



## **Impact of Macro Economic Variables on External Reserve in Nigeria, 1981-2019**

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### **ABSTRACT**

*The broad objective of this study was to examine the impact of macroeconomic variables on external reserve in Nigeria, 1981-2019. The specific objectives of this study were to examine the impact of trade openness on external reserve in Nigeria, ascertain the effect of exchange rate on external reserve in Nigeria, assess the influence of balance of payment on external reserve in Nigeria, and finally, investigate the impact of gross domestic products on external reserve in Nigeria. This study employed auto regressive distributed lag model using data extracted from CBN statistical bulletin over the period of 1981-2019. Results of ARDL revealed that trade openness had a positive and non-significant impact on external reserve statistics in Nigeria, Besides, exchange rate had positive and non-significant impact on external reserve in Nigeria, Balance of payment had a negative and non-significant influence on external reserve in Nigeria, and gross domestic product had a positive and significant impact on external reserve in Nigeria. The study concluded that there existed irrational positive relationship between the macroeconomic variables and external reserve in Nigeria. The implication shows that selected macroeconomic variable under the scope of this study plays a serious positive and significant impact on external reserve in Nigeria. It was recommended that the government should aggressively embark 9 that will influence private sector policies effectively. Controlling inflation, balance of payment position will be positive and this will consequently increase our external reserve. And finally, it had been statistically revealed that gross domestic product improves our external reserve. More efforts should be on deck to improve our economy through adequate regulation of macroeconomic variables. The above recommendation will result to more improvement in external reserve position in Nigeria.*

**Keywords: Macroeconomic variables, External reserves, Autoregressive Distributed Lag, Nigeria.**

## 1. Introduction

The panic of fiscal and financial crisis has compelled countries, both developed and developing to preserve certain level of external reserves in order to intercede in the foreign exchange markets and shrink foreign exchange instability while also protecting the international value of their currencies. External reserves or international reserves as it is called refers to official public part foreign assets that are readily available to, and controlled by monetary authorities for direct financing or payment imbalances in the current accounts of country, through intervention in the exchange market to affect the currency or assets of central banks or other monetary authorities held in different reserves countries such as the United States dollars, pound, sterling, euro, yen, etc. (IMF, 1993).

External reserves are used by countries to protract monetary and foreign exchange policies, among other uses, in order to meet the macroeconomic objectives of safeguarding currency stability and to smoothen the normal working of domestic and external payment system. It also serves as an authentic source of funds for the payment of government expenditures overseas, especially those with known import bills for the authorities to meet (Nugee, 1999).

Over the last two decades, there has been a marked increase in the accumulation of external reserves among countries, notably the oil exporting countries of Africa. The substantial accumulation of external reserves by African countries is, however, not unconnected to the European financial crisis of the 1980s which necessitated these countries to build up massive level of reserves as a result of precautionary demand, reflecting the desire for self-insurance against sudden restrictions in their ability to borrow funds from other countries (Allen and Hong, 2011). It is also noted that the bulk of the external reserves accumulation in Asian countries can be attributed to an optimal insurance model that serves as a steady source of liquidity to mitigate the impact of a sudden stop in capital flows (Islam, 2009).

In Africa, the accumulation of external reserves is seen as a defensive strategy to serve as a form of self-insurance precipitate by high level of global economic and financial instability and the absence of an adequate international system for crisis management. In Nigeria, the level of accumulated external reserves has been on the increase since independence in 1960. Despite the unavailability of an articulated policy direction on ground at that time to stimulate economic activities towards projected reserves target through proper reserves management, the country's reserves gradually rose from N343.3 million in 1960 to N13,992.5 million in 1992 before the country converted her reserve holdings to the United States dollar in 1993 (Onoh, 2005).

Similarly, the level of reserves grew from US \$1,330.1 million in 1993 to US \$28,779 million in 2005 and reached an all-time high of US \$62,081.86 billion in September, 2000, US \$72,081.86 billion in September 2004, US \$84,081.86 billion in 2009, US \$108,991.86 billion in September 2008, US \$146,181.86 billion in 2015 and currently, US \$72,081.86 billion in 2019 when oil prices reached an all-time fail of \$147 per barrel (CBN, 2018). This growth in the level of foreign as recorded by Magnus (2007) was attributed to the improvement in macroeconomic fundamentals such internal reforms and the upsurge in oil prices in the international oil market. However, the country witnessed a downswing in the level of reserves as it dropped to US \$42.4 billion at the end of the first quarter of 2009 and further declining to US \$40.7 in the first quarter of 2010 which only financed 15.1 months of foreign exchange disbursement and about 18.9 months of imports cover. In 2011, the country witnessed a further decline in the level of reserve to US \$32.6 billion and in May, 2014 it further nosedived to US \$18.17 and finally, it was further depleted by May, 2018 to US \$10.57 This plunge in the nation's reserve is largely as a result of the volatility of commodity prices in the global economy, particularly the oil market which compelled the CBN to intervene by deploying part of the reserves to defend the value of the naira (CBN, 2018). In defending its stance on massive foreign exchange reserve accumulation, the Central Bank of Nigeria (CBN) compared the nation's foreign reserves level to those of the Asian countries, particularly China whose foreign reserves stood at US \$822 million in 2004 when compared to the nation's reserve of US \$17 billion in the same year (Soludo, 2017, CBN, 2018).

Again, there is an ongoing debate on the relevance of accumulating massive foreign reserves when the economy is almost in depression and the level of inflation, exchange and unemployment rates are rising rapidly seem to be mere waste of resources that should be ploughed back in the building of infrastructures and job creation for the teeming unemployed youths. Also, there is a dearth of studies on the macroeconomic impact of external reserves. While other available studies are focused on the determinants and composition of foreign reserve and its impact on economic growth, very few studies exist on the macroeconomic implication of external reserves accumulation in Nigeria. This study, therefore, is an attempt to deviate from the impact of Nigeria's foreign reserves accumulation on the macroeconomic environment but to cover the impact of macroeconomic aggregates on external reserve statistics in Nigeria, 1981-2019.

The main implication of the theoretical assumptions in this study is that an increase in foreign reserves has significant long-run impacts on several macroeconomic variables in developing countries like Nigeria. However, in the reverse, another implication is that the theoretical assumption in this study is that a decrease in external reserves has significant long-run impacts on several macroeconomic variables in developing countries like Nigeria.

## 1.2 Statement of the Problem

Over the years, an empirical study abounds in finance literature. Some of the works dwell on impacts studies, Kebo (2017), Mwangi (2016), Raustava (2015), Okeke (2014), Nowbuting (2014) all evaluated the impact of trade openness on economic growth. Others are on relationship studies such as Ndibbio (2016), Saddiki (2016) all studied the relationship existing between trade openness and economic growth, some researched on the cause and effect relationship existing between trade openness and economic growth, still other concentrated on exchange rate research such as Ebaidalla (2017), Ismaila (2016), Abakah and Abakah, (2015) all studied the impact of exchange rate on the economy. Also, few works were done on the impact on macroeconomic variable on the economy such as the work of Akater and Farugui (2015).

None of these works to the best of my knowledge was carried out on the impact of macroeconomic variables on external reserve in Nigeria. This study is poised to fill this important gap by evaluating the impact of macroeconomic variables on external reserve in Nigeria, 1981-2019.

## 1.3 Objective of the Study

The broad objective of this study was to examine the impact of macroeconomic variables on external reserve in Nigeria, 1981-2019, while the specific objectives were to:

- i) Assess the impact of trade openness on external reserve in Nigeria.
- ii) Ascertain the effect of exchange rate on external reserve in Nigeria.
- iii) Investigate the influence of balance of payment on external reserve in Nigeria.
- iv) Examine the impact of gross domestic product (GDP) on external reserve in Nigeria,

## 1.4 Research Questions

Based on the above objectives, this study sought to provide answers to the following research questions

- i) How far did trade openness impact external reserve in Nigeria?
- ii) To What extent did exchange rate affect external reserve in Nigeria?
- iii) How far did balance of payment influence external reserve in Nigeria?
- iv) To what extent did gross domestic product (GDP) impact external reserve in Nigeria?

### 1.5 Statement of Hypotheses

In view of the research questions raised above, the following null hypotheses were formulated for this research.

