**TITLE PAGE**

**EXCHANGE RATE DETERMINATION AND THE NIGERIAN ECONOMY**

**BY**

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**U14/MSS/ECO/089**

**A RESEARCH PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF ECONOMICS, FACULTY OF MANAGEMENT OF SOCIAL SCIENCES GODFREY OKOYE UNIVERSITY UGWUOMU NIKE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc) IN ECONOMICS**

**SUPERVISOR: DR. PIUS EZE**

**JULY, 2018**

**CERTIFICATION PAGE**

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**APPROVAL PAGE**

This project has been approved to have satisfied the requirements for the award of Bachelor of Science (B.sc) Degree in the department of Economics, Godfrey Okoye University, Ugwuomu-Nike Enugu State.

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**DEDICATION**

This project work is dedicated to my sponsor (Prof Ferdinand Nwafor) for his fatherly love and care and also to my family most especially my mother (Beatrice Onwusi).

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**ABSTRACT**

*This research work is an empirical attempt to examine determinants of exchange rate in Nigeria with annual data from 1980 to 2016. The main type of data used in this study is secondary sourced from central bank of Nigeria statistical bulletin. For this purpose, annual figures of interest rate, inflation rate, balance of payments and gross domestic product were regressed on exchange rate in a framework of multiple regression models; ordinary least square technique at estimation were employed. The evidence from the result revealed that interest rate and real gross domestic product are positive and they have significant impact on exchange rate whereas Inflation rate and balance of payment and are negative and have no significant impact on exchange rate. The work recommends that the government should encourage export promotion and discourage import in order to increasethe gross domestic productand also effective fiscal and monetary policies should be adopted in order to reduce and maintain a single digit interest rate figure.*

**CHAPTER ONE**

**INTRODUCTION**

* 1. **Background of the study**

One of the features that distinguish international trade from domestic trade is that each nation has its own currency and its own banking system. Prices in each country rely on the country’s currency units be it dollars, naira, pounds, euro, rupees, francs, ceddis and so on. Exchange rate refers to the price of a domestic currency in terms of a foreign currency. Exchange rate plays a key role in international economic transactions because no nation is self sufficient due to varying factor endowment as well as comparative advantages. According to Jhingan (2009), this price is as a result of the interaction of the forces of demand and supply of foreign currencies in any particular period of time. It determines the relative price of domestic goods and services as well as the external sector participation in the international trade. Dornbusch (2004), defined exchange rate as the rate at which one currency is exchanged for the currency of another country. Whereas Mankiw (1997), defined it as the price at which exchange between two countries takes place. The exchange rate has two main components; the domestic currency and foreign currency and it can be quoted directly or indirectly. In a direct quotation, the price of a unit of a foreign currency is expressed in terms of the domestic currency; the foreign currency is the base currency while the domestic currency is the counter currency. In an indirect quotation, the price of a unit of domestic currency is expressed in terms of foreign currency. In this case, the domestic currency is the base currency while the foreign currency is the counter currency. Most exchange rates use the American dollar as the base currency and other currencies as the counter currency. (1: N) (Base: counter). In addition, there are exceptional cases such as the Euro and commonwealth currencies like British pound, Australian Dollar and New Zealand Dollar.

The exchange rate between the Nigerian naira and the American dollar is the number of naira required to purchase one dollar which is currently about N360 per dollar. The exchange rate of naira per dollar will be maintained in the world exchange market by arbitrage. Arbitrage refers to the purchase of foreign currency in a market where its price is low and to sell it in some markets where its price is high. The essence of arbitrage is to remove differences in the foreign exchange rate of currencies so that there will be a single rate in the world exchange rate market. Exchange rate has played an important role in the macroeconomic performance of a nation. Many economists argue that exchange rate stability facilitates production activities and economic growth and misalignment in real exchange rate distorts production activities and hinders export growth, generates capital flight and macroeconomic instability (MamtaChowdhury 1999).

 The exchange rate appreciated when less of naira is needed to buy a dollar, it was caused by an increase in gross domestic product, favourable balance of payment etc and it depreciates when high amount of naira is needed to buy a single dollar and it was caused as a result of over dependence on importation, heavy debt burden, weak balance of payments position and capital flight.

 Movement in exchange rates have ripple effect on other economic variables such as Foreign Direct Investment (FDI), inflation rate, interest rate, balance of trade etc. These facts emphasize the importance of exchange rate to the economic well-being of every country that opens its doors to international trade in goods, services and cross border investment. Ellsworth (1964) defined exchange rate as the rate at which a country’s currency exchanges for those of other countries measures its external values. An exchange rate is simply the value or price of one currency in terms of another and it makes no difference in which currency the price ratio is expressed (Ellsworth, 1964). Exchange rate is of two types: real and nominal exchange rate.

The real exchange rate is defined as the ratio of the price level abroad and the domestic price level where the price level is converted into domestic currency units through the current nominal exchange rate. Montiel (2003), defined real exchange rate as the relative price of foreign goods in terms of domestic goods. The real exchange rate tells us how many times, more or less goods and services can be purchased abroad. Real exchange rate determines the ratio of price in the local market to the price in the foreign market. According to purchasing power parity, real exchange rates do not change. The nominal exchange rate is defined as the number of units of the domestic currency that can purchase a unit of a given currency. A decrease in this variable is termed nominal appreciation of the currency. An increase in this variable is termed nominal depreciation of the currency. Nominal exchange rate tells how many times an item of goods purchased locally can be purchased abroad. If the nominal exchange rate is high, it will benefit an economy a lot in the trading activities. If it is high, the goods and services get more foreign units. If there is a change in the real exchange rate, the nominal exchange rate is less affected as compared to the real exchange rate. There are factors that can affect exchange rate and they are: inflation rate, interest rate, balance of payments, political stability, internal harmony and these factors can lead to either increase or decrease in exchange rate.

There are different types of exchange rate regimes practiced all over the world; from the extreme case of fixed exchange rate system to a freely floating regime, and managed floating, whichever that suits their peculiar economic conditions. For instance, exchange rate managements in Nigeria have witnessed different significant changes over the years. Nigeria maintained fixed exchange rate from 1960 till the breakdown of the Bretton Woods Monetary System in the early 1970s. Between 1970 and 1986, Nigeria practiced a fixed exchange rate when the Naira was pegged against the British Pounds and later on the American Dollar. Nigeria exchange rate policy shifted from fixed exchange rate to flexible exchange rate to the various types of the floating regime since 1986 following the adoption of the Structural Adjustment Programme (SAP) (Sanusi, 2004). This floating was determined by the market forces of demand and supply. Since then, the naira rate of exchange against the dollar has experienced significant fluctuations such that naira/ dollar rate of exchange moved from 0.6091, 0.6369, 3.3166, 9.001, 84.5, 92.52, in 1980, 1981, 1986, 1990, 1995, and 1999 respectively to 132.6, 147.6 and 156.35 in 2004, 2009, and 2013 respectively. In the 1970’s and 1980’s, the naira appreciated against the dollar but in the recent time, naira lost its value up to the extent that a dollar was 500naira. Some of the policies employed by the government to stabilize the exchange rate include: Second Tier Foreign Exchange Market (SFEM), Autonomous Foreign Exchange Market (AFEM), inter-bank foreign exchange market (IFEM), the Dutch auction market (DAS). The policies were unable to provide a solution to exchange rate stability. The naira continued to depreciate against the American dollar. Some economists have attributed the recent depreciation to the decline in the nation’s foreign exchange reserve, over dependency on importation, heavy debt burden, weak balance of payments position and the market activities of speculators and banks and capital flight.

Exchange rate has maintained consistent fluctuations in Nigeria over the years and these changes are accountable to some macroeconomic variables. It becomes pertinent to estimate the various factors that influence and determine exchange rate in Nigeria. In the light of these, this study is aimed at carrying out an empirical analysis of the determinants of exchange rate in Nigeria covering the period 1980-2016.

