oil prices decreases the amount of revenue generated from the sale of crude oil which leads to a decline in the total Real Domestic Product of an oil producing country. In other words, a decrease in oil prices negatively affects the budget of oil producing economies which hinders the proper execution of government projects and execution of economic policies thereby affecting the total productivity of the country (Ghalayini, 2011)

1.2.2.2 The Effect of Oil Price Shocks on Oil-Importing Economies

The effect of oil price volatility on economic growth in oil importing economies can be discussed in two ways: direct effects and adjustment effects

Direct Effects

In oil importing economies, the immediate result of an oil price shock is a decline in revenue. The amount of revenue lost is determined by the price inelasticity of demand and the amount of oil used in production. It is also determined by the effect of inflation from oil price changes, the degree to which gas prices increase due to a rise in oil prices, the gas intensity of the economy and the effect of increased prices on alternative sources of energy which are close substitutes of oil or are derived from oil and gas (e.g. electricity). If the price of oil products rises and consumers are incapable or reluctant to cut back on their oil consumption, consumers can decrease their spending on other products and services, possibly causing slower growth rate in GDP. The greater the rise in oil prices and the longer they remain up, the greater the macroeconomic effect. (Ghalayini, 2011)

In oil importing economies, for final consumption goods like gasoline, the revenue lost due to a rise in oil prices will be suffered by consumers because the demand for energy and oil price goods is inelastic in the short term. In terms of headline consumer price inflation, taxes on oil goods cushion the price level from fluctuations in oil prices fundamentally by decreasing the degree of oil usage contemporaneously and in the long term because the percentage effect of an increase in oil price has a negative impact on tax component of the retail price. Whether a rise in the price causes a change in inflation rate is determined by the "second round" impacts i.e. if labourers and/or firms are in a positions to make up for the revenue deficit by increase in wages and costs, which will also depend on the monetary policy regime (Ghalayini, 2011)

However, if the policy makers perceive rising oil prices as widespread price inflation, they may employ contractionary monetary policies in order to limit the inflation rate. Restrictive monetary and fiscal policies to stabilize inflation rate may aggravate the recessionary income and unemployment impact while expansionary monetary and fiscal policies can slow down the decline in output caused by rising in oil prices, increase the inflation rate and exacerbate the influence of rising oil prices in the long run (Ghalayini, 2011)

Adjustment effects

The direct income effect is further influenced by the adjustment effect, which is driven by real wage, price, and structural rigidities in the economy. This is because labour market institutions limit the degree to which real wages adjust to changes, the depreciation in the terms of trade from an oil price shock affects equilibrium employment, because it causes a wedge between value-added and consumer prices. Also, oil is an important intermediate input in the process of production of many products and services and it is also used in transportation in all types of businesses. Therefore positive oil price shocks leads to higher input cost, and if these higher costs cannot be transferred to customers, economic factors of production like labor and capital may have to be redistributed. (Ghalayini, 2011)

In situations where oil is an intermediate input in the production of price-elastic final products in a competitive market, manufacturers will initially bear the negative income impact considering the fact that they cannot pass on the increased cost as a result of changing the menu prices. On the other hand, workers will refuse to accept a reduction in real wages, higher oil prices usually cause an upward pressure on nominal wages. Profit margins and returns on capital will decrease to the extent that suppliers will be affected, which will in turn have a significant impact on capital allocation. Although capital is the most flexible and adaptable among all other inputs in the long run, moving from energy-intensive areas to areas with more profits, capital in energy-intensive industries are relatively inflexible in the short term, forcing it to suffer a loss in revenue. Fluctuations in oil prices will therefore result in losses when macroeconomic restrictions limit sudden fluctuations in nominal prices for final products and or for important inputs, like wages. As a result, increase in oil prices will result in job losses and the under-utilization of plants, lowering economic production in the short run. (Ghalayini, 2011)

Within the short term, the economic influence of volatile oil prices on production and employment will be lesser, the larger the percentage of the price increase which may be transferred to consumers and/ or the greater the flexibility of wages when the increase in oil prices cannot be passed on. As buyers and suppliers change their behavior, the negative effect of increasing oil prices on domestic demand and revenue will decline over time. However, evidence from research suggests that the demand for oil does not return to its previous level as the price of oil decline. Nominal price “stickiness” is asymmetric because companies, associations, and institutions are far more hesitant to drop nominal prices and wages they earn than to increase them. As a result, oil importers' income reductions could be partially offset in the future. Changes in oil prices can cause changes in the amount and patterns of investment, savings, as well as expenditure which will cause a loss business and consumer confidence. In the medium term, a lack of confidence and ineffective policy responses may exacerbate the economic impact. Where changes in the price of oil cause uncertainty, this can result in a decrease in investment, however there is still a lack of consensus about whether the impacts on profitability or capacity utilization are asymmetric or not. (Ghalayini, 2011)

In addition, abrupt major price spikes in oil trigger widespread uncertainty over suitable production processes, buying of new equipment and consumer durable products such as cars, as well as pay and price negotiations. As companies and households adapt to the new circumstances, some machinery and equipment will not be used and some labourers will be temporarily laid off, while economy may not function close to its long-run production possibility curve. On a conceptual basis, it is simple to distinguish between gradual from rapid price increases, but empirically, it's more complex. (Ghalayini, 2011)

1.3 Economic Growth

Xavier (2006) defined economic growth as an increase in the capacity of an economy to produce goods and service compared from one period to another. He further added that economic growth may be calculated in nominal terms which is influenced by the level of inflation or in real terms which are corrected for inflation. The GDP per capita can also be used to compare one country's economic growth to that of another.

1.4 Research Questions

Based on the issues discussed above, this research aims to answer the following questions:

i. Does oil price volatility have any long-run effect on Nigeria's economic growth?

ii. Does oil price volatility have any short-run effect on Nigeria's economic growth?

1.5 Research Hypothesis

In order to answer the above research questions, the null hypothesis and alternative hypothesis to be tested are given below:

H_0: Volatile oil prices have no long run effect on Nigeria's economic growth.
H_1: Volatile oil prices have a long run effect on Nigeria's economic growth.

H_0: Volatile oil prices have no short run effect on Nigeria's economic growth.
H_1: Volatile oil prices have a short run effect on Nigeria's economic growth.

1.6 Objectives of the Study

The aim of this thesis is to analyze the influence of volatile oil prices on Nigeria’s economic growth. However this broad objective is further sub-divided into two:

i. To analyze the long run influence of oil price volatility on Nigeria’s economic growth
ii. To analyze the short run influence of oil price volatility on Nigeria’s economic growth

1.7 Scope of the Study

This research work seeks to analyze the short and long term influence of volatile oil prices on economic growth using annual data from 1981 to 2019. The period of time chosen is considered enough to capture the effects of the short and long term influence of volatile oil prices on the economy of Nigeria

1.8 Significance of the study

The economy of Nigeria is a mono-economy that is highly dependent on the income from the oil and gas industry which constitutes almost 90% of the nation's source of foreign exchange income and accounts for around 70% to 80% of the country's Gross Domestic Product. This makes the Nigerian economy to be vulnerable to the shocks and fluctuations in the global oil prices. Therefore, the major contribution of this thesis is to analyze the symmetric and asymmetric influence of volatile oil prices on Nigeria's Real GDP using the ARDL and NARDL models respectively

1.9 Limitations of the study

The constraints and limitations that were encountered during the course of this research were mostly data related. One of the initial contributions of this research was to use the Cobb Douglas production function where capital and labor were to be incorporated in the regression model as independent variables. However the unavailability of adequate data for capital and labor served as a deterrent in contributing to the existing literature through the use of the Cobb Douglas production function.

Another limitation of this research was the unavailability of the data to cover a longer period of time. The data used in this research covered a period of 39 years only from 1981 to 2019

CHAPTER TWO: LITERATURE REVIEW

INTRODUCTION

This section examines previous studies on influence of oil price volatility on Nigeria's economic growth. The literature review consists of two main parts i.e. theoretical literature and empirical literature

2.1 Theoretical Literature

2.1.1 Dutch Disease Syndrome

The Dutch disease originated in Netherlands in 1960's when the discovery of large deposits of oil and gas caused a decline in the development of non-oil sectors in the Netherland economy. Since then, the term Dutch disease has been used to describe a paradoxical situation where huge influx of foreign exchange from the exploration of large deposits of a natural resource (such as crude oil and natural resource) in a country, results in a decline in the revenues generated by the non-oil sectors. Corden and Neary (1982) were the first researchers to test and use the Dutch Disease theory in Australia (a small open economy) that has two sectors (i.e. tradable and non-tradable sector) each of which produces two goods. The results of their analysis show the Dutch disease had two consequences on the Australian economy i.e. the resource movement impact and the spending impact. The resource movement impact showed that an expansion in the tradable goods sector attracts government's resources which causes a reduction in the output of the non-tradable goods sector while the spending effect shows that government resources, expenditures and investments are diverted to the booming tradable goods sector which causes an appreciation in the exchange rate value of a nation's currency (Neary and Van Wijinbergen, 1986)

After the first research conducted by Corden and Neary (1982) on the Dutch disease syndrome, numerous studies have been done by various researchers to investigate the impacts of Dutch disease in different countries. Ismail (2010) used a typical model to extract the structural effect of the Dutch disease in oil exporting countries because of volatile oil prices. He further analyzed the impacts of this permanent volatile oil prices on the manufacturing sector of a set of oil exporting economies from 1977 to 2004. The findings of his analysis show that permanent rise in the global price of oil causes a decline in the overall output of the manufacturing sector which is consistent with the Dutch disease theory. Secondly, volatile oil prices have a stronger impact on the manufacturing sector of economies where capital markets are more open to foreign investments. Thirdly, they discovered that as oil prices increase, the capital intensity as well as the relative prices of labor to capital ratio also increases. This shows that countries that have a capital intensive manufacturing sector absorb the effects of fluctuating oil prices. Otaha (2012) investigate the impacts of Dutch disease on the Nigerian economy by explaining the problems that may arise when a country depends on crude oil exports as its main source of foreign exchange. He stated that since the exploration of oil in Nigeria, other sectors like agricultural sector (which was the main stay of the Nigerian economy) and manufacturing sector have experienced a decline in their total contribution to GDP. According to Bature (2013), any country that does not plan on diversifying to other sectors will be vulnerable to the Dutch disease. He argued that different countries around the world have been blessed with different types of natural resources and that it is those countries that refuse to diversify their economy that suffer from the Dutch disease. Therefore, he concluded that the economic growth of primary resource rich nations depends on how diversified their economy is.

2.1.2 The Linear/Symmetric Relationship Theory of Oil Prices and Economic Growth

The symmetric relationship theory of oil prices and economic growth explain that a positive oil price shock on economic growth has the same effect with a negative oil price shock. Hamilton (1983), Gisser and Goodwin (1986), Hooker (1986) and Laser (1987) are the pioneers of the linear /symmetric theory of oil prices and economic growth. They argued that the fluctuations in oil prices cause fluctuations in economic growth. Their theory was based on the events of the oil market from 1948 to 1972 as well as its effects on the oil producing and oil importing countries. Based on this theory, fluctuations in oil prices had an inverse and significant impact on national output growth. Other researchers tried to analyze the symmetric influence of oil prices on economic growth through the supply side as well as the demand side. The results of their analysis are explained below

Supply side channel

The supply side channel tries to explain how changes in oil prices affect economic growth via the supply side. Kilian and Vigfusson (2011) explained that an unexpected increase in the global oil prices increases production costs causing firms to produce less which causes a decline in a country's aggregate output. On the other hand, households will experience higher inflation and a decline in their purchasing power. Also, Cashin et al (2014) employed the Global VAR method to analyze the influence of volatile oil prices on economic growth in 38 economies with the help of quarterly data from 1979Q1 to 2011Q2. They concluded that a supply induced positive oil price shock causes a decrease in Real GDP in oil importing economies while a supply induced rise in the global prices of oil boosts Real GDP in oil producing economies

Demand side channel

The influence of volatile global oil prices on economic growth can also be explained via the demand side channel. Hamilton (2011) argued that rising oil prices causes income to flow from oil importing economies to oil producing economies which consequently affect consumer purchasing power. Therefore, a positive oil price shock boosts national output in oil producing economies and depresses economic growth in oil importing economies. Baumeister and Kilian (2016) also supported Hamilton (2011) and further explained that an unexpected positive oil price shock causes a rise in gasoline prices. The higher the price of gasoline, the higher the amount of money spent on transportation by household resulting in lower disposable income. Therefore, an unexpected rise in oil prices brings about a decrease in disposable income and purchasing power of households consequently resulting in a decline in aggregate demand

2.1.3 The Asymmetry-In-Effects Theory of Oil Prices and Economic Growth

The asymmetric relationship theory of oil prices and economic growth explain that a positive oil price shock has a different effect on economic growth than a negative oil price shock has on economic growth. The proponents of this theory state that a decline in oil prices has an insignificant influence on Real GDP in contrast to the impacts of a rise in oil prices on real GDP. In other words it has been shown that a rise in oil prices have negative impacts, but a fall in oil prices have a small or insignificant influence on economic activity in the US and other OECD nations. Mork (1989) was one of the pioneers of this theory and he analyzed the asymmetric influence of volatile oil prices on United States Real GDP. His research was one of the first to differentiate between a rise and a decline in global prices of oil. Mork (1989) discovered that increase in oil prices depresses national output while a negative oil price shock has an insignificant influence on United States national output growth. Sadorsky (1999) also found out that a decrease in global oil prices has insignificant impact on the economic growth in United States compared to rising oil prices. Huang et al. (2005) utilized a multivariate threshold VAR to verify the asymmetric output of oil prices on some variables in the United States of America, Canada, and Japan. Similarly, Rahman and Serletis (2010) used a logistic smooth transformation Vector Autoregressive and the impulse response function to analyze the asymmetric impacts of volatile global oil prices and monetary policy on production in the United States. Both Huang et al. (2005) and Rahman and Serletis (2010) explained that the extent of asymmetric influence of changes in global oil price on national output depends on the threshold level and the extent of the economy's dependence on oil. Çatık and Önder (2013) also contributed to the asymmetry in effects theory by analyzing the asymmetric correlation between volatile oil prices and production in Turkey. They established the nonlinear link between oil price and macroeconomic behavior using a multivariate TVAR model. They concluded that after a certain threshold amount, global oil prices have an impact on production and inflation. Shin et al. (2014) suggested a Non-linear Auto regressive Distributed lag for non-linear cointegration. To analyze the asymmetric influence of the chosen variables, this approach involves the exogenous variables as two independent time series built in their positive and negative partial sum. They also found strong proof of asymmetric impacts of volatile oil prices on economic growth. Pal and Mitra (2015) used NARDL to analyze the interaction between crude oil price and oil product prices in USA, and they discovered strong signs of asymmetric influence of oil price changes on national output. Driouche et al (2020) also supported the asymmetric influence of oil prices on economic growth by using the Non-linear Auto regressive Distributive Lags. They split oil price volatility into positive and negative oil price shocks to evaluate the asymmetric influence of oil prices on national output. The results of their findings reveal that there is a long run non-linear correlation between volatile global oil prices and national output while the influence of global oil price shocks on national output is symmetric and very weak in the short run.

2.2 Empirical Literature Review

Benramdane (2017) used yearly time series data from 1970 to 2012 to examine the impact of oil price volatility on Algeria's economic growth, an oil-producing country in Africa. The variables in this study were estimated using the Vector Autoregressive (VAR) estimation approach. These variables include: Real GDP per capita as a dependent variable while oil prices, unemployment rate, real effective exchange rate, government expenditure (as a % of GDP), money supply (M2), inflation rate, investment (as a share of GDP) and corruption index. The findings of this research shows negative oil price changes offset an increase in global oil prices. This research also confirms that the resource curse hypothesis also holds in Algeria

Okoro (2013) used quarterly data to investigate the correlation between fluctuations in oil prices and Nigeria's economic growth from 1980 to 2010 using the Vector Auto regression estimation technique. The author used a multiple regression model where GDP was used as a regressand to capture economic growth and oil price volatility was as the regressor in the model while oil revenue and global oil prices were used as control variables. The findings of this study reveal a negative effect of volatile oil price on Nigeria's economic growth

Shuaibu (2020) utilized data from 1981 to 2016 to analyze the impacts of exchange rate variations and changing oil prices on Nigeria's economic growth using both the ARDL and the NARDL. The findings of NARDL suggest that there is an asymmetric influence of oil prices on Nigeria's national output. Volatile oil prices and Real GDP have a direct relationship in the short run but an inverse relationship in the long run. Furthermore, the findings of this paper suggests, in the long run, exchange rate depreciation causes a rise in economic growth, and exchange rate appreciation causes a decline economic growth.

Okonkwo and Mojekwu (2018) analyze the influence of changes in oil prices on Nigeria's economic growth with yearly data from 1997 to 2015. The researchers employed a multivariate regression model consisting of GDP as a regressand to capture economic growth while oil prices exchange rate, government expenditure and unemployment rate were used as regressors in the model. The results of the Ordinary Least Square estimates reveal an insignificant direct relationship between fluctuations in oil prices and Nigeria's economic growth.

Driouche et al. (2020) utilized yearly data from 1970 to 2018 to study the link between the asymmetric influences of oil price shocks on Algeria's national output. The authors employed the NARDL model to examine the short and long term non-linearity's via positive and negative partial sum decomposition of regressors. Real GDP, which is used to measure economic growth was the regressand, while oil prices, Real Effective Exchange Rate, government capital spending as a percent of GDP, and inflation rate were used as resgressors in the model. The findings of this research indicate a long run non-linear correlation while the influence of changes in oil prices on Real GDP is symmetric and very weak in the short run.

Alley et al (2014) employed the Ordinary Least Squares, GMM and the Two Stage Least Squares to analyze the influence of oil price fluctuations in Nigeria from 1981 to 2012. The authors used Gross Domestic Product (explained variable) to measure economic growth and oil prices was used as an explanatory variable while control variables like imports, consumption, government expenditure, non-oil exports were also included in the model. The findings of this research show that changing oil prices does not influence Nigeria's economic growth

Aimer (2019) examined the impact of oil price fluctuations on Libya's economic growth. Using a yearly data set from 1990 – 2016, the author employed the ARDL model to analyze the correlation between the GDP which was the regressand while crude oil prices, import from goods, trade openness and trade balance as regressors. The results of this research reveal that a 1% positive change in global oil prices causes an increase on the GDP of Libya by 29% while the other 71% is as a result of other factors

Mordi and Adebiyi (2010) utilized the SVAR model to study the asymmetric effects of oil price volatility on Nigeria's Real GDP using monthly time series data from 1990M1 to 2008M12. The empirical results of this research reveal that the effect of a rise in global the price of oil shock causes an rise in Real Gross Domestic Product after two months while a decline in global oil prices causes an instant effect on Nigeria's Real GDP

Tehrancian and Seyyedkolaee (2017) employed the Threshold Regression model to examine the influence of oil price changes in Iran (an oil exporting nation) using yearly data from 1980 to 2014. The influence of changing oil prices on national output growth in Iran was studied using a univariate regression model with oil price volatility as a regressor and GDP as the regressand to capture economic growth. This study's empirical finding reveals the influence of oil price shocks on Iran's GDP diminishes with time.

Oriakhi and Osaze (2013) utilized quarterly time series data between 1970 and 2010 to study the impact of oil price variations on Nigeria's economic growth using VAR model. The goal of this research was to demonstrate the link between a number of key macroeconomic factors and Real GDP, which served as a measure of economic growth. Real GDP, real exchange rate, real money money supply, real government expenditure, real money imports, oil price volatility and inflation rate were the variables considered in this study. According to the findings of this study oil price volatility has an influence on Nigeria's economic growth,

Jawad (2013) utilized yearly time series data from 1973 to 2011 to analyze the influence of variations in oil prices on economic growth in Pakistan (a net oil exporting country) using a Linear Regression technique. The regressand was GDP, which is a measure of economic growth, and the regressors were oil price volatility, private sector investment, public sector investment, while trade balance. The findings of this study suggest that fluctuations in oil prices has no significant impact on Pakistan's economic growth.