- i) Trade openness had no positive and significant impact on external reserve in Nigeria, during the review period.
- ii) Exchange rate had no positive and significant effect on external reserve in Nigeria, throughout the period under review.
- iii) Balance of payment had no positive and significant influence on external reserve in Nigeria, over the review period.
- iv) Gross domestic product (GDP) had no positive and significant impact on external reserve in Nigeria, within the period under consideration.

### 1.6 Scope of the Study

The study is to examine the impact of macroeconomic on external reserve in Nigeria, 1981-2019. The scope covers the variables in the objectives of the study. The scope of the study covered the period from 1981 to 2019 and also covered these selected macroeconomic. In 1981, there was a deep international structural adjustment programme meant for financial liberalization measurement. So, 1981 was chosen because it covered the period of this SAP era, hence the choice of 1981 as base year. In order to manage the ripples deregulation, 2019 was chosen as the cross bar because it provided all the residual values needed to measure currency of this study in Nigeria.

### 1.7 Significance of the Study

The study will be useful to the following group of people.

#### i) Academics

It will further develop the players in the African financial system, students, academicians and researchers which in turn draw their attention to the nexus between macroeconomic variables and external reserve statistics in Nigeria, and also provide literature materials for future studies.

#### ii) Policy Makers

External reserve is one of the hubs in financial systems/markets that influence macroeconomic aggregates. Understanding these markets by policy makers would enhance their development and performance. The study will further broaden our knowledge on the operations of the financial markets and would help build awareness among investors on the general activities of the financial market, which could translate to increased investments, economic growth and development.

#### iii) General Public

The study will also provide an assessment base on global economic recession and the extent of its future prevention and control. The general public will also gain insights into the economic implications of external reserve and global recession and would be guided properly to absorb shocks of future recession. The study will act as enlightenment for public and economic watchers who criticize and expose the regulators of government policies.

### 1.8 Limitations of the Study

This study was limited on its inability to update the data used for analysis up to the year 2020. This study was further weakened by its failure to examine the casual relationships between all the macro economic variables (except trade openness, exchange rate, balance of payment and GDP) and external reserve in Nigeria.

## 2. Review of Related Literature

### 2.1 Conceptual Review

A number of concepts make up the topic of our research, which are reviewed as follows;

#### 2.1.1 External Reserve

Onyeiwu (2010) define external reserve as the reserve derived from the excess of exchange. It is a reserve created in Nigeria due to oil boom or excess crude. The stability of any country is dependent on their international reserve. When the international reserve is high, financing disequilibrium in the capital account and exchange rate risk management became essay as used during the Babangida regime of 1986. The fixing of naira to N22 to one US dollar was financed from the international reserve. However, the influence of international reserve is assumed to be negative in the face of exchange rate risk crises. The link between the premium and international reserve shows that an increase in the level of international reserve reduce the demand for foreign exchange in the parallel market as the supply increases in the official market thereby ending up in lowering the parallel premium. On the other hand, the official rate and the back market rate follow a random effect. While international reserve has a negative impact on economy when black market of foreign exchange is used, its impact continues to increase if the country fails to efficiently manage their foreign exchange crises.

kendivali (2017) sees external reserve as those external assets that are readily available to a country and controlled by the monetary authorities for meeting balance of payment financing needs, intervention in foreign exchange market so as to affect currency exchange rate and for other related purposes such as maintaining confidence in the currency management and economy as well as acting as collateral for foreign borrowing.

Kayoed (2016) define international reserve as the distinction between resident and non-resident of a country in the currency union. Here, the reserve assets include monetary gold, special drawing rights, reserve position with international monetary fund and other forms of reserve assets.

Okogi (2017) recorded that almost all countries in the world regardless of the size of their economy held significant foreign exchange reserve in the US denominated. The most traded global currency are now the US dollars, the British pounds, sterling, The Euro, Chinese Yean, Japanese yard and France franc. Many theorists believe that it is in the best interest of a country to hold foreign currency so as to serve as a shock at the event of economic crises.

However, international reserve are all assets denominated in foreign currency which include gold held by central bank that are used in the intervention of exchange rate crises or used to influence the peg of exchange in the exchange management of a country.

Gosselin and Parent (2005) state that there is a relatively stable long run reserve demand function that depends on five categories of explanatory variables; economic size, current account vulnerability, capital account vulnerability, exchange rate flexibility, and the opportunity cost. Reserve holding is expected to increase with economic size and the volume of international transactions. Thus, in view of the nature of commodity base production and oil export in Nigeria, both the level and growth rate of output are expected to influence reserve accumulation. Increased current and capital account vulnerability should motivate central banks to hold more reserves, while exchange rate flexibility reduces demand for reserves. Economic theory predicts that the higher the opportunity cost of holding reserves the lower the demand for reserves. In their own contribution, Burkee and Lane (2001) opine that, apart from trade openness, financial depth and external indebtedness also influence the demand for international reserves. Aizenman and Marion (2004) observe that the size of international transactions; their volatility, exchange rate arrangement and political stability are some of the key determinant of international reserve holdings in most East Asia. Focusing on Korea,

Adam and Leonce (2007) investigated the crowding out effect of external reserves on both public and private investment, Real GDP growth, domestic credit to public sector (for public investment) and interest rate and exchange rate expectations (for private investment) served as additional variables to external reserves. The same study considered monetary variables such as interest rates, inflations rate, as additional variables to external reserve in exchange rate equation and finally, only the lag value of inflation rate was added for inflation equation. All these illustrations were done to explain the meaning of external reserve statistics to the audience.

### 2.1.2 Macroeconomic variable

Macroeconomics is the branch of economics that studies the behavior and performance of an economy as a whole. It focuses on the aggregate changes in the economy such as unemployment, growth rate, gross domestic product and inflation. Jhingan, (2006) defines Macroeconomics is the branch of economics that studies the behavior and performance of an economy as a whole. It focuses on the aggregate changes in the economy such as unemployment, growth rate, gross domestic product and inflation. Macroeconomics analyzes all aggregate indicators and the microeconomic factors that influence the economy. Government and corporations use macroeconomic models to help in formulating of economic policies and strategies. Macroeconomics is a branch of economics that studies how an overall economy the market systems that operate on a large scale behave. Macroeconomics studies economy-wide phenomena such as inflation, price levels, rate of economic growth, national income, , and changes in unemployment. Some of the key questions addressed by macroeconomics include: What causes unemployment? What causes inflation? What creates or stimulates economic growth? Macroeconomics attempts to measure how well an economy is performing, to understand what forces drive it, and to project how performance can improve. Macroeconomics deals with the performance, structure, and behavior of the entire economy, in contrast to microeconomics, which is more focused on the choices made by individual actors in the economy (like people, households, industries, etc (Udabah, 2000).

### 2.1.3 Trade Openness in Nigeria

Trade Openness refers to the outward or inward orientation of a given country's economy. Outward orientation refers to economies that take significant advantage of the opportunities to trade with other countries, while Inward orientation refers to economies that overlook taking or are unable to take advantage of the opportunities to trade with other countries. Trade openness measures the international competitiveness of a country in the global market. To measure trade openness, we use the addition of imports and exports over GDP. Increased production facilitates greater integration into global markets. Trade openness is interpreted to include import, export taxes, exchange-rate policies, and domestic taxes and subsidies, competition and other regulatory policies, education policies, the nature of the legal system, the form of government, and the general nature of institution and culture (Baldwin, 2002). Trade has long been identified as a veritable way through which the quest of nations for improved well-being of their citizens could be achieved. Adam Smith recommended division of labour and specialization, and the pursuit of foreign trade as a way of increasing the wealth of nations (Obadan, 2008). He went further to state that division of labour was limited by the size of the domestic market (Bakare, 2011). In recent years, openness has played an increasingly important role in the growth. The Adam Smith and Ricardo traditional models explained that openness would promote specialization. Thus, countries specialize in the production of goods and services that they have advantages and export such goods and services. On the other hand, countries without such advantages will import from those countries and specialize in other types of goods and services. As a result, resources are more optimally allocated. In the early and mid-1980s Nigeria made important changes in trade policy, aimed at reducing trade barriers and fostering export activities. This was in striking contrast to trade policies followed in the 1960s and 1970s, when they followed the policy of import substitution which, given its failure to promote sustainable growth and employment, fell prey to growing criticism in the 1980s. One of the Nigerian governments' main reasons for pursuing this trade-oriented policy was to foster growth and productivity (Tamayo, 2004). These changes in trade policies included a tariff reform, important reductions in import restrictions, export promotion laws, the modernization of trade institutions, and the simplification of trade procedures.