* 1. **Statement of the problem**

Foreign exchange is said to be an important element in the economic growth and development of a nation because foreign exchange policies influence the economic activities and to a large extent, dictate the direction of the macroeconomic variables in the country. The mechanism of exchange rate determination are different systems of managing the exchange rate of a nation’s currency in terms of other currencies and this should be properly done in a way that will bring about efficient allocation of scarce resources so as to achieve growth and development. Jhingan (2005) suggested that to maintain both internal and external balance, a country must control its exchange rate.

Over the years, exchange rate fluctuations and volatility in Nigeria has been a major macroeconomic issue and this has resulted to the introduction of many macroeconomic policies to reduce the damage caused by exchange rate fluctuations in the economy. A major and significant issue is to capture to major macroeconomic variables that influence the variations and changes in exchange rate as this will go a long way in controlling the changes. Some of the policies employed by the government to stabilize the exchange rate include: Second Tier Foreign Exchange Market (SFEM), Autonomous Foreign Exchange Market (AFEM), inter-bank foreign exchange market (IFEM), the Dutch auction market (DAS). The policies were unable to provide a solution to exchange rate stability. It was in this light that this study is motivated to evaluate the determinants of exchange rate in Nigeria covering the period 1980-2016.

* 1. **Objectives of the study**

 The main objective of this study is to ascertainthe determinants of exchange rate in Nigeria covering the period 1980-2016. In line with this general objective, the following specific objectives will be pursued:

1. To ascertain if interest rate is a major determinant of exchange rate in Nigeria.
2. To find out if inflation is a major determinant of exchange rate in Nigeria.
3. To ascertain if balance of payment is a major determinant of exchange rate in Nigeria.
4. To ascertain if Real Gross Domestic Product (GDP) is a major determinant of exchange rate in Nigeria.

**1.4 Research Questions**

The following research questions will guide this study:

1. To what extent has interest rate determined exchange rate in Nigeria?
2. To what extent has inflation determined exchange rate in Nigeria?
3. To what extent has balance of payment determined exchange rate in Nigeria?
4. To what extent has real gross domestic product determined exchange rate in Nigeria?

 **1.5 Statement of Hypotheses**

The following hypotheses will be tested in the course of the study.

H01: interest rate is not a major determinant of exchange rate in Nigeria.

 H02: inflation is not a major determinant of exchange rate in Nigeria.

H03: balance of payment is not a determinant of exchange rate in Nigeria.

H04: Real Gross Domestic Product is not a major determinant of exchange rate in Nigeria.

**1.6 Significance of the Study**

This research work shall be beneficial to future economic researchers for this shall be a very good reference material to source information on, it will equally benefit the government in making informed decision on the issues relating to exchange rate for policy prescriptions and intervention.As exchange rate is a pure financial variable, the banking sector will find this research relevant given that it will provide clear information on exchange rate.

**1.7 scope of the study**

 The focus of this study is to estimate the major determinants of exchange rate in Nigeria. Some of the proposed determinants of exchange rate in Nigeria for the study are interest rate, inflation rate, balance of payments and Real Gross Domestic Product (RGDP) covering the period 1980-2016.

**1.8 Limitations of the study**

The challenges the researcher faced in the process of this research work include:

**Time constraint**: it was difficult for the researcher to combine her lectures, exams and the research work. Furthermore, trying to gather material for this study was not an easy task as emphasis was placed on where to source the right material for the work as different textbooks and journals were consulted.

**Financial constraint**: the researcher found it very difficult to raised fund for her research work.

**1.9 Definitions of terms**

**Gross domestic product:** this is the monetary value of all the finished goods and services produced in a country’s borders in a specified period usually one year.

**Inflation:** this can be defined as the persistent and sustained increase in the general price level of goods and services in an economy over a period of time.

**Balance of payment:** this is the record of all economic transactions between the residents of the country and of the world in a particular period usually one year.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 The concept of exchange rate**

As we discussed earlier, exchange rate is the price of one currency in terms of another. It is also the rate of transformation of one currency to another. Arbitrage refers to the sale and purchase of a currency in two different foreign exchange markets in order to make profit in exchange rate differentials in two locations.

**Types of exchange rate**

**Fixed exchange rate**

This is the rate by which the government announces a specific exchange rate for its currency and maintains this rate.

**Flexible or floating exchange rate**

This is the system by which the rate of exchange is determined by the forces of demand and supply in the foreign exchange market. It is free to fluctuate according to the changes in the demand and supply of foreign exchange.

 **Spot exchange rate:**

spot exchange rate is the rate at which exchange rate is made available on demand or on the spot. Spot rate is the day to day rate of exchange.

**Forward rate**:

The forward rate of exchange is the rate of which the future contract foreign currency is made. The forward exchange rate is settled now but the actual sales and purchase of foreign exchange are done in the future.

**Multiple rate**:

Multiple rate refers to a system whereby a country adopts more than one rate of exchange for its currency

**2.2 The concept of interest rate as a determinant of exchange rate**

Interest can be defined as the return or yield on equity or opportunity cost of deferring current consumption into the future (Uchendu, 1993). Interest rate is the cost of borrowings. Interest rate can also be categorized as nominal or real. Nominal interest rate is the interest rate that does not take inflation into account while the real interest rate adjusts for inflation and gives the real rate of bond or loan.

Higher interest rate attracts foreign capital and cause the exchange rate to rise. The central bank exerts power on interest rate through the manipulation of inflation and exchange rate. Higher interest rate brings lenders higher returns. The impact of higher interest rates may however be reduced if the inflation rate is higher than other countries or if other factors are affecting their currency negatively.

**2.2.2 The concept of inflation as a determinant of exchange rate:**

Inflation is the persistent and appreciable rise in general level of prices. A country with a low level of inflation experiences higher value for their Currency and better purchasing power for its citizens compared to other countries. Creeping inflation is important for the appreciation of the currency.

**2.2.3 The concept of balance of payment as a determinant of exchange rate:**

The balance of payments simply means a record of the country’s international transactions reflecting its demand for foreign currency and other countries demand for its own currency over the accounting period usually one year. The balance of payment represents the demand for and supply of foreign exchange which will determine the value of the currency.

**2.3 Theoretical literature**

In this section of the study, some of the existing theories/models on exchange rate determination were reviewed.

**2.3.1 Traditional Flow Theory**

This theory suggests that exchange rate is determined by the market forces of demand and supply of foreign exchange. Therefore, there is equilibrium when the supply equals the demand for foreign exchange. The model assumes that two basic variables interact to determine the exchange rate. The variables are: relative income and interest rate differential. This is justified since foreign demand for domestic goods is a function of foreign income and vice versa, and also asset demand depends on the difference between domestic and foreign interest rates.

**2.3.2 The Portfolio Balance Theory**

This theory of exchange rate determination is an extension of the monetary exchange rate models focusing on the impact of bonds. According to this approach, any change in the economic conditions of a country will have a direct impact on the demand and supply of bonds both internal and external which will in turn influence the exchange rate between the domestic and foreign economies. This is as a result of the substitution between money and financial assets in the domestic economy and the substitution between domestic and foreign financial assets (CBN, 1998). Macdonald and Taylor (1992) argued that an exchange rate is determined at least in the short-run by the supply and demand in the markets for wide range of financial assets. This is an asset pricing view of the exchange rate. The idea is that agents have a portfolio choice decision between domestic and foreign assets those instruments (either money or bonds) have an expected return. This arbitrage opportunity is what determines the process of the exchange rate (Dornbusch, 1988).

**2.3.3 The Monetary Approach**

The shortcomings of the portfolio balance theory led to the development of the monetary approach. This approach focuses on the monetary policies of two countries in order to determine their currency exchange rate. Countries that apply strict monetary policies decrease the amount of money in circulation. The monetary approach uses two dynamics to determine an exchange rate, the price dynamics and the interest rate dynamics. A change in the domestic money supply leads to a change in the exchange rate. This is based on the important of money as a unit of exchange, thus, it visualizes exchange rate as a function of relative shift in money stock, inflation rate domestic output, between a country and a trading partner economy. According to Frankel (1978), this model of exchange rate determination attains equilibrium when existing stocks of money in the two countries are willingly held. The monetary approach, under the flexible exchange rate can be presented in two forms: the monetary approach or the asset market approach, and it emphasized on the role of money and other assets in determining the exchange. Obioma (2000) holds the view that asset market or monetary approach attributes variation in exchange rate essentially to income and expected rates of return as well as to other factors that influence the supplies of and demands for the various national monies. Thus, based on the fact that supply and demand for monies is determined by the level of income, the monetary model postulates three basic determinants of exchange rate as follows: relative money supplies, relative income and interest rate differentials.