Yusuf (2015) utilized quarterly data from 1970Q1 to 2011Q4 to examine the impact of oil price shocks on Nigeria’s economic growth .The study employed the Vector Auto regression and the Structural Vector Auto regression estimation techniques where GDP was used as a regressand and oil prices was used as regressor while nominal foreign exchange rate, unrest in oil prices, and agricultural output were included in the model as control variables. The empirical results of this research reveal that oil prices contain important information in forecasting long run national output in Nigeria

Aktug, Mehmet, and Star (2019) investigated the impact of oil prices and production on Iraqi (oil producing nation) economic growth. The scope of their study covered a period of 21 years, from 1995 to 2017. Using the Correlation Coefficient model where Real GDP served as a regressand while oil prices and oil production were regressors used in the model. The empirical results of this research reveal a direct correlation between global oil prices and real GDP. Also, a rise in oil production boosts Real GDP in Iraq

Cantah and Asmah (2015) used the ARDL model to explore the influence of crude oil prices on Ghana's national output. The researchers utilized yearly secondary data for 45 years from 1967 to 2012. The regressand was GDP which was used to measure economic growth while consumer price index, oil prices, money supply, labour force, investment, government expenditure and exchange rate were used as regressors. The empirical results of this paper shows an inverse correlation between oil prices and Ghana’s GDP growth rate contemporaneously and in the long term

Yoshino and Alekhina (2016) analyzed the effect oil price fluctuations on Russia’s GDP growth rate and consumer price index using the Seemingly Unrelated Equations (SUE) model. The study made use of monthly secondary data between 2000 and 2014. The findings of this research reveal that the impact of lower prices of oil on Russia’s GDP growth rate is larger than during increasing oil prices. While the influence of oil price fluctuations on the consumer price index is less sensitive during periods of low oil prices

Alkhahteeb (2019) used VECM to analyze the impact of changing oil prices on India’s Real GDP (an oil-importing economy) from 1989 to 2017. The regressand in the model is Real GDP, which is used to measure for economic growth, whereas the regressors are real gross fixed capital formation, oil prices, and inflation rate. The findings of this research indicate that the variables are cointegrated in the long run and that all the regressors Granger cause India’s economic growth. The research also finds that the price of oil has a significant negative influence on growth rate of India's national output, with a rise in oil prices causing a decline in economic growth.

Baba (2020) used the VAR model and the Granger Causality test to examine the impact of oil price volatility on Nigerian economic growth over a 20-year period, utilizing data from 1997 to 2017. The researchers utilized a linear regression model using GDP as the regressand and oil price volatility as the regressor in the study. The findings of this study reveal that the first lag of GDP growth has a positive influence on the growth of the current GDP significantly which has a negative significant influence on the current variations in oil prices. The study also discovered that the first and second lags of oil price fluctuations has a negative influence on the current GDP growth rate, but that current oil price variations are unrelated to their lags.

Balashova and Sertelis (2020) use monthly data to analyze influence of oil price variations on Russia's economic output from 2000 to 2008. The influence of fluctuating oil prices on five indices of economic activity was analyzed using a bivariate VAR model. The empirical results of the research indicate a rise in global oil prices boosts the growth of some economic activity parameters in Russia: factory demand, manufacturing, and key economic activity. However, the effect is temporary, with growth rates decreasing and returning to baseline in less than a year.

Dong et al. (2019) performed a Wavelet analysis to analyze the link between global economic development and crude oil prices using monthly time series data from May 1985 to February 2018. The empirical results of this research indicate strong influence of oil prices on global output with large values in the short term, whereas the influence is weak in the long term and present in particular periods.

Yasmeen, (2019) used yearly data to investigate the short and long term link between oil prices and growth in the real sector in Pakistan from 1976 to 2017. The researchers used the transportation sector, manufacturing sector, electricity sector, communication sector and livestock sector to measure Pakistans real sector growth. The relationship between oil price shocks and economic growth was investigated using Classical Linear Regression models with ARDL. The empirical results reveal higher oil prices negatively affects economic growth in three areas (electricity, manufacturing and livestock) and vice versa, while the transportation and communication sector has a direct relationship with oil prices

Charfeddine and Barkat (2020) used quarterly time series data between 2000Q1 and 2018 Q3 to analyze the link between oil prices, economic growth and economic diversification in Qatar (an oil producing country). In analyzing this relationship, the method of analysis used was the A-B structural VAR model and the NARDL. According to the conclusions of this study, a rise in oil prices boosts economic growth, whereas a fall in oil prices depresses growth in national output. Oil price fluctuations, on the other hand, have an asymmetric effect on economic growth

Nonejad (2020) examine the influence of fluctuating oil prices on United Kingdom economic growth with an out of sample forecasting analysis. The author used quarterly data and the scope of the study was between 1974Q1 to 2018Q4. The empirical findings of this study show that oil prices have information that may be utilized to anticipate the UK's economic growth rate. Nonetheless, the influence of crude oil price predicting capability was stronger throughout the 1990s

Bergmann (2019) examined the effects variations in oil prices on national output growth in 12 nations over a 44-year period using linear and non-linear VAR estimation technique. The author found out that rising oil prices have a negative impact on economic growth in oil-consuming nations, whereas a decline in oil prices have a positive impact, according to the conclusions of this article, which is consistent with most previous researches carried out in the literature.

Jawadi and Ftiti (2019) use quarterly data from 1970 to 2016 to study the link between oil price shocks and Saudi Arabia's economic growth rate. WTI (West Texas Intermediate) was utilized as a regressor to measure oil prices, while GDP per capita was employed as the regressand to capture economic growth and development. The authors also employed the following as control variables stock prices and exchange rate prices (Saudi Riyal/US Dollar), as well as Real GDP as an alternate measure of economic growth. The empirical results of this paper indicate that oil prices influences Real GDP and GDP per capita, however the extent of that benefit differs depending on the regime.

Narayan et al (2014) investigated whether oil prices could be used to project the level of economic growth in 28 industrialized and 17 emerging nations using quarterly data. The independent variable was world average crude oil prices, and the explanatory variable was industrial production, which was utilized to quantify economic growth. Nominal crude oil prices were found to be able to forecast economic growth in 21 developed and 16 developing nations.

Yazdan, Ehsan, and Hossein (2012) investigate the link between oil prices and Iran's Real GDP per capita (an oil exporting nation) from 1980 to 2010 using yearly time series data. A univariate regression approach was adopted, with the regressand being Real Gross Domestic Product per capita, and the regressor being Dubai oil prices. The empirical results reveal an insignificant correlation between oil prices and Real GDP per capita, which contradicts outcomes of the majority of previous researches.

Anorou and Elike (2009) examine the influence of fluctuating oil prices on national output in some African oil importing countries (Rwanda, Central African Republic, Kenya, Malawi, Ethiopia and Togo). The method of analysis used was the Perron Rodriguez Cointegration procedure and the Dynamic Ordinary Least Squares and the findings of this paper indicate that in the long run, there is an inverse correlation between oil prices and national output for all the countries under consideration i.e. a rise in global crude oil prices causes a decrease in economic growth and vice versa. As a result, the authors urged governments in these countries to reduce their dependence on crude oil and invest in the research and development of alternative renewable energy sources so as to stimulate economic growth in these economies.

Jarret et al (2019) employed the Cross Sectional Augmented Auto Regressive Distributed Lags (CS-ARDL) to study how financial institutions can reduce the influence of oil price changes on economic growth in 30 countries from 1980 – 2016. The findings of this research reveal that the level of financial depth in a country actually mitigates the influence of volatile oil prices on economic growth

R.V. Eyden et al. (2019) analyze data from 1870 to 2013 to investigate the impacts of oil price shocks on Real GDP growth in seventeen OECD member nations. Using five different panel data estimators, the research explores the link between oil prices and national output in these nations. The empirical results of this paper reveals variations in oil prices have a considerable negative impact on Real GDP in OECD nations. Furthermore, when slope heterogeneity is taken into consideration, oil price volatility has a negative and considerable influence on national output growth in oil-exporting nations, particularly in Norway and Canada.

Kurihara (2015) investigates the link between oil prices and growth in industrialized economies (US, EU and Japan). The authors used quarterly data and the scope of the study was from 1990Q1 to 2015Q1 for Japan and United States while the data for European Union was from

2000Q1 to 2015Q1 because of the adoption of the Euro. Real GDP was utilized as a regressand in the model to capture economic growth, crude oil prices were utilized as a regressor, and the exchange rate was used as a control variable. The estimation techniques used in this study was the Ordinary Least squares and the Vector Autoregression model. The findings of this paper reveal increasing oil prices boosts economic growth in these economies and vice versa

B. Mo et al. (2019) use quarterly frequency data from 1996Q2 to 2018Q3 to analyze the link between crude oil prices and national output in BRICS nations with a wavelet-based quantile-on-quantile methodology. The empirical results reveal oil prices have varied effects on national output in different countries, and that these impacts vary by quantiles and investor perspectives, as well as signal size and time.

Aimer and Moftah (2016) used time series to analyze the influence of changing global oil prices on Libya's economic growth using yearly data between 2000 and 2015 by adopting the Vector Auto-regressive Model and Cointegration estimation techniques. The dependent variable was Real GDP (proxy for economic growth) while oil prices was the explanatory variable. The findings of this paper indicate that oil prices have a direct relationship with Real GDP in Libya. In other words, higher oil prices cause a rise in economic growth in Libya

Foudeh (2017) examines the effect of changing oil prices on Saudi Arabia's economic growth using quarterly data from 1995Q4 to 2015Q. The estimation technique used in this research was the ARDL and the results of this research reveal increasing global oil prices boosts Saudi Arabia's economic growth in the long run and vice versa

Cashin et al (2014) employed the Global Autoregressive method to explore the influence of volatile global oil prices on economic growth in 38 countries with quarterly data from 1979Q1 to 2011Q2. They came to the conclusion that a supply-induced rise in global oil prices reduces economic growth in oil-importing economies whereas a supply-induced rise in global oil prices boosts economic growth in oil-producing economies.

Bouzid (2012) used yearly frequency data between 1960 and 2009 to analyze the influence of fluctuating global oil prices on Tunisian economic growth. The regressor used in the model was global oil prices, and the measure employed to quantify economic growth was Real GDP. The VECM was used to study this relationship, and the results reveal higher oil prices induces a decline in economic growth, whereas a drop in oil prices boosts in Real GDP in Tunisia

Mohaddes and Raissi (2015) used Global Vector Autoregressive estimation technique to study the influence of declining oil prices (because of the oil revolution in USA) on the world economic activity by analyzing it effects on 38 selected economies from 1979Q1 to 2011Q2. The results of this research reveal that declining oil prices causes a rise in economic growth in oil importing economies while declining oil prices depresses economic growth of oil producing economies

El Anshasy (2009) analyzed the impact of changing oil prices on national output in fifteen oil producing countries economies 1970 to 2004. Real GDP per capita (explained variable) was used in order to capture economic growth and oil prices was used as an explanatory variable while fiscal policy variables served as control variables. The findings of this paper indicate that an increase in oil prices boosts economic growth while a drop in oil prices depresses economic growth. The authors suggested the governments of these countries to diversify to other sectors and also to refrain from decreasing capital expenditure in periods of scarcity.

J.M Maheu et al (2020) used various methods of analysis to analyze the influence of fluctuating oil prices on United States of America’s economic growth using quarterly frequency data between 1976Q3 to 2018Q3. The US Real Gross Domestic Product growth rate was used as a proxy to capture economic growth while Refiners acquisition Cost Composite Index was used to capture global prices of oil. The results of this research indicate that changes in oil prices affect Real GDP

M Shahbaz et al (2019) used three methods of analysis (i.e. ARDL, VECM and Granger Causality test) to analyze the nexus between oil prices and national output and presence of resource curse hypothesis in United States of America using yearly time series data between

1976 to 2016. The regressand used was Real GDP per capita and crude oil prices were used as the regressor while control variables like capitalization and labor force. The empirical findings of this paper reveal a direct correlation between oil prices and USA's Real GDP per capita as well as existence of resource curse hypothesis in the United States

CHAPTER THREE: THE NIGERIAN ECONOMY

INTRODUCTION

This chapter provides an insight into the Nigerian economy. It entails a brief history of the Nigerian economy, a review of Nigerian sectorial and aggregate economic growth and an analysis of the relationship between oil price volatility and economic growth in Nigeria

3.1 Brief History of the Nigerian Economy

Nigeria is a country blessed with lots of natural resources which include: 68 million hectares of cultivatable agricultural land that allows the country to produce a diverse range of crops, 12.6 million hectares of water for fishing activities etc. (Olabanji et al, 2017).

Before the 1960's, Nigerian economy was an agrarian economy whose main source of foreign exchange revenue was from the agricultural sector. The agricultural sector was the main stay of the Nigerian economy comprising about 52% of total Gross Domestic Product, about 85% of foreign exchange revenue and employing about 60% of the total population (Azevedo, 2019). The agricultural sector is composed of four different subsectors which are livestock, forestry, fishery and crop production. These four subsectors of the agricultural sector contributed significantly to the Nigerian economy in different aspects for example it served as a major source of food for Nigerians through the livestock, fishing and crop production sectors, provision of employment, foreign exchange revenue through the export and sale of cash crops like cotton, rubber, groundnuts, timber, palm oil, cocoa etc. provision of employment, source of raw materials to the industrial sector etc. (Kemi, 2016). Nweze and Edame (2016) explained that agriculture was the major sector of the Nigerian economy while the contribution of the oil sector was very little. According to the Federal Bureau of Statistics, oil only contributed only 0.0007% of the total Gross Domestic Product from 1958 to 1969.

The exploration of crude oil in large quantities in Oluibiri, Niger Delta in the year 1956 by Shell BP diverted the focus of the Nigerian economy from the agricultural sector to oil and gas sector. The discovery of crude oil had a number of implications on the Nigerian economy which was evident by the steady decline in the significance and total contribution of agricultural sector to total GDP, a decrease in agricultural exports, a decrease in the total number of people employed in the agricultural sector, an increase in food importation. However, due to corruption and misappropriation of crude oil money, the oil wealth that was supposed to be a blessing became a curse. (Akin, 2016)

The exportation of crude oil in Nigeria began in the year 1958 with a total production of 5100 barrels per day. However, commercial production of crude oil in large quantities began in 1965 on Bonny Island. The discovery of oil in the southern part of Nigeria provided optimism for a brighter future in terms of industrial and economic growth, but it had serious economic implications as it exacerbated already existing political tensions and ethnic rivalries. The civil war in Nigeria was the height of political and ethnic tensions, which mirrored the influence and destiny of the oil sector. Nigeria made it through war and was able to recuperate largely due to the vast amounts of money it earned from oil in the 1970s. The end of the civil war in the early 1970's corresponded with an increase global crude oil prices of which led to a rise in Nigeria's economic growth during the period. Nigeria joined the OPEC in 1971, and established NNPC in 1977, which is a government-owned and operated corporation that is engaged in the exploration and refining of crude oil in Nigeria. By the end of the1960s and early 1970s, Nigeria had reached an output average of more than 2,000,000 barrels of crude oil per day. Nigeria greatly benefited from oil boom for about 36 months, which produced a large amount of funds required to fulfill all developmental and infrastructural needs (Arubayi, 2016)

The total amount of crude oil produced from 1956 to 1970 was estimated to be about 395.7 million barrels. By the year 1998, the total crude oil production reached 776.01 million barrels and by the year 2006 crude oil production in Nigeria rose to 919.3 million barrels.
Similarly, the revenue generated from the sale of crude oil rose from N166.6 million in 1970 to N 1,591,675 in the year 2000 before increasing to N6, 530,430.00 million in 2008. By the year 2012, oil revenue increased to about N8025.971 billion and by the year 2019 the revenue generated from the oil sector declined to N6270.86 billion due to the decline in global oil prices per barrel

Nigeria has approximately 37 billion barrels of oil reserves in 2019, and produces about 1.65 million (bpd) of crude oil.

3.2 Nigeria's Sectorial and Aggregate Economic Growth (1970 – 2019)

The Nigerian economy is divided into three major sectors i.e. agricultural, industrial and service sector. These three sectors have been the main drivers of the Nigerian economy and have their various contributions in achieving the economic growth and developmental goals of the country over time. Before the 1960's the Nigerian economy was solely dependent on the activities of the agricultural sector which contributed to about 70% of the total Gross Domestic Product, 75% of foreign exchange revenue and employed more than 65% of the total Nigerian population. However, the discovery of oil in 1956 and the subsequent exportation to other countries around the world in large quantities in the 1970's, the government of Nigeria diverted all its resources and focus to the oil sector and neglected the agricultural sector. This caused a decrease in the total contribution of the agricultural sector to the total output of the country and a rise in the total contribution of oil sector in Nigeria's GDP which brought about the growth of the industrial sector. Since the early 1970s, the expansion of the industrial sector resulted in the use of foreign capital in the production of goods and services, in order to increase the level of industrialization, employment, and economic growth.

The total percentage contribution of each sector to Gross Domestic Product in Nigeria from 1981 to 2019 is given in the table below.

	1981	**1991**	**2001**	**2011**	**2015**	**2016**	**2017**	**2018**	**2019**
Agriculture	15.50%	18.70%	19.89%	23.35%	23.11%	24.45%	25.08%	25.13%	25.16%
Industry	48.98%	44.66%	40.34%	26.06%	23.71%	21.96%	22.25%	22.24%	22.25%
Services	35.53%	36.64%	39.78%	50.59%	53.18%	53.59%	52.67%	52.63%	52.60%
Oil Sector	32.62%	32.42%	30.33%	14.95%	9.61%	8.35%	8.67%	8.59%	8.78%
Non-oil Sector	67.38%	67.58%	69.67%	85.05%	90.39%	91.65%	91.33%	91.41%	91.22%

Table 1: Nigeria's Sectorial and Aggregate Economic Growth (1970 – 2019)
(Source: Authors Computation using data from CBN Statistical Bulletin)

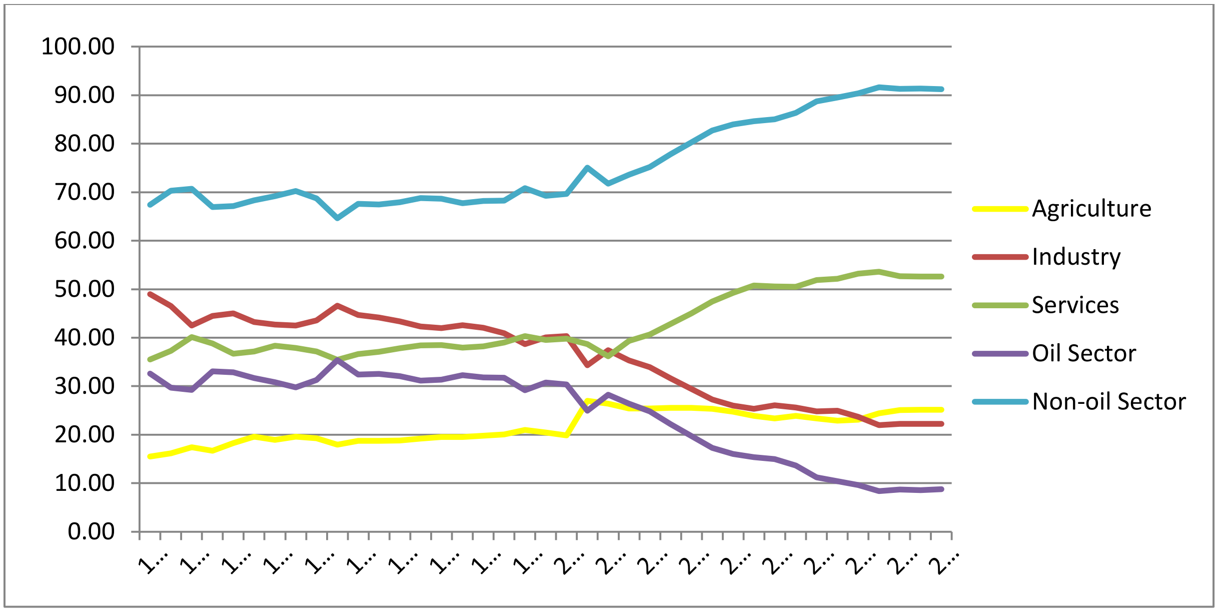


Figure1: Nigeria's Sectorial and Aggregate Economic Growth (1970 – 2019)
(Source: Authors Computation using data from CBN Statistical Bulletin, 2019)