#### 2.1.4 Balance of Payment

Balance of payment is a concept where importation is used to balance with exportation. The exchange rate of foreign currencies is dependent on the country's balance of payment position. A favourable balance of payment raises the exchange rate in the capital account, while an unfavourable balance of payment reduces the exchange rate. Thus, this concept implies that exchange rate is determined by the demand and supply of foreign exchange which was sourced through balance of payment, external reserve, payment of external debt etc. (Dada & Oyeranti, 2012) Ocampo (2012) expresses that the demand for foreign exchange arises from the debit side of the balance of payments. It is equal to the value of payment made to the foreign countries for goods and services purchased plus loans and investment. The supply of foreign exchange arises from the credit side of the balance of payment. It equals all payment made by the foreign country to our country for goods and services purchased from us plus loans disbursed and investment made in this country. The balance of payment balances if debit and credit are equal. If debit exceeds credit the balance of payment is unfavorable. On the contrary, if credits exceed debit, it is favorable. When the balance of payment is favorable, exchange rate is controlled. (Kiprop, 1994) expressed that the demand for foreign currency is more than its supply. This caused the external value of the domestic currency to fall in relation to the foreign currency. Consequently, the exchange rate falls. On the other hand, in case the balance of payment is favorable, the demand for foreign currency is less than its supply at any given exchange rate. This cause the external value of the domestic currency to raise in relation to the foreign currency, consequently, the exchange rate also rises.

#### 2.1.5 Exchange Rate

An exchange rate is the rate at which one currency will be exchanged for another. Exchange rate is defined as the value of one currency for the purpose of conversion to another. The Exchange rate of the dollar against the naira. There are two types of exchange rate, namely Real exchange rate and Nominal exchange rate. Nominal exchange rate is defined as the number of the domestic currency that can purchase a unit of a given foreign currency. Nominal exchange rate is the representation of one currency in terms of the other. Whereas, the Real exchange rate is the weighted average of a country's currency in relation to an index of other major currencies. It is also the ratio of foreign prices to domestic prices, measured in the same currency. Ayodele (2009) opined that Real Exchange Rate (RER) is the rate of traded weighted average of real exchange rate between two countries and these trading partners. The weight reflects the proportion of imports over exports. This type of exchange rate is used by CBN as official exchange rate. Nominal Exchange Rate (NER); this is the weighted average of nominal exchange rate between one country and its partners. For policy makers, exchange rate policies in practice require the adjustment of the nominal rate to achieve real effective exchange rate equilibrium. While this possible in the short run, it is debatable if the long run equilibrium value to the real exchange rate can be properly targeted govern the fact that the long-run equilibrium.

#### 2.1.6 Economic Growth

Ndebbio (2004) sees economic growth as the increase in physical production in all the three sectors of the economy: agricultural, production industry and various services were referred as economic growth. An increase in economic growth need not bring an increase in economic development. This is because; the increased production may be consumed by the increased population. Hence, Okonkwo (2011) increase in production experienced in all the three sectors should be sufficient not only to cater to the needs of population but also provide some surplus for the economy to grow. The financial services have to play a supportive role in channeling the savings and investment so that growth can be achieved.

Bakang (2015) defines economic growth as the increase in the capacity of the economy to produce goods and services from one period of time to another. This exists when the productive capacity of a country increase. Based on the fact that economic growth measures total production for a country, it therefore connotes the market value

of all the final goods and services including personal consumption, government purchases, and private inventories paid in construction costs and their foreign trade balance.

## 2.2 Theoretical Review

### 2.2.1 Endogenous Growth Theory

This is a theory propounded by Paul Romer in 1980 called the New Growth theory. This theory was developed in the 1980's as a response to criticism of the neoclassical growth model. The endogenous growth theory holds that trade policy measures such as trade openness can have an impact on the long run growth rate of an economy. For example, a subsidy on research and development or education increases the growth rate in some endogenous growth models by increasing the incentive to innovate. The main implication of recent growth theory is that policies which embrace openness, competition, change and innovation will promote growth. Conversely, policies which have the effect of restricting or slowing change in trade by projecting or favoring particular industries or firms are likely over time to slow growth to the disadvantage of the community. The theory of endogenous growth assumes that technology is developed internally. As an aftermath of openness, developing countries build their profit and productivity by utilizing new advances, consequently bringing about an expanded production (Jin, 2000). According to the endogenous growth theories, an increment in trade openness would positively improve technology and thus increase production. A study by Levine and Renelt (1992) indicated that openness to trade would encourage foreign direct investment as a result of reduced tariffs, thus increasing long-term growth. In another previous study, Grossman and Helpman (1995) stated that a reduction in tariffs would positively affect the resources allocated to R&D. In a microeconomic framework, exporting firms are more expert and technology oriented than non-exporting firms because exporting firms are more exposed to more intense competition as compared to those firms that focus only on the domestic market (López, 2005). Based on the various empirical reviews, this study adopted this growth theory because the level of trade openness determines economic growth. When trade openness is low, economic growth will be affected but when openness is high, growth rate will equally be high.

## 2.3 Empirical Review

Keho (2017) examined the effect of trade openness on economic growth in Cote d'Ivoire over the period 1965 and 2014 using the Autoregressive Distributed Lag bounds test to cointegration the trade openness and economic growth. Result reveals that trade openness has a positive and significant effect on economic growth of Cote d'Ivoire over the period, also, there is a long run relationship existing between trade openness and economic growth in the country over the period. The study concludes that that trade openness drives economic growth. Hence, all trade policies that restrict trade openness should be avoided to encourage reasonable number of trade volume amongst nations of the world.

Mwngi (2016) investigated the impact of trade openness to economic growth in Malaysia using ordinary least square from 1980-2014. Result reveals that trade openness proxied by the ratio of exports and imports to GDP positively and significantly impacted on the economic growth of Malaysian both in the short and long run. It was concluded adequate management of trade policies can improves the economic growth of the country under the study.

Ndebbio (2016) examined the relationship between economic growth and trade openness in Nigeria from 1981-2015 using correlation matrixes. Result from the analysis reveals that trade openness and economic growth has a positive and significant relationship with economic growth in Nigeria. t was concluded adequate management of trade policies can improves the economic growth of the Nigeria.

Siddiki (2016) examined the cause and effect relationship existing between trade openness and economic growth in Rwanda from 1996-2015 using granger causality estimation. Result reveals that trade openness had bidirectional causality with economic growth but importation and exportation had a unidirectional relationship existing among the variables under study.

Sakyi, Villarverde & Maza (2015) investigated the cause and effect relationship between trade openness and economic growth of a sample of 115 developing economies in Asia from the period 1970–2009 using panel data. Granger causality estimation was adopted in the analysis. Result from the investigation reveals that there is bidirectional among some historical data of some countries, some have unidirectional relationship while few shows no relationship existing in the variables of trade openness proxied by trade volume ratio of export and economic growth represented by GDP, The study concludes that trade openness causes economic growth but usually on a unidirectional directional because 80 countries have a unidirectional characteristics between trade openness and economic growth in the 115 country used in the panel sample.

Raustava (2015) investigated the impact of trade openness to economic growth of Croatia using VAR from 1975-2013. Econometric evidence reveals that there are there are block exogeneity existing between trade openness and economic growth in Croatia. Also, there is no individual exogeneity existing between the variables of interest.

Munozu (2014) examined the contribution of effective trade policies in the growth and development of the economy in Zimbabwe, 1986-2012, using ordinary least square regression. Result reveals that trade policies in the country positively and significantly impacted on the economic growth of Zimbabwe under the scope of the study.