**2.3.4 Purchasing Power Parity (PPP)**

The purchasing power parity theory was developed by Gustav Cassel in 1920 to determine the exchange rate between countries on inconvertible paper currencies, the theory states that equilibrium exchange rate between two inconvertible paper currencies is determined by the equality of the relative change in relative prices in the two countries. In other words, the rate of exchange is determined by their relative price level. The purchasing power parity approach to the exchange rate determination was and continues to be a very influential way of thinking about the exchange rate. The PPP suggests that the exchange rate between two countries would be equal to the relative national price level. The PPP derives from the assumption that in the world, there exist the “law of one price”. This law states that identical goods should be sold at identical prices.(Note this assumption and not law). The assumption of one price implies that exchange rates should adjust to compensate for price differentials across countries (Hoontrakul 1999).

**2**.**3.5 Balance Of Payments Approach**

This approach of exchange rate determination under the free exchange rates, the exchange rate of a country’s currency depends on its balance of payments. A favourable balance of payment raises the exchange rate while an unfavourable balance of payments reduces the exchange rate. This implies that exchange rate is determined at the equilibrium of demand and supply of foreign exchange. The demand for foreign exchange arises from the debit side of the balance of payments. It is equal to the value of payments made to the foreign country for goods and services purchased from it plus loans and investments made abroad. The supply of foreign exchange arises from the credit side of the balance of payments. It equals all payments made by the country to our country for goods and services purchased from us plus loan disbursed and investments made in this country. The balance of payments balances when the debits and credits are equal. If the debits exceed credit, there is unfavourable balance of payments. On the other hand, if credits exceed debits, it is favourable.

 **2.3 Empirical Literature**

 This section of the study reviews the empirical literature on exchange rate determinants.

Aniekwe (2016) examined the determinants of exchange rate in Nigeria from 1980 to 2014. Annual figures of interest rate, inflation and degree of trade openness were regressed on exchange rate in a framework of multiple models; ordinary least square (OLS) technique at estimation was employed. The result revealed that inflation rate was an insignificant determinant of exchange rate. Also the interest rate was revealed to be insignificant determinant of exchange rate while trade openness was revealed to be positive and significant determinant of exchange rate. The study recommends the adoption of policies that would encourage and facilitate improvement in productivity in all sectors of the economy.

Udoye (2007) examined the determinants of real exchange rate in the recent years in Nigeria over the period of 1970 to 2006 using the Nigerian time series data. The potential determinants of real exchange rate as lag of real exchange rate, real interest rate, inflation rate, trade openness and real gross domestic product. After examined the time series characteristics of the data with Augmented Dickey-Fuller (ADF) unit roots test of stationarity and Engle-Granger procedure for co-integration test, Udoye applied Auto-regressive Distributed Lag Model (ARDL-ECM). The result suggests that one year past value of real exchange rate and immediate past value of trade openness are the major determinants of real exchange rate in Nigeria. The result further indicates that there is evidence of long run relationship between real exchange rate and two explanatory variables (gross domestic product growth rate and trade openness).

Udousung et al (2012) analyzed the Exchange Rate determinants in Nigeria (1971 – 2000). Six (6) variables were used in the exchange rate model namely: balance of payment, fiscal deficit, import tax, openness of the economy, trends and exports tax. Data on these variables were obtained largely from Central Bank of Nigeria’s publication and were analyzed using econometric technique. The result reveals that the coefficient of multiple determination, R2 became 0.95 percent with Durbin-Watson of 2.00. The result further reveals that import tax, trend, openness of economy and export tax had positive coefficients, implying a direct positive relationship between these variables and the real exchange rate. Hence, measures to improve the competitiveness of the economy should revolve around these four variables. However, openness of the economy, fiscal deficit and import tax were significant at 1 per cent probability level.

Gelbard and Nagayasu (2004) have added to the literature on the topic by investigating the real exchange rate in Angola for the period spanning from 1992 to 2002. Their results proved that oil price and foreign interest rate were the most important sources of exchange rate movements. They recommended that flexible exchange rate policy is more likely to be the right exchange rate policy for Angola than fixed exchange rate policy.

Aliyu (2011) empirically investigated real exchange rate misalignment in Nigeria based on behavioral equilibrium exchange rate (BEERs) approach. Quarterly time series data were used from 1986Q1 to 2006Q4. The author utilized Johansen cointegration technique and error correction model. The variables controlled were net foreign assets, terms of trade, and index of crude oil price volatility, government fiscal stance, monetary policy, productivity, trade openness and foreign reserve. The results showed that long-run behavior of real exchange rate was positively influenced by terms of trade, index of crude oil volatility, index of monetary policy performance and net foreign assets, while government spending and foreign reserve were negatively related to real exchange rate behavior. The results also reported that an increase in oil revenue and sound macroeconomic performance could overvalue or undervalue real exchange rate in Nigeria. The author recommends sound (effective) monetary policy and reduction of fiscal power.

Victor and Dickson (2012) investigated the determinants of the real exchange rate in Nigeria. The objective of the study has been to present a dynamic model of real exchange rate determination and empirically test the implications of changes in possible determinants of the real exchange in Nigeria. With data covering 1970-2010, the closeness of Error Correction Model result shows amongst others that the ratio of government spending to GDP, terms of trade and technological progress are not important determinants of the real effective exchange rate in Nigeria. The result showed that capital flow, price level and nominal effective exchange rate are important determinants of the real effective exchange rate in Nigeria. The Johansen cointegration test suggests a long relationship among the variables. It is thus recommended amongst others that policies have to be put in place to stabilize the problem of inflation.

Mungule (2004) investigated the determinants of real exchange rate in Zambia. He used the real exchange rate as a function of terms of trade, capital inflow, closeness of the economy and excess supply of domestic credit. Using the cointegration technique, he discovered that the REER and the fundamental determinants have a long run equilibrium relationship.

Ogun (2004) examined the impact of real exchange rate on growth of non-oil export in Nigeria. Specifically, he analyzed the effects of real exchange rate misalignment and volatility on the growth of non oil exports. He employed the standard trade theory model of determinants of export growth and two different measures of real exchange rate misalignment; one of which entailed deviations of purchasing power parity (PPP) and the other was model based estimation of equilibrium real exchange rate. He reported that, irrespective of the alternative measures of misalignment adopted, both real exchange rate misalignment and volatility adversely affected growth of Nigeria’s non-oil export.

Mustapha and Ogbeide (2014) estimated Naira real exchange rate equilibrium viz-a-viz the US Dollar and its determinants by examining the existence of a significant long –run relationship between exchange rate, money (M2) supply, interest rate differentials and external reserves on high frequency data series over a4-year period from 2008-2011.Vector Error Correction model was used to generate threshold for misalignment of exchange rate in this study. Empirical findings reveal that a rise in oil price leads to a real appreciation of the Naira, while M2 growth and rise in real interest rate differentials undermine real Naira/Dollar rate.