Agricultural Sector

The agricultural sector consists of crop production sector, livestock sectors, forestry sectors and fishing sectors. The agricultural sector is largely informal where production activities are carried out with the use of crude simple farming tools. Crop production subsector is the major contributor of this sector. (NPC, 2011)

From the graph above, the contribution of the agricultural sector to Nigeria's Gross domestic Product rose from 15.50% in 1981 to 19.81% in 2001. The steady increase in agricultural sector was because of the numerous policies that were introduced during this period such as the Green Revolution Program (1981 – 1983) Agricultural Input Subsidy Policy, Agricultural Mechanization Policy, Structural Adjustment Program in 1986, Water Resources and Irrigation Policy, Agricultural Extension and Technology Transfer Policy, National Fadama Development Project (NFDP) of the 1990's etc. The contribution of the agricultural sector increased from 19.89% in 2001 to 26.99% in 2002 because of the introduction of Presidential Initiative on Special Crops policy in 2001. Since then, the contribution of the agricultural sector has been relatively stable with an average of 24.76% from 2002 to 2019. Some of the notable agricultural policies introduced during this period include NEEDS in 1999, NSPFS in 2002, New

Agricultural Policy in 2004, National Fertilizer policy of 2006, National Food Security Programme (NFSP) of 2008, Agricultural Transformation Agenda (ATA) from 2011 to 2015 etc. In 2019, the agricultural sector contributed about 25.16% to the total Gross Domestic Product. The crop production subsector remains the major contributor to the agricultural sector in 2019 with a percentage contribution of 90.1% while livestock forestry and fishing constituted 6.75%, 1.04% and 2.11%

Industrial sector

The industrial sector consists of mining, manufacturing, electricity, water supply, and construction. The percentage contribution of the industrial sector has experienced a steady decline from 1970's to 2019 which can be seen on the graph above. The contribution of the industrial sector gradually increased to 46.98% in 1990 which was as a result of the structural adjustment program that was adopted in 1986 which included policies and incentives to help boost industrial production. After 1990, output in the industrial sector declined to 34.35% of GDP 2002. However in the year 2003, the contribution of the industrial sector increased to 37.42% in 2003 due to an increase in the contribution of the oil sector which is a major component of the industrial sector. The rise in the contribution of oil sector is attributed to the sudden increase in global oil prices. Since then the output of the industrial sector has been decreasing because of the efforts of the Nigerian government to diversify its economy and reduce its reliance on the oil sector which is a major driver in the total output of the industrial sector. In 2019 the percentage contribution of industrial sector was just 22.5% of total Gross Domestic Product. (CBN Statistical Bulletin, 2019)

Service sector

The trend of the service sector was relatively stable from 1981 to 2003 with an average contribution of 37.92%. However the service sector contribution has been experiencing an increasing trend from 36.20% in 2003 to 52.60% in 2019. The service sector is currently the highest contributor to the Gross Domestic Product in 2019 with a percentage of 52.60%. The trade sector and the telecommunications sector are the major drivers of the service sector representing about 30.44% and 24.79% respectively (CBN Statistical Bulletin, 2019). Although the service sector has a sizable contribution to the total national output, The National Planning Commission (2011) argued that the sector cannot be considered as a significant influencer of the Nigerian economy.

The Oil sector

Since the exploration of oil in 1956 in Nigeria, the oil sector has grown to be a major part of the Nigerian economy. The oil sector serves as the nation's major source of foreign exchange revenue. As a result of this overdependence of Nigeria on the oil sector, changes in the global oil prices affect the revenue generated from the sale of crude oil consequently affecting its contribution to the Real GDP of the country. The Nigerian economy benefited and suffered from the oil boom of the 1970s. By the year 1981, the oil sector which was approximately 32.62% of Gross Domestic Product generated about 80% of government income and more than 90% of export earnings. The contribution of the oil sector decreased from 33.09% in 1984 to 29.78% in 1988 which was due to the decrease in the price of crude oil globally. As the price of crude oil decreased during this period, the revenue generated by the oil sector also decreased thereby affecting the sectors total contribution. The contribution of oil sector increased to 35.39% in 1990 which was the highest ever contribution of the oil sector to the Gross Domestic Product. This increase is attributed the Middle Eastern Crisis when Iraq invaded Kuwait that led to the increase in global oil prices. However since 1990, the percentage contribution of the oil sector has been decreasing because of the various efforts of the Nigerian government to diversify its economy and reduce the country's dependence on the oil sector. In 2019, the oil sector was 8.98% of the total Gross Domestic Product (CBN Statistical Bulletin, 2019)

Non-Oil Sector

The contribution of the non-oil sector increased from 66.91% in 1984 to 70.22% in 1988 which was due to the decrease in the global prices of crude oil thereby causing a decrease in the revenue generated in the oil sector and a consequent rise in the non-oil sector contribution to GDP. In 1988, the Middle Eastern Crisis between Iraq and Kuwait led to a rise in global oil prices and a rise in oil sector contribution brought about a decline of the non-oil sector contribution from 70.22% in 1988 to 64.61% in 1990. The National Rolling Plan of 1990 whose main objective was to consolidate the progress made in the implantation of the Structural Adjustment Program immediately increased the contribution from 64.61% in 1990 to 75.05% in 2002 .The introduction of the fiscal policy thrust of 2003 and the NEEDS in 2004 that was aimed at diversification of the economy to other sectors increased the non-oil sector contribution to GDP from 71.77% in 2003 to 84.61% in 2010. The Vision 2020 which was development plan that was introduced in 2010 which covered the period 2010 to 2020 also helped in the continuous increase in the contribution of the non-oil sector to the total Gross Domestic Product to about 91.22% in 2019

3.3 Oil Price Volatility and Economic Growth in Nigeria (1981-2019)

Nigeria is the second producer and the sixth oil producer in the world. The economy of Nigeria is a mono-economy that is highly dependent on the income generated from the oil industry. As a result of this overdependence on crude oil revenue, fluctuations in global oil prices will have a huge influence on the economic growth of the country. Going by the historical economic events of the country, the Nigerian economy has been consistently susceptible to changes in global oil prices due to the mono-economy it operates. These fluctuations in the global oil prices have subjected the country into experiencing economic booms and recessions. (Ben et al, 2016)

Between 1981 and 2019, there has been a series of fluctuations in the global oil price. The trend of volatile oil prices and Nigeria's Real GDP growth (economic growth) can be analyzed using the graph below

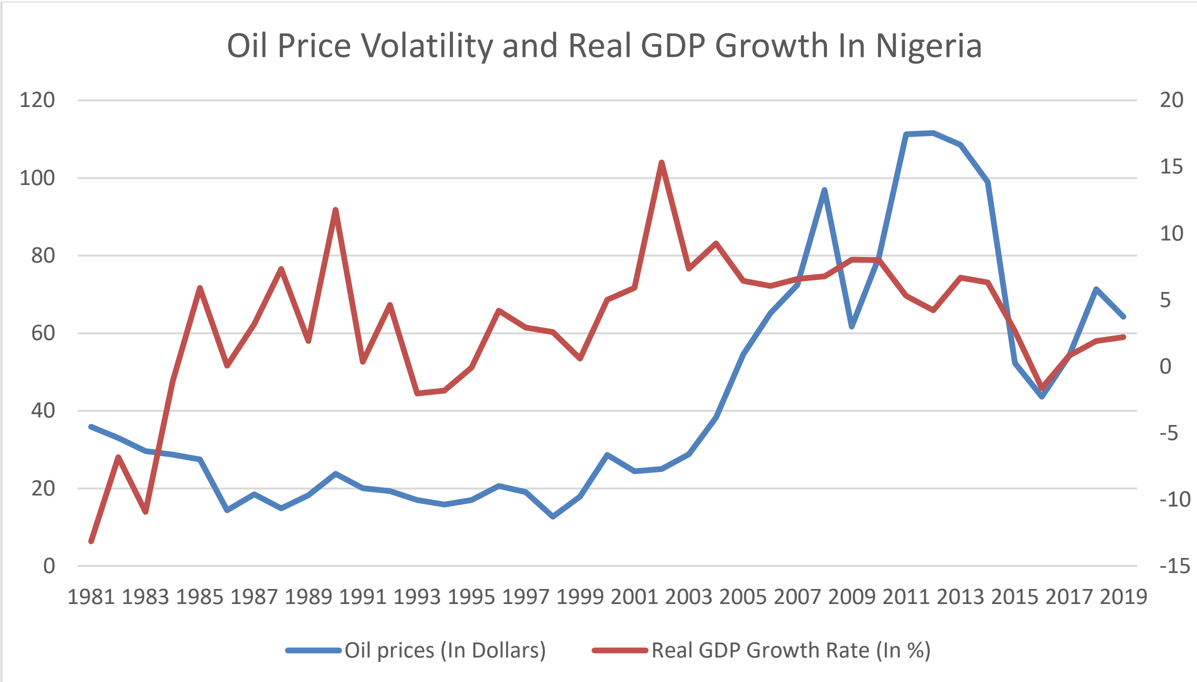


Figure 2: Oil Price Volatility and Real GDP Growth in Nigeria
(Source: Authors computation using data from World Bank and EIA 2021)

From the graph above, the average real GDP growth rate from 1981 to 1984 was while the average of global oil prices within this period was $31.8 per barrel. A decline in the price of oil in 1985 from $27.5 per barrel to $14.4 per barrel caused a decrease in the real GDP growth rate from 5.91% in 1985 to 0.06% in 1986.

The Nigerian government introduced Structural Adjustment Program in 1986 which caused the real GDP growth rate to increase to 7.33% in 1988 despite the continuous decline in oil prices during this period caused by the increase in supply by OPEC.

The Persian Gulf war caused the average price of crude oil to increase to about $18.75 from 1989 to 1995 while the average real GDP growth rate from 1989 to 1995 increased by about 2.46%. From 1996 to 1998, the Asian financial crisis caused a decrease in the global price of oil $20.64 per barrel to $12.76 per barrel which caused a decline in the real GDP growth from 4.2% to 2.58% in Nigeria. Between 1998 to 2008, the Venezuelan crisis in the early 2000's and the global commodity super cycle which caused high demand of oil and low supply of oil which caused the average price of crude oil to increase to $42.27 per barrel while there was an average increase of 6.53% of real GDP growth rate of Nigeria.

The global financial crisis of 2008 led to a drastic decline of oil prices from $96.94 per barrel in 2008 to $61.74 in 2009. However, the decision by oil producing countries around the world to decrease the production of oil and maintain their revenues in 2009 caused an immediate increase the global prices from $61.74 in 2009 to $111.63 per barrel in 2012

The persistent decrease of global oil prices because of the increased production of shale oil by the United States and the depreciation of the dollar caused oil prices to decrease from $111.63 per barrel in 2012 to $43.64 in 2016 caused the real GDP growth rate to decline from 6.67% in 2013 to -1.62 in 2016 which caused an economic recession in the country. However, the decision by OPEC to cut oil supply during this period helped to stabilize and increase oil prices from $43.64 in 2016 to $71.34 per barrel in 2018 which made the real growth rate to increase from -1.62% in 2016 to 1.92% in 2018 which helped the Nigerian economy to emerge out of recession

CHAPTER FOUR: METHODOLOGY

INTRODUCTION

This section explains the study's methodological approach and how it aided data collection, processing and analysis. The section contains the data description, model specification providing the framework for estimation, the econometric tools that were used as well as method of data analysis. The empirical framework sets the foundation that best suits the evaluation criteria and the estimation techniques

4.1 Data Description

This research utilized secondary data with a yearly frequency for 39 years from 1981 to 2019. Data on Real Gross Domestic Product which is a measure for economic growth was sourced from Maddison Project Database, version 2020, Inflation rate (Consumer Price Index) and Real Exchange rate (Naira to Dollar) were gotten from CBN Statistical Bulletin while the data for crude oil prices were sourced from BP Statistical Review of World Energy.

4.2 Model Specification

This study used variables that were identical to those used by Mordi and Adebiyi (2010) in his study on the influence of oil price shocks on Nigeria's economic growth. Below is the ARDL econometric model of the effect of volatile oil prices on Nigeria's economic growth:

$$RGDP_t = \alpha_0 + \alpha_1 ROIL_t + \alpha_2 REER_t + \alpha_3 INF_t + \epsilon_t \quad \text{………………. (1)}$$

Where

RGDP is Real Gross Domestic Product

ROIL is Oil prices

REER is the Real Effective Exchange Rate

INF is Inflation rate

ϵ_t is the residual term

α_0 is the constant or intercept

α_1, α_2 and α_3 are slope parameters

The Non Linear Auto regressive Distributed Lags was also applied since the variables are expected to be cointegrated asymmetrically. In other words an asymmetric influence of oil prices is expected on Nigeria's economic growth. Therefore the model for the asymmetric relationship is given as

$RGDP_t = \alpha_0 + \alpha_1 ROIL\_POS_t + \alpha_1 ROIL\_NEG_t + \alpha_2 REER_t + \alpha_3 INF_t + \epsilon_t$ ………………. (2)

Where:

RGDP is Real Gross Domestic Product

$ROIL\_POS_t$ is positive oil price shocks

$ROIL\_NEG_t$ is negative oil price shocks

REER is the Real Effective Exchange Rate

INF is Inflation rate

ϵ_t is the error term or residual

α_0 is the constant or intercept

α_1, α_2 and α_3 are slope parameter

4.3 Method of Data Analysis

The effect of changing oil prices on Nigeria's economic growth is examined using a range of techniques. These methods are Unit Root Test, ARDL and NARDL

4.3.1 Unit root test

The unit root test is a statistical approach for determining whether a series is stationary or non-stationary. The unit root test is done on time series data so as to prevent spurious regression and bias in the estimation process that may arise as a result of the non-stationarity of the variables used in this research which makes the result of the analysis to be irrelevant for forecasting and decision making (Gujurati, 2013). The unit root tests employed in this research were the ADF test and the Phillips Perron test.

4.3.2 Descriptive Statistics

Descriptive Statistics are important in describing the important statistical characteristics or properties of the data used in a research and are important in presenting the quantitative summary of the data. Descriptive statistics data can be classified into measures of central tendency and measures of variability. Mean and median are examples of central tendency metrics, whereas standard deviation, kurtosis, skewness, jarque bera, minimum and maximum are examples of variability measurements

The mean is the data set's average value, while the median is the middle number of the data set when arranged in an ascending or descending manner.

Standard deviation is the degree of variation of the data set from their mean value. A low standard deviation implies that the values are close to the mean, whereas a large standard deviation shows the values are dispersed away from the mean value.

Kurtosis is a statistical measure that shows how peaked or flat is the probability distribution of a real valued random variable. High kurtosis data sets have a peak distribution around the mean value, whereas low kurtosis data sets have a flat distribution around the mean value.

Skewness refers to the degree of asymmetry of a probability distribution. Time series data can be positively skewed, negatively skewed, or undefined.

The Jarque-bera test reports the goodness-of-fit of the distribution and shows if a time series data has a skewness or kurtosis. In other words, it is used to verify if time series data is normally distributed or not.

4.3.3 Auto Regressive Distributive Lags (ARDL)

The Auto regressive distributive lags model is an Ordinary Least Square method devised by Pesaran et al, (2001) used to analyze time series data that are non-stationary or have a mixed order of integration. In a general to specific modeling framework, the Auto regressive Distributed Lags method uses a suitable number of lags to analyze the relationship between the regressand and the regressors. The “autoregressive” nature of the ARDL model means that the regressand is partly explained by the lagged values of itself. It consists of a “distributed lag” part which is made up of successive lags of the regressors

The basic ARDL model can be illustrated using the equation below.

$$y_t = \beta_0 + \beta_1 y_{t-1} + ...+ \beta_p y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + ... + \alpha_q x_{t-q} + \varepsilon$$

Where:

y_t is the regressand,

β_0 is the constant,

β_1 to β_p are the coefficients of the lagged values of the regressand

α_0 to α_q are coefficients of the independent variable and its lagged values

y_{t-1} to y_{t-p} are the lagged values of the dependent variable,

x_t is the regressor,

x_{t-1} to x_{t-q} are the lagged values of the regressors

ε is the error term.

4.3.4 Non Linear Auto regressive Distributed Lags (NARDL)

The NARDL model is a single-equation error correction model which allows for asymmetries with respect to positive and negative changes in the regressor. The NARDL method was formulated by Shin et al (2014) to correct for the defects of the Symmetric or Linear Auto regressive Distributed Lags which assumed the impact of an increase or decrease of the explanatory variable to be the same on the explained variable e.g. a 5% increase in the explanatory variable causes a 10% decline in the explained variable and a 5% decline of the explanatory variable causes a 10% increase in the explained variable. However the Non Linear Auto regressive Distributed Lags captures the short run and long run non-linearities via negative and positive partial sum decompositions of the regressors. In other words, a positive change in the explanatory variable can have a different effect on the explained variable from a negative shock. The Non Linear Auto regressive Distributed Lags model can be written as:

$$y_t = \beta_0 + \beta_1 x^+ + \beta_2 x^- + \varepsilon$$

Where

y_t is the regressand

β_0 is the constant term

x^+ is the positive change in the regressor

x^- is the negative change in the regressor

β_1 and β_2 are coefficients

ε is the error term

CHAPTER FIVE: EMPIRICAL FINDINGS

INTRODUCTION

This chapter consists of a detailed presentation, interpretation and analysis of the results and findings of the research. It includes the result, interpretation and analysis of the descriptive statistics, unit root test, Symmetric Autoregressive Distributed Lags and Non-Linear Autoregressive Distributed Lags

5.1 Descriptive Statistics

From table 2 below, the mean for RGDP, ROIL REER and INF are 17.19994, 5.275392, 4.786686 and 19.14646 respectively while the median values for RGDP, ROIL REER and INF are 16.98049, 4.567115 4.610363 and 12.55496 respectively.

The skewness for RGDP, ROIL, REER and INF are 0.298237 0.834891 0.999627 and 1.783591 respectively which means that the data for all the variables are positively skewed towards the right. The results of the kurtosis statistics reveals that the kurtosis for RGDP and ROIL are 1.575399 and 2.421522 respectively which makes them to be platykurtic because their kurtosis values are less than 3 while INF is leptokurtic (4.997667) because it has a kurtosis value that is greater than 3 and REER is mesokurtic with a kurtosis value of 3.00942

The probability value of the Jarque Bera statistics show that the data for Real GDP and oil prices are normally distributed at 5%level of significance while the data for real exchange rate is normally distributed at 1% level of significance and the data for inflation is not normally distributed at all percentage levels of significance

	RGDP	ROIL	REER	INF
Mean	17.19994	5.275392	4.786686	19.14646
Median	16.98049	4.567115	4.610363	12.55496
Maximum	18.08364	8.9014	6.285566	72.8355

Minimum	16.43867	3.169163	3.906668	5.388008
Std. Dev.	0.572482	1.684908	0.611661	17.06283
Skewness	0.298237	0.834891	0.999627	1.783591
Kurtosis	1.575399	2.421522	3.00942	4.997667
Jarque-Bera	3.876065	5.074567	6.4953	27.16262
Probability	0.143987	0.079081	0.038865	0.000001
Sum	670.7978	205.7403	186.6807	746.712
Sum Sq.Dev.	12.45395	107.8787	14.21692	11063.33
Observations	39	39	39	39

Table 2: Descriptive Statistics

(Source: Author's computation using E-views 9.0 software)

5.2 Unit Root Test

The unit root tests carried out in this research are the ADF test and the Phillips Perron test. Each was tested at levels as well as first difference

ADF Test

The ADF test was formulated by David Dickey and Wayne Fuller in (1979). The ADF test is a parametric test that was developed to correct the problem of serial correlation that is associated with the Dickey Fuller test. The ADF handles bigger, more complex models.

The p-value of the ADF test results is analyzed in order to know whether the data is stationary or non-stationary.