Okeke, (2014) examined the impact of trade openness on economic growth in Nigeria from 1981-2013 using OLS regression and Johnson cointegration approach. Result found that trade openness has a positive and significantly impact on economic growth in Nigeria. An estimate from the variables reveals that there is a long run relationship called cointegration existing between trade openness and economic growth for the periods of the study in Nigeria. The study concludes that that trade openness drives economic growth. Hence, all trade policies and tariff that restrict trade openness should be avoided to encourage reasonable number of trade importation and exportation amongst nations of the world of trade.

Nowbutsing (2014) examined the impact of trade openness on economic growth in Indian Ocean Rim Countries over the time period 1997 to 2011 using Fully Modified Panel Ordinary Least Square. Result reveals that trade openness has a positive and significant impact on economic growth of Indian Ocean Rim Countries over the time period 1997 to 2011. Estimated from the variables reveals that there is a long run relationship existing between trade openness and economic growth for Indian Ocean Rim Countries over the time period 1997 to 2011. The study concludes that that trade openness drives economic growth. Hence, all trade policies and tariff that restrict trade openness should be avoided to encourage reasonable number of trade importation exportation nexus amongst nations of the world.

Ebaidalla (2017) examined the impact of Foreign exchange parallel premium to macro-economic performance in Sudan using vector auto regressive model. Results reveal that Foreign exchange parallel premium positively and significantly affected by policy variable such as real and effective exchange rate, trade openness and money supply but negatively and significant affect GDP, expected rate of devaluation and foreign aid. The study concluded that narrowing official and black market exchange rate will contain inflationary pressure, improve the economic performance of Sudan with more emphases on boasting the economic growth.

Ismaila (2016) examined the long run impact exchange rate depreciation to Nigerian economic growth during the SAP and post SAP period (1986 – 2012) using Johansson cointegration test. Result shows that exchange rate depreciation has a positive and significant impact on broad money supply; net export and total government expenditure in the long run while exchange rate depreciation has direct negative and non-significant response to Nigerian economy in both short and long run. This implies that exchange rate depreciation during SAP has robust effect on GDP and advised that policy makers should not only rely on exchange rate depreciation but use policy instrument to induce economic growth. Also, the study should use it to compliment other macro-economic variables such as monetary and fiscal policies.

Abakah and Abakah (2016) explored the impact of foreign exchange reserves on stock market growth in Ghana using a monthly data for the period of December 2001 to December 2015. Analytical tools used were Ordinary Least Square (OLS) regression techniques, co-integration test, and Granger causality test. The authors discovered that enhanced foreign exchange reserves will bolster stock market growth in Ghana. Particularly, the study provided that foreign exchange reserve has a significant positive impact on stock market capitalization in Ghana; and that a unidirectional relationship exists between foreign exchange reserve and stock market capitalization in Ghana.

Akhter and Faruqi (2015) explored the effects of macroeconomic variables on exchange rates in Bangladesh for the periods (1981-2013). The study captured export amount, remittance, import amount and foreign currency reserve as independent variables and exchange rate as the dependent variable. The study employed correlation and regression analysis techniques and found that macroeconomic variables significantly influenced the exchange rate in Bangladesh. The study particularly discovered that after adopting the floating exchange rate regime, Bangladesh experienced positive impacts on macroeconomic development of the country but to manage efficiently free-floating exchange rate regime in developing countries like Bangladesh, the central bank and the government may establish strict control over the foreign exchange business, to control inflation rate, increase export, reduce trade deficit and increase foreign currency earnings.

Shobande and Odeleye (2015) assessed the effect of exchange rate to economy using Nigeria as a case study from 1970 – 2012. Ordinary least square regression technique was used as a method of estimation. Result reveal that exchange rate has a negative and significant impact on output performance and gross capital formation in Nigeria but positively impacted on the broad money supply and other fiscal policies. The study concluded that appropriate policy that will encourage stabilization of exchange rate which will boost national output and as well encourages investment.

Ayodele and Obafemi (2015) examined the fiscal and quasi fiscal effect of the Foreign exchange parallel premium to Nigeria GDP using OLS regression. Result reveals that the politics of Foreign exchange parallel premium and its behavior causes a negative and significant shock on GDP. The study concluded that unification of real and effective exchange rate with black market exchange rate will prevent necessitation, depreciation and instability in the economic system.

Ebiadalla and Abidalla (2014) studied the impact of Foreign exchange parallel premium to macroeconomic variable in Sudan using Auto regressive distributed lag model. Result reveals that Foreign exchange parallel premium in Sudan negatively and significantly impact on the flow of migrants' remittance and as well the GDP in Sudan. It was also founded that Foreign exchange parallel premium positively improves foreign aids, encourage trade openness and influences real effective exchange rate. It was recommended that monetary authorities should eliminate foreign exchange black market by equating the demand of foreign exchange with the supply at any given period.

Oleke, Eyisi and Mgbodile (2014) examined the empirical analysis of the impact of foreign exchange rate to the growth of Nigeria economy using multiple regression models. Econometric result reveals that exchange rate impacted negatively and significantly to growth in money supply on the economy as well as increase inflation, GDP and unemployment. They concluded that monetary authorities should be responsive in tackling inflation first before they combat exchange rate variability.

Akpan and Patrick (2014) examined the implication of foreign exchange movement to exportation and economic growth in a petroleum based economy, evidence from Nigerian using ordinary least square technique. Result reveals that exchange rate positive impacted to exportation and negative on economic growth in Nigeria. The study concluded that exchange rate should be properly managed to bridge the saving investment gap, enhance government revenue as well as reduce fiscal imbalance created by gap in exchange rate instability and finally to sustain economic growth.

Eme, Akpan, Joshua, and Atan (2014) investigated the effect of exchange rate movements to economic growth of Nigeria using generalized method of moment regression technique. The estimated result suggested that there is no evidence of strong direct effects between changes in exchange rate and output growth. Rather, Nigerian economy has been affected negatively by exchange rate behavior. The study concluded that improvement in the management of exchange rate with broad reform in exchange rate management will enhance improvement of exchange rate so as to contribute to the economic growth.

## 2.4 Review Summary

From the empirical evidence carried out above, some of the reviews that was carried out on macro-economic variables centers on impact of trade openness on the economic growth and or effect of trade openness on the economic growth. Others were investigating the cause and effect relationship between trade openness on the economic growth while others are on the relationship between trade openness on the economic growth; some went further to study impact of exchange rate on the economy while others dwell on the impact of macroeconomic variables on the economic growth.

### 2.4.1 Knowledge Gap

This study deviated from numerous empirical evidences to cover the impact of macroeconomic variables on external reserve in Nigeria. The gap created is that this study examined the impact of macroeconomic variables on external reserve in Nigeria, 1981-2019.

Most of the works done on impact of macroeconomic variables was done using panel survey, granger causality, generalized method of moment regression as well as ordinary least square regression, this study adopted auto regressive distributed lag model which form the high light of the knowledge gap which this study attempts to fill.

## 3 Methodology

### 3.1 Research design

This study adopted the expost-facto research design. The expost-facto research design is described as after-the-fact research (Onwumere, 2009). This is suitable for the work given that it is based on an already completed event and the researcher is meant to analyze the outcomes of the already completed event and draw reasonable conclusions.

### 3.2 Nature and Sources of Data

All the data to be employed for this work will be time series, secondary and purely quantitative. They are drawn from sources such as The Statistical Bulletins of Central Bank of Nigeria and the World Bank development indicator. They are annualized time series data because they have a natural time ordering covering the period 1981 to 2019 which is a period of 38 years.

