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IMPACT OF EXCHANGE RATE FLUCTUATION ON SELECTED ECONOMIC SECTORS OF THE NIGERIAN ECONOMY

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ABSTRACT

The study investigated the impact of exchange rate fluctuation on selected economic sectors of the Nigerian economy. The study covered the agricultural (AGDP), manufacturing (MGDP), petroleum (PGDP) and service sector (SGDP) of the Nigerian economy. The petroleum sector represented the oil sector while the agricultural (AGDP), manufacturing (MGDP), and service sector (SGDP) represented the non-oil sector. The main objective of the study was to determine whether exchange rate fluctuations had a significant impact on the selected sectors of the economy. These sectors were invariably the largest contributors to the GDP. The time scope covered 1981-2016. Data for the study were obtained specifically from CBN statistical bulletin (2016). The data were analysed using the Auto Regressive Distributed Lagged (ARDL) model. The study concluded that there was no significant impact of exchange rate on AGDP, MGDP and SGDP respectively. However, there was a positive and significant impact of exchange rate on PGDP. The study recommended that Nigeria's economy should be diversified to enable the non-oil sector to become significant foreign exchange earners.

Contribution/Originality: This study contributes to the existing literature by unbundling Nigeria's economy into its component sectors and determining the impact of exchange rate fluctuations on each sector. This study uses a relatively new estimation methodology of Auto-Regressive Distributed Lagged model (ARDL). This study originates a new formula which integrates lagged variables into the model.

1. INTRODUCTION

The Nigerian economy has been planned to become a developed economy in the world by the year 2050 (Obi *et al.*, 2016). An important route to achieving this vision is to pursue a quick and sustained economic growth and development through a well-managed exchange rate policy. An ill-managed exchange rate policy could have a negative effect on economic growth and development (Rodrik, 2008; Kalu *et al.*, 2019). The exchange rate is therefore an international price measure for the competitiveness of an economy. The exchange rate also plays an important part in the allocation of income, spending and production of goods and services. It influences the flow of goods, services, and capital in a country. It has a strong influence on balance of payments, inflation and other

macroeconomic variables (Takaendesa, 2006). The choice and management of an effective exchange rate regime is vital to attain macroeconomic stability, growth and development.

Since the end of the Bretton Woods, several developed and developing economies had adopted the floating exchange rate system. Since then, the impact of exchange rate fluctuations on price and aggregate output had attracted several studies. Empirical studies which sought to determine the reasons of these fluctuations have generally based on two main approaches. The first approach suggested that real exchange rate fluctuations are caused by nominal shocks. The second approach suggested that real shocks are productivity-motivated (Inoue and Hamori, 2009).

The exchange rate policy in Nigeria has fluctuated between the fixed exchange rate system and a market based (flexible) exchange rate system. The fixed exchange rate system was introduced during the post-independence era in 1960 while the market based exchange rate system was introduced from 1986 during the structural Adjustment Programme (SAP) era. There have however been controversies (in respect to production of goods and services) under the flexible and fixed exchange rate system. Several exchange rate reforms which had been introduced were aimed at setting the Nigerian economy on the path of macroeconomic stability, recovery and sustainable development (Bakare, 2011). The economy has however degenerated in terms of macroeconomic performances. Several exchange rate regimes had brought in exchange rate volatilities and uncertainties. The volatilities in exchange rates could be explained in two ways. The first reflects systematic movement of the exchange rate and the second; exchange rate volatility. Exchange rate volatility determines economic performance by influencing savings, lending rate and inflation.

The exchange rate policies in Nigeria have changed over the years. It has changed from a fixed exchange rate system in 1960 when it was solely linked with the British Pounds. By 1967, following the depreciation of the British Pounds, the US dollar was included in the parity system. By 1972, the parity system with the Pound Sterling was suspended due to the rise of the stronger US dollar. In 1973, Nigeria returned to the fixed exchange rate system linked to the British Pound as a result of the US dollar devaluation. In 1974, the Naira was tied to both the pound and dollar. During the 1970s, there were frequent increases in value of the naira occasioned by increases in the price of crude oil in the world market. This led to over-reliance on imports, capital flight and reduction of non-oil exports. This created balance of payments imbalance and depletion of external reserves. This also led to the demise of critical sectors of the economy such as the agricultural sector (Osaka *et al*., 2003). In 1978, the Nigerian currency was pegged to a basket of 12 foreign currencies. This was however neglected in 1985 in favour of quoting the naira against the dollar.

Before 1986, the exchange rate policies created the problem of over-valuation of the naira. In a bid to solve this problem, the naira was deregulated in September 1986 under the Structural Adjustment Programme (SAP). The Second-tier Foreign Exchange Market (SFEM) was therefore established to enhance the SAP. SFEM was expected to create a mechanism for determination of exchange rates in order to provide stability in the short term and ensure balance of payments equilibrium in the long run. The objectives of SFEM was to achieve a realistic naira exchange rate through the market forces of demand and supply, improve foreign exchange inflow and discourage outflow, create an efficient allocation of resources, stimulate non-oil exports, reduce currency trafficking by wiping out unofficial parallel foreign exchange market (Mordi, 2006).