> At 90% confidence interval, if the p-value is less than 0.1, the null hypothesis is rejected which says the series does not have a unit root

> At 90% confidence interval, if the p-value is more than 0.1, we fail to reject the null hypothesis and say the series has a unit root

From the table below, at 10% level of significance, all the variables are stationary at first difference except inflation rate which is stationary at levels

Variables	Level(t-statistics)	p-value	1st difference t-statistics	p-value	Order of integration
RGDP	-2.403350	0.3719	-3.351691	0.0738	I(1)
ROIL	-1.601821	0.7735	-5.533150	0.0003	I(1)
REER	-2.001255	0.5820	-4.660359	0.0033	I(1)
INF	-4.019832	0.0166	---	---	I(0)

Table 3: ADF Test

Phillips Perron test

Peter C. B. Phillips and Pierre Perron (1988) formulated the Phillips Perron test as an alternative to the ADF test. The Phillips Perron test is a non-parametric test that corrects for Heteroscedasticity and autocorrelation in the errors

The p-value of the Phillips Perron test results is analyzed in order to know whether the data is stationary or non-stationary

At 90% confidence interval, if the p-value is smaller than 0.1, the null hypothesis is rejected which says the series does not have a unit root

At 90% confidence interval, if the p-value is higher than 0.1, we fail to reject the null hypothesis and say the series has a unit root

From the table below, all the variables are stationary at first difference at 10% level of significance

Variables	Level(t-statistics)	p-value	1st difference t-statistics	p-value	Order of integration
RGDP	-2.554066	0.3022	-3.230912	0.0942	I(1)
ROIL	-1.619436	0.7664	-5.520889	0.0003	I(1)
REER	-2.269512	0.4396	-4.486776	0.0052	I(1)
INF	-2.867527	0.1839	-10.60546	0.0000	I(1)

Table 4: Phillips Perron

5.3 Structural Breakpoint Test

A structural break occurs when a time series data suddenly changes at a certain period of time. The Bai Perron test was used in this analysis to check for the presence of structural breaks. The Bai Perron Breakpoint test's null and alternative hypotheses are given below.

H_0: There are no structural breaks

H_1: There are structural breaks

Since the value of the f-statistic 127.3254 is more than the critical value 16.19 at 5% level of significance, we reject the null hypothesis and say there are structural breaks in our model

The empirical findings of the Bai Perron test reveal there is a structural break in 2003. This structural break was a result of the fiscal policy thrust that was adopted during this period. The fiscal policy thrust in 2003 provided a growth strategy that will bring about fiscal stability, diversification of the economy by improving the non-oil sector contribution to GDP, decrease inflation, achieve and sustain a fiscal deficit below 2.5% of the total Gross Domestic Product, provide a wide range of fiscal incentives to stimulate investments in the manufacturing and industrial sector, entice and draw more foreign investments into the country, improve and maintain a competitive and stable exchange rate, external debt management reforms that will result in a decrease in total debts and the cost of debt servicing, transform N1.5 trillion domestic debt into long-term bonds in order to reduce the burdens of yearly debt servicing on capital development and proceed with the structural reforms for better tax and customs management. (CBN Statistical Bulletin, 2019)

The adoption of these policies in 2003 had important effects on important macroeconomic variables. For instance, the fiscal policy thrust of 2003 increased government revenue to about ₦2, 575.1 billion consisting of N2, 074.3 billion from oil the oil sector and N500.8 billion from the non-oil sector. The total amount in the federation account was N2, 011.6 billion, while Federation account revenue for allocation was N1821.0 billion. Also, the average inflation rate for 2003 was about 11.2% while the Naira to Dollar exchange rate was N129.22 to $1 (CBN Statistical Bulletin, 2019)

Breaks	F-statistic	Scaled F-statistic	Weighted F-statistic	Critical Value
1 *	127.3254	509.3015	509.3015	16.19

Estimated break dates:
1: 2003

Table 5: Bai Perron Multiple Break Point Test

5.4 Auto Regressive Distributed Lags

5.4.1 Cointegration Tests

The cointegration test is a test conducted to examine the long run equilibrium between the variables. The bound test was used in this study to investigate the presence of a long run equilibrium between the variables i.e. oil prices, inflation rate and Real effective exchange rate

To analyze the bound test, the F-statistic is compared with I(0) and I(1).

If the F-statistic is greater than I(1), the null hypothesis is rejected in favour of the alternative hypothesis which means the variables are cointegrated
If the F-statistic is smaller than I(1), we fail to reject the null hypothesis and say the variables are cointegrated.

From the table below, at 5% level of significance, the F-statistics (8.444589) is more than I(1) which is 5.07; therefore the null hypothesis is rejected and we conclude that there is a long run relationship among the variables

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	8.444589	10%	3.47	4.45
K	3	5%	4.01	5.07
		2.5%	4.52	5.62
		1%	5.17	6.36

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.642828	10%	-3.13	-3.84
		5%	-3.41	-4.16
		2.5%	-3.65	-4.42
		1%	-3.96	-4.73

Table 6: Cointegration test

5.4.2 Long Run Analysis

The table below shows the ARDL long run results where Real GDP is the regressand while oil prices, inflation and real exchange rate are given as the regressors in the model. The regression equation is given as

$$RGDP_t = 15.37024 + 0.109260ROIL + 0.010722\ REER + 0.000750INF_t + \epsilon_t$$

The intercept 15.37024 shows the value of RGDP is 15.37024 irrespective of the changes in the regressors in the model

The coefficient of ROIL is 0.109260 reveals a direct relationship between oil prices and RGDP. This implies that a 1unit increase in ROIL will cause a 0.109260 unit increase in RGDP and vice versa. The p-value (0.0000) of ROIL shows that this relationship is highly significant at 5%. This finding also confirms the symmetric relationship theory of the influence of oil prices on long run economic growth which states that a rise in the price of oil causes an increase in national output and a decline in oil prices causes decrease in national output is also applicable to an oil exporting nation like Nigeria. This is because the sale of crude oil is the primary means of foreign exchange revenue and a major component of Nigeria's GDP. As a result, a rise in global oil prices generates more revenue to the Nigerian economy and consequently increases economic growth in the country while a decrease in global oil prices restricts the amount of revenue generated from the sale of crude oil which leads to decline in long run economic growth. This empirical result is also consistent with the findings of Kurihara (2015) among others

The coefficient of INF is 0.010722 reveals a direct relationship between inflation rate and RGDP. It means that a 1unit rise in INF causes a 0.010722 unit rise in RGDP and vice versa. The p-value (0.0810) of INF is significant at 10%

The coefficient of REER is 0.010722 reveals a direct relationship between REER and RGDP. It means that a 1unit rise in REER causes a 0.010722 unit rise in RGDP and vice versa. The p-value (0.5938) of REER is insignificant at 5% level of significance. The insignificant influence of REER on long run Real GDP in Nigeria can be attributed to the different exchange rate policies that are adopted so as to manage and stabilize the exchange rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROIL	0.109260	0.018641	5.861207	0.0000
INF	0.000750	0.000417	1.799775	0.0810
REER	0.010722	0.019908	0.538605	0.5938
DUM2003	0.104829	0.059622	1.758226	0.0880
C	15.37024	0.211071	72.82017	0.0000
@TREND	0.060243	0.004803	12.54345	0.0000
R-squared	0.992183			
Adjusted R-squared	0.990999			
F-statistic	837.7468	Durbin-Watson stat		0.812710
Prob(F-statistic)	0.000000	Wald F-statistic		564.2028

Table 7: Long Run Analysis

5.4.3 ARDL Long Run RAMSEY RESET Test

Ramsey RESET test was developed by Ramsey (1969) in order to diagnose general functional form misspecification.

H_0: The model is well specified

H_1: There is misspecification error

From the table below, we fail to reject the null hypothesis which says the model is well specified since the p-value of the t-statistic, f-statistic and likelihood ratio are all insignificant at 1%, 5% and 10%.

	Value	Df	Probability
t-statistic	0.165006	32	0.8700

F-statistic	0.027227	(1, 32)	0.8700
Likelihood ratio	0.033169	1	0.8555

Table 8: ARDL Long run Ramsey RESET Test

5.4.4 ARDL Long Run Normality Test

The p-value of the Jarque Bera helps to determine if data are normally distributed.
If the p-value of the Jarque Bera test is significant, the null hypothesis is rejected and we say the data is not normally distributed
If the p-value of the Jarque Bera test is insignificant, we fail to reject the null and say the data are normally distributed

H_0: The data is normally distributed
H_1: The data is not normally distributed

We fail to reject the null hypothesis at 5% level of significance which says the data is normally distributed since the probability value of the Jarque Bera test (i.e. 0.816238) is insignificant which implies that the data is normally distributed

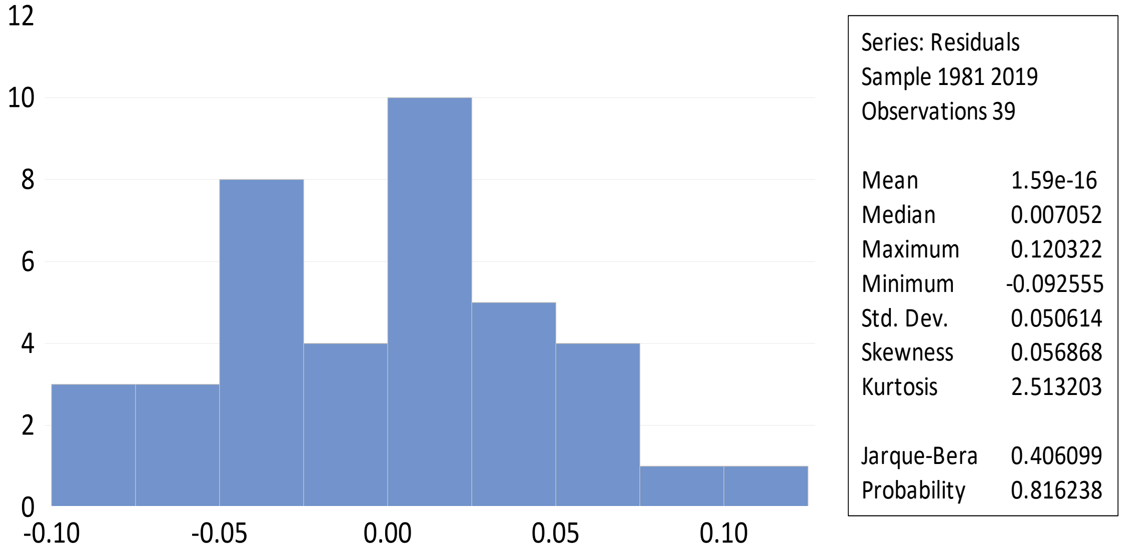


Figure 3: ARDL Long Run Normality Test

5.4.5 ARDL Long Run CUSUM Test

The CUSUM test is used to check if there are structural breaks in the residuals. From the graph below, since the plotted blue line graph is within the red boundaries at 5% level of significance, the structural breaks in the model has been rectified

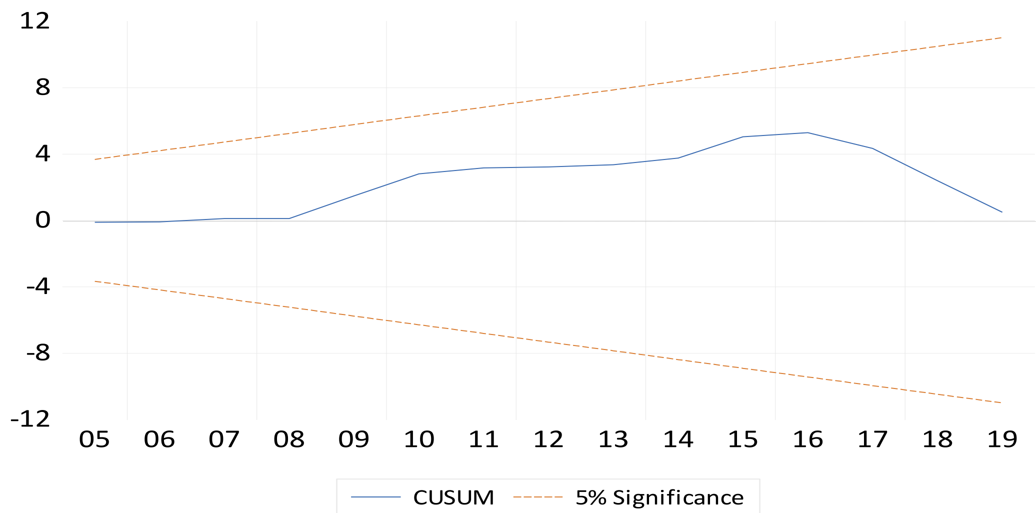


Figure 4: Long Run CUSUM test

5.4.6 Short Run Analysis

The ARDL method was also used to examine the short run link between the regressor and the regressand

The intercept 0.017355 shows the value of RGDP is 0.017355 irrespective of the changes in the regressors in the model

The coefficient of ROIL is 0.046063 shows a positive correlation between crude oil prices and RGDP. This implies that a 1unit increase in ROIL will lead to a 0.046063unit rise in RGDP. The p-value (0.0069) of ROIL reveals that this relationship is highly significant at 5% level of significance. This is because a rise in oil prices results in increased foreign exchange revenue to the Nigerian economy, which provides additional resources that can be used to promote economic growth. This finding also confirms the symmetric relationship theory holds in the short run and also agrees with the findings most studies in this area.

The coefficient of REER is 0.030394 which reveals a positive relationship between real effective exchange rate and RGDP. This implies that a 1unit rise in REER will lead to a 0.030394 rise in RGDP. The p-value (0.0263) of REER reveals this relationship is highly significant at 5%. This is because an appreciation of the domestic currency (i.e. a decline in Real effective exchange rate) will make the country's exports to be costlier in the international market which causes a decrease in the demand for Nigerian exports consequently leading to a decline in Real GDP and vice versa. This results is also consistent with the results of Shuaibu (2020)

The coefficient of INF is 3.22E-05 reveals a direct relationship between inflation and RGDP. It means that a 1unit increase in inflation rate will cause a 0.00322E-05 rise in RGDP and vice versa. However, the p-value (0.8884) of ROIL reveals that this relationship is highly insignificant at 5% level of significance

The Error Correction model shows the speed at which the variables adjust in order to attain equilibrium. The value of ECT is -0.529283 with a significant probability value of 0.0001 shows that the speed which the variables converge at an equilibrium is 52.92%

The value of Rsquared in the table is 0.653450 which means that 65.35% of variations in the explained variable are as a result of changes in the explanatory variables.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	0.669843	0.117905	5.681209	0.0000
D(REER)	0.030394	0.013010	2.336296	0.0263
D(ROIL)	0.046063	0.015886	2.899676	0.0069
D(ROIL(-1))	-0.030749	0.016303	-1.886175	0.0690
D(INF)	3.22E-05	0.000227	0.141557	0.8884
ECT(-1)	-0.529283	0.120216	-4.402784	0.0001
C	0.017355	0.007354	2.359910	0.0250
R-squared	0.653450	Durbin-Watson stat		2.340735
Adjusted R-squared	0.584139			
F-statistic	9.427914			
Prob(F-statistic)	0.000008			

Table 9: Short Run Analysis

5.4.7 ARDL Short run CUSUM test

The CUSUM test below shows that the structural breaks in the model have been successfully rectified since the plotted blue line graph lies between the two red lines at 5% level of significance

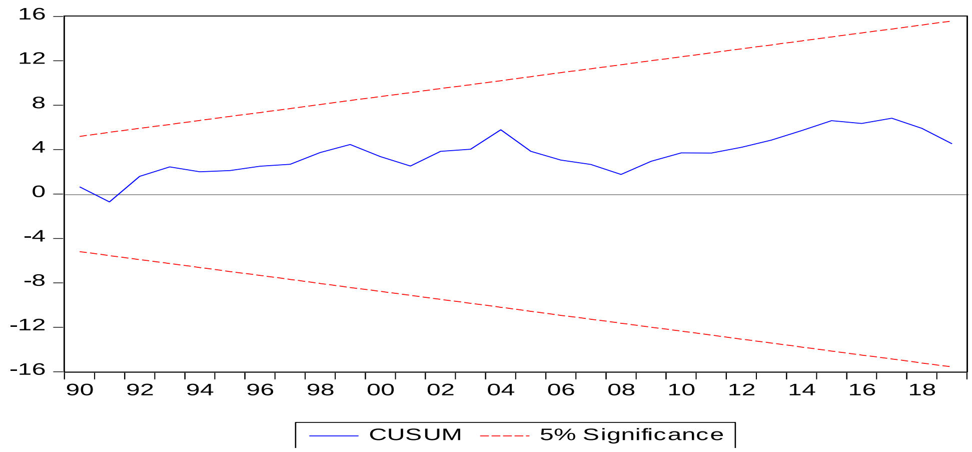


Figure 5: ARDL Short run CUSUM test

5.4.8 ARDL Short run Normality test

H_0: The variable is normally distributed

H_1: The variable is not normally distributed

We fail to reject the null hypothesis at 5% level of significance which says the data is normally distributed since the p-value of the Jarque Bera test (0.585174) is more than 0.05 it means the data is normally distributed

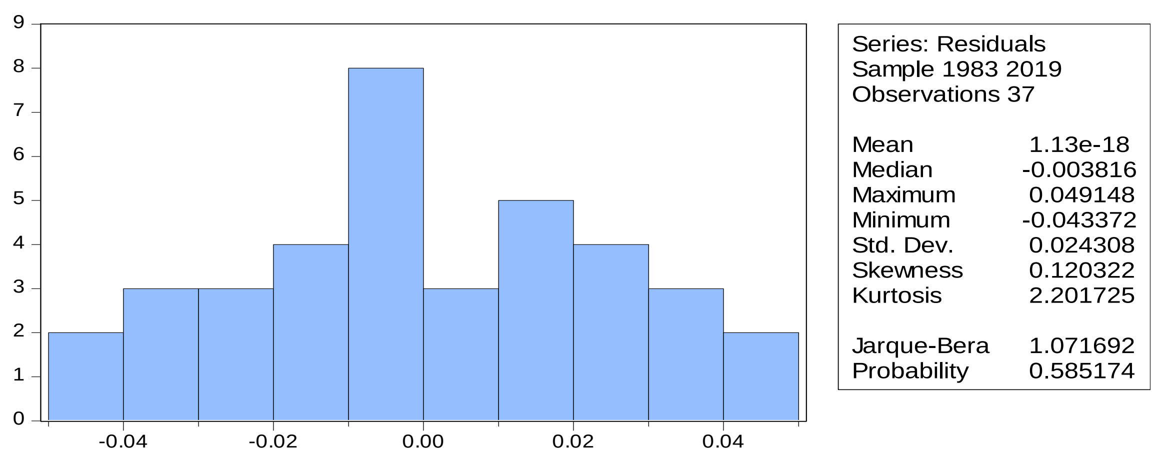


Figure 6: ARDL Short run Normality Test

5.4.9 ARDL Short Run RESET test

H_0: The model is well specified

H_1: There is misspecification error

From the table below, we fail to reject the null hypothesis which says the model is well specified since the p-value of the t-statistic, f-statistic and likelihood ratio are insignificant at 1%, 5% and 10%.

	Value	Df	Probability
t-statistic	0.925493	29	0.3623
F-statistic	0.856538	(1, 29)	0.3623
Likelihood ratio	1.076997	1	0.2994

Table 10: ARDL Short run Ramsey RESET Test

5.5 Non-Linear Auto Regressive Distributed Lags

5.5.1 Wald test for asymmetric effect of oil prices

To examine the need for NARDL estimation, the first step is to use the Wald test to check if a symmetric or asymmetric relationship exists between the variables.

If the f-statistic is significant, this means that we there is an asymmetric effect between the variable, hence the null hypothesis is rejected.

If the f-statistic is insignificant, this means that there is a symmetric effect between the variables, therefore we fail to reject the null hypothesis.

