EFFECT OF MACROECONOMIC FACTORS ON EXTERNAL RESERVES IN NIGERIA

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D58F/CTY/28805/2013

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OCTOBER, 2016
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University. No part of this thesis should be reproduced without authority of the author and/or Kenyatta University.

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DEDICATION

This thesis is dedicated to my niece Fukki-liz Kanang Akims. I love you so much.
ACKNOWLEDGEMENT

First, I thank God for his Grace and favour, He has been my strength. Secondly, I appreciate my parents Mr & Mrs Amos Akims for their love and support. I thank my brother Kanang Akims and my sisters Balin Akims, Ufoh Akims and Uhoman Akims for their encouragement. I thank my supervisors, Prof Seddi Maimako and Ms Farida Abdul for their encouragement, support, and guidance. I appreciate my friends Wyciffe, Ongiti and Amabel for their support and encouragement. I thank the chairman of Accounting and Finance department Dr Eddie Simiyu and other staff of the department for their support and encouragement, I really appreciate you. Lastly, I thank the Government of Kenya for making Kenya a conducive learning environment for foreigners.
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OPERATIONAL DEFINITION OF TERMS

Balance of Trade: This is also referred to as international trade balance; it is the difference in monetary value between value of exports and value of imports of merchandise of a country.

External reserves: Also referred to as international reserves or foreign exchange reserves, external reserves are assets held externally by the monetary authority of a country that is convertible and available for use to meet stated and official needs of the country.

International oil Price: This is the amount by which crude oil is sold for per barrel in the international oil market, it is usually sold in US dollars.

Macroeconomic factors: These are factors that affect a whole economy rather than just a small or single unit. The macroeconomic factors used in this study are international oil prices, nominal exchange rate and real interest rate.

Naira: This is the currency used for the purpose of buying and selling and other exchange transactions in Nigeria.

Nominal Exchange Rate: This is the amount of a local currency that is required to acquire or exchange one unit of a foreign
currency. In this study, US dollars was applied because the US dollars is used in the international oil market.

**Real Interest Rate:** This is an interest rate that is adjusted for either expected or realized or inflation. It is presented in percentage.

**Structural breaks:** This is a concept in econometrics used to classify different change points in a (macroeconomic) time series.

**United States Dollars:** This is the currency used for the purpose of buying and selling and other exchange transactions in the United States of America.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADF</td>
<td>Augmented Dickey Fuller.</td>
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<tr>
<td>AIC</td>
<td>Akaike Information criteria</td>
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<tr>
<td>ARDL</td>
<td>Autoregressive Distributed Lag</td>
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<tr>
<td>BOT</td>
<td>Balance of Trade</td>
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<tr>
<td>CBN</td>
<td>Central Bank of Nigeria</td>
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<td>FGN</td>
<td>Federal Government of Nigeria</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GLS</td>
<td>Generalized Least Square</td>
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<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>LM</td>
<td>Lagrange Multiplier</td>
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<td>NBS</td>
<td>National Bureau of Statistics</td>
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<tr>
<td>OLS</td>
<td>Ordinary Least Square</td>
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<tr>
<td>OPEC</td>
<td>Organization of Petroleum Exporting Countries</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
</tr>
<tr>
<td>SDR</td>
<td>Special Drawing Right</td>
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<td>TVECM</td>
<td>Threshold Vector Error Correlation Model</td>
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<tr>
<td>USA</td>
<td>United States of America</td>
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</table>
USD  United States Dollars

VAR  Vector Autoregressive Models.

VECM  Vector Error Correlation Model.

WB  World Bank
External reserves are recognized as key ingredients for financing international trade. The fall in Nigeria's external reserves has been of great concern as this has caused panic in both the economic and political environment. This is because Nigeria greatly depends on its external reserves for import cover, exchange rate stability and for international ranking. In 2014, external reserves for Nigeria went below three months import cover, which is the International Monetary Fund, stipulated optimum reserves level. The main source of external reserves in Nigeria is crude oil exports which are susceptible to the vagaries of international oil shocks. The fall of international oil price pose great concerns forcing the Federal Government of Nigeria to review its budgeted crude oil benchmark in its 2014 and 2015 budgets respectively. Similarly, the exchange value of the Nigerian currency has experience a continuous downfall thereby discouraging traders engaged in imports and exports activities as their rate of return is threatened. The fall in the value of the Nigerian currency, which has made it a less attractive investment option, is largely attributed to low level of reserves, as there are inadequate reserves to ensure its stability. This is further linked to the excess demand of foreign currency for international transactions as this has continued to mount pressure on the Nigerian currency. Most studies on macroeconomic factors and external reserves focused on developed countries and obtained varying results. In the case of Nigeria, few studies investigated the effect of macroeconomic factors on external reserves. However, these studies did not capture the periods of falling oil prices and periods after the global financial crises. Therefore, the main objective of this study was to determine the effect of macroeconomic factors on external reserves in Nigeria. Consequently, the specific objectives include; to determine the effect of international oil prices on external reserves in Nigeria, to establish the effect of nominal exchange rate on external reserves in Nigeria, to determine the effect of real interest rate on external reserves in Nigeria. To establish the moderating effect of balance of trade on the relationship between international oil price and external reserves. To determine the moderating effect of balance of trade on the relationship between nominal exchange rate and external reserves. To establish the moderating effect of balance of trade on the relationship between real interest rate and external reserves in Nigeria. In addition, this study covered periods of rising and falling international oil prices and periods before and after the global financial crises. The study adopted the positivism doctrine. The study made use of causal research design. The research primarily relied on secondary data on the research variables ranging from 1981 to 2014 which was sourced from Central Bank of Nigeria, National Bureau of Statistics, Organization of Petroleum Exporting Countries and World Bank. The study carried out diagnostic tests before conducting the analysis. Time series regression analysis model (Autoregressive Distributed Lag approach) was employed in the study. The research findings showed that macroeconomic factors namely international oil price, nominal exchange rate and real interest rate have a significant effect on external reserves in Nigeria. The findings showed no evidence of a moderating effect of balance of trade on the relationship between international oil price and external reserves. However, there was evidence of a moderating effect of balance of trade on the relationship between nominal exchange rate and external reserves. Lastly, the findings of the study showed no evidence of a moderating effect of balance of trade on the relationship between real interest rate and external reserves. Furthermore, the study recommends that the Federal Government of Nigeria should put in place measures that will boost exports and discourage imports.
CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Globally, external reserves have improved considerably since the 1990’s as most developing economies hold external reserves as a preventive measure to curb against the effect of external shocks in their economies. In June 2009, China, Japan, and Saudi Arabia were ranked first, second and third respectively, in external reserves holdings (Oputa and Ogunleye, 2010). Similarly, the International Monetary Fund (2014) estimates that the global external reserves holding have increased from US$1.57 trillion in 1996 to US$11.69 Trillion in 2013, with the share of developing and emerging economies increasing from US$0.55 Trillion to US$7.87 Trillion. The phenomenal increase in external reserves holding across many emerging markets particularly among oil exporting countries in recent years have been motivated largely by the drive for self-insurance against adverse external shocks (Gong, 2012)

However, global external reserves decreased to approximately US$11.6 in March, 2015 after reaching a peak of US$12.03 trillion in August, 2015. The decline in global external reserves value is as a result of the strengthening of the US dollar, which subsequently led to a fall in value of other external reserves currencies such as the pounds (CBN, 2015). China being the world’s largest reserves holder accounts for about 30 percent of total global reserves holdings. China’s external reserves declined from its peak of US$4 trillion in June, 2014 to US$3.56 trillion in September, 2015. This has been largely attributed to the devaluation of the Yuan, which made it a less attractive investment option, as more individuals and enterprises prefer to hold US dollars. In addition, Russia’s external reserves holdings declined to US$361 billion in 2014, while Saudi Arabia, the third
largest reserves holder after China and Japan, also experienced a US$10 billion decline in its external reserves holdings amounting to US$721 billion in September, 2015 (Bloomberg, 2015).

In Africa, commodity price such as international oil price hikes have allowed external reserves accumulation among exporting countries, while on the other hand draining the external reserves among importing countries. However, the recent fall in international oil price has led to the depletion of reserves for oil exporting countries. Evidently, Egypt devalued its national currency three times in 2015 as a result of the dwindling reserves. Egypt’s reserves depleted by 10 percent in September, 2015, which is the highest since January, 2012 (Namatalla, 2015). Similarly, Libya spent more than 25 percent of its external reserves in 2014 to offset the sharp decrease in oil revenues and keep the country running. This sharp decrease in oil revenue is attributed to the fall in international oil price. Libya’s reserves totaled US$76.6 billion at the end of 2014, a decrease from the US$105.9 billion in the previous year (Bloomberg, 2015). The rationale for holding reserves varies from one country to another; however, the most common reason for holding reserves is to back monetary policy (Sajal, 2012).

Nigeria like other developing countries relies on external reserves for import cover, and also for exchange rate stability (CBN, 2015). Total external reserves for Nigeria was used in this study. Total external reserves constitute monetary gold holdings, Special Drawing Rights, holdings of foreign exchange, and external reserves of IMF member countries, under the management of Central Banks, which are expressed in US dollars (World Bank, 2014).
1.1.1 External reserves in Nigeria

Nigeria’s external reserves have been on an increasing trend over the past two decades (CBN, 2015). In 2005, the country’s external reserves holdings amounted to US$28.63 billion; this is a significant increase from the US$4.33 billion reported in 1996. In 2008, the external reserves increased to US$53.60 billion (World Bank, 2014). However, in 2014, the external reserves declined to US$37.50 billion and this decline has been continuous (CBN, 2014). The Central Bank of Nigeria uses the external reserves to meet the country’s transactionary needs. Equally, the regulator uses the external reserves for precautionary purposes in order to provide a framework necessary to absorb unexpected fiscal shocks in terms of trade and capital outflows (Gong, 2012).

![Trends in external reserves in Nigeria from 1996 to 2014](image)

**Figure 1.1: Trends in external reserves in Nigeria from 1996 to 2014**

Source: (World Bank, 2014)

Charles (2012) reports that the factors that influence external reserves level in Nigeria are exchange rate, GDP, inflation and trade openness. Determination of optimal external reserves levels has gone through a number of approaches, some of these approaches employed earlier to estimate the optimal external reserves level in emerging economies.
are reserves to external debts, reserves to imports, and reserves to money aggregates. However, reserves to import ratio which makes import cover of three months adequate, appears to be favoured by most developing countries including Nigeria (Oputa and Ogunleye, 2010).

Similarly, the IMF (2014) posits three months of import cover as adequate level of reserves. The Fund noted that low external reserves level in a country, leads to loss of investor confidence, thereby generating risk of capital flight in that country. In addition, lack of external reserves brings worry to the nation; this is because it limits the ability of a country to make foreign currency denominated payments, and also limits the spending of such a country abroad (Adetiloye and Oyerinde, 2010).

1.1.2 Macroeconomic Factors and External Reserves

Macroeconomic stability continues to be at the center of economic policy making. According to Agade (2014) macroeconomic factors affect the economy as a whole, rather than just a single unit. Crude oil is a key source of energy in the world as nearly everything we consume is directly or indirectly dependent on oil (Tertzakian, 2007). Oil is an integral part of the Nigerian economy, as it plays an important function in determining the political and economic fate of the country. Annually, the Nigerian government sets oil price benchmark for its revenue budget (Osigwe and Okechukwu, 2015). The value of Nigeria’s overall revenue from export, in 2010 was US$70,579 million and the revenue generated from oil exports amounted to US$61,804 million which is 87.6% of the overall, thus confirming Nigeria to be highly dependent on oil (CBN, 2015). Tule (2015) opined that external reserves in Nigeria have become a seasonal commodity. Seasonal in the sense that external reserves depend on international
oil price movements. Increase in international oil prices lead to increase in Nigeria’s external reserves position in the international markets. Conversely, a fall in international oil prices leads to depletion of the reserves.

Although statistics have shown that the international oil prices have gradually increased from 1996 to 2013, it is clear that the increase has not been constant. In 1997, for instance, the international oil price was USD 18.86 per barrel. This was a reduction from the previous year, which recorded a price of USD 20.29 per barrel. The oil price recorded the highest value of USD 109.45 in 2012 (OPEC, 2015). However, in the subsequent two years, the price has continuously dropped to USD 105.87 and USD 96.29 respectively (see figure 1.2).