### 3.3 Model Specification

The study used a regression model. This study adopted a model used by Ebiadalla and Abidalla (2014). The model used by Ebiadalla and Abidalla (2014) was the Auto regressive Distributed lag model. (ARDL). The model for this work is a special Classical multiple Regression Model called Auto regressive Distributed lag model. (ARDL). Ebiadalla and Abidalla (2014) Model=GDP=f(FEPP). With the same specification, this study adopted the above where FEPP is used as a dependent variable and MEV as independent variable, Thus:

$$FEPP = f(MEV)$$

$$FEPP_t = \beta_0 + \beta_1 FREM_t + \beta_2 GDP_t + \beta_3 FAI_t + \beta_4 TOP_t + \beta_5 EXR_t + \beta_6 FEPP_{t-1} + \beta_7 FREM_{t-1} + \beta_8 GDP_{t-1} + \beta_9 FAI_{t-1} + \beta_{10} TOP_{t-1} + \beta_{11} EXR_{t-1} + \dots + U_t$$

As a modification to the above, study introduces selected macroeconomic variables that are interrelated closely in determining external reserve position in the country and that was why the study used selected macroeconomic aggregates and also used. Autoregressive Distributed Lag Model to capture both the baseline and lagged relationship among the variables under study. Then, the model for this study adopted the above model of Ebiadalla and Abidalla (2014) but was re-modified so that external reserve will be endogenized as well and other macro-economic aggregates that relates to exchange rate will be exogenized. To ensure linearity and trimming down the data size without losing its real value, the variables were logged transformed. The model used for this study is written thus:

$$\text{EXTRSV} = f(\text{TOP}, \text{EXR}, \text{BOP}, \text{GDP})$$

$$\text{EXTRSV}_t = \beta_1 \text{TOP}_t + \beta_2 \text{REER}_t + \beta_3 \text{BOP}_t + \beta_4 \text{GDP}_t + \dots \text{Et} \dots \dots 1$$

Where,

GDP = Gross Domestic Product.

BOP = Balance of payment.

EXTRSV = External Reserve.

TOP = Trade openness

$\beta_0$  = Coefficient of Equilibrium.

U = Stochastic/Error Term.

$\beta_1, \beta_2, \beta_3, \dots, \beta_{10}$  = Proxies of the Coefficient of the parameter estimates.

t = Time series data.

$t-1, t-2, \dots$  = Lag values of the variables

LN = Log form of the variables

$\beta_n X_{nt-n}$  = Lag of Variables to infinity.

### Disaggregation the model based on hypotheses.

#### Model 1 = Hypotheses one

Trade openness had no positively and significantly impact on external reserve in Nigeria during the review period.

$$\text{EXTRSV}_t = B_0 + B_1 \text{TOP}_t + \beta_2 \text{EXTRSV}_{t-1} + B_3 \text{ROP}_{t-1} \dots \dots \dots + E_t \quad (2)$$

Where: EXTRSV = External reserve

TOP = Trade openness

#### Model 2 = Hypotheses two

Exchange rate had no positively and significantly impact on external reserve in Nigeria during the review period.

$$\text{EXTRSV}_t = B_0 + B_1 \text{EXR}_t + \beta_2 \text{EXTRSV}_{t-1} + B_3 \text{EXR}_{t-1} \dots \dots \dots + E_t \quad (4)$$

Where: EXTRSV = External reserve

EXR = Exchange rate,

#### Model 3 = Hypotheses 3

Balance of payment had no positively and significantly impact on external reserve in Nigeria during the review period.

$$\text{EXTRSV}_t = B_0 + B_1 \text{BOP}_t + \beta_2 \text{EXTRSV}_{t-1} + B_3 \text{BOP}_{t-1} \dots \dots \dots + E_t \quad (5)$$

Where: EXTRSV = External reserve

BOP = Balance of payment

#### **Model 4 = Hypotheses 3**

Gross domestic product had no positively and significantly impact on external reserve in Nigeria during the review period.

$$\text{EXTRSV}_t = B_0 + B_1\text{GDP}_t + \beta_2\text{EXTRSV}_{t-1} + B_3\text{GDP}_{t-1} + E_t \quad (6)$$

Where: EXTRSV = External reserve

GDP = Gross domestic product

### **3.4 Description of Research Variables**

#### **Balance of payment**

Balance of payment can be defined as a concept where importation is used to balance with exportation. The exchange rate of foreign currencies is dependent on the country's balance of payment position. A favorable balance of payment raises the exchange rate in the capital account while an unfavorable balance of payment reduces the exchange rate. Thus, this concept implies that exchange rate is determined by the demand and supply of foreign exchange which was sourced through balance of payment.

The above variables as indicated are exchange rate econometric variable which are employed as regressor to the parallel market premium. These variables were also used by the above researchers and were consistent with the body of the literature.

#### **External reserve**

External reserve can be defined as a reserve as the reserve derived from the excess of exchange. It is a reserve created in Nigeria due to oil boom or excess crude. The stability of any country is dependent on their external Reserve otherwise called international reserve. When the international reserve is high, financing disequilibrium in the capital account and exchange rate risk management became essay as used during the Babangida regime of 1986. The fixing of naira to N22 was financed from the international reserve. But the influence of international reserve is assumed to be negative in the face of exchange rate risk crises.

#### **Economic Growth**

Bakang (2015) defines economic growth as the increase in the capacity of the economy to produce goods and services from one period of time to another. This exists when the productive capacity of a country increase. Based on the fact that economic growth measures total production for a country, it therefore connotes the market value of all the final goods and services including personal consumption, government purchases, private inventories paid in construction costs and their foreign trade balance.

#### **Exchange Rate**

Ayodele (2009) opined that Real Exchange Rate (RER) is the rate of traded weighted average of real exchange rate between two countries and these trading partners. The weight reflects the proportion of imports over exports. This type of exchange rate is used by CBN as official exchange rate. Nominal Exchange Rate (NER); this is the weighted average of nominal exchange rate between one country and its partners.

## **Trade Openness**

Trade Openness refers to the outward or inward orientation of a given country's economy. Outward orientation refers to economies that take significant advantage of the opportunities to trade with other countries, while Inward orientation refers to economies that overlook taking or are unable to take advantage of the opportunities to trade with other countries. Trade openness measures the international competitiveness of a country in the global market. To measure trade openness, we use the addition of imports and exports over GDP. Increased production facilitates greater integration into global markets. Trade openness is interpreted to include import, export taxes, exchange-rate policies, and domestic taxes and subsidies, competition and other regulatory policies, education policies, the nature of the legal system, the form of government, and the general nature of institution and culture

### **3.5 Techniques of Analysis**

#### **3.5.1 Auto regressive Distributed lag model (ARDL)**

Auto regressive Distributed lag model (ARDL) formed the method of data analysis. ARDL was chosen over the ordinary least square regression (OLS) because ARDL is a dynamic model, while OLS is a static model. (Pesaran and Shin, 1999). Other reasons responsible for the choice of ARDL are: ARDL bound test is more appropriate for a sample size that is small. Usually sample size that is less than 40 observations. (Pesaran and Shin, 1999), Therefore, the justification of the choice of the model arises from the fact that ARDL techniques is more superior than the OLS traditional approach.

## **4 Data Presentation, and Analysis and Interpretation**

### **4.1 Data Presentation**

**Table 4.1. External reserve statistics and macroeconomic aggregates in Nigeria, 1981-2019.****Table 1:**

YEAR	LNEXTRSV	LNBOP	LNTOP	LNGDP	REER
1981	7.8004	8.4460	5.5226	4.5467	0.61
1982	6.9501	9.6157	5.2522	4.6152	0.67
1983	5.4134	7.0879	4.8670	4.7010	0.72
1984	6.5654	8.4460	4.7632	4.7559	0.76
1985	7.4133	8.7332	4.8545	4.9022	0.89
1986	7.9503	8.0315	4.7147	4.9023	2.02
1987	8.9232	7.1150	5.1262	5.2633	4.02
1988	8.5619	8.4200	5.0189	5.5732	4.54
1989	8.0221	7.6009	4.8402	5.9461	7.4
1990	8.4209	8.7438	5.0759	6.1583	8.03
1991	8.3306	9.6157	5.6489	6.3020	9.91
1992	7.3489	10.2027	5.9406	6.7746	17.3
1993	7.2651	8.9687	5.8322	6.9936	22.05
1994	9.1059	8.4507	4.9728	7.2440	21.89
1995	7.3846	12.6523	5.6443	7.9750	21.89
1996	8.1326	12.9635	5.6763	8.3020	21.89
1997	8.8849	13.5154	5.2891	8.3402	21.89
1998	8.8689	11.2594	5.4061	8.2914	21.89
1999	8.5986	13.9572	6.0407	8.4508	92.69
2000	9.1469	14.5827	6.2085	8.8118	102.11
2001	9.2366	13.9055	6.0293	8.8385	111.94
2002	8.9465	13.9228	6.0240	8.9613	120.97
2003	8.9183	13.9862	6.2297	9.2016	129.36
2004	9.7383	15.0858	6.3772	9.3423	133.5
2005	10.2499	15.3927	6.3543	9.5895	132.15
2006	10.6524	15.3486	6.3357	9.8290	128.65
2007	10.8460	14.8284	6.2784	9.9358	125.83
2008	10.8780	15.6512	6.2721	10.0988	118.56
2009	10.6544	15.6512	6.2518	10.1183	148.88
2010	10.3840	15.6512	5.4622	10.9080	150.3
2011	10.3932	16.0699	6.1430	11.0505	153.8
2012	10.6880	16.6380	5.9697	11.1804	111.39
2013	10.6653	15.7936	5.5814	11.2908	118.82
2014	10.4411	16.0048	5.5831	11.3968	127.1
2015	10.6129	16.3457	5.7182	11.4525	126.07
2016	10.3996	15.4127	5.5017	11.5045	130.02
2017	10.4411	16.0048	5.5831	11.3968	127.1
2018	10.6129	16.3457	5.7182	11.4525	126.07
2019	10.3996	15.4127	5.5017	11.5045	130.02