H_0: there is symmetric relationship

H_1: there is asymmetric relationship

Test Statistic	Value	df	Probability
F-statistic	12.68324	(1, 25)	0.0015

Table 11: Wald Test

According to Table 11, since the f-statistic is significant at 5%, the null hypothesis is rejected, therefore there exist an asymmetric relationship between the regressor and the regressand. This implies that negative oil price shocks and positive oil price shocks have varying impact on Real GDP which justifies the application of the NARDL

ROIL POSITIVE

The graph of positive oil price shocks depicts an increasing trend over the years as shown below

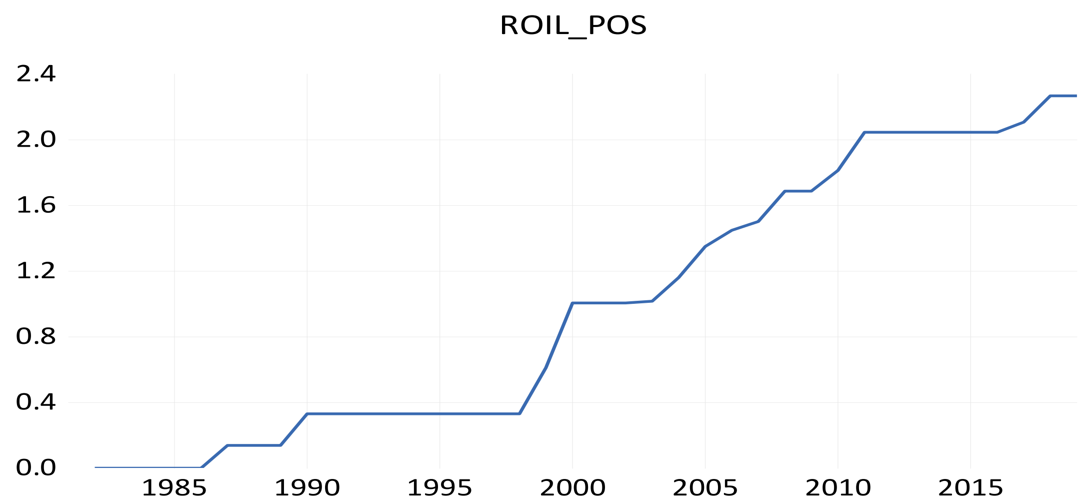


Figure 7: Positive Oil Price Shocks

ROIL NEGATIVE

The graph of negative oil price shocks depicts a decreasing trend over the years as shown below

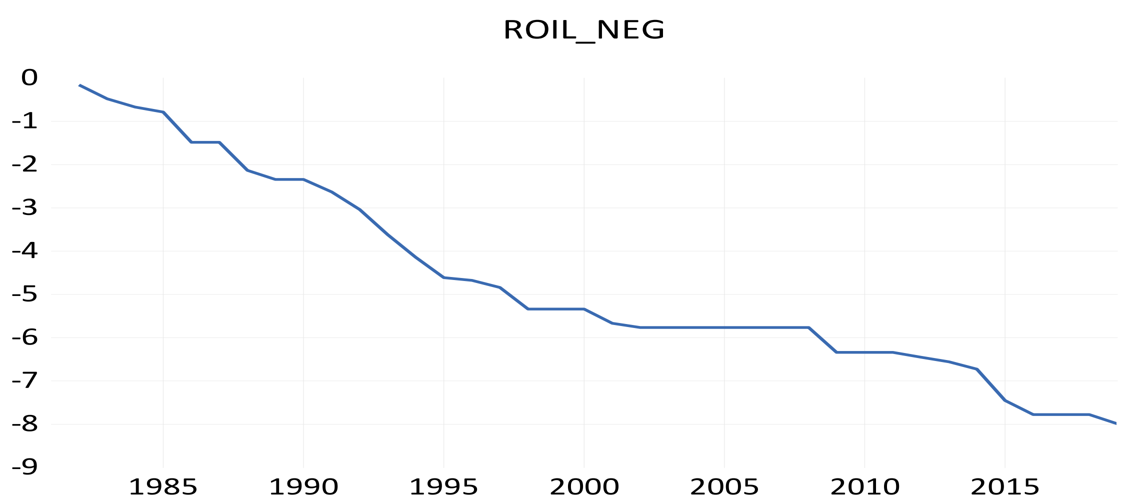


Figure 8: Negative Oil Price Shocks

5.5.2 Cointegration Bound Test

In order to analyze the bound test, the value of the F-statistic is compared with I(0) and I(1).
If the F-statistic is greater than I (1), the null hypothesis is rejected in favour of the alternative hypothesis which means the variables are cointegrated

If the F-statistic is smaller than I(1), we fail to reject the null hypothesis and say that the variables are cointegrated

From the table below, at 5% level of significance, the F-statistics (10.26695) is more than the I(1) which is 4.57; therefore, the null hypothesis is rejected and conclude that the variables have a long run relationship with each other

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	10.26695	10%	3.03	4.06
K	4	5%	3.47	4.57
		2.5%	3.89	5.07
		1%	4.4	5.72

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-4.631842	10%	-3.13	-4.04
		5%	-3.41	-4.36
		2.5%	-3.65	-4.62
		1%	-3.96	-4.96

Table 12: Cointegration test

5.5.3 NARDL Long Run Analysis

The table below shows the NARDL regression results where Real GDP is the regressand while oil prices, inflation and real exchange rate were given as the regressors. The regression equation is given as

$RGDP_t$= 16.35345+ 0.109812ROILNEG + 0.079481ROILPOS + 0.004181REER + $0.000675INF_t + \epsilon_t$

The intercept 16.35345 shows the value of RGDP is 16.35345 irrespective of the changes in the regressors

The coefficient of ROILNEG is 0.109812 which means that a 1unit decline in oil prices causes a 0.109812 unit decrease in RGDP. The p-value (0.0279) of ROIL proves this relationship is significant at 5%

The coefficient of ROILPOS is 0.079481 which implies that a 1unit rise in oil price causes a 0.079481unit rise in RGDP. The p-value (0.5299) of ROIL shows that this relationship is insignificant at 5% level of significance

The statistics above confirms that the asymmetry in effects theory of oil price on economic growth in Nigeria where an increase in oil prices has an insignificant influence on economic growth whereas a negative oil price shock has a significant influence on economic growth in the long run. The result of the asymmetric effect of oil prices on Nigeria's economic growth is also consistent with the findings of Mordi & Adebiyi, (2010) among others. The significant influence of a decrease in oil prices on national output is due to the impacts of uncertainty oil price shocks bring when preparing government budgets. A decline in oil prices destabilizes government fiscal activities, and can have a detrimental impact on other economic plans, strategies and results. This will reduce the performance and productivity of important sectors of the economy thereby leading to a decrease in economic growth. Alternatively, the insignificant effect of a rise in oil prices on Real GDP growth is as a result of high rate of corruption as well as the embezzlement and mismanagement of public funds by Nigerian leaders. Also the insignificant effect of oil price increases on long run Real GDP growth confirms the presence of the Dutch disease syndrome in Nigeria where the discovery of large deposits of crude oil has not led to any meaningful long term economic growth. The empirical findings of the insignificant influence of oil prices on Real GDP growth agrees with the findings of Okonkwo and Mojekwu (2018) amongst others

The coefficient of INF is 0.000675 shows a direct relationship between inflation and RGDP. It means that a 1unit rise in INF will cause a 0.000675 rise in RGDP and vice versa. The p-value (0.1028) of INF is insignificant at 5%

The coefficient of REER is 0.004181shows a direct relationship between REER and RGDP. It means a 1unit rise in REER will lead to a 0.004181increase in the RGDP and vice versa. The p-value (0.7969) of REER is insignificant at 5% level of significance. The insignificant effect of the real exchange rate in the long run can be attributed to the different policies adopted by the Nigerian government to stabilize the effect of exchange rate fluctuations.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROIL_NEG	0.109812	0.047595	2.307225	0.0279
ROIL_POS	0.079481	0.125120	0.635237	0.5299
REER	0.004181	0.016110	0.259524	0.7969
INF	0.000675	0.000401	1.681129	0.1028
C	16.35345	0.097086	168.4422	0.0000
DUM2003	0.103928	0.060659	1.713333	0.0966
@TREND	0.062870	0.018809	3.342526	0.0022
R-squared	0.993355	Durbin-Watson stat		0.925977
Adjusted R-squared	0.992069	Wald F-statistic		486.2294
F-statistic	772.3704			
Prob(F-statistic)	0.000000			

Table 13: NARDL Long Run Analysis

5.5.4 NARDL Long Run RAMSEY Test

H_0: The model is well specified

H_1: There is misspecification error

From the table below, we fail to reject the null hypothesis which says the model is well specified since the p-value of the t-statistic, f-statistic and likelihood ratio are all insignificant at 1%, 5% and 10%.

	Value	Df	Probability
t-statistic	0.935342	30	0.3571
F-statistic	0.874865	(1, 30)	0.3571
Likelihood ratio	1.092312	1	0.2960

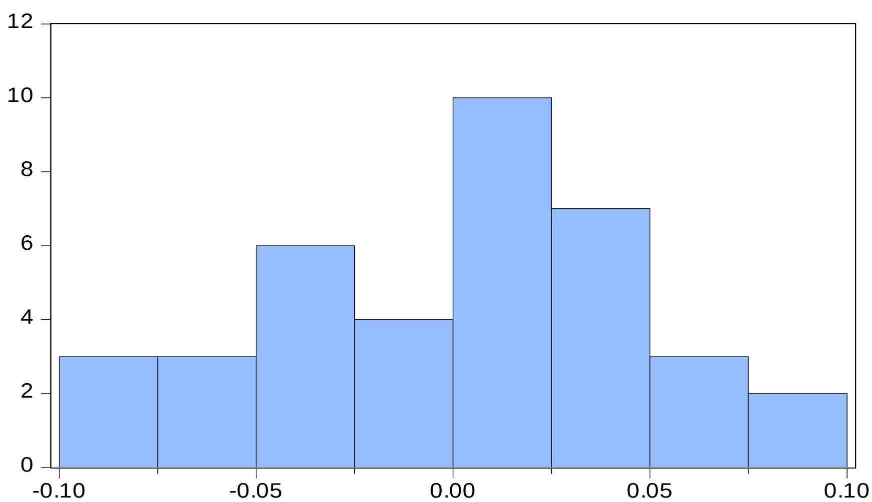
Table 14: NARDL Ramsey Test

5.5.5 NARDL Long Run Normality Test

H_0: The data is normally distributed

H_1: The data is not normally distributed

At 5% level of significance, we fail to reject the null hypothesis which says the data is normally distributed since the p-value of the Jarque Bera (i.e. 0.718272) is more than 0.05 it means that the data is normally distributed



Series: Residuals	
Sample 1982 2019	
Observations 38	
Mean	-2.99e-15
Median	0.007760
Maximum	0.094405
Minimum	-0.093336
Std. Dev.	0.046438
Skewness	-0.104460
Kurtosis	2.388167
Jarque-Bera	0.661814
Probability	0.718272

Figure 9: NARDL Long Run Normality test

5.5.6 NARDL Long Run CUSUM Test

The CUSUM test is done to know if there are structural breaks in the residuals. From the graph below, since the blue line graph lies within the red boundaries at 5% level of significance, the structural breaks in the model have been rectified

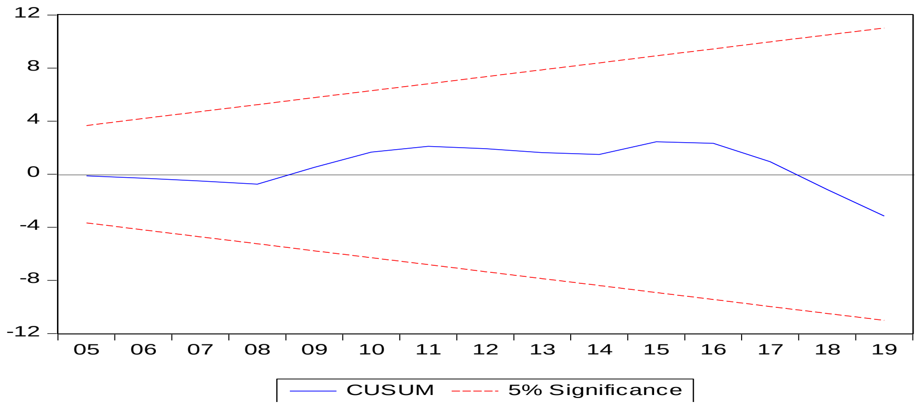


Figure 10: NARDL Long Run CUSUM test

5.5.7 Short run Non-Linear Auto Regressive Distributed Lags

The NARDL method was employed to examine the short run relationship between the regressand and the regressors

The intercept 0.022463 shows the value of RGDP is 0.022463 irrespective of the changes in the regressors

The coefficient of the lag of Real GDP (RGDP(-1)) is 0.603579 reveals a positive relationship between RGDP and the first lag of RGDP. This implies a 1unit increase in the first lag of real GDP causes a 0.603579 unit rise in RGDP. The p-value (0.0000) of ROIL proves this relationship is highly significant at 5%.

The coefficient of ROILPOS is 0.096302 reveals a direct correlation between a rise in oil prices and RGDP. This implies a 1unit rise in oil price cause a 0.096302 unit rise in RGDP. The p-value (0.0438) of ROIL shows that this relationship is significant at 5% level of significance. This significant influence of a rise in price of oil on Real GDP in the short term is because an increase in global oil prices moves income from oil importing economies to oil producing economies which increases foreign exchange income for the Nigerian government and contributes to an increase in Nigeria's economic growth

The coefficient of the lag of positive crude oil price shocks (ROIL_POS(-1)) is -0.124575 shows that there is an indirect relationship between the first lag of positive oil prices shocks and RGDP. This implies 1unit rise in oil price cause a -0.124575 unit decline in RGDP. The p-value (0.0413) of ROIL_POS(-1) proves this relationship is significant at 5%

The coefficient of REER is 0.030394 reveals a direct relationship between oil prices and RGDP. This implies a 1unit increase in REER will lead to a 0.030394 unit rise in RGDP and vice versa. The p-value (0.0263) of REER proves this relationship is significant at 5% level of significance. A rise in the real exchange rate (i.e. the depreciation of the Naira) makes the Nigeria's exports to be less expensive in the international market which increases the demand for Nigeria's exports thereby causing an increase in foreign exchange revenue and consequently a rise in Nigeria's economic growth while a decline in exchange rate (i.e. appreciation of the Naira) causes a decrease in economic growth as Nigerian exports become more expensive relative to other country's exports which reduces the demand for Nigerian exports

The Error Correction model shows the speed at which the variables adjust in order to attain equilibrium. The value of ECT1(-1) is -0.519677 with a significant probability value of 0.0017 shows the speed which the variables converge to an equilibrium is 51.96%

The coefficient of R squared in the table is 0.583590 which means that 58.35% of changes in the regressand are caused by changes in the regressors.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	0.603579	0.104692	5.765280	0.0000
D(ROIL_POS)	0.096302	0.045746	2.105145	0.0438
D(ROIL_POS(-1))	-0.124575	0.058421	-2.132383	0.0413
D(REER)	0.029364	0.012678	2.316069	0.0276
ECT1(-1)	-0.519677	0.150758	-3.447097	0.0017
C	0.022463	0.005402	4.158024	0.0002

R-squared	0.583590	Durbin-Watson stat	2.064700
Adjusted R-squared	0.514188	Wald F-statistic	12.28362
F-statistic	8.408861		
Prob(F-statistic)	0.000046		

Table 15: Short run Analysis NARDL

5.5.8 NARDL Short run RESET test

H_0: The model is well specified

H_1: There is misspecification error

From the table below, we fail to reject the null hypothesis which says the model is well specified since the p-value of the t-statistic, f-statistic and likelihood ratio are all insignificant at 1%, 5% and 10%.

	Value	Df	Probability
t-statistic	0.244037	29	0.8089
F-statistic	0.059554	(1, 29)	0.8089
Likelihood ratio	0.073853	1	0.7858

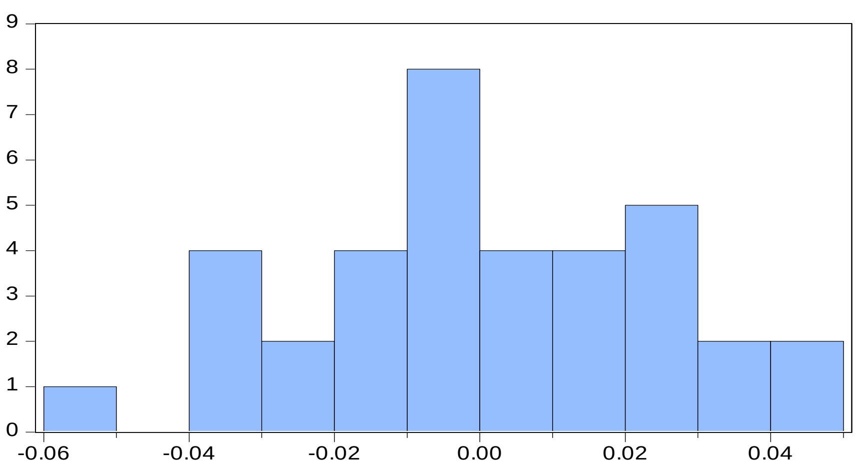
Table 16: NARDL Ramsey RESET Test

5.5.9 NARDL Short run Normality test

H_0: The data is normally distributed

H_1: The data is not normally distributed

At 5% level of significance, we fail to reject the null hypothesis which says that the data is normally distributed since the probability value of the Jarque Bera (i.e. 0.762876) is more than 0.05 it means that the data is normally distributed



Series: Residuals	
Sample 1984 2019	
Observations 36	
Mean	-1.16e-18
Median	-0.001964
Maximum	0.046504
Minimum	-0.050456
Std. Dev.	0.023480
Skewness	-0.050707
Kurtosis	2.407889
Jarque-Bera	0.541320
Probability	0.762876

Figure 11: NARDL Short run Normality test

5.5.10 NARDL Short run CUSUM test

From the graph below, since the blue line graph lies within the red boundaries at 5% level of significance, the structural breaks in the model has been rectified

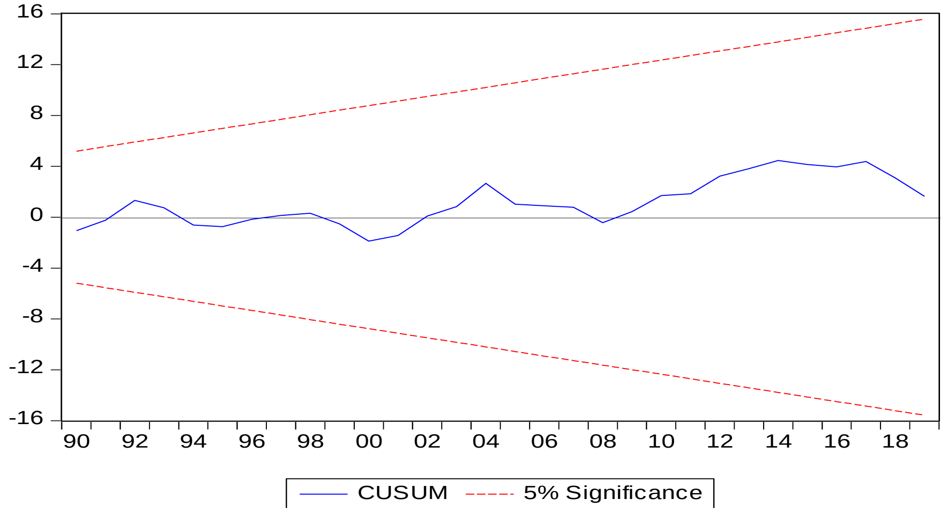


Figure 12: NARDL Short run CUSUM test

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

INTRODUCTION

This section consists of the summary of the thesis, empirical findings, policy recommendations and limitations to the study

6.1 Summary

This study examines the impact of volatile oil prices on Nigeria's economic growth. The research employed two estimation techniques i.e. ARDL and the NARDL where Real GDP which is the dependent variable as a proxy variable to measure economic growth and oil prices was used as an independent variable while real effective exchange rate and inflation rate were used as control variables.

This thesis utilized secondary data with a yearly frequency spanning a time frame of 39 years from 1981 to 2019. Data for Real GDP was sourced from Maddison Project Database, version 2020; Inflation rate and Real Effective Exchange rate were gotten from CBN Statistical Bulletin while the data for crude oil prices were sourced from BP Statistical Review of World Energy.

6.2 Findings

The empirical findings of the ADF test reveal that all data were stationary at first difference except for inflation which was stationary at levels while the Phillips Perron test results reveal all the data are stationary at first difference. The Bai Perron structural breakpoint test reveal that there is a structural break in 2003 as a result of the fiscal policy thrust that was adopted by the federal government of Nigeria in 2003 which had effect on important variables like real GDP, exchange rate, inflation, etc.