Figure 1.2: Trends in international oil price from 1996 to 2014
Source: (OPEC, 2015)

International oil prices determine the value of oil revenue in Nigeria (Osigwe and
Okechukwu, 2015). In Africa, Nigeria is the major oil producer and the 11th world’s major oil producer. Globally, Nigeria is ranked number eight in oil exports, exporting mainly to the U.S.A (Udochukwu and Ogbonnaya, 2011). This implies that oil exports form an integral part of Nigeria’s national income. The variations in the international oil price, however, continue to pose a significant threat not only on Nigeria’s income sustainability but also on the mobilization of the economy’s external reserves. The fundamental factors influencing international oil prices are demand and supply, geographical flashpoints, seasonal weather, and OPEC decisions (Petroleum Resources Branch Energy Sector, 2010).

Exchange rate is an important monetary policy tool used by the monetary authority, which determines the value of foreign exchange transactions in the nation (CBN, 2015). How the trends in the exchange rate influence the overall economic activity in a country has been an issue of many controversies, both in macroeconomics theory and empirical literature (Khondker et al., 2012). Calvo and Reinhart (2011) observe that developing countries seem to be more tolerant to external reserves fluctuations than exchange rate volatility; this is because exchange rate volatility influences the level of reserves. Also, Heller and Klan (1978) identified exchange rate as a major element that drives the level of external reserves. When exchange rate appreciates, it enhances the accumulation of external reserves (Adam & Leonce, 2007). Irefin and Yaaba (2012) opined that in periods of exchange rate fluctuations, the monetary authority of a country may use their external reserves stock to stabilize the exchange market with the aim of dampening the exchange rate volatility. However, this leads to the depletion of the external reserves thereby making a nation vulnerable to economic shocks (CBN, 2015).
Real interest rate refers to nominal interest rate less the rate of expected inflation. Interest rate being a short term monetary policy tool is used by the monetary authority of a country to influence the level of foreign reserves of a nation (Bird & Rajan, 2003). Higher interest rates increase the value of a given economy’s currency. An interest rate above the average world rate will attract foreign capital into the domestic market, and as this continuous, the value of the country’s currency increases. Conversely, lower interest rates tend to be unattractive for foreign investment and it also decreases the value of a country’s currency. Interest rate decisions in Nigeria are taken and reported by the Central Bank (CBN, 2015). Similarly, inflation has been one of the macroeconomic problems in Nigeria that seems to be intractable over the years (Charles, 2012). Price Stability that is, moderate inflation is essential in the accumulation of external reserves and economic well being of a nation, it enables the monetary authorities to curb volatility of real economic activity and spur the management of liquidity and financial crises (Lin & Wang, 2010).

On the other hand, price instability, particularly high inflation strongly affects a country’s reserves accumulation by reducing the investments and productivity growth of a country (Navoda & Selliah, 2015). In periods of high inflation, a country experiences a general increase in the cost of its goods and services (Romero, 2005). Thus, as domestic goods and service become more expensive, there will be a relatively lower demand for exports of that country, leading to the decrease of net exports and eventually depleting the external reserves level. In addition, inflation erodes savings; it discourages investment and stimulates capital flight as domestic investors shift investment from local assets to foreign assets (Osigwe et al., 2015; Charles, 2012).
1.1.3 Balance of Trade

The balance of trade of a country refers to the difference between the values of a country’s merchandise exports and that of its imports (Chuku, Akpan, Sam and Effiong, 2011). When the exports of a country surpass its imports, such a scenario is referred to as a balance of trade surplus. Conversely, if the imports of a country are higher than its exports, the country is said to be having a balance of trade deficit. Imports and exports that are featured in the balance of trade concept arise in the context of international trade (CBN, 2015). Surplus or deficit balance of trade is considered an important factor in the economic growth and development of a nation, and thus it has implications for jobs created within the country or jobs lost out of the country to other countries.

Balance of trade forms part of the current account, it influences exchange rates of currencies through its influence on the supply and demand of foreign exchange (CBN, 2015). When a country’s balance of trade does not amount to zero, it indicates that there is relatively higher demand or supply for the currency of such country, which subsequently, influences the currency value of that country in the international market, thus, impacting on external reserves either positively or negatively (Adam, Cahyono, Rahim, and Syarif, 2015). Therefore, the relative value of a country’s currency is influenced by the demand for that currency, which is in turn influenced by trade. If a country exports more than it imports, there is a high demand for its goods and thus for its currency. Demand and supply law dictates that when demand is high, prices rise and thus the value of currency appreciates. Conversely, if a nation imports more than it exports, then there is relatively less demand of that nation’s currency, so prices should decline. In such a scenario, a currency depreciates or loses value.
In the long run, balance of trade deficits may be expected to contribute to a weaker home currency, as the economy adjusts to create the surpluses needed to repay foreign investors. However, in the short run, balance of trade deficits and the home currency have a weak relationship, and the determination of the value of the home currency is largely based on preferences of investors for the home currency assets (Chuku et al., 2011). Nigeria’s balance of trade statistics are reported by the National Bureau of Statistics of Nigeria.

1.1.4 Importance of external reserves in an economy

The accumulation of external reserves has been attributed to its enormous importance to an economy. External reserves contribute to the GDP of a country thereby creating jobs and enhancing the well-being of its citizens (Charles, 2012). In addition, external reserves are employed by monetary authorities of countries to curb exchange rate fluctuations (Fang and Lili, 2011). It boosts the confidence of foreign investors, which in turn boosts foreign direct investment (FDI) into the country.

Adequate external reserves enhance the value of a country’s currency thereby encouraging traders to embark on imports and exports transactions as they find it profitable to do so, thus boosting the economy (Romero, 2005). Also, the monetary authorities use external reserves as a store of value to build up additional wealth which can be consumed in the future. This is done by segregating the external reserves into a wealth tranche and liquidity tranche for speculative purposes. The wealth tranche includes long term securities such as bonds and equities, which are controlled alongside a special benchmark that lays emphasis on return maximization (CBN, 2015).

Tule (2015) opines that use of external reserves provide monetary authorities means of controlling the money supply in an economy and also to strike equilibrium for foreign
exchange demand and supply through policy intervention that is, offering to trade foreign currency to commercial banks in the foreign exchange markets. When commercial banks buy foreign exchange from monetary authorities, the monetary authorities’ level of external reserves drops by that amount of sale (CBN, 2015). This in turn, results to a decrease in domestic supply of money by the equivalent of local currency of the sale. On the contrary, when the Central Bank buys foreign currency from commercial banks, its reserves level rises and at the same time an equivalent value of the local currency is credited into the accounts of commercial banks, thus, increasing the level of domestic money supply in an economy. Increase in domestic money supply has a positive impact on the degree of economic activities in a country. This is because; productive activities are enhanced by the availability of more capital. This in turn, generates employment, increases output and boosts consumption in an economy (Akram & Mortazavi, 2015).

Adequate external reserves serve as a boost for a nation’s international ranking and credit worthiness by enhancing regular servicing of external debt thus avoiding additional penalties (Charles, 2012). Moreover, a country’s external reserves is a vital factor in a country’s risk models that are employed by the international financial institutions and credit rating agencies. External reserves serves as a cover for the “Rainy Day”, particularly when nations experience a fall in revenue. A sound reserves level readily provides cushion against such back drop in revenue and facilitates the recovery of such economies (CBN, 2015).

External reserves provide an economy with a buffer against external shocks. When a country’s external trade position is suddenly thrown into disequilibrium, adequate external reserves position usually helps an economy to absorb and quickly adjust to such
shocks without resorting to any costly financing options (Tule, 2015).

1.2 Statement of the problem

Macroeconomic stability is essential for the accumulation of external reserves and growth of the economy at large. Adequate external reserves enhance the growth and development of an economy. The fall in Nigeria's external reserves has been of great concern and this has caused panic in both the economic and political environment (Sajal, 2012). This is because Nigeria greatly depends on its external reserves for import cover, exchange rate stability and for international ranking. In 2014, external reserves for Nigeria went below three months import cover which is the IMF stipulated optimum reserves level (CBN, 2015). The main source of external reserves in Nigeria is revenue from crude oil exports which are susceptible to the vagaries of international oil shocks.

The falling international oil prices pose great concerns as it forced the Federal Government of Nigeria to review its budgeted crude oil benchmark of US$75 and US$73 per barrel as proposed in its 2014 and 2015 budgets respectively (CBN, 2015). Similarly, the exchange value of the Nigerian currency has experienced a continuous downfall thereby discouraging traders from engaging in imports and exports activities as their rate of return is threatened.

The fall in the value of the Nigerian currency which has made it a less attractive investment and store of value option is largely attributed to low level of reserves, as there are inadequate reserves to ensure its stability. This is further linked to the surplus demand of foreign currencies for international transactions as this has continued to mount pressure on the Nigerian currency (Tule, 2015). In response to this excess demand, the CBN has authorized commercial banks in Nigeria to ban the use of ATM cards overseas. The ban,
which was announced to take effect from January 1, 2016, is as a result of the dwindling external reserves and the inability of banks to settle transactions involving dollars and other foreign currencies arising from the use of Nigerian ATM cards overseas (CBN, 2015). This has however raised concerns in the society especially from traders in the foreign exchange market and Nigerians in Diaspora.

Various studies have been done on the effect of macroeconomic factors on external reserves. These studies include that of Parish and Rusell (2007); Lin and Wang (2010); Fang and Lili (2011); Akhtar et al (2011) and Gokhale and Raju (2013); for China, Japan, China, Pakistan and India respectively. However, these studies were conducted for countries outside Africa and the studies obtained varying results. In the case of Nigeria, studies conducted on macroeconomic factors and external reserves include Heller and Klan (1978), Jayaraman and Lau (2011) Olayungbo and Akinbola (2011), Charles (2012). However, these studies did not consider the effect of moderating characteristics on the relationship between macroeconomic factors and external reserves. Furthermore, previous studies did not consider the use of time lags. Also, these studies did not capture the periods before and after the global financial crises and also the periods of rising and falling international oil prices.

This study sought to address the gap in literature by focusing on the effect of macroeconomic factors on external reserves in Nigeria. Essentially, this study sought to determine the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria. The study captured the periods of rising and falling international oil prices and periods before and after the global financial crises. Lastly, the study made use of time lags by incorporating the previous
values of the research variables.

1.3 Objectives of the study

1.3.1 General objective

The general objective of the research was to determine the effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria.

1.3.2 Specific Objectives

The specific objectives include:

i. To determine the effect of international oil price on external reserves in Nigeria.

ii. To establish the effect of nominal exchange rate on external reserves in Nigeria.

iii. To determine the effect of real interest rate on external reserves in Nigeria.

iv. To establish the moderating effect of balance of trade on the relationship between international oil price and external reserves in Nigeria.

v. To determine the moderating effect of balance of trade on the relationship between nominal exchange rate and external reserves in Nigeria.

vi. To establish the moderating effect of balance of trade on the relationship between real interest rate and external reserves in Nigeria.

1.4 Research Hypotheses

In determining the effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria, it was hypothesized that:
H0₁: International oil price has no significant effect on external reserves in Nigeria.

H0₂: Nominal exchange rate has no significant effect on external reserves in Nigeria.

H0₃: Real interest rate has no significant effect on external reserves in Nigeria.

H0₄: Balance of trade has no significant moderating effect on the relationship between international oil price and external reserves in Nigeria.

H0₅: Balance of trade has no significant moderating effect on the relationship between nominal exchange rate and external reserves in Nigeria.

H0₆: Balance of trade has no significant moderating effect on the relationship between real interest rate and external reserves in Nigeria.

1.5 Significance of the study

The results of this study will be of value in many ways. In the first case, the findings will be useful to the Federal Government of Nigeria as it will influence effective formulation of policies by the government of Nigeria. Secondly, the study will be of great importance to stakeholders and the society at large, it educates them on macroeconomic factors such as international oil price, nominal exchange rate and real interest rate and their effect on external reserves. Lastly, the findings of this study address the knowledge gap in literature on effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria. In addition, the study lays foundation for future researchers, as it provides recommendations, which other researchers across the globe interested in similar research study may pursue in future.
1.6 Scope of the study

This study focused on the effect of macroeconomic factors such as international oil price, nominal exchange rate and real interest rate on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria. The study made use of time series data while employing time series regression (Autoregressive Distributed Lag Approach) in the study. Yearly data was collected on the research variables ranging from the period 1981 to 2014, this period was sufficient to capture the dynamics of the study as it covers both periods of rising and falling international oil prices. In addition, it covers the periods before and after the global financial crises.