Orji (2015) investigated the determinants of real exchange rate in Nigeria. Adopting the Ballassa-Samuelson Hypothesis, the study employed the Error Correction model (ECM) technique to perform the data analysis while using time series data ranging from 1981 through 2012. Findings revealed that the interest rate differential and oil revenues are major determinants of real exchange rate in Nigeria. Productivity differential was not a determinant in influencing real exchange rate, thus Ballassa-Samuelson technique could not be confirmed. The study calls for diversifying of the Nigerian economy away from the oil sectors so as to reduce the shocks arising from the oilsector.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Waheed (2016) investigated the determinants of real effective exchange rate in Nigeria for the period between 1960 and 2015 using the vector error correction mechanism to separate long run from the short run fundamentals. The findings from the regression estimates revealed that; terms of trade, openness of the economy, net capital inflow and total government expenditure were the major long run determinants of real effective exchange rate in the country while variables such as; broad money supply (M2), nominal effective exchange rate, structural adjustment program dummy, June 12 crisis and change to civil rule dummies were revealed as the major short run determinants of exchange rate in Nigeria between 1960 and 2015. The study concludes by recommending that since the major variable of terms of trade (crude oil price) is out of the government control, the effect of shocks due to the fluctuations of crude oil price can be minimized by shifting the economy from a mono-product nation and diversify the economy to increase productive capacity. **CHAPTER THREE****3.0 Research Methodology**This study will employ the multiple regression model using ordinaryleast square (OLS).**3.1 Theoretical Framework**The theory adopted for this research work is the balance of payments theory developed by Keynes which states that exchange rate of a country’s currency depends on its balance of payments. Favourable balance of payments raises the exchange ratebecause it is the most satisfactory explanation of the determination of exchange rate. The theory studies the problem of determination of exchange rate under the framework of the general equilibrium analysis in terms of demand and supply. The theory studies the actual forces which lie behind the demand and supply of foreign exchange such as the current account and the capital account of the balance of payments. An important implication of the theory is that adjustment in balance of payments can be made through devaluation and revaluation of some currencies in case of deficit and surplus in balance of payments respectively.**3.2 Model Specification**This model is formulated to test the determinants of foreign exchange in Nigeria. In this research, exchange rate is the dependent variable while GDP, inflation, interest rate and balance of payments as the independent variables.**Functional form of the model**the functional form of the model to be estimated is as follows:EXR = F (GDP, INF, INT, BOP)...........(1)**Mathematical Form Of The Model**EXR = B1 +B2GDP+B3INF+B 4INT+B5BOP.......(2)Econometrics **form of the model**EXR = BI+B2GDP+B3INF+B4INT+B5BOP +Ui.......(3)WhereEXR = exchange rateGDP = gross domestic productINF = inflationINT = interest rate BOP = balance of paymentsUi = error term B1 = constant termB2-B5 = Parameters to be estimated. B2 is the coefficient of GDP, B3 is the coefficient of INF, B4 is the coefficient of INT, B5 is the coefficient of balance of payments.**3.3 Method of Evaluation**The estimated result will be evaluated subject to the following tests:1. Preliminary Test
2. Economic Test of Significance (A Priori Test)
3. Statistical Test of Significance ( First Order Test)
4. Econometric Test of Significance ( Second Order Test)

**3.3.1 Preliminary Tests****3.3.1.1 Stationarity (Unit Root) Test:** The importance of this test cannot be over emphasized since the data to be used in the estimation are time-series data. In order not to run a spurious regression, it is worthwhile to carry out a stationary test to make sure that all the variables are mean reverting, that is, they have constant mean, constant variance and constant covariance. In other words, that they are stationary. The Augmented Dickey-Fuller (ADF) test would be used for this analysis since it adjusts for serial correlation. **Decision Rule:** If the ADF test statistic is greater than the MacKinnon critical value at 5% (all in absolute term), the variable is said to be stationary. Otherwise it is non stationary.**3.3.1.2 Co-integration Test:**Econometrically speaking, two variables will be co-integrated if they have a long-term, or equilibrium relationship between them. Co-integration can be thought of as a pre-test to avoid spurious regressions situations (Granger, 1986). As recommended by Gujarati (2004), the ADF test statistic will be employed on the residual. **Decision Rule:** If the ADF test statistic is greater than the critical value at 5%, then the variables are co-integrated (values are checked in absolute term). **3.3.1.3 Error Correction Mechanism:** If there exist a long run relationship (co-integration) among the time series variables, the Error correction mechanism will be estimated to know the rate at which the dependent variable returns to equilibrium to the independent variable after some levels of variations i.e to derive the numerical value of the magnitude of the short run dynamics or disequilibrium. Error correction models are theoretically driven approach useful for estimating both short-term and long-term effects of one time series on another. The term error-correction relates to the fact that last-periods deviation from long-run equilibrium, the error, influences its short-run dynamics.**Decision Rule:** In conducting ECM, the expected sign of the result should be negative. A positive ECM implies a model misspecification or an indication of structural changes and will not give us the rate of these change in the dependent and independent variables.**3.3.2Economic criteria**According to economic theories, the expected sign for the variables GDP on the determinants of exchange rate, exchange rate is the dependent variable. The aprior sign is expected to be positive. Inflation rate: this is one of the independent variables. The aprior sign is expected to be negative.**Interest rate:** it is one of independent variables. The aprior sign expected to negative.**Balance of payment:** it is one of the independent variables the aprior sign is expected to be positive or negative **3.3.2.1 Aprior expectation**

|  |  |
| --- | --- |
| Variables  | Expected sign |
| GDP | + |
| Interest rate | + |
| Inflation rate | - |
| BOP | - |

**3.3.3 Statistical test of significance (first order test)****3.3.3.1Test of Goodness of fit**The coefficient of determination (r2) is used to test the explanatory power of the independent variables. (r2) lies between zero and one (0< r2 < 1).The closer the r2 is to1, the greater the proportion of the variation in the dependent variables attributable to the variation in the independent variables. It takes into account the degree of freedom associated with the sum of squares.**3.3.3.2 T- test**It tests for the statistical significance of the individual regression co-efficient, t-statistics is used. A two tailed test will be conducted at 5% level of significance the null hypothesis H0 will be test against the alternative hypothesis H1 and (n-k) degree of freedom (df) where n is the number of observation and k is the number of parameters examined.**Decision Rule:**The computed (t) will be compared with the critical t-value (t0.05) if t \* > to 0.05 the H0 will be rejected and H1 will be accepted. Otherwise, H0 is accepted and H1 rejected.**3.3.3.3 F-test of significance** F-test is used to test the statistical significance of the entire regression. The f-ratio is used. The test would be conducted and using one tailed test at 5% level of significance and (v1/v2) degree freedom where v1= degree of freedom (df) for the numerator vi=k-1 V2=degree of freedom (df) for the denominator v2=n-k **Decision rule for (f-test)**If the F\*>F0.05 we will reject the null hypothesis and accept the alternative hypothesis. Otherwise, the alternative hypothesis H1 will be rejected and null accepted.**3.3.4 Econometric test of significance** **3.3.4.1 Autocorrelation test** Autocorrelation also known as serial correlation or lagged correlation will be used to determine the strength of relationship of a variable with its own past and present values, that is, explaining correlation of the error term in the present with the error term in the past **3.3.4.2 Normality test** The normality test is conducted in this research in order to know whether the error term is normally distributed in the model.**3.3.4.3 Heteroscedasticity test** The problem of heteroscedasticity occurs when the variance of the error term is not constant across the observation or independent variables.**Data requirement and sources** The data for this study are time series secondary data on GDP, inflation rate, interest rate, balance of payments, foreign reserve covering the period of 1980-2016 the data required will be collected from the central bank of Nigeria statistical bulletin.**CHAPTER FOUR****PRESENTATION AND ANALYSES OF RESULT**This chapter will analyze the results using various economic, statistical and econometric tests. Thus, the earlier posted hypothesis of this study will be tested based on the empirical results.**4.1 The Empirical Results**As the performance of theoretical postulation is no guarantee, but only an indicator of what we may expect in practice, empirical testing of the time series data of the variables is absolutely necessary.**4.1.1 Unit Root Test Results**The Augmented Dickey-Fuller (ADF) was used to test for the unit root in the individual variable. The test was done based on the following hypothesis;H0: variable is non-stationary H1**:** variable is stationaryThe results from the Augmented Dickey-Fuller test for unit root are summarized below.**Table 4.1: ADF Test for Unit Root**

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **ADF test** **Statistics** | **5% critical** **Value** | **Order of** **Integration** |
| **EXR** | **-3.087139** | **-1.950687** | I(1) |
| **GDP** | -5.187908 |

|  |  |
| --- | --- |
| -3.548490 |  |

 | I(1) |
| **INTR** | -3.746437 | -2.954021 | 1(0) |
| **INF** | -3.118686 | -2.945842 | I(0) |
| **BOP** | -3.271771 | -1.950394 | I(0) |