The ARDL long run form and bound test reveal that the f-statistics is more than the value of I(1) which means that there is a long run relationship among the variables. The findings of the Linear Autoregressive Distributed Lags model show a long run significant direct relationship between oil prices and Nigeria's economic growth, with a 1unit rise in oil prices causing a 0.109260 unit rise in RGDP and a 1unit drop in oil prices causing a 0.109260 unit reduction in RGDP while the results of the short run analysis shows a significant direct relationship between oil prices and RGDP where a 1unit rise in oil prices causes a 0.046063 unit rise in RGDP and a 1unit decline in oil prices causes a 0.046063 decline in RGDP. This is because a rise in global oil prices generates more revenue to Nigeria and consequently increases economic growth in the country whereas a fall in global oil prices reduces the amount of revenue generated from the sale of crude oil which leads to decline in economic growth.

The empirical findings of the Wald test show evidence of an asymmetric effect of oil prices on Nigeria's economic growth in the long run which justifies the use of the NARDL. The main results of the long run NARDL reveal a decline in oil price has a significant effect on Nigeria's economic growth where a 1 unit decline in oil prices causes a 0.109812unit reduction in Real GDP. This significant influence of a negative oil price shock on Nigeria's economic growth shows the overdependence of the economy of Nigeria on oil sector revenue where a decrease in oil prices will reduce the amount of revenue generated from the sale of oil which is a significant component of the government's budget. A drop in oil prices disrupts government finance and has a negative effect on important government projects and economic policies which consequently leads to a decline in economic growth. However, a positive oil price shock has an insignificant influence on economic growth where a 1unit rise in oil prices causes a 0.079481unit rise in RGDP. The insignificant influence of a positive oil price shock on Nigeria's economic growth is attributed to corruption and embezzlement of public funds by government officials. Also the insignificant positive influence of a rise in oil prices on Nigeria's economic growth provides proof of the Dutch Disease in Nigeria.

The results of the short run NARDL reveal a significant influence of a rise in oil prices on RGDP in Nigeria i.e. a 1unit increase in oil price causes a 0.096302 unit rise in RGDP. An increase in global oil prices generates more revenue to the Nigerian government which leads to an increase in economic growth while the effect of a decline in oil prices on Nigeria's economic growth is insignificant in the short run which is as a result of the government policies put in place to cushion the immediate effect of a decrease in oil prices.

6.3 Policy Recommendations

Therefore this study recommends the diversification of the Nigerian economy into other sectors of the economy like agriculture, industry, services, tourism etc. to reduce the influence of volatile oil prices on the Nigerian economy which will also bring about short term as well as sustainable long term economic growth

Secondly, appropriate institutions and measures should be put in place to hold corrupt Nigerian leaders accountable for public funds in order to prevent them from embezzling and mismanagement of oil revenue which will lead to long term growth in the economy

Thirdly, this study also recommends the repair of the old Nigerian refineries and get them to work at full capacity as well as the construction of new refineries in order to satisfy domestic demand because most productive sector require oil as a vital input in the production of goods and services which will reduce the influence of volatile oil prices on the economy of Nigeria from the importation of oil

The government needs to also strengthen the security in the Niger Delta region so as to increase the level of production which will bring about increased oil revenue to the government and consequently higher economic growth

Lastly, the country should invest in the research and development of other sources of energy such as solar energy, hydroelectric energy

REFERENCES

Aimer, N. M. (2019). The Long Run Effects of Oil Prices on Economic Growth: The Case of Libya. *International Journal of Social and Administrative Sciences*, *4*(2), 232-242.

Aimer, N. M. M., & Moftah, M. (2016). The effects of fluctuations of oil price on economic growth of Libya. *Energy economics letters*, *3*(2), 17-29.

AKTUĞ, S. S., Mehmet, D. A. Ğ., & STAR, H. R. (2019). THE IMPACT OF OIL PRICE ON ECONOMIC GROWTH: AN INVESTIGATION ON IRAQI ECONOMY. *R&S-Research Studies Anatolia Journal*, *2*(6), 273-285.

Alkahteeb, T. T. (2019). Oil price and economic growth: The case of Indian economy. *670216917*.

Alley, I., Asekomeh, A., Mobolaji, H., & Adeniran, Y. A. (2014). Oil price shocks and Nigerian economic growth. *European Scientific Journal*, *10*(19).

Anon (2012), "Ten Factors that Affect the Price of Oil", Clover Global Solutions webpage, https://c1wsolutions.wordpress.com/2012/04/30/factors-affect-price-of-oil/. Accessed: January 25, 2017

Anon (2015), "The Determinants of Oil Prices", Investopedia webpage, http://www. investopedia.com/ask/answers/012715/what-causes-oil-prices-fluctuate.asp. Accessed: January 25, 2017.

Anorou, E., & Elike, U. (2009). An Empirical Investigation into the Impact of High Oil Prices on Economic Growth of Oil-Importing African Countries. *International Journal of Economic Perspectives*, *3*(2).

ARUBAYI, O. M. (2016). *IMPACT OF OIL PRICE FLUCTUATIONS AND EXCHANGE RATE VOLATILITY ON ECONOMIC PERFORMANCE OF NIGERIA* (Doctoral dissertation, DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, UNIVERSITY OF LAGOS).

Azevedo, M. J. (2019). Geo-economy and History. In *African Economic Development*. Emerald Publishing Limited.

Baba, S. (2020). A VECTOR AUTOREGRESSIVE ANALYSIS OF OIL PRICE VOLATILITY AND ECONOMIC GROWTH IN NIGERIA (1997-2017). *Journal of International Business, Innovation and Strategic Management*, *4*(1), 29-46.

Balashova, S., & Serletis, A. (2020). Oil prices shocks and the Russian economy. *The Journal of Economic Asymmetries*, *21*, e00148.

Bature, B. N. (2013). The Dutch Disease and the Diversification of an Economy: Some Case Studies.

Baumeister, C., & Kilian, L. (2016). Lower oil prices and the US economy: Is this time different?. *Brookings Papers on Economic Activity*, *2016*(2), 287-357.

Benramdane, A. (2017). Oil price volatility and economic growth in Algeria. *Energy Sources, Part B: Economics, Planning, and Policy*, *12*(4), 338-343.

Bergmann, P. (2019). Oil price shocks and GDP growth: Do energy shares amplify causal effects?. *Energy Economics*, *80*, 1010-1040.

Bildirici, M. E., & Sonustun, F. O. (2018). The effects of oil and gold prices on oil-exporting countries. Energy strategy reviews, 22, 290-302.

Boheman, H., & Maxén, J. (2015). Oil Price Shocks Effect on Economic Growth-OPEC versus non-OPEC Economies.

Bouzid, A. (2012). The relationship of oil prices and economic growth in Tunisia: A vector error correction model analysis. *The Romanian Economic Journal*, *43*, 3-22.

Cantah, W., & Asmah, E. (2015). Crude oil price and growth of output: the case of Ghana. *Cantah WG and Asmah EE (2015)" Crude Oil Price and Growth of Output: the Case of Ghana". International Journal of Economics, Commerce and Management*, *3*(5).

Cashin, P., Mohaddes, K., Raissi, M., & Raissi, M. (2014). The differential effects of oil demand and supply shocks on the global economy. *Energy Economics*, *44*, 113-134.

Çatık, A. N., & Önder, A. Ö. (2013). An asymmetric analysis of the relationship between oil prices and output: The case of Turkey. *Economic Modelling*, *33*, 884-892.

Charfeddine, L., & Barkat, K. (2020). Short-and long-run asymmetric effect of oil prices and oil and gas revenues on the real GDP and economic diversification in oil-dependent economy.

Chatziantoniou, I., Filis, G., Eeckels, B., & Apostolakis, A. (2013). Oil prices, tourism income and economic growth: A structural VAR approach for European Mediterranean countries. *Tourism Management*, *36*, 331-341.

Chikwe, G., Ujah, C., & Uzoma, C. (2016). The Effect of Oil Price on Nigerian Macroeconomic Variables. *International Journal of Managerial Studies and Research*, *4*, 13-20.

Chuku, C. A., Akpan, U. F., Sam, N. R., & Effiong, E. L. (2011). Oil price shocks and the dynamics of current account balances in Nigeria. *OPEC Energy Review*, *35*(2), 119-139.

Corden, W. M., & Neary, J. P. (1982). Booming sector and de-industrialisation in a small open economy. *The economic journal*, *92*(368), 825-848.

Dong, M., Chang, C. P., Gong, Q., & Chu, Y. (2019). Revisiting global economic activity and crude oil prices: A wavelet analysis. *Economic Modelling*, *78*, 134-149.

Driouche, D. M., Manel, A., Moussa, C., & Mohamed, B. (2020). Asymmetric Responses of Oil Price Shocks on Economic Growth in Algeria: An Empirical Analysis through NARDL Approach. *Energy Economics Letters*, *7*(2), 74-93.

El Anshasy, A. (2009). Oil prices and economic growth in oil-exporting countries. In *Proceedings of the 32nd international IAEE conference*. *Energy Economics*, 104680.

Foudeh, M. (2017). The long run effects of oil prices on economic growth: The case of Saudi Arabia. *International Journal of Energy Economics and Policy*, *7*(6), 171-192.

Gazdar, K., Hassan, M. K., Safa, M. F., & Grassa, R. (2019). Oil price volatility, Islamic financial development and economic growth in Gulf Cooperation Council (GCC) countries. *Borsa Istanbul Review*, *19*(3), 197-206.

Ghalayini, L. (2011). The interaction between oil price and economic growth. *Middle Eastern Finance and Economics*, *13*(21), 127-141.

Gisser, M., & Goodwin, T. H. (1986). Crude oil and the macroeconomy: Tests of some popular notions: Note. *Journal of Money, Credit and Banking*, *18*(1), 95-103.

Hamilton, J. D. (1996). This is what happened to the oil price-macroeconomy relationship. *Journal of Monetary Economics*, *38*(2), 215-220.

Hamilton, J. D. (2011). Nonlinearities and the macroeconomic effects of oil prices. *Macroeconomic dynamics*, *15*(S3), 364-378.

Hanabusa, K. (2009). Causality relationship between the price of oil and economic growth in Japan. *Energy Policy*, *37*(5), 1953-1957.

Happonen, J. (2009), "A Review of Factors Determining Crude Oil Prices", Unpublished MSc Thesis Report, Helsinki School of Economics, Finland, pp. 1 – 24.

Hooker, M. A. (1996). What happened to the oil price-macroeconomy relationship?. *Journal of monetary Economics*, *38*(2), 195-213.

Huang, B. N., Hwang, M. J., & Peng, H. P. (2005). The asymmetry of the impact of oil price shocks on economic activities: an application of the multivariate threshold model. *Energy Economics*, *27*(3), 455-476.

Ismail, K. (2010). *The structural manifestation of the 'Dutch disease': the case of oil exporting countries*. International Monetary Fund.

Iwayemi, A., & Fowowe, B. (2011). Impact of oil price shocks on selected macroeconomic variables in Nigeria. *Energy policy, 39*(2), 603-612.

Jarrett, U., Mohaddes, K., & Mohtadi, H. (2019). Oil price volatility, financial institutions and economic growth. *Energy policy*, *126*, 131-144.

Jawad, M. (2013). Oil price volatility and its impact on economic growth in Pakistan. *Journal of Finance and Economics*, *1*(4), 62-68.

Jawadi, F., & Ftiti, Z. (2019). Oil price collapse and challenges to economic transformation of Saudi Arabia: A time-series analysis. *Energy Economics*, *80*, 12-19.

Kemi, A. O. (2016). Diversification of Nigeria economy through agricultural production. *Journal of Economics and Finance*, *7*(6), 104-107.

Kilian, L., & Vigfusson, R. J. (2011). Nonlinearities in the oil price-output relationship. *FRB International Finance Discussion Paper*, (1013).

King, K., Deng, A., Metz, D. (2011), "An Economic Analysis of Oil Price Movements: The Role of Political Events and Economic News, Financial Trading, and Market Fundamentals", Bates White Economic Consulting, Washington DC, pp. 1 – 52.

Kosakowski, P. (2016), "What Determines Oil Prices?", Investopedia webpage, http://www. investopedia.com/articles/economics/08/determining-oil-prices.asp. Accessed: February 2, 2017.

Kurihara, Y. (2015). Oil prices and economic growth in developed countries. *International Journal of Business and Social Science*, *6*(11), 40-46.

Lee, C. C., & Chiu, Y. B. (2011). Nuclear energy consumption, oil prices, and economic growth: Evidence from highly industrialized countries. *Energy Economics*, *33*(2), 236-248.

Maheu, J. M., Song, Y., & Yang, Q. (2019). Oil price shocks and economic growth: The volatility link. *International Journal of Forecasting*.

Mo, B., Chen, C., Nie, H., & Jiang, Y. (2019). Visiting effects of crude oil price on economic growth in BRICS countries: Fresh evidence from wavelet-based quantile-on-quantile tests. *Energy*, *178*, 234-251.

Mohaddes, K., & Raissi, M. (2019). The US oil supply revolution and the global economy. *Empirical Economics*, *57*(5), 1515-1546.

Mordi, C. N., & Adebiyi, M. A. (2010). The asymmetric effects of oil price shocks on output and prices in Nigeria using a structural VAR model. Central Bank of Nigeria economic and financial review, 48(1), 1-32.

Mork, K. A. (1989). Oil and the macroeconomy when prices go up and down: an extension of Hamilton's results. *Journal of political Economy*, *97*(3), 740-744.

Narayan, P. K., Sharma, S., Poon, W. C., & Westerlund, J. (2014). Do oil prices predict economic growth? New global evidence. *Energy Economics, 41*, 137-146.

Neary, J. P., & Van Wijnbergen, S. (1986). Natural resources and the macroeconomy.

Nonejad, N. (2020). Crude oil price changes and the United Kingdom real gross domestic product growth rate: An out-of-sample investigation. *The Journal of Economic Asymmetries*, *21*, e00154.

Nweze, N. P., & Edame, G. E. (2016). An empirical investigation of oil revenue and economic growth in Nigeria. *European Scientific Journal*, *12*(25).

Okonkwo, I. V., & Mojekwu, K. O. (2018). Crude Oil Price Fluctuations and Nigeria Economic Growth: 1997-2015. *International Journal of Research in Business, Economics and Management*, *2*(2), 44-61.

Okoro, E. G. (2014). Oil price volatility and economic growth in Nigeria: A Vector Auto-Regression (VAR) approach. *Acta Universitatis Danubius. OEconomica*, *10*(1), 70-82.

Olimb, M., Ødegård, T. M. (2010), "Understanding the Factors Behind Crude Oil Price Changes A Time-varying Model Approach",Unpublished MSc Thesis Report, Norwegian University of Science and Technology, pp. 1 – 45.

Oriakhi, D. E., & Osaze, I. D. (2013). Oil price volatility and its consequences on the growth of the Nigerian economy: An examination (1970-2010). *Asian economic and financial review*, *3*(5), 683.

Otaha, J. I. (2012). Dutch disease and Nigeria oil economy. *African Research Review*, *6*(1), 82-90.

Pal, D., & Mitra, S. K. (2015). Asymmetric impact of crude price on oil product pricing in the United States: An application of multiple threshold nonlinear autoregressive distributed lag model. *Economic Modelling*, *51*, 436-443.

Rahman, S., & Serletis, A. (2010). The asymmetric effects of oil price and monetary policy shocks: A nonlinear VAR approach. *Energy Economics*, *32*(6), 1460-1466.

Sadorsky, P. (1999). Oil price shocks and stock market activity. *Energy economics*, *21*(5), 449-

Seth, S. (2015), "Do Oil and Natural Gas Prices Rise and Fall Together", Investopedia webpage, http://www.investopedia.com/articles/active-trading/032515/do-oil-and-natural-gas-prices-riseand-fall-together.asp. Accessed: February 2, 2017.

Shahbaz, M., Ahmed, K., Tiwari, A. K., & Jiao, Z. (2019). Resource curse hypothesis and role of oil prices in USA. *Resources Policy*, *64*, 101514.

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. In *Festschrift in honor of Peter Schmidt* (pp. 281-314). Springer, New York, NY.

Shuaibu, M. (2020). Do Asymmetric Currency Price Fluctuations and Oil Price Shocks Matter for Growth in Nigeria? Evidence from Non-Linear Analysis. İstanbul İktisat Dergisi, 70(1), 17-46.

Tehranchian, A. M., & Seyyedkolaee, M. A. (2017). The impact of oil price volatility on the economic growth in Iran: An application of a threshold regression model. *International Journal of Energy Economics and Policy*, *7*(4), 165-171.

Troster, V., Shahbaz, M., & Uddin, G. S. (2018). Renewable energy, oil prices, and economic activity: A Granger-causality in quantiles analysis. *Energy Economics*, *70*, 440-452.

Van Eyden, R., Difeto, M., Gupta, R., & Wohar, M. E. (2019). Oil price volatility and economic growth: Evidence from advanced economies using more than a century's data. *Applied energy*, *233*, 612-621.

Yasmeen, H., Wang, Y., Zameer, H., & Solangi, Y. A. (2019). Does oil price volatility influence real sector growth? Empirical evidence from Pakistan. *Energy Reports*, *5*, 688-703.

Yazdan, G. F., Ehsan, A. G., & Hossein, S. S. M. (2012). Is Cointegration between Oil Price and Economic Growth? Case Study Iran. *Procedia-Social and Behavioral Sciences*, *62*, 1215-1219.

Yoshino, N., & Alekhina, V. (2016). Impact of oil price fluctuations on an energy-exporting economy: Evidence from Russia. *Journal of Administrative and Business Studies*, *2*(4), 156-166.

Yusuf, M. (2015). An analysis of the impact of oil price shocks on the growth of the Nigerian economy: 1970-2011. African journal of business management, 9(3), 103-115.