1.7 Organization of the study

The thesis is structured as follows: the foregoing chapter one provides the research background, research objectives, significance of the study, scope and limitations of the study. Chapter two presents the literature review on the effect of macroeconomic factors on external reserves. It looks at theoretical review and empirical review to provide insights into the study. It also encompasses summary of literature review and research gaps and the conceptual framework, which models the effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves. Chapter three deals with the methodology of the study, it provides explanations on how data was obtained and analyzed. Chapter four provides the data analysis, presentation and interpretation. Chapter five presents the summary of the study, conclusion and recommendations.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction
The literature review critically looks at existing theories and studies relating to macroeconomic factors and external reserves. This chapter consists of theoretical review that is, looking at the relevant theories supporting the research, empirical review, summary of literature review and research gaps, as well as conceptual framework which presents the link between the study variables.

2.2 Theoretical review
In carrying out the research, a number of theories were used to support the study;

2.2.1 Liquidity Preference Theory
Liquidity Preference Theory was propounded by Keynes (1936). According to this theory, interest rate is the reward for partying with liquidity. Liquidity preference theory is key to success in acquisition of goods and services. Every individual in the world desires to hold money with him for various reasons which sum up his demand for money to hold. Therefore, the sum total of all individual demands for money constitutes the total demand for money in the economy (Mankiw, 2005).

Liquidity Preference Theory attributes the motives for holding liquidity to transactionary motive, which includes business motive, day to day financing of activities and business transactions. Precautionary motive, which attributes the demand for money to cover for the rainy days, and to meet unforeseen emergencies. Lastly, speculative motive which attributes
the demand for money to take advantage of the uncertainty of the future due to fluctuations in rate of interest in the market. Some money is set aside to speculate on these probable changes in order to earn some profit (Frank & Bernanke, 2012). The rate of interest is established by the interaction between supply and demand of money in an economy (see figure 2.1).

Figure 2.1: Liquidity preference

Source: (Researcher, 2016)

Supply of money is exogenous, usually determined by the monetary authority. Therefore, the money supply curve is vertical. However, the demand for money is downward sloping and is largely determined by the prevailing rate of interest in the money market. The equilibrium rate of interest (r*) is therefore arrived at a point of interception between the supply and demand.
The research study is underpinned on liquidity preference theory. Liquidity preference theory is relevant to this study as it explains the rationale behind accumulation of external reserves by countries. Similarly, CBN (2015) opines that the Federal Government of Nigeria holds external reserves, which constitute mainly revenue from oil exports for transactionary, precautionary and speculative motives. The need to finance foreign trade gives rise to demand for liquid reserves which are readily accessible and easily convertible for use to settle trade obligations.

Adequate external reserves ensure stability of the economy as the higher the external reserves position, the better the capacity of monetary authorities to curb the volatility in Balance of Payments and to ensure smooth consumption in the long run (Charles, 2012). Also, external reserves are used as a form of backing or support for the local currency. Thus, the external reserves position can change as the Central Bank implements its monetary policies (CBN, 2015).

2.2.2 Purchasing Power Parity (PPP)

Purchasing Power Parity (PPP) Theory was propounded by Cassel (1916). It is widely known as the law of one price. Purchasing Power Parity Theory postulates that exchange rates between two currencies are at equilibrium when the purchasing power of these currencies is the same in each country (Amano & Norden, 2003). This means that exchange rate between two countries should equal the ratio of these two countries' price level of a fixed basket of goods and services. When the domestic price level of a country is increasing that is, when a country experiences high inflation, the exchange rate of that country's currency must
Depreciated in order to return to PPP.

Cassel (1916) postulate that nominal exchange rate of a country’s currency reflects the purchasing power of that country’s currency, when compared with another country’s currency. Cassel (1916) further opined that a purchasing power exchange rate existed between any two countries; this is measured by the reciprocal of one country’s price level against that of the other. According to the purchasing power theory, movements of exchange rates are influenced by the difference between the domestic and foreign rates of inflation. When domestic inflation relative to changes in foreign prices increases, there would be an appreciation in exchange rate value, and vice versa (Khondker, Bidisha & Razzaque, 2012).

Figure 2.2 provides an illustration of exchange rate determination for Naira/Dollar.

**Figure 2.2: determination for Naira/Dollar.**

Source: (Researcher, 2016)
The equilibrium rate of exchange (Naira/Dollar) is established by the interception of supply of and demand for dollars in the Nigerian foreign exchange market. The supply of dollar primarily arises from funds received from the country’s exports while the demand for dollars emanates from the need for imports.

A rise in exports without a corresponding rise in imports will tend to raise the supply of dollars relative to demand. This will in turn create a high supply of dollars in the foreign exchange market that will pressure the exchange rate downwards thus, resulting to an increase in the value of Naira against the dollar. Conversely, an increase in imports implies a rise in the demand for dollars. Without a corresponding rise in exports, an increase in imports will create excess demand over supply, which will exert an upward pressure on the rate of exchange, thereby, leading to a depreciation of the naira against the dollar.

### 2.2.3 Interest Rate Parity

The Interest Rate Parity Theory was developed by Keynes (1936). The Interest Rate Parity comprises of the relationship between interest rate and exchange rate of two countries (Amano and Norden, 2003). It assumes that the exchange rate between two countries is affected by their interest rate differentials. The Interest Rate Parity relates interest rate of one country to the exchange rate value of her trading partner (fadli et al., 2011). This means that, interest rate charged in a country reflects the exchange rate value of that country’s currency and that of her trading partner(s) (Keynes, 1936).

Interest Rate Parity Theory is relevant to this study as it explains the variations in international oil prices due to changes in market conditions. Importers and exporters of crude
oil embark on such activities with the aim of achieving high rate of return, that is, high interest rate. However, this rate of return is often determined by international oil prices. Also, investors trade currencies daily in the foreign exchange market. Some investors supply a currency in exchange for another and at the same time, some demand for a currency in exchange for another all in search for higher return (Alum, 2012). Therefore, when interest rates are low, the local currency is devaluated thereby making its exchange value low in relation to international currency.

The devaluation of the home currency can be attributed to the low demand of such currency as a result of low interest rate. The reverse is the case when interest rates are high, as this attracts foreign investors thereby leading to high demand of such currency and subsequently leading to an appreciation in the exchange value of such currency (Bergen, 2010). Thus, the appreciation of the exchange value of a country’s currency enhances its external reserves accumulation (CBN, 2015).

2.2.4 The Theory of Balance of Trade

The Theory of Balance of Trade was propounded by Bullock (1901). When a country imports more than it exports, such a country is referred to as “a loser by its foreign trade” and other countries in the globe. An excess of exports over imports is considered favorable for a nation. While excess of imports over exports is considered unfavorable for a nation (Chuku et al., 2011). The Balance of trade of a country is an important factor that shows the level of performance of a country in international trade.

A country should therefore, encourage exports and discourage imports especially importation
of luxury goods by means of quotas, taxes, subsidies, tariffs, and so on as this will help in achieving a favorable balance of trade. Production should be stimulated by governmental interference in the home economy and by foreign trade regulation (CBN, 2015). Protective duties should be placed on manufactured goods from overseas; and government should encourage the importation of cheap raw materials, to be used in manufacturing goods for exports.

The Theory of Balance of Trade is relevant to this study as it explains the benefits and detriments of favorable and unfavorable balance of trade respectively. Balance of trade reflects the demand and supply of a home currency and foreign currency respectively (Chuku et al., 2011). Balance of trade surplus implies that there is higher demand of a home currency than that of a foreign currency and vice versa.

2.3 Empirical Review

This section summarizes previous studies relating to effect of macroeconomic factors on external reserves. In this section, literature is reviewed on each of the hypothesized variables.

2.3.1 Factors affecting external reserves

Several studies have been conducted on the status of external reserves. A number of studies including Charles (2012), Abdullateef and Waheed (2010) and Heller and Klan (1978) have identified international oil prices, exchange rate and interest rate as factors affecting external reserves.
2.3.2 Oil Price and External Reserves

Imarhiagbe (2015) studied the impact of international oil price on external reserves in Nigeria. The study used monthly data on international oil price and external reserves ranging from January 1995 to December 2013 which were modeled using the EGARCH-M and GARCH-M. The independent variable in the study was international oil price and the dependent variable was external reserves. The empirical result suggests that there exist a significant positive impact of international oil price on external reserves for Nigeria. However, the study focused on periods of rising oil prices and did not consider the use of time lags in its methodology. Audu and Okumoko (2013) conducted a study using Johansen Cointegration technique, the results of the study showed that external reserves in Nigeria is determined by crude oil price, exchange rate, capital account vulnerability, current account vulnerability, trade openness, the opportunity cost of holding reserves, credit to the public sector, and foreign direct investment. The empirical findings from the study further showed evidence of Cointegration among the variables.

Jayaraman and Lau (2011) conducted a study on international oil price, economic growth and external reserves for Nigeria. The study employed Vector Error Correlation Model (VECM) using annual data ranging from 1981 to 2007. The findings from the study show that although there is no causality relationship between the study variables in the long run, in the short run the causality linkage runs from international oil prices and external reserves to economic growth. Thus, they opined that international oil price, economic growth and external reserves are co-integrated. However, Jayaraman and Lau (2011) did not consider moderating characteristics and their effect on the relationship between international oil price.
and external reserves in Nigeria. This study sought to determine the effect of international oil price on external reserves and the moderating effect of balance of trade on the relationship between international oil price and external reserves in Nigeria.

2.3.3 Exchange Rate and External Reserves

Many researchers have attempted to investigate the relationship between exchange rate and external reserves in both country specific and cross-country studies. Gokhale and Raju (2013) studied the relationship between Exchange Rate and Foreign Exchange Reserves in the Indian Context. The study employed the Johansson Co-integration test, Unit Root test, and Vector Auto Regression (VAR). Time series data was used covering the period 1980 to 2010, the empirical findings of their study show that there is no long and short term relationship between exchange rate and foreign exchange reserves in India.

In addition, Chinaemerem (2012) conducted a study on the relationship between external reserves and exchange rate in Nigeria. The study employed the VAR with the use of time series data covering the period 1980 to 2009. The empirical findings provided evidence of a negative relationship between external reserves and exchange rate in Nigeria. However, the period covered in the study did not capture the aftermath period of the global financial crises.

Fang and Lili (2011) conducted a study on the relationship between exchange rate and external reserves in China. The authors used monthly data ranging from the period 1994 to 2011 while employing the ADF test, Johansen test, and Granger causality test. The findings from the study show that a long-term equilibrium relationship exists between exchange rate and external reserves. The exchange rate has a negative relationship with external reserves.
On the contrary, total volume of import and export trade and GDP have positive relationship with external reserves in China.

Akinbola and Olayungbo (2011) studied the relationship between exchange rates (real and nominal) and Nigeria’s external reserves. The authors made use of quarterly data ranging from the period 1970:Q1 to 2006:Q4. The study employed the Cointegration test, unit root test and the Granger causality test and ECM. The findings of the study show that there exist both short run and long run relationship between external reserves and nominal exchange rate. The findings also show that there exists a faster adjustment of external reserves to changes in nominal exchange rate than changes in real exchange rate. However, their study focused on periods before the global financial crises. Hence, there was a need to conduct a study that will capture the post era of the global financial crises.

Ahmed and Pentecost (2009) investigated the long run relationship between exchange rates and external reserves in a sample of eight African countries including Nigeria during 1980Q1-2004Q4. They used the threshold cointegration method and found evidence of non-linear cointegration between the variables. The results of their estimated threshold vector error correlation model (TVECM) show that the threshold cointegration parameter varied from country to country, depending on the prevailing exchange rate regimes in the countries. They concluded that countries having more flexible exchange rate regime have high threshold than those operating fixed exchange rate regime. For Nigeria, a threshold parameter of 0.97 and adjustment in the second regime of the TVECM was principally due to external reserves. However, their study applied the threshold cointegration procedure based on a cross country study and not country specific and it predated the 2007/2008 global financial crises.
The study did not consider moderating characteristics and their effect on the relationship between exchange rate and external reserves.