Sources: CBN Statistical Bulletin (2020) See Appendix 1

## 4.2 Results and Analysis

### 4.2.1 Tests of Unit root using Philip and Peron

In an attempt to confirm the order of integration of the series under study thereby confirming their suitability for a linear combination in the form of a model, the unit root test following the form specified as Philip and Peron Test was used. Table 4.3 below represents a summary of the unit root result that was stationary.

**Table 4.2: SUMMARY OF UNIT ROOTS TEST RESULTS**

Variable	PP Statistic	Critical Values @ 5%	Probability Value	Inference
LNEXTRSV	-6.3222	-3.5484	0.0000	I(1)
LNTOP	-4.5527	-3.5485	0.0048	I(1)
LNBOP	-3.88576	-3.5443	0.0000	I(0)
REER	-7.0344	-3.5415	0.0000	I(1)
GDP	-7.0344	-3.5415	0.0000	I(1)

Source: Author's e-view 10 output with data in Appendix One.

From the result of Philip and Peron unit root test contained in table 4.2, Foreign Exchange Parallel Premium, Gross Domestic Product and External Reserve are all integrated of order 1(1). On the other hand, Balance of payment is integrated at I(0) meaning that is stationary at levels. Given this different order of integration, the Ordinary Least Square Regression Method was given up in preference for the Autoregressive Distributed Lag Model which tolerates such stationary property combination. In addition, the sample size is also good enough for the ARDL given that its estimates remain robust and consistent in the face of not too large sample size and finally good for data characterized with structural breaks. Also, the variable of FEPP, GDP and EXTRSV are log transformed to bring down the data size and ensure linearity.

#### 4.2.2 Descriptive Statistics/ Standard tests for Normality

The statistical properties of the data sets are seen as vital determinants of their behaviors when used in econometric analyses. On the basis of this, the researcher presented in this section, the basic descriptive statistics called Normality test of the variables under study.

**Table 4.3: Basic Descriptive Statistics/ Standard tests for Normality:**

	LNEXTRSV	LNBOP	LNTOP	LNGDP	REER
Mean	9.083294	12.61184	5.631068	8.407771	72.65923
Median	8.946518	13.92287	5.644389	8.811886	102.1100
Maximum	10.87805	16.63803	6.377256	11.50451	153.8000
Minimum	5.413430	7.088000	4.714719	4.546799	0.610000
Std. Dev.	1.417659	3.308917	0.504266	2.401643	59.61105
Skewness	-0.489900	-0.402127	-0.214660	-0.246431	-0.094033
Kurtosis	2.421488	1.508840	1.932522	1.717918	1.167849
Jarque-Bera	2.103862	4.664376	2.151214	3.065802	5.512237
Probability	0.349263	0.097083	0.341091	0.215908	0.063538
Sum	354.2485	491.8616	219.6117	327.9031	2833.710
Sum Sq. Dev.	76.37073	416.0594	9.662816	219.1798	135032.1
Observations	39	39	39	39	39

Source: Author's e-view 10 output with data in Appendix One.

Table 4.3 contains the basic measures of central tendency, spread and variations calculated on the different series of the dataset. All the variables are negatively skewed to the left showing the degree of their departure to the line of symmetry. Also, the Kurtosis of the distribution is less than 3 meaning that they are leptokurtic and are not peaked. Of particular interest is the Jarque-Bera (JB) statistics which is a test for normality. It is a combined test of Skewness

(S) of zero (0) and a kurtosis (K) of three (3), which are signs of a Mesokurtic distribution. In this case, however, the JB statistics shows that the variables are tending to 3 which are signs of Mesokurtic. The assumption of normality is accepted by the JB statistics, as well as the (K) and (S) figures. This, however, does not affect the goodness of the data for the estimation in this study as the kurtosis of all the variables are between 2 and 3 and the Skewness above 0-1 which is consistent with the properties of most financial time series.

### 4.3 Test of Hypothesis

The formulated hypotheses were tested using the Autoregressive Distributed Lag Model (ARDL) Base line test for hypotheses in a stepwise testing process, the following steps were adopted in this study:

#### Step I: Restatement of the hypotheses in null and alternate forms,

This is done by stating both the null called negative hypotheses and alternate, expected or researchers hypotheses which will be subjected to testing using the approved methodology. Under this, ARDL was used.

#### Step II: Presentation and discussion of the results arrived at using the estimation Technique.

Presentation of data was done after estimation of the methodology. The methodology was presented without adding or subtracting any output. Interpretation was done on what was estimated and presented. Any alteration invalidates the result.

#### Step III: Statement of Decision criteria

This is done by adopting a special decision criterion as the base of judgment. This decision criterion must be applied to every hypothesis so that it can be tested and result deduced. The decision criteria was presented thus, Accept  $H_0$  if the sign of the coefficient of the parameter estimates is negative, otherwise reject  $H_0$  and accept  $H_1$  when the coefficient of the parameter estimates is positive, or Accept  $H_1$  if the sign of the coefficient is positive, otherwise reject  $H_0$ .

#### Step IV: Taking a decision on the rejection or acceptance of the null or alternate hypothesis.

The decision to adopt depend on the variable coefficient, If the variable coefficient is negative, it means that the dependent variable was reduced but if it is positive, it means that the dependent variable was improved by the dependent variable. Hence, this is called the magnitude. It is this magnitude that directs the direction. The direction can be significant and non-significant. It is significant when the magnitude is high, ie, when the magnitude is 35% and above, the direction must be less than 5%. but when it is less than 35%, it is none significant, ie, more than 5%. Most of the time, the researcher hypotheses or alternate hypotheses is preferable but when null is accepted, it is against apporari expectation.

#### 4.3.1 Test of Hypothesis One

##### Step 1: Restatement of the hypotheses in null and alternate form.

$H_{01}$ : Trade openness did not positively and significantly impact on external reserve statistics in Nigeria, 1981-2019.

$H_{02}$ : Trade openness did positively and significantly impact on external reserve statistics in Nigeria, 1981-2019.

##### Step II: Presentation and discussion of the results arrived at using the estimation technique

Dependent Variable: LNEXTRSV

Method: ARDL

Date: 05/02/21 Time: 22:56  
 Sample (adjusted): 1982 2019  
 Included observations: 38 after adjustments  
 Maximum dependent lags: 1 (Automatic selection)  
 Model selection method: Akaike info criterion (AIC)  
 Dynamic regressors (1 lag, automatic): LNTOP  
 Fixed regressors: C @TREND  
 Number of models evaluated: 2  
 Selected Model: ARDL (1, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNEXTRSV (-1)	0.444530	0.156382	2.842586	0.0075
LNTOP	0.055205	0.244054	0.226200	0.8224
C	3.580488	1.466704	2.441180	0.0200
@TREND	0.061700	0.019638	3.141830	0.0035
R-squared	0.832839	Mean dependent var		9.117054
Adjusted R-squared	0.818090	S.D. dependent var		1.420712
S.E. of regression	0.605947	Akaike info criterion		1.935252
Sum squared resid	12.48384	Schwarz criterion		2.107630
Log likelihood	-32.76980	Hannan-Quinn criter.		1.996583
F-statistic	56.46564	Durbin-Watson stat		1.788593
Prob(F-statistic)	0.000000			

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

From step 2 above, trade openness is represented with the coefficient of positive 5% which is positive and probability value of 0.82 which is non-significant.