APPENDIX

Data Used In the Study

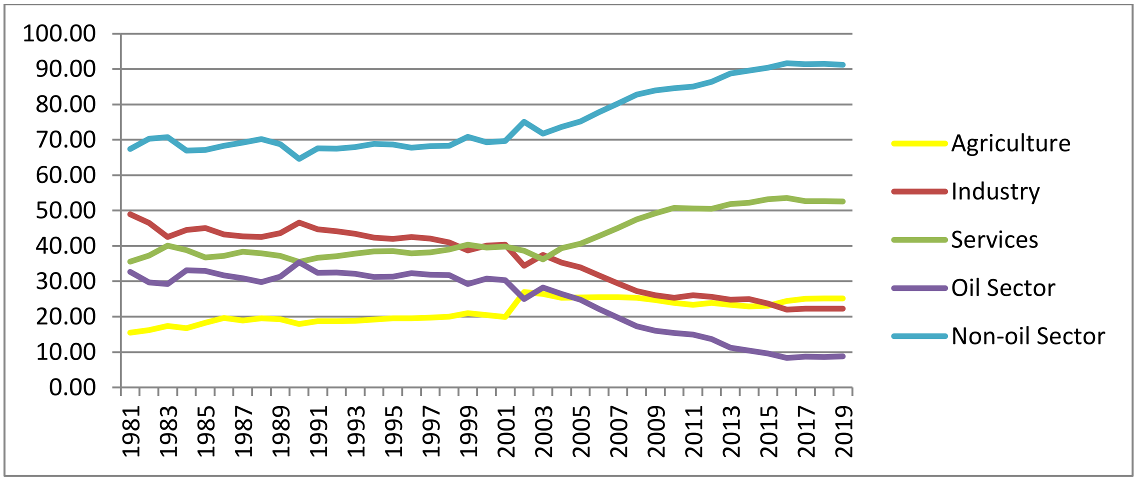
	RGDP	ROIL	REER	INF
1981	16.54061	8.901400	5.770554	20.81282
1982	16.52257	8.741267	5.795804	7.697747
1983	16.44378	8.423014	5.964366	23.21233
1984	16.43867	8.232618	6.285566	17.82053
1985	16.52048	8.117584	6.179133	7.435345
1986	16.53930	7.414931	5.574510	5.717151
1987	16.54100	7.552902	4.430556	11.29032
1988	16.60147	6.906513	4.446122	54.51122
1989	16.66591	6.697837	4.334617	50.46669
1990	16.77591	6.890487	4.262651	7.364400
1991	16.77037	6.597421	4.095156	13.00697
1992	16.79207	6.194104	3.906668	44.58884
1993	16.80764	5.612335	3.996255	57.16525
1994	16.81020	5.090639	4.610668	57.03171
1995	16.82875	4.616538	5.075473	72.83550
1996	16.86847	4.554235	5.334840	29.26829
1997	16.89692	4.393069	5.463691	8.529874
1998	16.92157	3.891326	5.609133	9.996378
1999	16.92677	4.173114	4.236602	6.618373
2000	16.98049	4.567115	4.250503	6.933292
2001	17.04503	4.240860	4.358735	18.87365
2002	17.18135	4.143161	4.361721	12.87658

2003	17.27213	4.153489	4.299292	14.03178
2004	17.37145	4.296839	4.321629	14.99803
2005	17.43918	4.486534	4.457441	17.86349
2006	17.50428	4.585503	4.515726	8.225222
2007	17.57490	4.638479	4.505659	5.388008
2008	17.64442	4.824189	4.600914	11.58108
2009	17.72465	4.250389	4.528870	12.55496
2010	17.81577	4.375701	4.605170	13.72020
2011	17.86749	4.608912	4.610363	10.84003
2012	17.90869	4.497356	4.705189	12.21778
2013	17.96211	4.388664	4.765703	8.475827
2014	18.02248	4.217489	4.824283	8.062486
2015	18.04996	3.495304	4.779582	9.009387
2016	18.03401	3.169163	4.702096	15.67534
2017	18.04221	3.230652	4.613357	16.52354
2018	18.06114	3.390973	4.692390	12.09473
2019	18.08364	3.178175	4.809746	11.39679

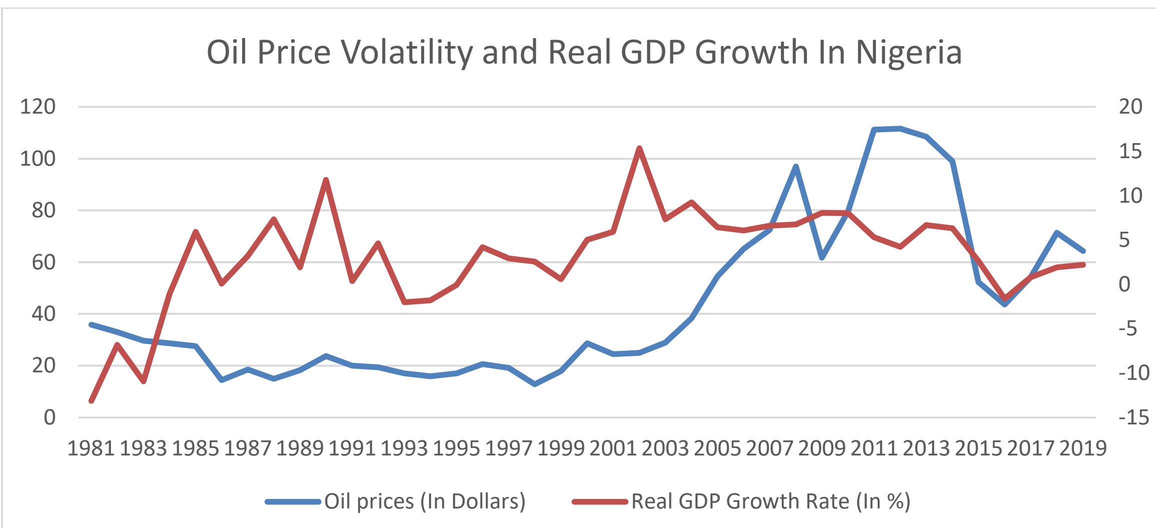
	1981	**1991**	**2001**	**2011**	**2015**	**2016**	**2017**	**2018**	**2019**
Agriculture	15.50%	18.70%	19.89%	23.35%	23.11%	24.45%	25.08%	25.13%	25.16%
Industry	48.98%	44.66%	40.34%	26.06%	23.71%	21.96%	22.25%	22.24%	22.25%
Services	35.53%	36.64%	39.78%	50.59%	53.18%	53.59%	52.67%	52.63%	52.60%
Oil Sector	32.62%	32.42%	30.33%	14.95%	9.61%	8.35%	8.67%	8.59%	8.78%
Non-oil Sector	67.38%	67.58%	69.67%	85.05%	90.39%	91.65%	91.33%	91.41%	91.22%

Nigeria's Sectorial and Aggregate Economic Growth (1970 – 2019)

(Source: Authors Computation using data from CBN Statistical Bulletin)



Nigeria's Sectorial and Aggregate Economic Growth (1970 – 2019)
(Source: Authors Computation using data from CBN Statistical Bulletin, 2019)



Oil Price Volatility and Real GDP Growth in Nigeria

(Source: Authors computation using data from World Bank and EIA 2021)

UNIT ROOT TESTS

Augmented Dickey Fuller Tests

RGDP Level

```
Null Hypothesis: RGDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=6)
```

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.403350	0.3719
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

RGDP First Difference

Null Hypothesis: D(RGDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.351691	0.0738
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

REER Level

Null Hypothesis: REER has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.001255	0.5820
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

REER First difference

Null Hypothesis: D(REER) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.660359	0.0033
Test critical values:	1% level	-4.226815	

	5% level	-3.536601	
	10% level	-3.200320	

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

INF Level

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.019832	0.0166
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

ROIL Level

Null Hypothesis: ROIL has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.601821	0.7735
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

ROIL First difference

Null Hypothesis: D(ROIL) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.533150	0.0003
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

PHILLIPS PERRON

RGDP Level

Null Hypothesis: RGDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.554066	0.3022
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.001334
HAC corrected variance (Bartlett kernel)	0.002660

RGDP First difference

Null Hypothesis: D(RGDP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.230912	0.0942
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	0.001179
HAC corrected variance (Bartlett kernel)	0.001027

REER Level

Null Hypothesis: REER has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.269512	0.4396
Test critical values:	1% level	-4.219126	

	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.106056
HAC corrected variance (Bartlett kernel)	0.143861

REER First difference

Null Hypothesis: D(REER) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.486776	0.0052
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	0.114901
HAC corrected variance (Bartlett kernel)	0.067046

INF Level

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.867527	0.1839
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	175.6434
HAC corrected variance (Bartlett kernel)	132.2487

INF First Difference

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 36 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.60546	0.0000
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	224.3316
HAC corrected variance (Bartlett kernel)	15.82349

ROIL Level

Null Hypothesis: ROIL has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.619436	0.7664
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Residual variance (no correction)	0.076170
HAC corrected variance (Bartlett kernel)	0.080399

ROIL First difference

Null Hypothesis: D(ROIL) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.520889	0.0003
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Residual variance (no correction)	0.083397
HAC corrected variance (Bartlett kernel)	0.079386

Structural breakpoint test

```
Multiple breakpoint tests
Bai-Perron tests of 1 to M globally determined breaks
Date: 02/25/21   Time: 22:37
Sample: 1981 2019
Included observations: 39
Breaking variables: ROIL REER INF C
Break test options: Trimming 0.15, Max. breaks 1, Sig. level
        0.05
Test statistics employ HAC covariances (Bartlett kernel, Newey
        -West fixed bandwidth)
Allow heterogeneous error distributions across breaks
```

Sequential F-statistic determined breaks:	1
Significant F-statistic largest breaks:	1
UDmax determined breaks:	1
WDmax determined breaks:	1

Breaks	F-statistic	Scaled F-statistic	Weighted F-statistic	Critical Value
1 *	127.3254	509.3015	509.3015	16.19

UDMax statistic*	509.3015	UDMax critical value**	16.37
WDMax statistic*	509.3015	WDMax critical value**	17.83

```
* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Estimated break dates:
1:  2003
```

Cointegration test results

```
ARDL Long Run Form and Bounds Test
Dependent Variable: D(RGDP)
Selected Model: ARDL(2, 2, 1, 0)
Case 5: Unrestricted Constant and Unrestricted Trend
Date: 02/25/21   Time: 23:26
Sample: 1981 2019
Included observations: 37
```

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.747072	1.702270	5.725924	0.0000
@TREND	0.038309	0.007261	5.275807	0.0000
RGDP(-1)*	-0.628918	0.111454	-5.642828	0.0000
ROIL(-1)	0.068795	0.015492	4.440576	0.0001
REER(-1)	-0.011968	0.012958	-0.923596	0.3642
INF**	-0.000461	0.000517	-0.892124	0.3805
D(RGDP(-1))	0.550117	0.142193	3.868812	0.0007
D(ROIL)	0.032203	0.020706	1.555263	0.1320
D(ROIL(-1))	-0.061030	0.020931	-2.915796	0.0072
D(REER)	0.036075	0.014882	2.424062	0.0226
DUM2003	0.051825	0.025946	1.997468	0.0563

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROIL	0.109386	0.011577	9.448668	0.0000
REER	-0.019029	0.019815	-0.960348	0.3457
INF	-0.000733	0.000667	-1.098009	0.2823

EC = RGDP - (0.1094*ROIL -0.0190*REER -0.0007*INF)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	8.444589	10%	3.47	4.45
k	3	5%	4.01	5.07
		2.5%	4.52	5.62
		1%	5.17	6.36
Actual Sample Size	37		Finite Sample: n=40	
		10%	3.76	4.795
		5%	4.51	5.643
		1%	6.238	7.74

		Finite Sample: n=35		
		10%	3.8	4.888
		5%	4.568	5.795
		1%	6.38	7.73

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.642828	10%	-3.13	-3.84
		5%	-3.41	-4.16
		2.5%	-3.65	-4.42
		1%	-3.96	-4.73

Long Run Analysis

Dependent Variable: RGDP
Method: Least Squares
Date: 02/26/21 Time: 00:46
Sample: 1981 2019
Included observations: 39
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROIL	0.109260	0.018641	5.861207	0.0000
INF	0.000750	0.000417	1.799775	0.0810
REER	0.010722	0.019908	0.538605	0.5938
DUM2003	0.104829	0.059622	1.758226	0.0880
C	15.37024	0.211071	72.82017	0.0000
@TREND	0.060243	0.004803	12.54345	0.0000

R-squared	0.992183	Mean dependent var	17.19994
Adjusted R-squared	0.990999	S.D. dependent var	0.572482
S.E. of regression	0.054314	Akaike info criterion	-2.847448
Sum squared resid	0.097349	Schwarz criterion	-2.591516
Log likelihood	61.52524	Hannan-Quinn criter.	-2.755622
F-statistic	837.7468	Durbin-Watson stat	0.812710
Prob(F-statistic)	0.000000	Wald F-statistic	564.2028
Prob(Wald F-statistic)	0.000000		

Long Run Ramsey RESET test

Ramsey RESET Test

Equation: LR_EQ_ARDL
Specification: RGDP ROIL INF REER DUM2003 C @TREND
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.165006	32	0.8700
F-statistic	0.027227	(1, 32)	0.8700
Likelihood ratio	0.033169	1	0.8555

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	8.28E-05	1	8.28E-05
Restricted SSR	0.097349	33	0.002950
Unrestricted SSR	0.097266	32	0.003040

LR test summary:

	Value
Restricted LogL	61.52524
Unrestricted LogL	61.54183

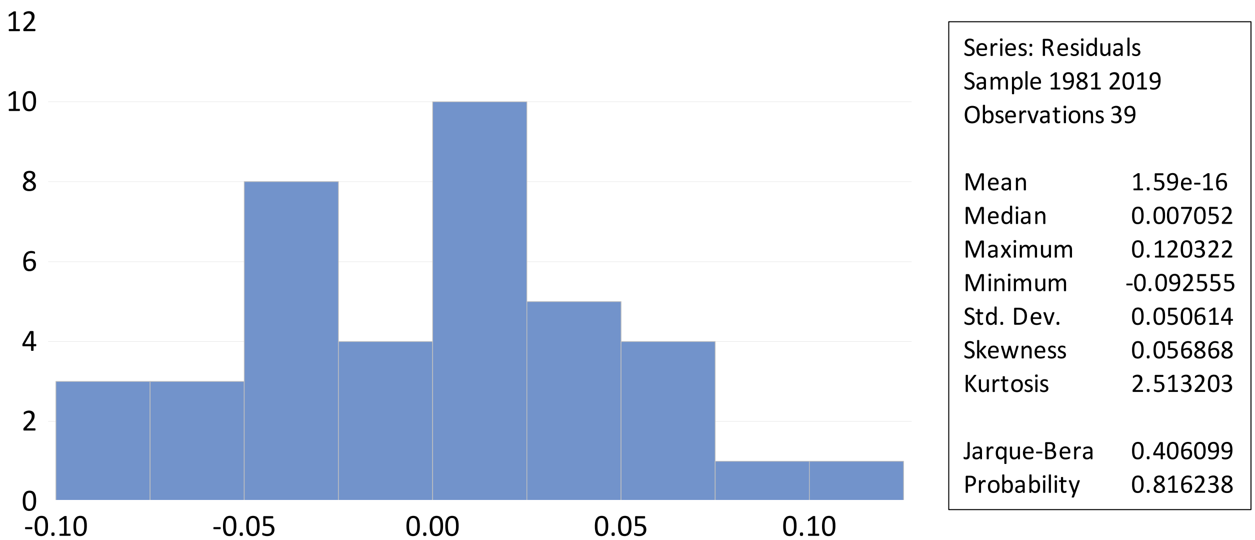
Unrestricted Test Equation:
Dependent Variable: RGDP
Method: Least Squares
Date: 02/28/21 Time: 13:08
Sample: 1981 2019
Included observations: 39
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROIL	0.159799	0.409015	0.390693	0.6986
INF	0.001124	0.003006	0.373900	0.7109
REER	0.017493	0.058983	0.296576	0.7687
DUM2003	0.144658	0.341813	0.423208	0.6750
C	18.21894	23.47881	0.775974	0.4435
@TREND	0.086810	0.216856	0.400310	0.6916
FITTED^2	-0.012412	0.102024	-0.121661	0.9039

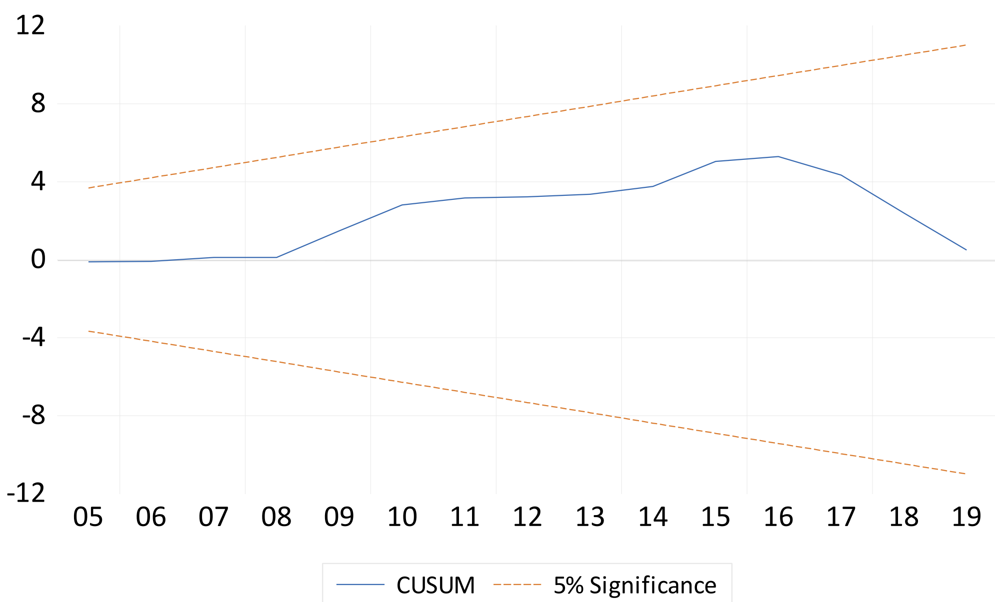
R-squared	0.992190	Mean dependent var	17.19994
Adjusted R-squared	0.990726	S.D. dependent var	0.572482
S.E. of regression	0.055132	Akaike info criterion	-2.797017
Sum squared resid	0.097266	Schwarz criterion	-2.498429
Log likelihood	61.54183	Hannan-Quinn criter.	-2.689886
F-statistic	677.5476	Durbin-Watson stat	0.820520
Prob(F-statistic)	0.000000	Wald F-statistic	520.1262

Prob(Wald F-statistic)	0.000000

Long Run Normality test



Long Run CUSUM test



Short Run Analysis (OLS)

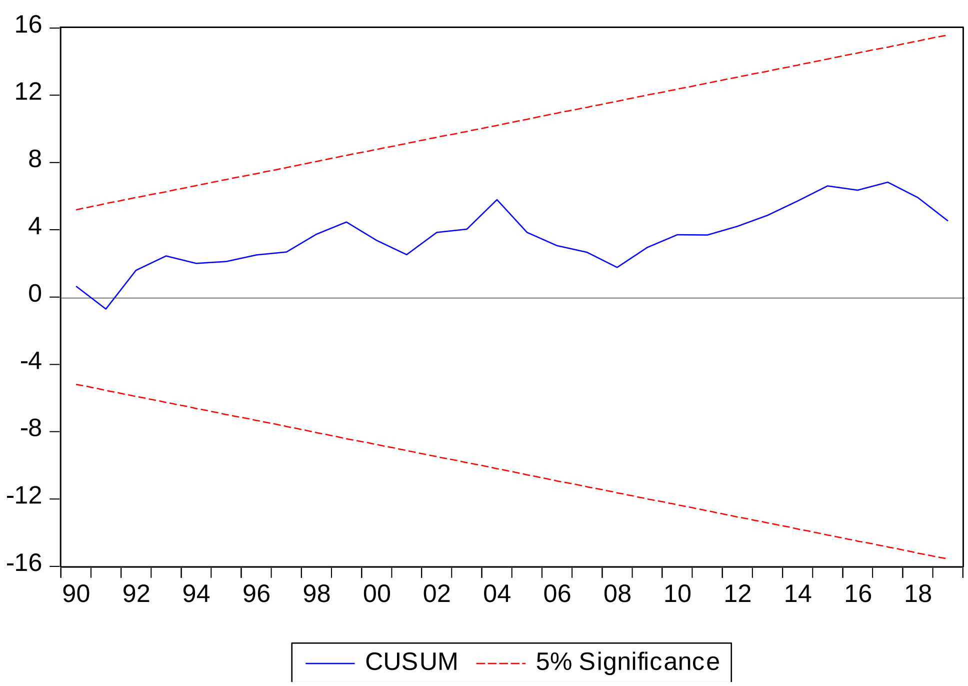
Dependent Variable: D(RGDP)
Method: Least Squares

Date: 02/28/21 Time: 14:14
Sample (adjusted): 1983 2019
Included observations: 37 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

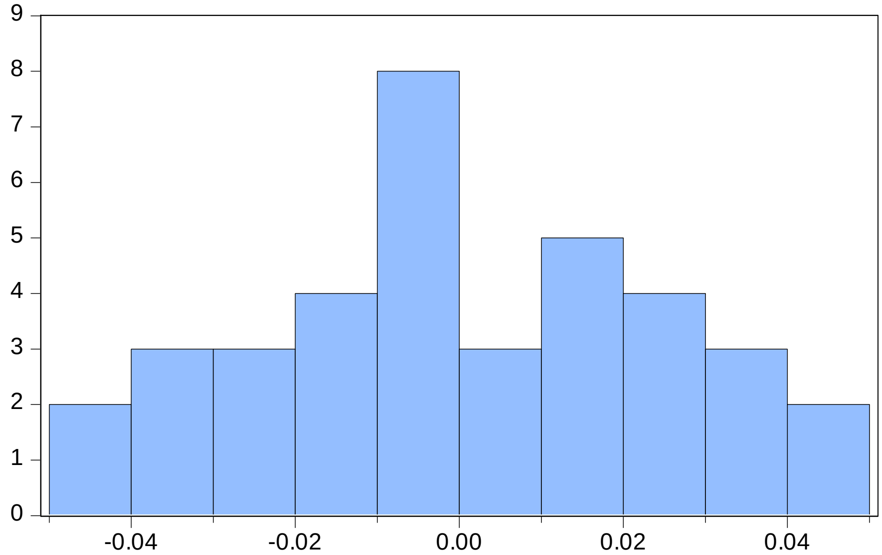
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	0.669843	0.117905	5.681209	0.0000
D(REER)	0.030394	0.013010	2.336296	0.0263
D(ROIL)	0.046063	0.015886	2.899676	0.0069
D(ROIL(-1))	-0.030749	0.016303	-1.886175	0.0690
D(INF)	3.22E-05	0.000227	0.141557	0.8884
ECT(-1)	-0.529283	0.120216	-4.402784	0.0001
C	0.017355	0.007354	2.359910	0.0250