Paresh and Rusell (2007) studied the dynamic relationship between exchange rates, interest rates and external reserves in China. The authors made use of monthly data ranging from 1980 to 2002. The study employed the unit root test and the findings show that there exists a single long-run relationship between the three variables. In the long run, there is evidence of exchange rate having a statistically significant positive effect on external reserves. The coefficient of the real interest rate differential is shown to be positive, however, statistically insignificant. In the short-run, they showed that the relationship between exchange rate, interest rate differential and external reserves is non-monotonic. Thus, their study contradicts that of Fang and Lili (2011) which says exchange rate has a negative relationship with external reserves in China. However, their study was focused on China, which is not an African country, and the study was centered on periods before the global financial crises. Due to the disparities and contextual gaps in previous researches there was a need to conduct a study using current data to investigate the effect of exchange rate on external reserves in Nigeria, which is a developing country, covering periods before and after the global financial crisis, making it one of the specific objectives of the study. In addition, the current study looks at the moderating effect of balance of trade on the relationship between exchange rate and external reserves in Nigeria.

2.3.4 Interest Rate and External Reserves

Chowdhury et al (2014) conducted an econometric analysis of the determinants of external
reserves with the use of annual data for the period 1972 to 2011. The study attempted to identify the key determinants of external reserves in Bangladesh using unit root test and ADF test to examine the stationary, Engle Granger residual based cointegration approach to show the co-integrating variables among variables and diagnostic tests for better modeling. The empirical results suggest that there exist a significant relationship among external reserves, exchange rate, remittance, interest rate and broad money. However, the study was not focused on Nigeria.

Irefin and Yaaba (2012) conducted a study using an Autoregressive Distributed Lag (ARDL) approach to estimate the determinants of external reserves in Nigeria with focus on income, exchange rate, imports and monetary policy rate within the period 1999 to 2011. The empirical results from the study show that there exists a long run relationship among the determinants of reserves in Nigeria. The lag of interest rate is negatively related to reserves, although not significant. They opined that their empirical result is consistent with most empirical studies on the determinants of external reserves, although, a negative relationship provides evidence in support of opportunity cost of reserves holding in Nigeria. They opined that a decline in interest rate in the preceding period will compel the deposit money banks to borrow more funds from the CBN, thereby restraining the CBN from building more external reserves. However, Irefin and Yaaba (2012) did not consider moderating characteristics and its effect on the relationship between interest rate and external reserves in Nigeria. This study sought to determine the effect of interest rate on external reserves and the moderating effect of balance of trade on the relationship between interest rate and external reserves in Nigeria.
2.3.5 Other macroeconomic factors

In their study on the determinants of external reserves in Nigeria, Osigwe and Okechukwu (2015) with the use of ECM, found GDP and oil exports to be positive and significant determinants of external reserves. In addition, they found exchange rate to be significant but negative determinant of external reserves in Nigeria. Similarly, their study showed the coefficient of inflation to be negative but significant. However, their study did not consider the use of time lags and moderating variables.

Charles (2012) conducted a research on the casualty effect of macroeconomic variables on Nigeria’s external reserves. The results show that there exists a long run relationship between external reserves and the selected macroeconomic variables. The study confirms that the factors that influence the level of external reserves in Nigeria are trade openness, GDP, inflation and exchange rate. The trade openness and level of GDP were found to have a positive relationship with external reserves. The study found inflation rate to have a negative relationship with external reserves for Nigeria. This implies that inflationary trend will lead to depletion of external reserves because as the domestic goods become more expensive, there will be a fall in demand for Nigerian exports that will lower net exports and subsequently reduce the external reserves level. However, Charles (2012) focused on the period (1980 to 2009) which does not cover the aftermath of the global financial crises. However, this study sought to determine the effect of international oil prices, nominal exchange rate and real interest rate on external reserves in Nigeria, which covers the period before and after the global financial crises.
Abdullateef and Waheed (2010) studied external reserves holdings with implications for exchange rate, inflation and investment in Nigeria. The data used in the study covered the period 1986 to 2006. The study applied a combination of Vector Error Correction model (VECM) and Ordinary Least Square, their empirical findings show that real exchange rate, current account variability, and opportunity cost of holding reserves (measured by the difference between the real return on reserves and the real return on domestic investments) are the factors that influence the demand for external reserves in Nigeria. They opined that their research results collaborated that of Adam and Leonce (2007) who opined that in Africa, the demand for external reserves is influenced by factors such as Export, GDP growth, and opportunity cost of holding external reserves.

Romero (2005) carried out a comparative study of factors that affect external reserves in India and China using (OLS) regression. The author modeled reserves holding as a function of average propensity to import, current account balance and exchange rate. The empirical results show that exchange rate was statistically important in determining external reserves in India while the same was not found for China. However, these studies (Abdullateef and Waheed, 2010; Adam and Leonce, 2007; Romero, 2005) focused on periods before the global financial crises. This study sought to determine the effect of macroeconomic factors on external reserves in Nigeria as it covers the periods before and after the global financial crises. In addition, the study sought to determine the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria.


2.4 Summary of Literature and Research Gaps

Adequate external reserves enhance the capacity of the central bank of a country to provide a favorable economic environment for the development of the country (Akinbola and Olayungbo, 2011). From the literature reviewed, most studies focused on developed nations. In addition, most studies focused on the effect of rising oil prices on external reserves and did not consider the use of time lags. Also, most studies did not capture the periods after the global financial crises.

Furthermore, the literature reviewed shows that previous studies did not consider moderating characteristics and their effect on the relationship between macroeconomic factors and external reserves. Also, a close scrutiny of past studies reviewed shows varying results by various researchers among similar variables. This study sought to determine the effect of macroeconomic factors on external reserves in Nigeria with the use of time lags. In addition, the study sought to examine the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria. The study looks at the effect of international oil price (both rising and falling international oil prices) and the effect of periods before and after the global financial crises on external reserves in Nigeria thereby filling the gap in literature.

Table 2.1: Summary of Literature Review and Research Gaps

Table 2.1 shows the summary of the literature reviewed by the researcher. It points out the focus and gaps of previous studies and how these gaps were addressed which is the focus of the current study.
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Focus of previous study</th>
<th>Major Findings</th>
<th>Research Gaps</th>
<th>Focus of current study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imarhiagbe (2015)</td>
<td>The study focused on impact of crude oil price on the conditional mean and volatility of external reserves in Nigeria (1995-2013)</td>
<td>Positive relationship between oil price and external reserves.</td>
<td>The study focused on periods of rising oil prices and it did not consider the use of time lags in its methodology.</td>
<td>The current study focuses on periods of both rising and falling oil price with the use of time lags.</td>
</tr>
<tr>
<td>Charles (2012)</td>
<td>The study focused on the casualty effect of macroeconomic variables on Nigeria’s external reserves (1980-2009).</td>
<td>The study found trade openness, GDP, inflation and exchange rate as factors that influence external reserves.</td>
<td>The study did not capture the aftermath period of the global financial crises and the study did not consider the use of moderating characteristics.</td>
<td>The current study looks at the aftermath period of the global financial crises and the current study uses balance of trade as a moderating variable.</td>
</tr>
<tr>
<td>Study</td>
<td>Focus</td>
<td>Findings</td>
<td>Limitations</td>
<td>Current Study Focus</td>
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<td>------------------</td>
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<tr>
<td>Chinaemerem (2012)</td>
<td>The study focused on the effect of external reserves on exchange rate in Nigeria (1980-2009)</td>
<td>The study found exchange rate to have a negative relationship with external reserves</td>
<td>The study did not capture the aftermath period of the global financial crises.</td>
<td>The current study focuses on effect of exchange rate on external reserves in Nigeria which covers periods before and after the global financial crises.</td>
</tr>
<tr>
<td>Fang and Lili (2011)</td>
<td>Relationship between foreign exchange reserves and exchange rate in China (1994-2011)</td>
<td>The study found a negative relationship between exchange rate and external reserves in China.</td>
<td>The study was centered on China.</td>
<td>The current study focuses on Nigeria</td>
</tr>
<tr>
<td>Source</td>
<td>Study Focus</td>
<td>Methodology</td>
<td>Comparison</td>
<td></td>
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<tr>
<td>Ahmed and Pentecost (2009)</td>
<td>The study focused on the relationship between exchange rates and external reserves in eight African countries (1980Q1-2004Q4)</td>
<td>The study found non-linear Cointegration between variables</td>
<td>The current study looks at the effect of exchange rate on external reserves which is country specific and it predated the 2007/2008 global financial crises. The study covers periods before and after the global financial crises.</td>
<td></td>
</tr>
<tr>
<td>Parish and Rusell (2007)</td>
<td>The study focused on the dynamic relationship between exchange rates, interest rates and foreign exchange reserves in China (1980-2002).</td>
<td>The study found a positive relationship between exchange rate and external reserves.</td>
<td>However, the current study focuses on Nigeria.</td>
<td></td>
</tr>
</tbody>
</table>

Source: *(literature reviewed by Researcher, 2016)*
2.5 Conceptual Framework

The conceptual framework shows the visual presentation of the relationship between the research variables. The proposed relationship of the research variables in the conceptual model shows macroeconomic factors (international oil price, nominal exchange rate and real interest rate) to be the independent variables. External reserves is dependent on the macroeconomic factors, thus making it the dependent variable. The movement of the independent variables is proposed to have an effect on the dependent variable. Balance of trade is proposed to have a moderating effect on the relationship between international oil price and external reserves. Also, balance of trade is proposed to moderate the relationship between nominal exchange rate and external reserves. Lastly, balance of trade is proposed to moderate the relationship between real interest rate and external reserves. The study sought to determine the effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria. The conceptual model (see figure 2.3) provides a visual presentation of the relationships explained.
Figure 2.3: Conceptual model

Source: (Researcher, 2016)
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology that was adopted for the study. Research methodology is the layout of the research framework. Sekaran (2000) opined that methodology refers to ways of obtaining, organizing and analyzing data. This section encompasses the research philosophy, research design, empirical model, data collection, data sources, data analysis procedure and diagnostic tests.

3.2 Research Philosophy

Research Philosophy is a belief on how data about a phenomenon should be gathered, analyzed and used. The study adopted the positivism doctrine; this philosophy advocates objectivity and consistent use of logical and rational approaches to research. Sunders, Lewis and Thornbill (2009) opined that positivist researchers take a structured and controlled approach in conducting a research, this is done by identification of a research topic, identification of the research objectives, construction of appropriate research questions and hypotheses and adopting an appropriate methodology (Omagwa, 2014). Positivism seeks to develop conceptual and theoretical structures in a research and then test the same through empirical investigations (Sunders et al, 2009). Also, mathematical and statistical techniques are central to positivist researchers and they adhere to specifically structured research techniques.
3.3 Research design

Research design constitutes the blueprint for the collection, measurement and analysis of data. Research design is an outline plan, which is used by a researcher to generate answers to research problems (Mugenda & Mugenda, 2003). The study made use of causal research design. Causal research design is quantitative in nature, preplanned and structured in design. It is the investigation of cause and effect relationships between variables in a research (Cooper and Schindler, 2009). In causal research designs, the researcher attempts to ascertain if the independent variable(s) causes a change in the dependent variable in a research (Omagwa, 2014). Thus, causal research design was adopted for the study as the study sought to determine the effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria.

3.4 Empirical Model

The study employed time series regression model (Autoregressive Distributed Lag approach). The ARDL model is based on the literature review in which authors including Imarhiagbe (2015) Ahmed and Pentecost (2009), Paresh and Rusell (2007) showed external reserves as a function of international oil price, nominal exchange rate and real interest rate. Thus, the ARDL equation models international oil price, nominal exchange rate, real interest rate, balance of trade and external reserves.
\[ Y_t = \beta_0 + \sum_{i=0}^{P} \delta_i X_{1t-i} + \sum_{i=0}^{Q} \gamma_i X_{2t-i} + \sum_{i=0}^{N} \phi_i X_{3t-i} + \epsilon X_{1t} + \lambda X_{2t} + \alpha X_{3t} + U_t \]

\( t = 0, 1, 2, 3, \ldots n \)

Structural breaks:

\[ \text{BREAKL-OILP} = \begin{cases} 1, & \text{Between 1981 to 1997 (gradually decreasing oil prices)} \\ 0, & \text{Between 1998 to 2004 (gradually increasing oil prices)} \end{cases} \ldots \text{Break 1} \]

\[ \text{BREAK-EXCH} = \begin{cases} 1, & \text{Period before global financial crisis (1981 to 2007)} \\ 0, & \text{Period after global financial crisis (2008 to 2014)} \end{cases} \ldots \text{Break 2} \]

Where:

\( Y_t = \) Yearly external reserves at time \( t \).