### Step III: Statement of Decision criteria.

Accept  $H_0$  if the sign of the coefficient of the parameter estimates is negative, otherwise reject  $H_0$  and accept  $H_1$  when the coefficient of the parameter estimates is positive, or Accept  $H_1$  if the sign of the coefficient is positive, otherwise reject  $H_0$ .

Given the coefficient of the parameter estimates of LNTOP is 5% and the probability of t-statistics of 0.82  $> 0.05$  which is non-significant, it shows that it is positive signed and statistically non-significant, the study rejected the Null hypothesis and accepted the alternate hypothesis thereby concluded that Trade openness positively and non-significantly impact on external reserve in Nigeria under the scope of the study

#### 4.3.2 Test of Hypothesis two

Step 1: Restatement of the hypotheses in null and alternate form.

$H_{01}$ : Exchange rate did not positively and significantly impact on external reserve statistics in Nigeria, 1981-2019.

$H_{02}$ : Exchange rate did positively and significantly impact on external reserve statistics in Nigeria, 1981-2019.

**Step II: Presentation and discussion of the results arrived at using the estimation technique**

Dependent Variable: LNEXTRSV  
 Method: ARDL  
 Date: 05/02/21 Time: 22:57  
 Sample (adjusted): 1982 2019  
 Included observations: 38 after adjustments  
 Maximum dependent lags: 1 (Automatic selection)  
 Model selection method: Akaike info criterion (AIC)  
 Dynamic regressors (1 lag, automatic): REER  
 Fixed regressors: C @TREND  
 Number of models evaluated: 2  
 Selected Model: ARDL (1, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNEXTRSV (-1)	0.426091	0.154612	2.755875	0.0093
REER	0.003173	0.003929	0.807657	0.4249
C	4.049608	1.093480	3.703411	0.0008
@TREND	0.050017	0.024551	2.037319	0.0495
R-squared	0.835739	Mean dependent var		9.117054
Adjusted R-squared	0.821245	S.D. dependent var		1.420712
S.E. of regression	0.600668	Akaike info criterion		1.917752
Sum squared resid	12.26727	Schwarz criterion		2.090130
Log likelihood	-32.43729	Hannan-Quinn criter.		1.979083
F-statistic	57.66257	Durbin-Watson stat		1.799423
Prob(F-statistic)	0.000000			

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

From step 2 above, Exchange rate is represented with the coefficient of positive 0.0003 which is positive and probability value of 0.42 which is non-significant.

**Step III: Statement of Decision criteria.**

Accept  $H_0$  if the sign of the coefficient of the parameter estimates is negative, otherwise reject  $H_0$  and accept  $H_1$  when the coefficient of the parameter estimates is positive, or Accept  $H_1$  if the sign of the coefficient is positive, otherwise reject  $H_0$ .

Given the coefficient of the parameter estimates of REER is 0'003% and the probability of t-statistics of 0.42 > 0.05 which is non-significant, it shows that it is positively signed and statistically non-significant, the rejected Null hypothesis and accepted the alternate hypothesis thereby concluded that exchange rate positively and significantly impacts on external reserve statistics in Nigeria, 1981-2019.

**4.3.3 Test of Hypothesis three****Step 1: Restatement of the hypotheses in null and alternate form.**

$H_{01}$ : Balance of payment position did not positively and significantly impact on external reserve statistics in Nigeria, 1981-2019.

$H_{02}$ : Balance of payment position positively and significantly impact on external reserve statistics in Nigeria, 1981-2019.

**Step II: Presentation and discussion of the results arrived at using the estimation technique**

Dependent Variable: LNEXTRSV

Method: ARDL

Date: 05/02/21 Time: 22:59

Sample (adjusted): 1984 2019

Included observations: 36 after adjustments

Maximum dependent lags: 1 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (1 lag, automatic): LNBOP

Fixed regressors: C @TREND

Number of models evaluated: 2

Selected Model: ARDL (1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNEXTRSV (-1)	0.497236	0.129113	3.851160	0.0006
LNBOP	-0.114707	0.082409	-1.391922	0.1739
LNBOP (-1)	0.199789	0.087387	2.286259	0.0292
C	3.263153	1.034028	3.155768	0.0035
@TREND	0.020225	0.028063	0.720706	0.4765
R-squared	0.860931	Mean dependent var		9.280124
Adjusted R-squared	0.842987	S.D. dependent var		1.257117
S.E. of regression	0.498131	Akaike info criterion		1.572340
Sum squared resid	7.692182	Schwarz criterion		1.792274
Log likelihood	-23.30213	Hannan-Quinn criter.		1.649103
F-statistic	47.97773	Durbin-Watson stat		2.074691
Prob(F-statistic)	0.000000			

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

From the figure above, Balance of payment position is represented with the coefficient of positive -0.11 which is negative and probability value of 0.17 which is non-significant.

**Step III: Statement of Decision criteria.**

Accept  $H_0$  if the sign of the coefficient of the parameter estimates is negative, otherwise reject  $H_0$  and accept  $H_1$  when the coefficient of the parameter estimates is positive, or Accept  $H_1$  if the sign of the coefficient is positive, otherwise reject  $H_0$ .

Given the coefficient of the parameter estimates of BOP is - 11% and the probability of t-statistics of  $0.17 > 0.05$  which is non-significant, it shows that it is negatively signed and statistically non-significant, the study accepted the Null hypothesis and rejected the alternate hypothesis thereby concluded that Balance of payment position do not positively and significantly impact on external reserve statistics in Nigeria, 1981-2019.

**4.3.4 Test of Hypothesis four****Step 1: Restatement of the hypotheses in null and alternate form.**

$H_{01}$ : Gross domestic product did not positively and significantly impact on external reserve statistics in Nigeria, 1981-2019.

$H_{02}$ : Gross domestic product positively and significantly impacts on external reserve statistics in Nigeria, 1981-2019.

**Step II: Presentation and discussion of the results arrived at using the estimation technique**

Dependent Variable: LNEXTRSV  
 Method: ARDL  
 Date: 05/02/21 Time: 23:02  
 Sample (adjusted): 1982 2019  
 Included observations: 38 after adjustments  
 Maximum dependent lags: 1 (Automatic selection)  
 Model selection method: Akaike info criterion (AIC)  
 Dynamic regressors (1 lag, automatic): LNGDP  
 Fixed regressors: C  
 Number of models evaluated: 2  
 Selected Model: ARDL (1, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNEXTRSV (-1)	0.497012	0.149453	3.325550	0.0021
LNGDP	0.266324	0.090399	2.946105	0.0057
C	2.353511	0.772527	3.046511	0.0044
R-squared	0.825613	Mean dependent var		9.117054
Adjusted R-squared	0.815648	S.D. dependent var		1.420712
S.E. of regression	0.610001	Akaike info criterion		1.924943
Sum squared resid	13.02353	Schwarz criterion		2.054226
Log likelihood	-33.57392	Hannan-Quinn criter.		1.970941
F-statistic	82.85135	Durbin-Watson stat		1.842207
Prob(F-statistic)	0.000000			

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

From table 4.4, Balance of payment position is represented with the coefficient of positive 0.27 which is positive and probability value of 0.005 which is significant.

**Step III: Statement of Decision criteria.**

Accept  $H_0$  if the sign of the coefficient of the parameter estimates is negative, otherwise reject  $H_0$  and accept  $H_1$  when the coefficient of the parameter estimates is positive, or Accept  $H_1$  if the sign of the coefficient is positive, otherwise reject  $H_0$ .

Given the coefficient of the parameter estimates of GDP is 27% and the probability of t-statistics of 0.0052 < 0.05 which is significant, it shows that it is positively signed and statistically significant, the study rejects the Null hypothesis and accept the alternate hypothesis thereby concluded that Gross domestic product positively and non-significantly impact on external reserve statistics in Nigeria, 1981-2019.