From the tabular illustration exchange rate and gross domestic product are integrated at order one whereas interest rate, inflation rate and balance of payment is integrated at order zero, it is integrated at order one; I(1) and zero I(0). Not having a stationary time series data indicates not having a short run relationship among the individual time series data, this result is expected since most macro- economic time series data are known to exhibit such behaviour.  Since our variables are non-stationary at level form, there is need to conduct a co-integration test. The essence is to show that although all the variables are non-stationary, the variables may have a long term relationship that is, and the variables may be co-integrated and will not produce a spurious result.**4.1.2 Co-integration Test Result**According to (Gujarati 2004) a regression involving non-stationary time series variables will produce a spurious (non-meaningful) result. But if such variables are co-integrated, having long run relationship, the result will therefore be acceptable. Econometrically speaking, two variables will be co-integrated if they have a long run equilibrium relationship between them (Gujarati, 2004:822)To test for co-integration among the variables, we will carry out ADF test on the regression residuals as proposed by Gujarati (2004). The ADF unit root test on the residuals work with the same decision rule as unit root test.The co-integration test result is summarized as follows:**Table 4.1.2: Co-integration Test Result**

|  |  |
| --- | --- |
| Null Hypothesis: ECT has a unit root |  |
| Exogenous: Constant, Linear Trend |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -5.366813 |  0.0005 |
| Test critical values: | 1% level |  | -4.243644 |  |
|  | 5% level |  | -3.544284 |  |
|  | 10% level |  | -3.204699 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(ECT) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 04:03 |  |  |
| Sample (adjusted): 1982 2016 |  |  |
| Included observations: 35 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| ECT(-1) | -1.018786 | 0.189831 | -5.366813 | 0.0000 |
| C | -11.02306 | 5.647053 | -1.952002 | 0.0597 |
| @TREND("1980") | 0.594171 | 0.262394 | 2.264422 | 0.0305 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.476718 |     Mean dependent var | 1.408410 |
| Adjusted R-squared | 0.444012 |     S.D. dependent var | 19.93853 |
| S.E. of regression | 14.86708 |     Akaike info criterion | 8.317992 |
| Sum squared resid | 7072.961 |     Schwarz criterion | 8.451308 |
| Log likelihood | -142.5649 |     Hannan-Quinn criter. | 8.364013 |
| F-statistic | 14.57623 |     Durbin-Watson stat | 1.881459 |
| Prob(F-statistic) | 0.000032 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

From the result above, the ADF test statistics (-5.366813) is greater than the 5% critical value (-3.544284) in absolute terms. This implies that the residuals are stationary (i.e. the variables are co-integrated or that the linear influence of the independent variables cancels out).**4.1.3 Error Correction Mechanism Result**

|  |  |  |
| --- | --- | --- |
| Dependent Variable: D(EXR) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 04:04 |  |  |
| Sample (adjusted): 1982 2016 |  |  |
| Included observations: 35 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(GDP) | -0.000639 | 0.001763 | -0.362537 | 0.7195 |
| INT | 0.459810 | 0.278529 | 1.650848 | 0.1092 |
| INF | -0.020664 | 0.159233 | -0.129773 | 0.8976 |
| BOP | -3.42E-05 | 0.000160 | -0.213384 | 0.8325 |
| ECT(-1) | -0.043797 | 0.225289 | -0.194404 | 0.8472 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | -0.028926 |     Mean dependent var | 7.225142 |
| Adjusted R-squared | -0.166116 |     S.D. dependent var | 16.70703 |
| S.E. of regression | 18.04139 |     Akaike info criterion | 8.754778 |
| Sum squared resid | 9764.757 |     Schwarz criterion | 8.976971 |
| Log likelihood | -148.2086 |     Hannan-Quinn criter. | 8.831479 |
| Durbin-Watson stat | 1.659681 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Table 4.1.3: ECM Test Result**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VARIABLE | COEFFICIENT | STD ERROR | T-STATISTICS | PROBABILITY |
| ECM(-1) | -0.043797 | 0.225289 | -0.194404 | 0.8472 |

 From table 4.3 above, the magnitude of the short run disparity is -0.043797%, that is to say the degree of the short run dynamics is 4.3797%. This shows a very low speed of adjustment to equilibrium after a shock. **4.2 REGRESSION RESULT** In the regression result, the variables under consideration are exchange rate (dependent variable), gross domestic product, interest rate[INT] and inflation rate [INF], balance of payment (BOP), from the result the estimated coefficient value of bo, b1, b2,and b3 are13.65297, 0.403238, 0.687204, -0.25464and -4.293105 respectively. The regression results are presented as follows:

|  |  |  |
| --- | --- | --- |
| Dependent Variable: D(EXR) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 04:05 |  |  |
| Sample (adjusted): 1981 2016 |  |  |
| Included observations: 36 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 13.65297 | 6.045822 | 2.258249 | 0.0311 |
| D(GDP) | 0.403238 | 0.001978 | 2.637290 | 0.0117 |
| INT | 0.687204 | 0.261207 | 3.099524 | 0.0310 |
| INF | -0.257464 | 0.174418 | -1.476137 | 0.0620 |
| BOP | -4.293105 | 0.000145 | -0.294995 | 0.7700 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.519012 |     Mean dependent var | 7.026212 |
| Adjusted R-squared | 0.505336 |     S.D. dependent var | 16.50983 |
| S.E. of regression | 16.46573 |     Akaike info criterion | 8.568685 |
| Sum squared resid | 8404.724 |     Schwarz criterion | 8.788618 |
| Log likelihood | -149.2363 |     Hannan-Quinn criter. | 8.645448 |
| F-statistic | 1.046937 |     Durbin-Watson stat | 1.616467 |
| Prob(F-statistic) | 0.399091 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

EXR = 13.65297 + 0.403238GDP + 0.687204INT– 0.257464INF – 4.293105BOPS.E = (6.045822) (0.001978) (0.261207) (0.174418) (0.000145) T\* = 2.258249 + 2.637290 3.099524 - 1.476137 - 0.294995R2 = 0.519012Adjusted R2 = 0.5053336F\* = 4.046937Durbin-Watson statistics = 1.616467**TABLE 4.4: Result of A prior Test**:

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **PRE-SIGN** | **POST-SIGN** | **RESULTS** |
| GDP | +VE | +VE | CWES |
| INTR | +VE | +VE | CWES |
| INF | -VE | -VE | CWES |
| BOP | -VE | -VE | CWES |

CWES – conform with expected sign**4.2 Evaluation of Regression Results****4.2.1 Evaluation Based on Economic Criterion**This subsection is concerned with evaluating the regression results based on prior expectations. The signs and magnitude of each variable coefficient is evaluated against theoretical expectations.The signs of all variables coefficient from the estimated model are totallyline with a priori expectations. The constant term is estimated at 13.65297 which mean that the model passes through the point 13.65297mechanically, if the independent variables are zero, exchange rate would be 10.16742(Gujarati and Sangeetha, 2007).The estimated coefficient for gross domestic product (GDP) is0.403238, this implies that if we hold all other variables affecting exchange rate constant, a unit increase in gross domestic product will lead to a 0.403238 increase in exchange rate on the average. Likewise, the estimated coefficient of interest rate (INT) is 0.687204, this means that holding every other variables that affect exchange rate constant, a unit increase in Interest Rate will bring about a 0.687204increase in exchange rate, a unit increase in inflation ratewill bring about a 0.257464 decrease in exchange rate,. Finally, a unit increase in balance of paymentwill bring about a 4.293105 decrease in exchange rate**4.2.2 Evaluation Based On Statistical Criterion****4.2.2.1 R2 –Result and Interpretation**This subsection applies the R2, the t-test and the f-test to determine the statistical reliability of the estimated parameters. These tests are performed as follows;The coefficient of determination R2 from the regression result, the R2 is given as 0.519012 this implies that 51.9012% of the variation in exchange rate is being explained by the variation in gross domestic product, Interest Rate, and Inflation Rate, balance of payment,.**4.2.2.2 t–Test Result and Interpretation**The t-test is used to measure the individual statistical significance of the explanatory variables, for a two tailed test, we use (ta/2). We also employ the 95% confidence interval or 5% level of significance (i.e.$α$=0.05) and 30 as our degree of freedom.**Decision rule**Reject Ho if t\*>ta/2 otherwise, do not reject.Note: ta/2=t0.05/2=t0.025From the distribution table, t0.025,31= 1.960The result of the t-test of significance is shown in table 4.5 below: The result of the t-test is presented below and evaluated based on the critical value (1.960) and the value of calculated t-statistics for each variable.**Table 4.5: Result of t-Test of Significance**