\( X_{1t} = \) Yearly international oil prices at time \( t-i \).

\( X_{2t} = \) Yearly exchange rate at time \( t-i \).

\( X_{3t} = \) Yearly real interest at time \( t-i \).

\( X_{4t} = \) Yearly balance of trade at time \( t \).

\( X_{1t}X_{4t} = \) Yearly cojoined effect of international oil prices and balance of trade at time \( t \).

\( X_{2t}X_{4t} = \) Yearly cojoined effect of nominal exchange rate and balance of trade at time \( t \).

\( X_{3t}X_{4t} = \) Yearly cojoined effect of real interest rate and balance of trade at time \( t \).

\( Y = \) Dependent variable (external reserves)

\( X_1, X_2, X_3 = \) Independent variables (international oil price, nominal exchange rate and real interest rate)
X_i = Moderating variable (balance of trade)

P, Q, M = Possible number of lags per variable. The number of lags per variable were determined by the Akaike Information Criteria (AIC).

\( \beta_0 \) = Constant term

\( \delta_i, \alpha_i, \beta_i, \phi, \varepsilon, \lambda, \Omega \) = Regression coefficients. The regression coefficients are used to measure the sensitivity of the dependent variable to unit change in the independent variables.

U_t = error term captures the unexplained variations in the model at time t, and it is assumed to be normally distributed with a mean of zero.

The strength of the predictor variables are tested at p-value of 0.05 which implies that the predictor variables with a p-value of less than 0.05 have significant effect on the dependent variable.

### 3.5 Operationalization and Measurement of Variables

The external reserves for Nigeria depend on macroeconomic factors, thus making it the dependent variable. It is measured in USD. The independent variables are the macroeconomic factors, which are oil prices, exchange rate and interest rate in Nigeria. For oil prices, the study made use of international oil prices, which are measured in USD per barrel. For exchange rate, the study made use of nominal exchange rate, which is measured as amount of naira to a USD. For interest rate, the study made use of real interest rate that is nominal interest rate less inflation rate which is measured in percentage. The moderating variable is the balance of trade for Nigeria. Balance of trade is exports less imports of
merchandise in Nigeria and it is measured in naira. The study variables were operationalized and measured as shown in Table 3.1.

**Table 3.1: Operationalization and Measurement of Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Operationalization</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Reserves</td>
<td>Dependent Variable</td>
<td>Amount of USD</td>
<td>Total external reserves value in USD</td>
</tr>
<tr>
<td>Oil Price</td>
<td>Independent Variable</td>
<td>International oil prices USD/Barrel</td>
<td></td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>Independent Variable</td>
<td>Nominal exchange rate</td>
<td>Naira/USD</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>Independent Variable</td>
<td>Nominal interest rate less inflation rate</td>
<td>Real interest rate in %</td>
</tr>
<tr>
<td>Balance of Trade</td>
<td>Moderating Variable</td>
<td>Value of exports less imports of merchandise</td>
<td>BOT balances in Naira</td>
</tr>
</tbody>
</table>

Source: *(Researcher, 2016)*
3.6 Data sources

The sources of data for the study were CBN, World Bank, OPEC and NBS. Exchange rate and interest rates are monetary policy tools set and reported by the CBN. The balance of trade for Nigeria is reported by the National Bureau of Statistics, Nigeria. International oil price and external reserves were sourced from OPEC and World Bank respectively. Thus, the yearly reports of these organizations were the unit of observation of the study which spans from 1981 to 2014.

3.7 Data collection

Data collection is the process of gathering empirical evidence in a research in order to gain new insights about a situation and answer the questions that prompt the undertaking of a research (Flick, 1998). The study made use of secondary data. According to Ghauri & Gronhaug (2002), use of secondary data is advantageous since information is readily available, easily accessible and convenient to use. Yearly data of the study variables namely international oil price, nominal exchange rate, real interest rate, balance of trade and external reserves were collected and reviewed with the use of a data review guide (see appendix 1). This period was sufficient enough to provide the data needed to inform the current study. In addition, the period was adequate to capture the dynamics of the study. In collecting the data for the study, the researcher made use of a research permit issued by the National Bureau of Statistics of Nigeria to approach the relevant organizations.
3.8 Data Analysis

Data analysis was performed on the collected data in order to transform it to a more suitable form for use. The research data was purely quantitative in nature therefore it utilized inferential data analysis to analyze the quantitative research data. Inferential statistics is applied to establish relationships between variables in a research (Field, 2005). Regression analysis was used to test the hypotheses on the effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria. Regression is concerned with describing and evaluating relationships between a given set of research variables. The ARDL approach was employed and the AIC was used in determining the appropriate number of lags. Pesaran bound testing approach was applied under the ARDL estimation model. The researcher made use of E-views 9 which generated graphical expressions and regression output.

3.9 Diagnostic Test

The researcher conducted diagnostic test for serial correlation using Breusch Godfrey Serial correlation LM test, test for Heteroscedasticity using Breusch Pagan Godfrey test, test for stationarity using the Augmented Dickey-Fuller tests, model specification test using the Ramsey-Reset test, test for multicollinearity using the Variance Inflation Factor (VIF) test and test for cointegration using the ARDL bounds test (Pesaran and Shins’ bounds testing approach). Diagnostic tests are performed to ensure that a good model is chosen, it checks whether the stochastic properties of the model are met in order to avoid conventional
econometrics problems. The researcher also checked Goodness of fit ($R^2$), statistical significance of coefficients and constant variance of the error term.

### 3.9.1 Stationarity Test

A major challenge encountered with time series data is that they often exhibit non-stationarity of variables. According to Chris (2008), when working with time series data, the data is required to be stationary that is, should have a constant mean, constant variance and a constant auto-covariance structure. To test for stationarity, the researcher examines stationarity of the variables within the framework of ADF test procedure. If the variables are stationary at level that means such variables are integrated of order zero $I(0)$. The variables that are not stationary were differenced, thus making them stationary at 1$^{st}$ difference integrated of order one $I(1)$.

### 3.9.2 Serial Correlation Test

Serial correlation also known as autocorrelation refers to a situation whereby the error term in one period is correlated with the error term in another time period. Ideally, tests of autocorrelation aim to examine whether a regression model has correlation between trouble errors in time period $t$ with errors in time period $t-1$. The study made use of Breusch Godfrey Serial correlation LM test to test for autocorrelation. The null hypothesis for this test is that there is no autocorrelation. If the p-value is less than 5 percent, then the null hypothesis is rejected which indicates presence of autocorrelation. If autocorrelation is established, appropriate number of lags will be added to eliminate autocorrelation.
3.9.3 Heteroscedasticity Test

Presence of heteroscedasticity is of major concern when applying regression analysis. Therefore, the initial step is to investigate whether the variance of the error term is constant. Heteroscedasticity occurs when the variance of the error term is not constant in that the variance of the error term changes as the values of the independent variables change. Heteroscedasticity test is aimed at interpreting whether the regression model has different residual variances from different observations (Ghozali, 2002). In this study, Breusch-Pagan-Godfrey test was used to examine heteroscedasticity. The null hypothesis for the test is that there is no heteroscedasticity. If p-value is found to be less than 5 percent, then reject the null hypothesis and conclude that the residuals are heteroscedastic. If heteroscedasticity is established, appropriate measures will be employed. Homoscedasticity is a term in statistics which indicates that the variance of the errors over the sample are similar in that as the variables increase the variance of errors will not increase. Ghozali (2002) opined that homoscedasticity occurs when the residual variances from one observation to the other are very similar.

3.9.4 Model Specification Test

One of the requirements for time series analysis is for the model to be correctly specified and ensure that there are no omitted variables. Model specification test was conducted using Ramsey-Reset test. The null hypothesis states that the model is well specified and there are no omitted variables. The null hypothesis is rejected or accepted at 5 percent significant level.
3.9.5 Multicollinearity Test

Multicollinearity is a situation where two or more independent variables in a regression are highly or moderately correlated. The Variance Inflation Factor (VIF) test was used to test for multicollinearity. The rule of thumb in multicollinearity test is that the Variance Inflation Factor should be less than 10 for it to be tolerated. In the presence of multicollinearity, Newey-West estimator can be used and dynamic regressors removed.

3.9.6 Cointegration Test

The cointegration test is done to check if there is cointegration or long run relationship among the research variables. The ARDL bonds test (Pesaran and Shins’ bounds testing approach) was used to test for cointegration. The null hypothesis for the test holds that there is no cointegration (or no long run relationship) among variables. If the F statistics is greater that the critical value at 5 percent significance level then the null hypothesis is rejected.

3.10 Research Ethics.

Research ethics are behaviours or norms that are expected to be observed by a researcher in any research. All researches are expected to conform to ethical principles and professional standards. Compliance with research ethics is important because it promotes the aim of the research study. Moreover, research often involves a great deal of cooperation and coordination among different groups of individuals, disciplines and organizations. The researcher undertook various steps to ensure that the study conforms to ethical principles and research standards. This was done by ensuring that misconducts such as fabrications,
falsifications, misrepresentation of research work, plagiarism were avoided in the research study and acknowledgement given to all persons who have contributed to the research work.
CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the results and discussion of the results. The findings of the study are based on the study objectives and hypotheses. The analysis was done on the basis of descriptive analysis, diagnostics tests and regression analysis.

4.2 Descriptive Statistics

Descriptive statistics are employed in a research study to describe the basic features of data in a research (Wooldridge, 2003). Thus, the researcher employed descriptive statistics to provide summary of the study data. International oil price per barrel was presented in US dollars. Data capturing external reserves was presented in billions of dollars. In this respect, the log form was used to ensure the data is consistent with other time series data. Real interest rate was presented as average annual change in interest rate. Table 4.1 shows a summary of the descriptive statistics.

Table 4.1: Summary of Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>DBOT</th>
<th>LEXTRES</th>
<th>EXCH</th>
<th>INT</th>
<th>OILP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1.2</td>
<td>22.65</td>
<td>67.849</td>
<td>-0.7</td>
<td>34.95</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>10.11</td>
<td>1.379</td>
<td>63.689</td>
<td>16.87</td>
<td>28.97</td>
</tr>
<tr>
<td>Minimum</td>
<td>-21.99</td>
<td>1.379</td>
<td>0.62</td>
<td>-43.6</td>
<td>12.28</td>
</tr>
<tr>
<td>Maximum</td>
<td>25.2</td>
<td>24.7</td>
<td>158.55</td>
<td>25.3</td>
<td>107.46</td>
</tr>
<tr>
<td>No. of Observations</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
</tr>
</tbody>
</table>

Source: Researcher, 2016
DBOT: Balance of trade, LEXTRES: Log of external reserves, EXCH: Nominal exchange rate (Naira/USD), INT: Real interest rate (%), OILP: International oil price (USD/Barrel).

Descriptive statistics show that change in balance of trade (DBOT), nominal exchange rate and change in real interest rate had a large standard deviation between 1981 and 2014. The results show that the dispersion - measured using standard deviation - of change in balance of trade (DBOT), exchange rate and change in real interest rate were significantly high. For example, the change in Balance of trade (DBOT) has a mean of 1.2 with a standard deviation of 10.11.

The mean of interest rate and exchange rate (estimated as NAIRA/USD) was -0.7 percent and 67.849 with standard deviation of 16.87 percent and 63.689 percent respectively. This implies that interest rate and exchange rate are highly volatile. Large variations in interest rate and exchange rate may signify instability in monetary and foreign exchange environment in Nigeria which in turn impacts on external reserves. Figure 4.1 shows the trend of international oil price and nominal exchange rate from 1981 to 2014 in Nigeria.
Figure 4.1: Comparing the Trend of international oil price, nominal exchange rate and real interest rate

Source of data: CBN, 2014; OPEC, 2015 and World Bank, 2014

Figure 4.1 compares the trend of international oil price and exchange rate over the period 1981 to 2014. International oil prices were generally decreasing from 1981 to 1998 before taking an upward turn from 1999 to 2008 followed by a general upward trend from 2009 to 2012 and a decrease from 2012 to 2014. The periods of decrease and increase in international oil price can be attributed to periods of high supply and low demand and periods of high demand and low supply respectively. On the other hand, the trend of exchange rate of the Naira/USD slightly increased from 1981 to 1998 before sharply increasing from 1999 to 2007. Also, a sharp decrease in the exchange rate is observed between 2007 and 2008 followed by an increase from 2008 to 2014 which may be attributed to increase in international oil prices.