R-squared	0.653450	Mean dependent var	0.042191
Adjusted R-squared	0.584139	S.D. dependent var	0.041292
S.E. of regression	0.026628	Akaike info criterion	-4.245045
Sum squared resid	0.021272	Schwarz criterion	-3.940277
Log likelihood	85.53334	Hannan-Quinn criter.	-4.137600
F-statistic	9.427914	Durbin-Watson stat	2.340735
Prob(F-statistic)	0.000008	Wald F-statistic	9.682847
Prob(Wald F-statistic)	0.000006		

Short Run CUSUM test



Short run normality test



Series: Residuals
Sample 1983 2019
Observations 37

Mean	1.13e-18
Median	-0.003816
Maximum	0.049148
Minimum	-0.043372
Std. Dev.	0.024308
Skewness	0.120322
Kurtosis	2.201725
Jarque-Bera	1.071692
Probability	0.585174

Short run RESET Test

Ramsey RESET Test
Equation: SR_EQ_ARDL
Specification: D(RGDP) D(RGDP(-1)) D(REER) D(ROIL) D(ROIL(-1)) D(INF) ECT(-1) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.925493	29	0.3623
F-statistic	0.856538	(1, 29)	0.3623
Likelihood ratio	1.076997	1	0.2994

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000610	1	0.000610
Restricted SSR	0.021272	30	0.000709
Unrestricted SSR	0.020661	29	0.000712

LR test summary:

	Value	df
Restricted LogL	85.53334	30
Unrestricted LogL	86.07184	29

Unrestricted Test Equation:
Dependent Variable: D(RGDP)
Method: Least Squares
Date: 03/03/21 Time: 16:15
Sample: 1983 2019
Included observations: 37
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(RGDP(-1))	0.861626	0.322871	2.668644	0.0123
D(REER)	0.040640	0.021989	1.848220	0.0748
D(ROIL)	0.063067	0.025837	2.440958	0.0210
D(ROIL(-1))	-0.042396	0.024169	-1.754137	0.0900
D(INF)	0.000144	0.000245	0.586899	0.5618
ECT(-1)	-0.670814	0.221067	-3.034443	0.0050
C	0.020377	0.006738	3.024184	0.0052
FITTED^2	-3.471489	4.921256	-0.705407	0.4862

R-squared	0.663392	Mean dependent var	0.042191
Adjusted R-squared	0.582141	S.D. dependent var	0.041292
S.E. of regression	0.026692	Akaike info criterion	-4.220099
Sum squared resid	0.020661	Schwarz criterion	-3.871793
Log likelihood	86.07184	Hannan-Quinn criter.	-4.097305
F-statistic	8.164788	Durbin-Watson stat	2.369564
Prob(F-statistic)	0.000017	Wald F-statistic	10.89372
Prob(Wald F-statistic)	0.000001		

Non Linear Autoregressive Distributed Lags (NARDL)

Cointegration bound test

ARDL Long Run Form and Bounds Test
Dependent Variable: D(RGDP)
Selected Model: ARDL(1, 2, 0, 1, 0)
Case 5: Unrestricted Constant and Unrestricted Trend
Date: 02/25/21 Time: 23:55
Sample: 1981 2019
Included observations: 36

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.621427	1.586586	4.803664	0.0001
@TREND	-0.001777	0.009947	-0.178615	0.8597
RGDP(-1)*	-0.449763	0.097102	-4.631842	0.0001
ROIL_POS(-1)	0.245462	0.063906	3.840970	0.0007
ROIL_NEG**	-0.019728	0.021880	-0.901647	0.3758
REER(-1)	-0.028460	0.010544	-2.699136	0.0123
INF**	-0.001049	0.000362	-2.902275	0.0076
D(ROIL_POS)	0.068812	0.063446	1.084584	0.2885
D(ROIL_POS(-1))	-0.234961	0.056770	-4.138806	0.0003
D(REER)	0.010514	0.014071	0.747232	0.4619
DUM2003	0.065489	0.023458	2.791786	0.0099

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation Case 5: Unrestricted Constant and Unrestricted Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROIL_POS	0.545758	0.185947	2.935015	0.0071
ROIL_NEG	-0.043863	0.057227	-0.766462	0.4506
REER	-0.063278	0.026402	-2.396674	0.0243
INF	-0.002333	0.000731	-3.193789	0.0038

EC = RGDP - (0.5458*ROIL_POS -0.0439*ROIL_NEG -0.0633*REER
-0.0023*INF)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	10.26695	10%	3.03	4.06
K	4	5%	3.47	4.57
		2.5%	3.89	5.07
		1%	4.4	5.72
			Finite Sample: n=40	
Actual Sample Size	36			
		10%	3.334	4.438
		5%	3.958	5.226
		1%	5.376	7.092
			Finite Sample: n=35	
		10%	3.374	4.512
		5%	4.036	5.304
		1%	5.604	7.172

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-4.631842	10%	-3.13	-4.04
		5%	-3.41	-4.36

2.5%	-3.65	-4.62
1%	-3.96	-4.96

Long Run Analysis

Dependent Variable: RGDP
Method: Least Squares
Date: 02/26/21 Time: 01:03
Sample (adjusted): 1982 2019
Included observations: 38 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROIL_NEG	0.109812	0.047595	2.307225	0.0279
ROIL_POS	0.079481	0.125120	0.635237	0.5299
REER	0.004181	0.016110	0.259524	0.7969
INF	0.000675	0.000401	1.681129	0.1028
C	16.35345	0.097086	168.4422	0.0000
DUM2003	0.103928	0.060659	1.713333	0.0966
@TREND	0.062870	0.018809	3.342526	0.0022

R-squared	0.993355	Mean dependent var	17.21730
Adjusted R-squared	0.992069	S.D. dependent var	0.569680
S.E. of regression	0.050734	Akaike info criterion	-2.959636
Sum squared resid	0.079791	Schwarz criterion	-2.657975
Log likelihood	63.23308	Hannan-Quinn criter.	-2.852307
F-statistic	772.3704	Durbin-Watson stat	0.925977
Prob(F-statistic)	0.000000	Wald F-statistic	486.2294
Prob(Wald F-statistic)	0.000000		

Long Run WALD test

Wald Test:
Equation: LRFORM

Test Statistic	Value	df	Probability
t-statistic	3.561354	25	0.0015
F-statistic	12.68324	(1, 25)	0.0015
Chi-square	12.68324	1	0.0004

Null Hypothesis: C(4)=C(5)
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.

C(4) - C(5)	0.265189	0.074463

Restrictions are linear in coefficients.

Long run Ramsey Test

Ramsey RESET Test
Equation: LR_EQ_NARDL
Specification: RGDP ROIL_NEG ROIL_POS REER INF C DUM2003 @TREND
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.935342	30	0.3571
F-statistic	0.874865	(1, 30)	0.3571
Likelihood ratio	1.092312	1	0.2960

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.002261	1	0.002261
Restricted SSR	0.079791	31	0.002574
Unrestricted SSR	0.077530	30	0.002584

LR test summary:

	Value	df
Restricted LogL	63.23308	31
Unrestricted LogL	63.77924	30

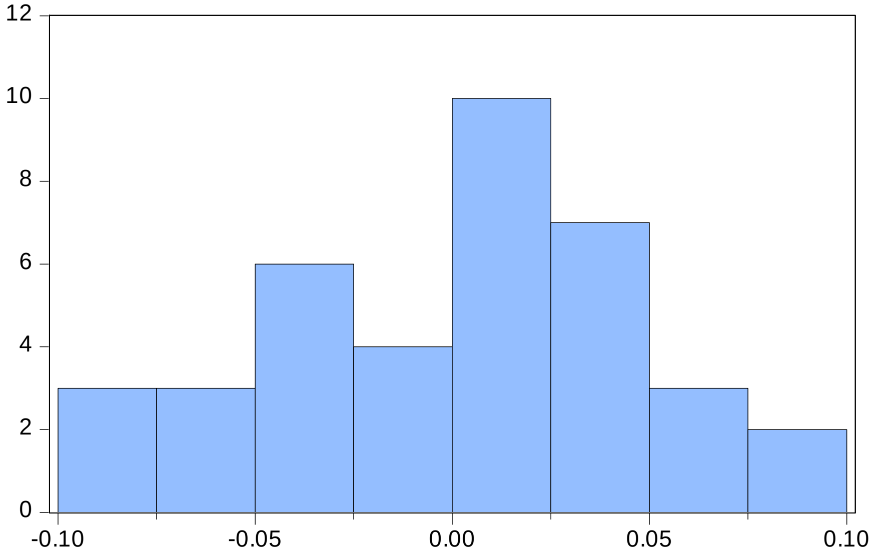
Unrestricted Test Equation:
Dependent Variable: RGDP
Method: Least Squares
Date: 03/14/21 Time: 20:43
Sample: 1982 2019
Included observations: 38
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROIL_NEG	0.443839	0.538733	0.823856	0.4165
ROIL_POS	0.257447	0.279700	0.920440	0.3647
REER	0.025153	0.038118	0.659870	0.5144
INF	0.002765	0.003422	0.808072	0.4254
C	36.97723	32.96316	1.121775	0.2709
DUM2003	0.350920	0.414906	0.845783	0.4044
@TREND	0.243065	0.290498	0.836718	0.4094
FITTED^2	-0.077452	0.123822	-0.625513	0.5364

R-squared	0.993543	Mean dependent var	17.21730
Adjusted R-squared	0.992037	S.D. dependent var	0.569680
S.E. of regression	0.050836	Akaike info criterion	-2.935749
Sum squared resid	0.077530	Schwarz criterion	-2.590994

Log likelihood	63.77924	Hannan-Quinn criter.	-2.813088
F-statistic	659.4844	Durbin-Watson stat	1.005735
Prob(F-statistic)	0.000000	Wald F-statistic	507.1624
Prob(Wald F-statistic)	0.000000		

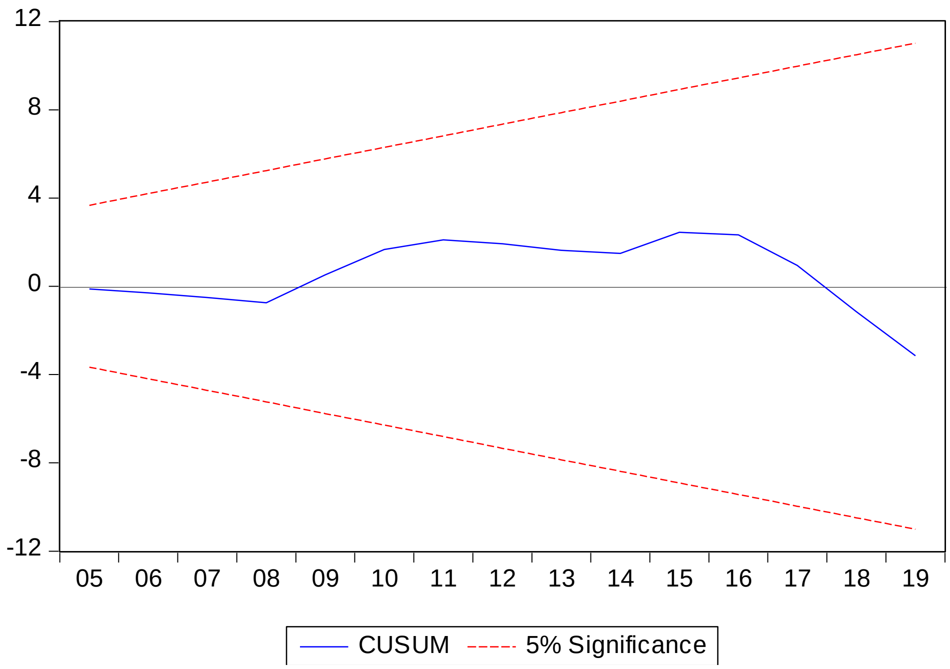
Long Run Normality Test



Series: Residuals
Sample 1982 2019
Observations 38

Mean	-2.99e-15
Median	0.007760
Maximum	0.094405
Minimum	-0.093336
Std. Dev.	0.046438
Skewness	-0.104460
Kurtosis	2.388167
Jarque-Bera	0.661814
Probability	0.718272

Long Run CUSUM test



Short run Non Linear Autoregressive Distributed Lags

Dependent Variable: D(RGDP)
Method: Least Squares
Date: 02/26/21 Time: 01:11
Sample (adjusted): 1984 2019
Included observations: 36 after adjustments
Huber-White-Hinkley (HC1) heteroskedasticity consistent standard errors
and covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	0.603579	0.104692	5.765280	0.0000
D(ROIL_POS)	0.096302	0.045746	2.105145	0.0438
D(ROIL_POS(-1))	-0.124575	0.058421	-2.132383	0.0413
D(REER)	0.029364	0.012678	2.316069	0.0276
ECT1(-1)	-0.519677	0.150758	-3.447097	0.0017
C	0.022463	0.005402	4.158024	0.0002

R-squared	0.583590	Mean dependent var	0.045552
Adjusted R-squared	0.514188	S.D. dependent var	0.036386
S.E. of regression	0.025361	Akaike info criterion	-4.360184
Sum squared resid	0.019296	Schwarz criterion	-4.096265
Log likelihood	84.48332	Hannan-Quinn criter.	-4.268069
F-statistic	8.408861	Durbin-Watson stat	2.064700
Prob(F-statistic)	0.000046	Wald F-statistic	12.28362
Prob(Wald F-statistic)	0.000002		

Short run RESET test

Ramsey RESET Test
Equation: SR_EQ_NARDL
Specification: D(RGDP) D(RGDP(-1)) D(ROIL_POS(-0)) D(ROIL_POS(-1))
D(REER) ECT1(-1) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.244037	29	0.8089
F-statistic	0.059554	(1, 29)	0.8089
Likelihood ratio	0.073853	1	0.7858

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	3.95E-05	1	3.95E-05
Restricted SSR	0.019296	30	0.000643
Unrestricted SSR	0.019256	29	0.000664

LR test summary:

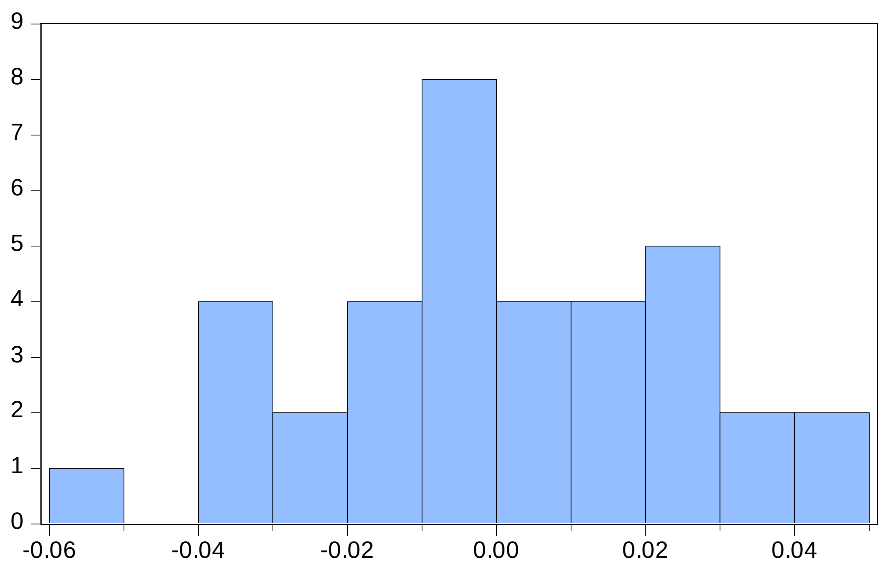
	Value	df
Restricted LogL	84.48332	30
Unrestricted LogL	84.52025	29

Unrestricted Test Equation:
Dependent Variable: D(RGDP)
Method: Least Squares
Date: 03/14/21 Time: 21:44
Sample: 1984 2019
Included observations: 36
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	0.538832	0.259519	2.076271	0.0468
D(ROIL_POS)	0.084798	0.062283	1.361510	0.1838
D(ROIL_POS(-1))	-0.109332	0.083105	-1.315582	0.1986
D(REER)	0.026571	0.016788	1.582761	0.1243
ECT1(-1)	-0.464835	0.242040	-1.920488	0.0647
C	0.021442	0.007779	2.756477	0.0100
FITTED^2	1.226058	5.191887	0.236149	0.8150

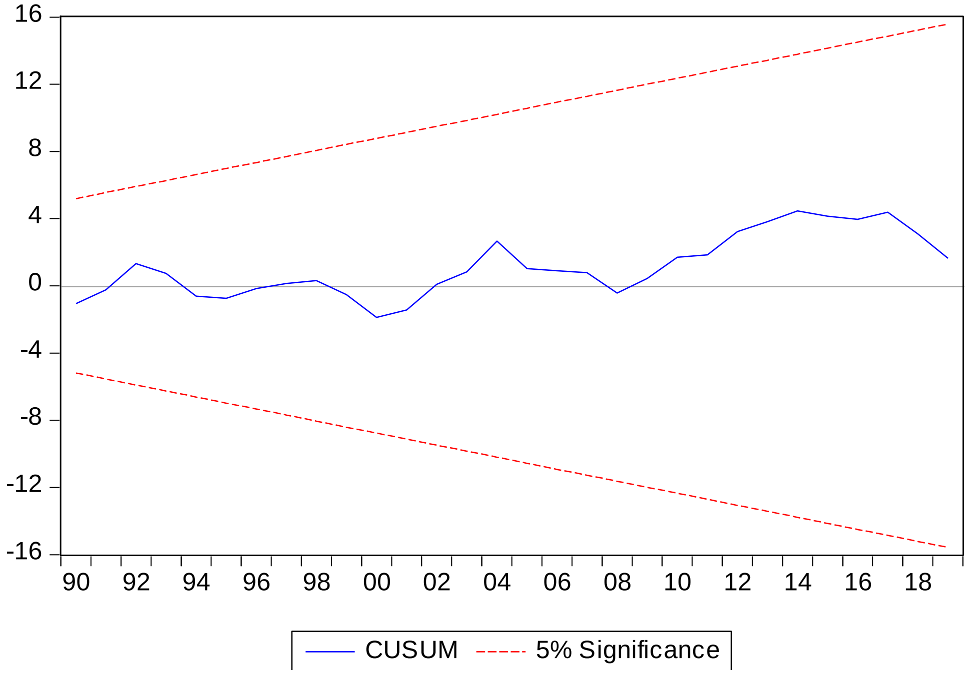
R-squared	0.584443	Mean dependent var	0.045552
Adjusted R-squared	0.498466	S.D. dependent var	0.036386
S.E. of regression	0.025768	Akaike info criterion	-4.306680
Sum squared resid	0.019256	Schwarz criterion	-3.998774
Log likelihood	84.52025	Hannan-Quinn criter.	-4.199213
F-statistic	6.797641	Durbin-Watson stat	2.092897
Prob(F-statistic)	0.000141	Wald F-statistic	12.02142
Prob(Wald F-statistic)	0.000001		

Short run Normality test



Series: Residuals	
Sample 1984 2019	
Observations 36	
Mean	-1.16e-18
Median	-0.001964
Maximum	0.046504
Minimum	-0.050456
Std. Dev.	0.023480
Skewness	-0.050707
Kurtosis	2.407889
Jarque-Bera	0.541320
Probability	0.762876

Short Run CUSUM test



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ETHICS COMMITTEE APPROVAL

Lisansüstü Eğitim Enstitüsü Müdürlüğü'ne;

Tezin yazılıp hazırlanmasında etik kurallarına aykırı hiçbir unsurun yer almadığını tez danışmanları olarak beyan ederiz.

Prof.Dr.Hüseyin ÖZDEŞER(Supervisor)

Yrd.Doç.Dr.Andisheh SALİMINEZHAD(Co-supervisor)