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **t-computed (t\*)** | **t-tabulated (ta/2)** | **Conclusion** |
| GDP | 2.637290 | 1.960 | Significant |
| INTR | 3.099524 | 1.960 | Significant |
| INF | -1.476137 | 1.960 | Insignificant |
| BOP | -0.294995 | 1.960 | Insignificant |

 Significant (Reject Ho; accept H1),Insignificant (Accept Ho).From the t- test result above, For GDP, t\*>ta/2, therefore we reject null hypothesis. Hence gross domestic product is statistically significant thus gross domestic productis a significant variable to determine exchange rate in Nigeria. For INT, t\*> ta/2 therefore we reject null hypothesis. Hence interest rate is statistically significant thus interest rate is a significant variable to determine exchange rate in NigeriaFor INF, t\*<ta/2 therefore we accept null hypothesis. Hence inflation rate is not statistically significant thus inflation rate has no significant impact on exchange rate in NigeriaFor BOP, t\*<ta/2 therefore we accept null hypothesis. Hence BOP is not statistically significant thus inflation rate has no significant impact on exchange rate in Nigeria**4.2.2.2 Result and Interpretation of F–Test of Significance** The F-test significance is use to measure the statistical significance of the entire regression plane or the joint impact of the independent variables on the dependent variable. The degree of freedom for the numerator (v1) and for the denominator (V2) are given as K-1 and n-k WhereN= sample size K= number of parameters including the constant term.**Decision rule (F-Test)**If F\*>F0.05 we will reject the null hypothesis and accept the alternative, otherwise, the alternative hypothesis H1 will be rejected and null hypothesis Ho be accepted.v1=5-1=4, V2=36-5=31, df=(4,31) at 5% level of significance and df=(4,29), f0.05= 2.70 and F\*=4.046937 Since f\*>f0.05, we reject the null hypothesis and conclude that the variables (GDP, INTR, INF and BOP) have joint inference on economic growth. This implies that the entire regression is significant.**Table 4.6: Result of f-Test of Significance:**

|  |  |  |
| --- | --- | --- |
| **Computed f-ratio value** | **Critical f-ratio value** | **Result** |
| 4.046937 | 2.70 | Statistically significant |

**4.2.3 Evaluation Based on Econometric Criterion**In this subsection, the following econometric test is used to evaluate the result obtained from our model: autocorrelation, heteroscedasticity test, normality test.* + - 1. **Result and Interpretation of Autocorrelation Test**

Using the durbin-watson statistics, the region of no autocorrelation (positive or negative) is given as followsdu< d\*< (4-du)du= 1.650d\*= 1.616467(4-du)= 4 – 1.650= 2.35By substitution, the region becomes:1.650 <1.616467< 2.35

|  |  |  |  |
| --- | --- | --- | --- |
| Du | d\* | 4-du | Result |
| 1.650 | 1.616467 | 2.35 | Autocorrelation present |

The result shows that there is the presence of autocorrelation problem in the model as the computed durbin Watson statistics did not fall within the zero autocorrelation regions. * + - 1. **Normality Test Result and Interpretation**

The Normality test will be done using the Jaque-Berra test of normality Jaque-Berra test of normality is hinged on the hypothesis that K is close to or exactly 3 and S is close to or exactly o, thus making the JB value close to or equal to O, which is the condition for normal distribution. **Decision rule:** For the residual to be normally distributed, the K value should be drawing close to or exactly three (3) and S should draw close to or exactly zero (0), thus making the JB value close to or equal to zero (0), which is the condition for normal distribution. **Table 4.6 Result of Normality Test**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Skewness** | **Kurtosis** | **Jarque-berra** | **Probability** | **Test** |
| 2.128742 | 7.816510 | 61.98741 | 0.000000 | NND |

NND= not normally distributed**Conclusion:**From the normality table, the Jaque-Berra does not draw close to zero (0) as stated, in order words the residual are not normally distributed **TEST FOR HETEROSCEDASTICITY**The test is carried out to evaluate the distribution of the error term. It is used to test if the error term has a constant variance. It follows chi-square distribution with degree of freedom equal to the number of regressors’ in the auxiliary regression excluding the constant. The test adopted is the white general heteroscedasticity. The F-statistics can also be used to verify this assumption and the hypothesis is formulated as follow.HO: There is no heteroscedasticityH1: There is heteroscedasticity**DECISION RULE**Following the result, the F Prob value is equal to 0.3126 therefore since this is greater than 5% level of significance, the study accept HO of heteroscedasticity and conclude that the conditional variance of the error term are constant

|  |
| --- |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey |
|  |  |  |  |  |
|  |  |  |  |  |
| F-statistic | 1.236703 |     Prob. F(3,32) | 0.3126 |
| Obs\*R-squared | 3.740227 |     Prob. Chi-Square(3) | 0.2909 |
| Scaled explained SS |  2.816513 |     Prob. Chi-Square(3) | 0.4208 |
|  |  |  |  |  |
|  |  |  |  |  |

* 1. **Evaluation of Research Hypotheses**

From the t-test result in table 4.5 above, and based on our decision rule, we reject the null hypothesis (Ho) on the variables (GDP, INT,), whereas INF and BOP have no significant impact on exchange rate in Nigeria.Further, from the f-test result in table 4.6 above, the fcal> f0.05, we reject the null hypothesis and conclude that all the variables jointly have significant impact on the exchange rate in Nigeria.**4.4 Implication of the Results** The result of this study indicates that gross domestic product and interest rate have a positive relationship with the exchange rate. This is consistent with our a priori expectation, more so, inflation and balance of payment have negative relationship with the exchange rate in NigeriaGross domestic product and interest rate are statistically significant, whereas inflation rate and balance of payment have no significant impact on the exchange rate in Nigeria.**CHAPTER FIVE****SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION****5.1 Summary of Findings** In other to carry out the analysis of this study a multiple regression model was built to analyse the determinants of exchange rate in Nigeria covering the period of 1980 to 2016. The model incorporates other variables that affect exchange rate in Nigeria which includes; gross domestic product, interest rate, inflation rate and balance of payment. The findings of the study shows a positive relationship existing between gross domestic product and interest rate on determinants of exchange rate in Nigeria, whereas inflation rate and balance of payment have negative relationship on the economic growth in Nigeria. Also, the findings indicates GDP and INT have significant impact on exchange rate whereas inflation rate and balance of payment have no significant impact on the exchange rate in Nigeria.**5.2 Conclusion**From the foregoing, we therefore conclude that GDP and INT have a positive relationship on the exchange rate in Nigeria whereas inflation rate and balance of payment have a negative relationship on the exchange rate in Nigeria. The researcher also concludes that gross domestic product and interest rate have significant impact on the exchange rate in Nigeria whereas inflation rate and balance of payment have no significant impact on the exchange rate in Nigeria. **5.3 Recommendations**Sequel to the finding of this study, I specifically made the following policy recommendations to the maintenance of stable exchange rate. To control exchange rate from fluctuating, these policies have to be adopted. 1. The government should create incentive such as loans subsidy etc to small scale industries, thereby encouraging them to process domestic goods into processed goods that will help boost our export and solve the initial findings of exchange rate, as an increase in export will lead to an increase in foreign exchange and affect the exchange rate positively and also sustain it to avoid fluctuating.
2. The government should encourage the export promotion strategies in order to maintain a surplus balance of trade which will bring a solution to our findings.
3. An effective policy should be made based on the fiscal and monetary policies which should be aimed at achieving a realistic exchange rate for naira in a bid to reduce and maintain a single digit interest rate figure which will solve the problem of uncertainties faced by potential investors and already existing ones.
4. In the case of import, tariffs can be placed to be very high on imported goods thereby discouraging imports and encouraging local industries to thrive and export their goods to gain foreign exchange, sustain and prevent the fluctuation of exchange rate.
5. Interest rate should be at a minimum, in order for the purchasing power of an average Nigeria to increase which spur economic growth and generally positive influences on currency value which brings a stop to the exchange fluctuation.
6. Finally, the government should influence the foreign exchange rate, by positive economic reforms that will reduce the adverse effect of unstable foreign exchange rate on the Nigerian economy with respect to trade flow.