It can also be shown that the trend of exchange rate of the Naira/USD was to a great extent correlated to the trend of international oil prices. In addition, a sharp decrease in both
international oil prices and exchange rate value during the 2007/2008 may partly be explained by the global financial crisis. Therefore, Figure 4.1 supports the view by Oyetunji (2013) and Ogundipe, Ojeaga & Ogundipe (2014) that exchange rate is sensitive to changes in international oil prices. More importantly, the trend of international oil price can be decomposed into two structural breaks represented by periods of falling (from 1981 to 1998) and period of general rising international oil prices (from 1999 to 2012). The graphs in Figure 4.2 compare the trend of the log of external reserves and international oil prices from 1981 to 2014.

**Figure 4.2: Trends of International oil prices and Log of External Reserves from 1981 to 2014**

*Source of data: OPEC, 2015 and World Bank, 2014*

Figure 4.2 shows that though volatile, external reserves have been on an increasing trend. For example, from 1981 to 1983 there is a sharp decrease in external reserves which is as a result of deficits being financed by external reserves between that period followed by relatively fluctuating trend between 1983 and 1988. From 1988 to 1991 there is a sharp increase
followed by a sharp decrease. From this period onward external reserves trend is generally positive but fluctuating. Comparison between the trend of international oil price and log of external reserves shows that there has been some co movement between the two variables. Thus, supporting the view of Charles (2012) that oil being the most significant export in Nigeria has a significant effect on accumulation of external reserves in Nigeria. The graph in Figure 4.3 shows the trend of balance of trade in Nigeria from 1981 to 2014.

![Figure 4.3: Trends of Balance of trade in billions of naira from 1981 to 2014](image)

Source of data: NBS, 2014

Figure 4.3 shows that the trend of Balance of trade for Nigeria was relatively stable from 1981 to mid-1990’s. From 1994 to 1998, there was a sharp increase followed by a sharp decrease. Thus, the sharp increase and sharp decrease in the trend of balance of trade can be attributed to periods of higher exports than imports and periods of higher imports than exports respectively. From this period onward, the trend of balance of trade is generally
increasing from 2000 to 2014. Comparison between the trend of international oil price, log of external reserves and BOT shows that there has been some co movement between the three variables from year 2000. These findings support the view of Oyetunji (2013) that oil is the most significant export and depreciation of the exchange rate in Nigeria has a significant effect on accumulation of external reserves and BOT position in Nigeria.

**Figure 4.4: Trends of interest rate from 1981 to 2014**

*Source of data: World Bank, 2014*

Figure 4.4 shows that real interest rate trend fluctuated between the +25 percent and -45 percent from 1981 to 2014, sharp decreases in 1995 and 2010 maybe an indication of structural shocks which are also registered in Balance of trade and exchange rate. These shocks maybe explained by unfavorable political climate in Nigeria between 1993 and 1998 due to self-imposed military rule in Nigeria and the impact of global financial crisis from
2008 to 2010 respectively. Thus, the graph shows that real interest rate is characterized by periods of more negative rates than positive rates. Furthermore, periods of negative real interest rate indicate that inflation was higher than nominal interest rate in such periods.

4.3 Diagnostic Tests

This section presents pre diagnostic and diagnostic tests of evaluation before analysis of the regression model. Pre-estimation diagnostic tests include stationarity and normality tests. Post estimation diagnostic tests include the Akaike Information Criteria used to check for optimal number of lags, ARDL Bounds test used to check for co integration, Breusch-pagan test for heteroskedasticity, Breusch-Godfrey test for autocorrelation, Variance Inflation factor used to check for multicollinearity and Ramsey-Reset test to check for model specification.

4.3.1 Stationarity Test

The test for stationarity is key when conducting a time series analysis. This is because non stationary variables can result to several model mis-specifications. Stationarity was tested using Augmented Dickey fuller test. Table 4.2 presents the result of stationarity test.
Table 4.2: Stationarity Tests Results

<table>
<thead>
<tr>
<th></th>
<th>ADF Test</th>
<th></th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test</td>
<td>Critical</td>
<td></td>
</tr>
<tr>
<td></td>
<td>statistic</td>
<td>value</td>
<td></td>
</tr>
<tr>
<td>Log of External</td>
<td>Level</td>
<td>-0.614</td>
<td>-2.954</td>
</tr>
<tr>
<td>reserves</td>
<td>1st Difference</td>
<td>-5.194</td>
<td></td>
</tr>
<tr>
<td>Exchange rate</td>
<td>Level</td>
<td>-0.194</td>
<td>-2.954</td>
</tr>
<tr>
<td></td>
<td>1st Difference</td>
<td>-5.387</td>
<td></td>
</tr>
<tr>
<td>Interest Rates</td>
<td>Level</td>
<td>-5.846</td>
<td>-2.954</td>
</tr>
<tr>
<td>Oil Prices</td>
<td>Level</td>
<td>1.768</td>
<td>-3.58</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>-6.06</td>
<td></td>
</tr>
<tr>
<td>Balance of Trade</td>
<td>Level</td>
<td>-0.419</td>
<td>-2.960</td>
</tr>
<tr>
<td></td>
<td>1st Difference</td>
<td>-6.2</td>
<td></td>
</tr>
</tbody>
</table>

Critical values at 5 percent significant level

Source: Researcher, 2016

The null hypothesis for the ADF test states that the variable being tested is not stationary. If the calculated ADF statistic is less than the critical value, reject the null hypothesis. Table 4.2 shows that with exception of interest rate at level, all variables’ ADF statistics were less than the critical values. This means the variables apart from interest rates were integrated of order I(1). Oil prices were stationary at first difference after providing for presence of structural breaks. Interest rates were found to be stationary at level indicating that it is integrated of order zero I(0).

4.3.2. Normality Test

Normality test is done to check if the residuals of the error term have a normal distribution.

Normality test is conducted using Jacques-Bera (JB) test. In testing for normality, the
approach used by Paavola (2006) for testing normality using Jacques-Bera test was adopted.

Table 4.3 presents normality test for each of the distribution.

**Table 4.3: Normality Test: Jacques-Bera Test**

<table>
<thead>
<tr>
<th></th>
<th>DBOT</th>
<th>LEXTRES</th>
<th>EXCH</th>
<th>INT</th>
<th>OILP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skewness</td>
<td>-0.005</td>
<td>0.2</td>
<td>0.22</td>
<td>-0.859</td>
<td>1.3</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>3.53</td>
<td>1.58</td>
<td>1.24</td>
<td>3.615</td>
<td>3.34</td>
</tr>
<tr>
<td>JB P-Value</td>
<td>0.8198</td>
<td>0.214</td>
<td>0.099</td>
<td>0.094</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*Sourced: Researcher, 2016*

Jarque-Bera (JB) test for normality assumes that the series are stationary. Table 4.3 shows that evaluation of JB statistics and corresponding values show that the null hypothesis of normality could not be rejected for four variables namely change in balance of trade, change in real interest rate, nominal exchange rate and log of external reserves. However, the null hypothesis of normality was rejected for international oil prices. However, despite the non-normal distribution of oil prices, it is presumed that 34 observations are adequate for time series analysis based on central limit theorem (Wooldridge, 2003; Verbeek, 2012).

**4.3.3 Cointegration Test**

Given that the data include variables that are integrated of order one $I(1)$, Cointegration test was conducted using Pesaran and Shins’ bounds testing approach and the results presented in Table 4.4
Table 4.4: ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Value</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>8.836754</td>
<td>3</td>
</tr>
</tbody>
</table>

Critical Value Bounds

<table>
<thead>
<tr>
<th>Significance</th>
<th>I0 Bound</th>
<th>I1 Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>2.72</td>
<td>3.77</td>
</tr>
<tr>
<td>5%</td>
<td>3.23</td>
<td>4.35</td>
</tr>
<tr>
<td>2.5%</td>
<td>3.69</td>
<td>4.89</td>
</tr>
<tr>
<td>1%</td>
<td>4.29</td>
<td>5.61</td>
</tr>
</tbody>
</table>

Source: Researcher, 2016

The null hypothesis for the test holds that there is no co integration (or no long run relationship) among variables. The F statistics of 8.8368 is greater than the critical value of 5.61 at 1 percent significance level. Therefore, the null hypothesis is rejected. This shows that there exists a long run relationship among log of external reserves as the dependent variable and real interest rate, nominal exchange rate and international oil prices. Given the findings from the ARDL bounds test both short run and long run ARDL model can be used for the analysis.

4.3.4. Akaike Information Criteria: Choice of optimal number of lags

Akaike information criteria was used to choose the best model that is, the optimal number of time lags.
Figure 4.5 shows the AIC comparison of top 20 models.

Source: Researcher, 2016

The selection criterion chooses the model that minimizes the AIC. Figure 4.3 shows that the model with the least AIC is ARDL (4,4,4,4). This means that after comparison, the best dynamic regression model includes 4 lags of log of external reserves, 4 lags of oil prices, 4 lags of exchange rate and 4 lags of interest rate.

4.3.5. Heteroskedasticity Test

Breusch-Pagan-Godfrey test was used to check whether the model residual has a constant variance as shown in Table 4.5.
Table 4.5: Heteroskedasticity Test (Breusch-Pagan-Godfrey)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>0.643</td>
<td>Prob. F(20,9)</td>
<td>0.8036</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>17.65</td>
<td>Prob. Chi-Square(20)</td>
<td>0.6104</td>
</tr>
<tr>
<td>Scaled explained SS</td>
<td>2.429</td>
<td>Prob. Chi-Square(20)</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Source: Researcher, 2016

The null hypothesis of Breusch-Pagan-Godfrey test assumed a constant variance. The estimated F-statistic was 0.643 with a corresponding probability value of 0.8036. Therefore, the null hypothesis could not be rejected at 5 percent significance level. This means that the model did not suffer from heteroskedasticity.

4.3.6. Serial Correlation Test

Serial correlation was tested using Breusch-Godfrey test as shown in Table 4.6.

Table 4.6: Serial Correlation Test (Breusch-Godfrey)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>2.825</td>
<td>Prob. F(1,8)</td>
<td>0.1313</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>7.829</td>
<td>Prob. Chi-Square(1)</td>
<td>0.0051</td>
</tr>
</tbody>
</table>

Source: Researcher, 2016

The null hypothesis states that there is no first order serial correlation. The F statistics of 2.825 has a corresponding probability value of 0.1313. This means that the null hypothesis could not be rejected at 5 percent significance level. Therefore, the results show that there is no first order correlation. The Q-Statistics in table 4.6 confirms that the residuals are not serially correlated.
4.3.7 Multicollinearity Test

Variance Inflation Factor (VIF) test was used to check for presence of multicollinearity among regressors and the results presented in Table 4.7