**4.4 Discussion of Result**

The broad objective of this study is to measure the impact of macroeconomic variables on external reserve in Nigeria between the periods 1981 to 2020. The pursuit of this broad objective led to theoretical reviews, conceptual investigation and empirical analyses. Several findings were recorded and the alignment of these findings to the specific objectives represents the focus of this section.

**Objective One: Assess the impact of trade openness on external reserve in Nigeria.**

Trade openness with a coefficient value of 0.05 and associated probability value of 0.82 which indicates that trade openness is positively and non-significantly impacted on external reserve in Nigeria within the context of the specified model. The result further revealed that 1 percent changes in inflation will bring about 5% increase in external reserve

in Nigeria Given the coefficient as  $-0.05$  and the probability of t-statistics of  $0.82 > 0.05$  which is non-significant and that is positively signed we reject the null hypothesis and accept alternate hypotheses and conclude that trade openness positively and non-significantly impacted on external reserve in Nigeria .The  $R^2$  which is the goodness of the fit of the model is good because it is above  $0.5$ ,  $0.83 > 0.50$  meaning the model is good to be used in predicting econometric results. The adjusted  $R^2$  is high and above  $0.50$ ,  $0.81 > 0.50$  meaning that the variables in the model had enough allowance for the addition of more econometric variables. The F-Statistics is good to the fit because it is  $> 3$  ie,  $56.46$  and probability of the F-Statistics is significant  $0.0000 < 0.05$  meaning that it is good enough in producing quality and acceptable econometric result. Finally, the Durbin Watson statistics is significant  $1.76$  ie  $> 1.5$  but  $< 2.5$  meaning there is no suspicion of autocorrelation.

#### **Objective two Ascertain the effect of exchange rate on external reserve in Nigeria.**

Exchange rate with a coefficient value of  $0.003$  and associated probability value of  $0.42$  which indicates that Exchange rate is positive and non-significantly impacted on Gross external reserve in Nigeria within the context of the specified model. The result further revealed that 1 percent changes in Exchange rate will bring about  $0.003\%$  increase in external reserve in Nigeria Given the coefficient as  $0.003$  and the probability of t-statistics of  $0.42 > 0.05$  which is non-significant and that is positively signed we rejected the null hypothesis and accepted the alternate hypothesis and conclude that Exchange rate positively and non-significantly impacted on external reserve in Nigeria .The  $R^2$  which is the goodness of the fit of the model is good because it is above  $0.5$ ,  $0.83 > 0.50$  meaning the model is good to be used in predicting econometric results. The adjusted  $R^2$  is high and above  $0.50$ ,  $0.82 > 0.50$  meaning that the variables in the model had enough allowance for the addition of more econometric variables. The F-Statistics is good to the fit because it is  $> 3$  ie,  $57.66$  and probability of the F-Statistics is significant  $0.0000 < 0.05$  meaning that it is good enough in producing quality and acceptable econometric result. Finally, the Durbin Watson statistics is significant  $1.79$  ie  $> 1.5$  but  $< 2.5$  meaning there is no suspicion of autocorrelation,

#### **Objective three: Investigate the influence of balance of payment on external reserve in Nigeria.**

Balance of payment with a coefficient value of  $-0.11$  and associated probability value of  $0.17$  which indicates that Balance of payment is negatively and non-significantly impacted external reserve in Nigeria within the context of the specified model. The result further revealed that 1 percent changes in Balance of payment will bring about  $0.003\%$  decrease in external reserve in Nigeria Given the coefficient as  $-0.11$  and the probability of t-statistics of  $0.17 > 0.05$  which is non-significant and that is negatively signed we accept the null hypothesis and conclude that Balance of payment negatively and non-significantly impacted on external reserve in Nigeria .The  $R^2$  which is the goodness of the fit of the model is good because it is above  $0.5$ ,  $0.9927 > 0.50$  meaning the model is good to be used in predicting econometric results. The adjusted  $R^2$  is high and above  $0.50$ ,  $0.9911 > 0.50$  meaning that the variables in the model had enough allowance for the addition of more econometric variables. The F-Statistics is good to the fit because it is  $> 3$  ie,  $47.97$  and probability of the F-Statistics is significant  $0.0000 < 0.05$  meaning that it is good enough in producing quality and acceptable econometric result. Finally, the Durbin Watson statistics is significant  $2.0$  ie  $> 1.5$  but  $< 2.5$  meaning there is no suspicion of autocorrelation,

#### **Objective four: Examine the impact of gross domestic product (GDP) on external reserve in Nigeria,**

Gross domestic product with a coefficient value of  $0.26$  and associated probability value of  $0.05$  which indicates that Gross domestic product is positively and significantly impacted external reserve in Nigeria within the context of the specified model. The result further revealed that 1 percent changes in Gross domestic product will bring about  $26\%$  increase in external reserve in Nigeria Given the coefficient as  $0.26$  and the probability of t-statistics of  $0.05 > 0.05$  which is significant and that is positively signed we reject the null hypothesis and and accept alternate hypothesis and conclude that Gross domestic product positively and non-significantly impacted on external reserve in Nigeria .The  $R^2$  which is the goodness of the fit of the model is good because it is above  $0.5$ ,  $0.82 > 0.50$  meaning the model is good to be used in predicting econometric results. The adjusted  $R^2$  is high and above  $0.50$ ,  $0.81 > 0.50$  meaning that the variables in the model had enough allowance for the addition of more econometric variables. The F-Statistics

is good to the fit because it is  $> 3$  ie, 82.05 and probability of the F-Statistics is significant  $0.0000 < 0.05$  meaning that it is good enough in producing quality and acceptable econometric result. Finally, the Durbin Watson statistics is significant 1.84 ie  $> 1.5$  but  $< 2.5$  meaning there is no suspicion of autocorrelation.

## Summary of Findings, Conclusion and Recommendations

### 5.1 Summary of Findings

The findings from the specific objective of this study are as follows:

- 1) Trade openness positively and non-significantly impacted on external reserve in Nigeria, 1981-2019.
- 2) Exchange rate positively and non-significantly impacted on external reserve in Nigeria, 1981-2019.
- 3) Balance of payment negatively and non-significantly impacted on external reserve in Nigeria, 1981-2019.
- 4) Gross domestic product positively and significantly impacted on external reserve in Nigeria, 1981-2019.

### 5.2 Conclusions

This work studied the impact of macroeconomic variables on external reserve in Nigeria. External reserve as a financial system is getting practically popular with economic development experts. The theoretical and empirical issues' concerning macroeconomic variables and External reserve activities helps to increase financial industry and also the financial system. Undoubtedly, macroeconomic variables in Nigeria strongly affect the countries financial development and play a significant role in the development of the financial system and economic growth. External reserve helps to provide growth in the financial outlet, development in money and capital market and increase in the level of economic growth. Knowledge of the review summary in the study attempt to fill the gap of the study by studying the impact of macroeconomic variables on external reserve statistics in Nigeria Hence, these variables are the macroeconomic variables which managers should strategically be conscious of whenever they are planning and forecasting future based on macroeconomic variables activities in Nigeria because of its negative attributes to financial statistics.

### 5.3 Recommendations

In line with the specific objective of the study, the following are the recommendations

- 1) Trade openness positive and non-significantly impacted on external reserve in Nigeria, 1981-2019. This is because Nigerian openness to trade is poor. It is advised that the government should aggressively embark on exportation and regulates importation to improve the extent of trade on external reserve.
- 2) Exchange rate positive and non-significantly impacted on external reserve in Nigeria, 1981-2019. Financial development such as regulation in exchange rate fluctuation, stabilization of exchange rate by the monetary authorities will be encouraged to enhance improvement in external reserve capacity
- 3) Balance of payment negatively and non-significantly impacted on external reserve in Nigeria, 1981-2019. Monetary authorities should endeavor to combat constructively the effect of inflation, regulate inflation rate so that private sectors will patronize private sector investment that will influence private sector policies effectively. By controlling inflation, balance of payment position will be positive and this consequently increases our external reserve.
- 4) Gross domestic product positively and significantly impacted on external reserve in Nigeria, 1981-2019. It had been statistically revealed that gross domestic product improves our external reserve. More efforts should be on desk to improve our economy through adequate regulation of macroeconomic variables.

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