**APPENDIX I****TIME SERIES DATA ON EXR, GDP, INT, INF AND BOP RANGING FROM 1980-2016**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **YEAR** | **EXR** | **GDP** | **INT** | **INF** | **BOP** |
| 1980 | 0.546358 | 15145 | 8.02 | 10 | 2991.2 |
| 1981 | 0.610025 | 15258 | 8.6 | 21.4 | 3020.8 |
| 1982 | 0.672867 | 14985.08 | 4.49 | 7.2 | 1398.3 |
| 1983 | 0.724142 | 13849.73 | 3.33 | 23.2 | 301.3 |
| 1984 | 0.764942 | 13779.26 | 2.67 | 40.7 | -354.9 |
| 1985 | 0.89375 | 14953.91 | 3.69 | 4.7 | -349.1 |
| 1986 | 2.020575 | 15237.99 | 1.5 | 5.4 | 4099.1 |
| 1987 | 4.017942 | 15263.93 | 31.92 | 10.2 | 17964.8 |
| 1988 | 4.536733 | 16215.37 | 5.13 | 56 | 20795 |
| 1989 | 7.391558 | 17294.68 | 16.96 | 50.5 | 22993.5 |
| 1990 | 8.037808 | 19305.63 | 14.65 | 7.5 | 57761.9 |
| 1991 | 9.909492 | 19199.06 | 2.07 | 12.7 | 15796.6 |
| 1992 | 17.29843 | 19620.19 | 25.77 | 44.8 | 101404.9 |
| 1993 | 22.05106 | 19927.99 | 4.37 | 57.2 | 41736.8 |
| 1994 | 21.8861 | 19979.12 | 8.03 | 57 | -42.6 |
| 1995 | 21.8861 | 20353.2 | 43.57 | 72.8 | -195.2 |
| 1996 | 21.8861 | 21177.92 | 9.71 | 30.4 | -53.2 |
| 1997 | 21.8861 | 21789.1 | 16.61 | 10.9 | 1.1 |
| 1998 | 21.8861 | 22332.87 | 25.28 | 7.9 | -220.7 |
| 1999 | 92.69335 | 22449.41 | 2.77 | 6.8 | -326.6 |
| 2000 | 102.1052 | 23688.28 | 10.32 | 7.1 | 314.1 |
| 2001 | 111.9433 | 25267.54 | 23.84 | 18.9 | 24.7 |
| 2002 | 120.9702 | 28957.71 | 10.81 | 13.1 | -563.5 |
| 2003 | 129.3565 | 31709.45 | 8.61 | 13.9 | -162.3 |
| 2004 | 133.5004 | 35020.55 | 19.37 | 15.4 | 1124.2 |
| 2005 | 132.147 | 37474.95 | 3.34 | 17.9 | -3459.9 |
| 2006 | 128.6516 | 39995.5 | 0.37 | 8.4 | -3849.5 |
| 2007 | 125.8331 | 42922.41 | 11.61 | 5.4 | -1666.5 |
| 2008 | 118.5669 | 46012.52 | 4.19 | 11.5 | -992.3 |
| 2009 | 148.8802 | 49856.1 | 23.71 | 12.6 | 1862.6 |
| 2010 | 150.298 | 54612.26 | 42.31 | 13.8 | 305.6 |
| 2011 | 153.8616 | 57511.04 | 5.94 | 10.9 | -831.4 |
| 2012 | 157.4994 | 59929.89 | 6.88 | 12.2 | 1949.2 |
| 2013 | 157.3112 | 63218.72 | 10.25 | 8.5 | 1209.1 |
| 2014 | 158.5526 | 67152.79 | 11.36 | 8 | 1932.3 |
| 2015 | 193.2792 | 69023.93 | 9.49 | 9 | -202 |
| 2016 | 253.49 | 67931.24 | 27.29 | 15.6 | 979.8 |

**SOURCE: CENTRAL BANK OF NIGERIA STATISTICAL BULLETIN****APPENDIX II****STATIONALITY TEST RESULT ON EXR**

|  |  |
| --- | --- |
| Null Hypothesis: D(EXR) has a unit root |  |
| Exogenous: None |  |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -3.087139 |  0.0030 |
| Test critical values: | 1% level |  | -2.632688 |  |
|  | 5% level |  | -1.950687 |  |
|  | 10% level |  | -1.611059 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(EXR,2) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 03:50 |  |  |
| Sample (adjusted): 1982 2016 |  |  |
| Included observations: 35 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(EXR(-1)) | -0.607680 | 0.196843 | -3.087139 | 0.0040 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.212665 |     Mean dependent var | 1.718490 |
| Adjusted R-squared | 0.212665 |     S.D. dependent var | 19.45623 |
| S.E. of regression | 17.26389 |     Akaike info criterion | 8.563267 |
| Sum squared resid | 10133.43 |     Schwarz criterion | 8.607705 |
| Log likelihood | -148.8572 |     Hannan-Quinn criter. | 8.578607 |
| Durbin-Watson stat | 1.836579 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX III****STATIONALITY TEST RESULT ON GDP**

|  |  |
| --- | --- |
| Null Hypothesis: D(GDP) has a unit root |  |
| Exogenous: Constant, Linear Trend |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -5.187908 |  0.0009 |
| Test critical values: | 1% level |  | -4.252879 |  |
|  | 5% level |  | -3.548490 |  |
|  | 10% level |  | -3.207094 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(GDP,3) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 03:52 |  |  |
| Sample (adjusted): 1983 2016 |  |  |
| Included observations: 34 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(GDP(-1),2) | -1.035237 | 0.199548 | -5.187908 | 0.0000 |
| C | 438.0032 | 417.1255 | 1.050051 | 0.3018 |
| @TREND("1980") | -23.60472 | 19.08442 | -1.236858 | 0.2254 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.472455 |     Mean dependent var | -75.82088 |
| Adjusted R-squared | 0.438419 |     S.D. dependent var | 1454.111 |
| S.E. of regression | 1089.692 |     Akaike info criterion | 16.90927 |
| Sum squared resid | 36810283 |     Schwarz criterion | 17.04395 |
| Log likelihood | -284.4577 |     Hannan-Quinn criter. | 16.95520 |
| F-statistic | 13.88136 |     Durbin-Watson stat | 1.834419 |
| Prob(F-statistic) | 0.000050 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX IV****STATIONALITY TEST RESULT ON INT**

|  |  |
| --- | --- |
| Null Hypothesis: INT has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 3 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -3.746437 |  0.0078 |
| Test critical values: | 1% level |  | -3.646342 |  |
|  | 5% level |  | -2.954021 |  |
|  | 10% level |  | -2.615817 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(INT) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 03:53 |  |  |
| Sample (adjusted): 1984 2016 |  |  |
| Included observations: 33 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| INT(-1) | -1.330386 | 0.355107 | -3.746437 | 0.0008 |
| D(INT(-1)) | 0.329255 | 0.318916 | 1.032418 | 0.3107 |
| D(INT(-2)) | 0.172790 | 0.248667 | 0.694865 | 0.4929 |
| D(INT(-3)) | 0.408787 | 0.172876 | 2.364630 | 0.0252 |
| C | 17.58362 | 4.822708 | 3.646006 | 0.0011 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.670391 |     Mean dependent var | 0.726061 |
| Adjusted R-squared | 0.623304 |     S.D. dependent var | 17.11045 |
| S.E. of regression | 10.50163 |     Akaike info criterion | 7.679666 |
| Sum squared resid | 3087.961 |     Schwarz criterion | 7.906410 |
| Log likelihood | -121.7145 |     Hannan-Quinn criter. | 7.755959 |
| F-statistic | 14.23728 |     Durbin-Watson stat | 1.989628 |
| Prob(F-statistic) | 0.000002 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX V****STATIONALITY TEST RESULT ON INF**