Table 4.7: Multicollinearity Test: Variance Inflation Factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient Variance</th>
<th>Uncentered VIF</th>
<th>Centered VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEXTRES(-1)</td>
<td>0.071159</td>
<td>8018.946</td>
<td>28.43306</td>
</tr>
<tr>
<td>LEXTRES(-2)</td>
<td>0.096980</td>
<td>10813.11</td>
<td>38.24211</td>
</tr>
<tr>
<td>LEXTRES(-3)</td>
<td>0.104263</td>
<td>11513.72</td>
<td>38.96585</td>
</tr>
<tr>
<td>LEXTRES(-4)</td>
<td>0.072896</td>
<td>7996.690</td>
<td>25.45166</td>
</tr>
<tr>
<td>OILP</td>
<td>9.75E-05</td>
<td>58.36404</td>
<td>22.24488</td>
</tr>
<tr>
<td>OILP(-1)</td>
<td>0.000340</td>
<td>182.5324</td>
<td>70.04026</td>
</tr>
<tr>
<td>OILP(-2)</td>
<td>0.000202</td>
<td>93.48597</td>
<td>35.00202</td>
</tr>
<tr>
<td>OILP(-3)</td>
<td>0.000242</td>
<td>92.52701</td>
<td>32.15143</td>
</tr>
<tr>
<td>OILP(-4)</td>
<td>0.000350</td>
<td>107.4680</td>
<td>32.30526</td>
</tr>
<tr>
<td>EXCH</td>
<td>6.86E-05</td>
<td>144.6115</td>
<td>56.48074</td>
</tr>
<tr>
<td>EXCH(-1)</td>
<td>8.79E-05</td>
<td>169.1976</td>
<td>71.24191</td>
</tr>
<tr>
<td>EXCH(-2)</td>
<td>8.44E-05</td>
<td>147.3071</td>
<td>66.47315</td>
</tr>
<tr>
<td>EXCH(-3)</td>
<td>0.000104</td>
<td>162.6078</td>
<td>78.18116</td>
</tr>
<tr>
<td>EXCH(-4)</td>
<td>5.51E-05</td>
<td>76.78140</td>
<td>39.17602</td>
</tr>
<tr>
<td>INT</td>
<td>0.000109</td>
<td>7.342126</td>
<td>7.336596</td>
</tr>
<tr>
<td>INT(-1)</td>
<td>6.53E-05</td>
<td>4.353147</td>
<td>4.340220</td>
</tr>
<tr>
<td>INT(-2)</td>
<td>9.73E-05</td>
<td>6.419184</td>
<td>6.377453</td>
</tr>
<tr>
<td>INT(-3)</td>
<td>4.18E-05</td>
<td>2.746444</td>
<td>2.726435</td>
</tr>
<tr>
<td>BREAK</td>
<td>0.541867</td>
<td>66.83755</td>
<td>28.96294</td>
</tr>
<tr>
<td>BREAKFINCRISIS</td>
<td>0.538223</td>
<td>31.24148</td>
<td>22.91042</td>
</tr>
<tr>
<td>C</td>
<td>101.2944</td>
<td>22048.86</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: Researcher, 2016

Table 4.7 shows that there is presence of multicollinearity among the regressors. It should be noted that high centered and uncentered VIF indicate presence of multicollinearity among regressors. However, these results are expected in a time series model with dynamic regressors. Moreover, inclusion of dummy variables might also be a cause of
multicollinearity. Multicollinearity problem in time series maybe ignored especially with time series models provided the other diagnostics are okay (Wooldridge, 2003).

4.3.7. Model Specification Test

Ramsey reset test checks whether the model is correctly specified. Table 4.8 shows the model specification test results.

Table 4.8: Model Specification Test: Ramsey-Reset Test

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Df</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-statistic</td>
<td>0.520317</td>
<td>8</td>
<td>0.6169</td>
</tr>
<tr>
<td>F-statistic</td>
<td>0.270730</td>
<td>(1, 8)</td>
<td>0.6169</td>
</tr>
</tbody>
</table>

F-test summary:

<table>
<thead>
<tr>
<th></th>
<th>Sum of Sq.</th>
<th>Df</th>
<th>Mean Squares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test SSR</td>
<td>0.040603</td>
<td>1</td>
<td>0.040603</td>
</tr>
<tr>
<td>Restricted SSR</td>
<td>1.240404</td>
<td>9</td>
<td>0.137823</td>
</tr>
<tr>
<td>Unrestricted SSR</td>
<td>1.199802</td>
<td>8</td>
<td>0.149975</td>
</tr>
</tbody>
</table>

Source: Researcher, 2016

The null hypothesis for Ramset-Reset test states that the equation is well specified and there are no omitted variables. Table 4.8 shows that the F statistic in Ramsey reset test is 0.27 with probability value of 0.6169. Therefore, the null hypothesis is not rejected meaning that the model is well specified and there are no omitted variables.

4.3.8 Regression Analysis and Hypothesis Testing

To determine the effect of macroeconomic factors on external reserves, time series regression analysis was employed. Regression involves describing and evaluating effect and relationships between a given study variable and one or more other study variables. The study adopted the ARDL model which has the advantage of incorporating the lagged values
of predictors therefore capturing the dynamics of the study. Furthermore, given that the research variables were integrated of different orders that is, order zero I(0) and order one I(1) the ARDL approach was appropriate for the study. This is because the ARDL approach has the advantage of being flexible as it has no restriction of having all the research variables to be integrated of the same order. Therefore, the ARDL approach can comfortably be applied irrespective of the research variables being integrated of order one I(1) or order zero I(0) (Pesaran, Shin, and Smith, 2001; Greene, 2008).

The study incorporates structural breaks to capture the periods of rising and falling international oil price and also periods before and after the global financial crises. Firstly, the existence of structural breaks is based on international oil price and exchange rate trends. In this regard, a dummy variable was used to capture the international oil price structural break as follows:

\[
\text{BREAKL-OILP} = \begin{cases} 
1, & \text{Between 1981 to 1997 (oil prices are gradually decreasing)} \\
0, & \text{Between 1998 to 2004 (Oil prices are gradually increasing)} 
\end{cases}
\]  

Break 1

This dummy is used to capture periods of falling oil prices and periods of rising oil prices as defined in Break 1. A second dummy variable was introduced to capture the periods before and after the 2007/2008 global financial crisis as follows:

\[
\text{BREAK-EXCH} = \begin{cases} 
1, & \text{Period before global financial crisis (1981 to 2007)} \\
0, & \text{Period after global financial crisis (2008 to 2014)} 
\end{cases}
\]  

Break 2

Secondly, diagnostic tests show that with exception of multicollinearity, all ordinary least square assumptions were met. Co integration test shows that both long run and short run
models are consistent and can be used for the analysis. The baseline ARDL model presented in Table 4.9 was used for the analysis.

Table 4.9: ARDL Cointegration and Long Run Form

| Variable                      | Coefficient | Std. Error | t-Statistic | Prob.  
|-------------------------------|-------------|------------|-------------|-------
| D(LEXTRES(-1))               | 1.639850    | 0.467899   | 3.504709    | 0.0172
| D(LEXTRES(-2))               | 0.976111    | 0.318397   | 3.065702    | 0.0279
| D(LEXTRES(-3))               | 0.456947    | 0.257294   | 1.77597     | 0.1359
| D(OILP)                      | -0.022455   | 0.007810   | 2.875319    | 0.0348
| D(OILP(-1))                  | -0.027974   | 0.012024   | -2.326549   | 0.0675
| D(OILP(-2))                  | -0.059813   | 0.035218   | -1.698346   | 0.1502
| D(OILP(-3))                  | 0.110940    | 0.042319   | 2.621500    | 0.0470
| D(EXCH)                      | 0.016916    | 0.006883   | 2.457768    | 0.0574
| D(EXCH(-1))                  | 0.008420    | 0.007130   | 1.180969    | 0.2907
| D(EXCH(-2))                  | 0.032424    | 0.012078   | 2.684571    | 0.0436
| D(EXCH(-3))                  | -0.022341   | 0.008643   | -2.584867   | 0.0491
| D(INT)                       | -0.013487   | 0.009463   | -1.425207   | 0.2134
| D(INT(-1))                   | 0.038920    | 0.009755   | 3.989751    | 0.0104
| D(INT(-2))                   | -0.001729   | 0.007261   | -0.238126   | 0.8212
| D(INT(-3))                   | 0.013263    | 0.006312   | 2.101187    | 0.0896
| D(BREAKRISING/FALLING OILP)  | 2.107484    | 0.681469   | 3.092560    | 0.0271
| D(BREAKFINCRISIS)            | -0.864988   | 0.535993   | -1.613804   | 0.1675
| CointEq(-1)                  | -3.095408   | 0.699097   | -4.427720   | 0.0068

Cointeq = LEXTRES - (0.0226*OILP + 0.0069*EXCH -0.0203*INT + 0.6808
*BREAK -0.2794*BREAKFINCRISIS + 20.7923 )

| Variable                      | Coefficient | Std. Error | t-Statistic | Prob.  
|-------------------------------|-------------|------------|-------------|-------
| OILP                          | 0.022650    | 0.003665   | 6.180115    | 0.0016
| EXCH                          | 0.006935    | 0.001384   | 5.009576    | 0.0041
| INT                           | -0.020319   | 0.005644   | -3.600005   | 0.0155
| BREAKRISING/FALLING OILP      | 0.680842    | 0.149920   | 4.541367    | 0.0062
| BREAKFINCRISIS                | -0.279442   | 0.164870   | -1.694929   | 0.1509
| C                             | 20.792291   | 0.090142   | 230.661118  | 0.0000

Source: Researcher, 2016
Firstly, the results of the co-integrating test show that the error correction coefficient (CointEqn(-1)) is -3.095 with a p value of 0.0068 which is significant at 5 percent level. A significant negative error correction term implies that external reserves adjust towards long run equilibrium path due to changes in international oil price, nominal exchange rate and real interest rate. The first part of Table 4.9 presents the short run model results, which includes the dynamic regressors, while the second part presents the long run coefficients.

The short run model shows that the coefficients of the lagged values of exchange rate, oil prices and interest rates are significant. The results also show that changes in external reserves were significantly different during the periods of decreasing oil prices and increasing oil prices. This implies that in the short run, past values of the three dynamic variables affect the current position of external reserves. However, the dummy representing global financial crisis has a coefficient of -0.8649 with a p value of 0.1675. This was insignificant in the short run.

The long run model shows that nominal exchange rate, international oil prices, real interest rates and changes in oil price (from falling trend to rising trend) were significant. However, the effect of global financial crisis was insignificant. These results indicate that the global financial crisis of 2007/2008 had no short run and long run effect on changes in external reserves in Nigeria. These results suggest that Nigeria may have been resilient to the 2007/2008 global financial crises.
4.5 Effect of macroeconomic factors on external reserves in Nigeria

In determining the effect of macroeconomic factors on external reserves in Nigeria, the specific objectives of the study were addressed. The specific objectives of the study were: to determine the effect of international oil price on external reserves in Nigeria. Secondly, to establish the effect of nominal exchange rate on external reserves in Nigeria. Third, to determine the effect of real interest rate on external reserves in Nigeria. Therefore, in addressing the specific objectives, the long run coefficients were used.

4.5.1 Effect of international oil price on external reserves in Nigeria

The first objective of the study was to determine the effect of international oil price on external reserves in Nigeria. The long run coefficient for international oil price (0.0226) has a probability value of 0.0016 which is less than 0.05. The null hypothesis stated that international oil price has no significant effect on external reserves in Nigeria. Therefore, the null hypothesis was rejected at 5 percent significance level. This means that a unit increase in the coefficient of international oil price increases external reserves by approximately 2 percent.

Positive relationship between international oil prices and external reserves are expected since the main source of external reserves for Nigeria is revenue from oil proceeds. The finding of this study in respect to international oil price and external reserves is consistent with that of Imarhiagbe (2015) who showed that there exist a statistically significant positive relationship between international oil price and external reserves in Nigeria. However, the study made use
of monthly data from January, 1995 to December, 2013 which was modeled using the GARCH-M and EGARCH-M.

4.5.2 Effect of nominal exchange rate on external reserves in Nigeria

The second objective of the study was to establish the effect of nominal exchange rate on external reserves in Nigeria. The long run coefficient of exchange rate (0.0069) has a probability value of 0.0041. The null hypothesis stated that nominal exchange rate has no significant effect on external reserves in Nigeria. Therefore, the null hypothesis was rejected at 5 percent significance level. This means that a unit increase in the coefficient of exchange rate increases external reserves by approximately 0.7 percent.

The finding of the study on effect of nominal exchange rate on external reserves is consistent with that of Parish and Rusell (2007) who found exchange rate to have a significant positive relationship with external reserves in China. However, their study employed the unit root test. In contrast, Chinaemerem (2012) and Fang and Lili (2011) found varying results in their studies. Where, Chinaemerem (2012) employed the VAR with the use of time series data from 1980 to 2009 and found exchange rate to have a negative relationship with external reserves for Nigeria. Similarly, Fang and Lili (2012) employed the VAR with the use of monthly data from 1994 to 2011 and found exchange rate negatively affecting external reserves for China. The variation in the findings of this study and that of Chinaemerem (2012) and Fang and Lili (2012) maybe attributed to the type of methodology used in each of the studies.
4.5.3 Effect of real interest rate on external reserves in Nigeria

The third objective of the study was to determine the effect real interest rate on external reserves in Nigeria. The hypothesis stated that real interest rate has no significant effect on external reserves in Nigeria. The coefficient for real interest rate (-0.02) has probability value of 0.016. Therefore, the null hypothesis was rejected at 5 percent significance level.

These results show that real interest rate is significant in determining external reserves in Nigeria. A unit increase in the coefficient of real interest rate decreases external reserves by approximately 2 percent. The findings of the study on the effect of interest rate on external reserves correspond with that of Irefin and Yaaba (2012) who showed that interest rate has a negative relationship with external reserves. However, these results contradict theoretical expectation as argued by the interest rate parity theory. This maybe the case if inflation in Nigeria rises faster than nominal interest rates such that the long run real interest rates are negative.

In addition, the data on real interest rate provides evidence that real interest rate for Nigeria from the study period 1981 to 2014 is characterized by some periods of negative real interest rates. As 15 out of the 34 number of observations on real interest rate are having relatively large negative values. Therefore, since real interest rate is nominal interest rate less inflation, a negative real interest rate in a particular period indicates that inflation rate is higher than nominal interest rate in such period. In addition, Osigwe et al (2015) and Charles (2012) found inflation rate to have a negative relationship with external reserves for Nigeria. This implies that inflationary trend will lead to depletion of external reserves. This is because as the domestic goods become more expensive, there will be lower demand for Nigerian exports
which will in turn, lower net exports and ultimately reduce the level of external reserves in Nigeria. Also, inflation erodes savings; it discourages investment and stimulates capital flight in an economy as domestic investors shift investment from local assets to foreign assets.

4.5.4 Moderating effect of Balance of trade on the relationship between macroeconomic factors (international oil price, nominal exchange rate and real interest rate) and external reserves in Nigeria.

The study sought to determine the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria thereby making it the fourth, fifth and sixth objectives of the study. Specifically, the fourth objective of the study was to establish the moderating effect of balance of trade on the relationship between international oil price and external reserves in Nigeria. The fifth objective was to determine the moderating effect of balance of trade on the relationship between nominal exchange rate and external reserves in Nigeria. Lastly, the sixth objective of the study was to establish the moderating effect of balance of trade on the relationship between real interest rate and external reserves in Nigeria.

The study made use of three models each for objectives four, five and six. Firstly, the study interacted changes in BOT with specific variables namely international oil prices, nominal exchange rate and real interest interest rate. Due to multicollinearity problem, the structural breaks were excluded from the model. A stepwise approach was used where each interaction term was introduced in the baseline model individually. Table 4.9 presents three models.
Model I shows results where changes in balance of trade was interacted with international oil price (BOTOIL). Model II shows results where changes in balance of trade was interacted with nominal exchange rate (BOTEXCH) and lastly, Model III shows results where changes in balance of trade was interacted with real interest rate (BOTINT).

Table 4.10: Moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves.

<table>
<thead>
<tr>
<th></th>
<th>MODEL I</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef</td>
<td>P-Value</td>
<td>Coef</td>
<td>P-Value</td>
</tr>
<tr>
<td><strong>OIL PRICES</strong></td>
<td>-0.01</td>
<td>0.805</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EXCHANGE RATE</strong></td>
<td>-0.03</td>
<td>0.639</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INTEREST RATES</strong></td>
<td>0.002</td>
<td>0.783</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOTOIL</td>
<td>-0.0465</td>
<td>0.336</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOTEXCH</td>
<td></td>
<td></td>
<td>0.002</td>
<td>0.045**</td>
</tr>
<tr>
<td>BOTINT</td>
<td></td>
<td></td>
<td></td>
<td>-0.002</td>
</tr>
<tr>
<td>Constant</td>
<td>24.91</td>
<td>0.264</td>
<td>20.203</td>
<td>0.0014***</td>
</tr>
</tbody>
</table>

**DIAGNOSTICS**

<table>
<thead>
<tr>
<th></th>
<th>MODEL I</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADJUSTED R SQUARE</strong></td>
<td>99.8%</td>
<td>99.2%</td>
<td>99.8%</td>
<td></td>
</tr>
<tr>
<td>VIF</td>
<td>71.72</td>
<td>26.06</td>
<td>60.72</td>
<td></td>
</tr>
</tbody>
</table>

*** Significant at 1%  **Significant at 5%  * Significant at 10%

Source: Researcher, 2016

Firstly, it is important to note that multicollinearity was a problem due to the nature of time series data. Presence of serial correlation and heteroskedasticity was also established. In this regard, the Newey-West estimator was used to estimate the standard error. According to Wooldridge (2003), the Newey-West estimator is consistent even in presence of serial correlation and heteroskedasticity.

The fourth hypothesis stated that balance of trade has no significant moderating effect on the relationship between international oil price and external reserves in Nigeria. The results in
Model I show that the interaction between balance of trade and international oil price BOTOIL has a coefficient of -0.0465 and a probability value of 0.336. Therefore, the null hypothesis was accepted at 5 percent significance level. This implies that there is no evidence of a moderating effect of balance of trade on the relationship between international oil price and external reserves in Nigeria. The findings may be attributed to the fact that international oil prices are determined by global demand and supply of crude oil. Therefore, the balance of trade of a country may not have a relationship with international oil prices.

The fifth hypothesis stated that balance of trade has no significant moderating effect on the relationship between nominal exchange rate and external reserves in Nigeria. The results in Model II show that the interaction between balance of trade and nominal exchange rate BOTEXCH has a coefficient of 0.002 with a probability value of 0.045 which was significant at 5 percent significance level. Therefore, the null hypothesis was rejected at 5 percent significance level. Therefore, there is evidence showing that balance of trade has a moderating effect on the relationship between nominal exchange rate and external reserves in Nigeria. The joint increase in the coefficient of balance of trade and nominal exchange rate BOTEXCH by 1 unit increases external reserves by 0.2 percent. These results are expected to the extent that changes in exchange rates have an effect on the demand of Nigerian oil and other exports and thereby affect balance of trade and ultimately have an impact on external reserves in Nigeria.

The sixth hypothesis stated that balance of trade has no significant moderating effect on the relationship between real interest rate and external reserves in Nigeria. The results in Model III show that the interaction between balance of trade and real interest rate BOTINT has a
70

coefficient of -0.002 and a probability value of 0.2498 which was insignificant at 5 percent
significance level. Therefore, the null hypothesis was accepted. The findings provide no
evidence of a moderating effect of balance of trade on the relationship between real interest
rate and external reserves in Nigeria.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section deals with summary, conclusion, knowledge contribution, recommendations and
suggestions for further research.

5.2 Summary of the study

The study sought to determine the effect of macroeconomic factors on external reserves and
the moderating effect of balance of trade on the relationship between macroeconomic factors
and external reserves in Nigeria which is the general objective of the study. The specific
objectives of the study are: to determine the effect of international oil price on external
reserves in Nigeria. Secondly, to establish the effect of nominal exchange rate on external
reserves in Nigeria. Third, to determine the effect of real interest rate on external reserves in
Nigeria. Fourth, to establish the moderating effect of balance of trade on the relationship
between international oil price and external reserves in Nigeria. Fifth, to determine the
moderating effect of balance of trade on the relationship between nominal exchange rate and
external reserves in Nigeria. Sixth, to establish the moderating effect of balance of trade on
the relationship between real interest rate and external reserves in Nigeria.
The findings of the study were based on the research objectives and hypotheses of the study. The findings of the study show that international oil price has a significant positive effect on external reserves in Nigeria. Therefore, the null hypothesis was rejected. Similarly, nominal exchange rate is shown to have a significant positive effect on external reserves in Nigeria. Therefore, the null hypothesis was rejected. Also, real interest rate is shown to have a significant but negative effect on external reserves in Nigeria. Therefore, the null hypothesis was rejected. Furthermore, there was no evidence of a moderating effect of balance of trade on the relationship between international oil price and external reserves in Nigeria. Thus, the null hypothesis was accepted. However, there was evidence of a moderating effect of balance of trade on the relationship between nominal exchange rate and external reserves in Nigeria. Therefore, the null hypothesis was rejected. Lastly, the study showed no evidence of a moderating effect of balance of trade on the relationship between real interest rate and external reserves in Nigeria. Therefore, the null hypothesis was accepted.

5.3 Conclusion

The accumulation of external reserves is beneficial to an economy in many folds. They are used by monetary authorities to stabilize monetary policies. External reserves are used in Nigeria to guard against terms of trade shocks and also, unforeseen emergencies. Thus, supporting the liquidity preference theory of money which attributes the demand for money for transactionary, precautionary and speculative motives.

The findings of the study show that international oil price, nominal exchange rate and real interest rate are significant in determining external reserves. External reserves in Nigeria is
sensitive to shocks in the international oil market. The fall in external reserves in Nigeria as a result of the fallen international oil prices confirms Nigeria to be suffering from the dutch disease. Global demand and supply of oil determine international oil prices. Strengthening of monetary policies should be the focus of the Central Bank as it plays a major role in the accumulation of external reserves.

5.4 Contribution to Knowledge

The study contributes to knowledge in many folds. The study sought to determine the effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria. Therefore, the study contributes to knowledge on the effect of international oil price on external reserves. It further provides knowledge of the effect of rising and falling international oil price on external reserves.

Secondly, the study contributes to knowledge on the effect of nominal exchange rate on external reserves. It further gives an insight on the effect of the global financial crises on external reserves. Thirdly, the study contributes to knowledge on the effect of real interest rate on external reserves.

Furthermore, the study contributes to knowledge on the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves. Specifically, showing the moderating effect of balance of trade on the relationship between international oil price and external reserves. Also, the study contributes to knowledge on the moderating effect of balance of trade on the relationship between nominal exchange rate and external
reserves. Lastly, the study contributes to knowledge on the moderating effect of balance of trade on the relationship between real interest rate and external reserves.

5.5 Policy Recommendations

The study concludes that international oil price has a significant positive effect on external reserves in Nigeria. This implies that periods of high international oil prices mean periods of higher revenue for Nigeria. Therefore, the Federal government should ensure that such revenue generated from high international oil price is used to increase external reserves position. In addition, such revenue can be invested into other areas of the economy.

Secondly, the study concludes that nominal exchange rate has a positive effect of external reserves. Therefore, the CBN should put in place sound monetary policy measures to attain stability in the exchange rate. There is also a need to ensure effective foreign exchange management measures particularly in terms of meeting the high demands for foreign currency for international transactions. Also, the Federal Government of Nigeria should put in place measures that will boost exports and discourage imports especially imports of luxury goods.

Thirdly, the study concludes that real interest rate has a negative effect on external reserves in Nigeria particular negative real interest rate that is, periods of high inflation. Therefore, the Government of Nigeria should employ measures that will ensure moderate inflation that is price stability. Fourth, the evidence of a moderating effect of balance of trade on the relationship between exchange rate and external reserves implies that policies aimed at
managing the exchange rate should incorporate the dynamics in the balance of trade in Nigeria.

5.6 Limitation of the Study and Suggestion for Further Research

Due to unavailability of monthly or quarterly data on all the research variables namely; international oil price, nominal exchange rate, real interest rate, balance of trade and external reserves, the study made use of yearly data. It is important to note that due to limited number of yearly data in the structural breaks incorporated in the study, dummy variables were used to account for international oil price and exchange rate in the periods of rising and falling international oil price and periods before and after the global financial crises respectively. Therefore, the use of monthly or quarterly data in further studies on these structural breaks will shed additional light on the effect of rising and falling international oil price and effect of periods before and after the global financial crises on external reserves in Nigeria.
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World Bank (2014) Total reserves (includes gold, current USD)
### APPENDICES

#### APPENDIX I: DATA REVIEW GUIDE

<table>
<thead>
<tr>
<th>Year (1981-2014)</th>
<th>International Oil Price (USD/Barrel)</th>
<th>Nominal Exchange Rate (Naira/USD)</th>
<th>Real Interest Rate (%)</th>
<th>Balance of Trade (Millions of Naira)</th>
<th>External Reserves (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>34</td>
<td>0.62</td>
<td>-8.1</td>
<td>-1,816.30</td>
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Source (CBN, 2014; World Bank, 2014; NBS, 2014; OPEC, 2015)
APPENDIX II: RESEARCH PERMIT
The Dean,
Graduate School,
Kenyatta University,
Nairobi – Kenya.

Dear Sir/Madam,

COLLECTION OF DATA ON SOME ECONOMIC INDICATORS IN NIGERIA

Your letter of 28th of January, 2016 with the reference number: D58F/CTY/28805/13 introducing Mr Akims M. Amos to National Bureau of Statistics (NBS) in respect of the above subject matter refers.

I wish to attest that Mr Akims M. Amos actually visited NBS to collect the necessary data for his research work.

Thank you.

Ichedi, S.J.
For: Statistician General