|  |  |
| --- | --- |
| Null Hypothesis: INF has a unit root |  |
| Exogenous: Constant |  |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -3.118686 |  0.0340 |
| Test critical values: | 1% level |  | -3.626784 |  |
|  | 5% level |  | -2.945842 |  |
|  | 10% level |  | -2.611531 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(INF) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 03:54 |  |  |
| Sample (adjusted): 1981 2016 |  |  |
| Included observations: 36 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| INF(-1) | -0.441299 | 0.141502 | -3.118686 | 0.0037 |
| C | 9.029349 | 3.820183 | 2.363591 | 0.0240 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared |  |     Mean dependent var | 0.155556 |
| Adjusted R-squared | 0.199565 |     S.D. dependent var | 17.09497 |
| S.E. of regression | 15.29437 |     Akaike info criterion | 8.346799 |
| Sum squared resid | 7953.199 |     Schwarz criterion | 8.434772 |
| Log likelihood | -148.2424 |     Hannan-Quinn criter. | 8.377504 |
| F-statistic | 9.726204 |     Durbin-Watson stat | 1.680365 |
| Prob(F-statistic) | 0.003687 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX VI****STATIONALITY TEST RESULT ON BOP**

|  |  |
| --- | --- |
| Null Hypothesis: BOP has a unit root |  |
| Exogenous: None |  |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -3.271771 |  0.0018 |
| Test critical values: | 1% level |  | -2.630762 |  |
|  | 5% level |  | -1.950394 |  |
|  | 10% level |  | -1.611202 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(BOP) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 03:56 |  |  |
| Sample (adjusted): 1981 2016 |  |  |
| Included observations: 36 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| BOP(-1) | -0.468186 | 0.143099 | -3.271771 | 0.0024 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.234205 |     Mean dependent var | -55.87222 |
| Adjusted R-squared | 0.234205 |     S.D. dependent var | 21306.82 |
| S.E. of regression | 18645.53 |     Akaike info criterion | 22.53199 |
| Sum squared resid | 1.22E+10 |     Schwarz criterion | 22.57597 |
| Log likelihood | -404.5757 |     Hannan-Quinn criter. | 22.54734 |
| Durbin-Watson stat | 2.329701 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX VII****COINTEGRATION TEST RESULT**

|  |  |
| --- | --- |
| Null Hypothesis: ECT has a unit root |  |
| Exogenous: Constant, Linear Trend |  |
| Lag Length: 0 (Automatic - based on SIC, maxlag=9) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic |   Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | -5.366813 |  0.0005 |
| Test critical values: | 1% level |  | -4.243644 |  |
|  | 5% level |  | -3.544284 |  |
|  | 10% level |  | -3.204699 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| \*MacKinnon (1996) one-sided p-values. |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller Test Equation |  |
| Dependent Variable: D(ECT) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 04:03 |  |  |
| Sample (adjusted): 1982 2016 |  |  |
| Included observations: 35 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| ECT(-1) | -1.018786 | 0.189831 | -5.366813 | 0.0000 |
| C | -11.02306 | 5.647053 | -1.952002 | 0.0597 |
| @TREND("1980") | 0.594171 | 0.262394 | 2.264422 | 0.0305 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.476718 |     Mean dependent var | 1.408410 |
| Adjusted R-squared | 0.444012 |     S.D. dependent var | 19.93853 |
| S.E. of regression | 14.86708 |     Akaike info criterion | 8.317992 |
| Sum squared resid | 7072.961 |     Schwarz criterion | 8.451308 |
| Log likelihood | -142.5649 |     Hannan-Quinn criter. | 8.364013 |
| F-statistic | 14.57623 |     Durbin-Watson stat | 1.881459 |
| Prob(F-statistic) | 0.000032 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX VIII****ERROR CORRECTION MECHANISM**

|  |  |  |
| --- | --- | --- |
| Dependent Variable: D(EXR) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 04:04 |  |  |
| Sample (adjusted): 1982 2016 |  |  |
| Included observations: 35 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| D(GDP) | -0.000639 | 0.001763 | -0.362537 | 0.7195 |
| INT | 0.459810 | 0.278529 | 1.650848 | 0.1092 |
| INF | -0.020664 | 0.159233 | -0.129773 | 0.8976 |
| BOP | -3.42E-05 | 0.000160 | -0.213384 | 0.8325 |
| ECT(-1) | -0.043797 | 0.225289 | -0.194404 | 0.8472 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | -0.028926 |     Mean dependent var | 7.225142 |
| Adjusted R-squared | -0.166116 |     S.D. dependent var | 16.70703 |
| S.E. of regression | 18.04139 |     Akaike info criterion | 8.754778 |
| Sum squared resid | 9764.757 |     Schwarz criterion | 8.976971 |
| Log likelihood | -148.2086 |     Hannan-Quinn criter. | 8.831479 |
| Durbin-Watson stat | 1.659681 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX IX****REGRESSION TEST RESULT**

|  |  |  |
| --- | --- | --- |
| Dependent Variable: D(EXR) |  |  |
| Method: Least Squares |  |  |
| Date: 07/22/18 Time: 04:05 |  |  |
| Sample (adjusted): 1981 2016 |  |  |
| Included observations: 36 after adjustments |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 13.65297 | 6.045822 | 2.258249 | 0.0311 |
| D(GDP) | 0.403238 | 0.001978 | 2.637290 | 0.0117 |
| INT | 0.687204 | 0.261207 | 3.099524 | 0.0310 |
| INF | -0.257464 | 0.174418 | -1.476137 | 0.0620 |
| BOP | -4.293105 | 0.000145 | -0.294995 | 0.7700 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.519012 |     Mean dependent var | 7.026212 |
| Adjusted R-squared | 0.505336 |     S.D. dependent var | 16.50983 |
| S.E. of regression | 16.46573 |     Akaike info criterion | 8.568685 |
| Sum squared resid | 8404.724 |     Schwarz criterion | 8.788618 |
| Log likelihood | -149.2363 |     Hannan-Quinn criter. | 8.645448 |
| F-statistic | 4.046937 |     Durbin-Watson stat | 1.616467 |
| Prob(F-statistic) | 0.039091 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**APPENDIX X****STATIONALITY TEST RESULT ON EXR****APPENDIX X****HETROSCEDASCITY TEST RESULT**

|  |
| --- |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey |
|  |  |  |  |  |
|  |  |  |  |  |
| F-statistic | 1.236703 |     Prob. F(3,32) | 0.3126 |
| Obs\*R-squared | 3.740227 |     Prob. Chi-Square(3) | 0.2909 |
| Scaled explained SS | 2.816513 |     Prob. Chi-Square(3) | 0.4208 |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Test Equation: |  |  |  |
| Dependent Variable: RESID^2 |  |  |
| Method: Least Squares |  |  |
| Date: 01/13/04 Time: 00:27 |  |  |
| Sample: 1981 2016 |  |  |
| Included observations: 36 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob.   |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 3804622. | 903248.8 | 4.212152 | 0.0002 |
| BOP | -27.02582 | 37.55713 | -0.719592 | 0.4770 |
| D(INT) | 39641.04 | 229481.6 | 0.172742 | 0.8639 |
| INF | -50457.88 | 37361.79 | -1.350521 | 0.1863 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.103895 |     Mean dependent var | 2618364. |
| Adjusted R-squared | 0.019885 |     S.D. dependent var | 3666247. |
| S.E. of regression | 3629612. |     Akaike info criterion | 33.15159 |
| Sum squared resid | 4.22E+14 |     Schwarz criterion | 33.32754 |
| Log likelihood | -592.7286 |     Hannan-Quinn criter. | 33.21300 |
| F-statistic | 1.236703 |     Durbin-Watson stat | 1.314845 |
| Prob(F-statistic) | 0.312559 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

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