Numerous changes were carried out in order to reinvent the SFEM. It was changed from SFEM to Foreign Exchange Market (FEM); to Autonomous Foreign Exchange Market (AFEM); to Dutch Action System and; to the wholesale Dutch Auction System. The FEM was introduced in 1987 due to the challenges which arose from the first and second tier market rates. Bureau de change was introduced in 1989 with a view to expanding the scope and achieving the objectives of FEM. The fixed exchange rate system was re-established in 1994. In 1995 there was a reversal of policy to guided deregulation which was termed Autonomous Foreign Exchange Market (AFEM). The interbank foreign exchange market (IFEM) was the restored in 1999. In 2002, the Dutch Auction System (DAS)

was reintroduced due to pressure in the foreign exchange market. Lastly, the wholesale DAS was introduced in 2006, which further liberalized the market (Obi *et al.*, 2016).

There also seem to be a gap in consensus among research studies on the impact of exchange rate fluctuation on economic growth in Nigeria. While some studies found a significant relationship between exchange rate and economic growth, other studies have found a non-significant relationship. Studies such as Oyovwi (2012); Azeez *et al.* (2012); Usman and Adejare (2012); Korkmaz (2013); Kogid *et al.* (2012); Jibrin *et al.* (2017) found a significant impact of exchange rate on economic growth. On the other hand, the studies of Adeniran *et al.* (2014) and Akpan and Atan (2012) have found a non-significant impact of exchange rate on economic growth in Nigeria. Very few of the previous studies have unbundled the economy into its component sectors to determine which of the sectors were more significantly impacted by the fluctuations in exchange rate. This paper therefore tends to unbundle the economy into its component sections and determine the impact of exchange rate on its components. This may however give a better direction to the formulation, selection and management of the exchange rate policy.

The contribution of this study varies. However, it is believed that Nigeria presents a valuable blueprint for Africa and other developing nations of the world. This is because Nigeria is the most populous black nation, a principal African economy and a developing nation in the world. Its study can therefore provide empirical evidence for the purposes of generalization of exchange rate and economic growth relationship. It should be noted that Nigeria has an import-dependent economy in terms of subsistence and an export-dependent economy in terms of the public revenue architecture and therefore is exposed to high levels of foreign exchange transactions and its associated risks (Kalu *et al.*, 2019). These exposures to the international market and the related shocks on Nigeria's economy beg for a study which would assist in better policy formulation and implementation. Another obvious value addition is the uniqueness of our estimation technique. The study presents the pre-estimation tests which focus on data description and the basic statistical properties of the data. This is crucial because the choice of an appropriate estimation technique should depend on the properties of the data. Also, we apply the Autoregressive Distributed Lag (ARDL) regression estimation method. The choice of this method is based on the fact that it avoids some diagnostic problems usually associated with the Ordinary Least Squares (OLS) due to the dynamic nature of the ARDL model which shows lagged and contemporaneous relationship simultaneously. Before inference, we carry out diagnostic tests to ensure the consistency and validity the estimates with the basic assumptions underlying the estimation framework.

1.1. Objectives Of The Study

The main objective of this study was to determine the impact of exchange rate fluctuations on selected economic sectors of the economy. The specific objectives were;

1. To determine the impact of exchange rate fluctuation on agricultural contribution to GDP (AGDP).
2. To determine the impact of exchange rate fluctuation on manufacturing contribution to GDP (MGDP).
3. To determine the impact of exchange rate fluctuation on petroleum and natural gas contribution to GDP (PGDP).
4. To determine the impact of exchange rate fluctuation on the service sector contribution to GDP (SGDP).

1.2. Research Questions

The research question were culled from the objectives of the study as follows

1. Has exchange rate fluctuation had any significant impact on AGDP.
2. Has exchange rate fluctuation had any significant impact on MGDP
3. Has exchange rate fluctuation had any significant impact on PGDP
4. Has exchange rate fluctuation had any significant impact on SGDP

1.3. Hypothesis

The null hypothesis was culled from the research questions as follows;

HO1. There was no significant impact of exchange rate fluctuation on AGDP

HO2. There was no significant impact of exchange rate fluctuation on MGDP

HO3. There was no significant impact of exchange rate fluctuation on PGDP

HO4. There was no significant impact of exchange rate fluctuation on SGDP

2. LITERATURE REVIEW

2.1. Conceptual Framework

Exchange rate signifies the price of one currency in terms of another. It shows the value at which, a unit of foreign currency can exchange with a local or domestic currency (Kalu *et al.*, 2019). Exchange rate could also be explained as the ratio of a unit of one currency and a unit of another currency at a particular time (Ngerebo-a and Ibe, 2013). Furthermore, exchange rate is the price of one currency vis-à-vis another currency and is the number of units of a currency required to buy another currency (Mordi, 2006). The exchange rate is the linkage between domestic and foreign prices of goods and services. Exchange rate can also appreciate or depreciate. If there is appreciation, less units of a domestic currency exchanges for one unit of foreign currency. During depreciation, more units of a domestic currency exchanges for one unit of a foreign currency. Devaluation could also mean depreciation; therefore we may use them interchangeable during the study. Devaluation signifies the reduction in the value of a currency in terms of a designated unit of gold (or other standard of measurement). Depreciation on the other hand, refers to reduction of the value of a currency in terms of a specific foreign currency. Since International Monetary Fund (IMF) does not measure currency in terms of gold again (since 1984), these concepts are used interchangeably. Economic analyst have suggested two basic concepts of exchange rate namely; nominal exchange rate and real exchange rate. The nominal exchange rate (NER) is rate which measures the relative price of two foreign currencies and vice versa; for example, Naira versus the U.S. dollar (₦365.00:USD1.00). The real exchange rate (RER) measures the relative price of two tradable goods (exports and imports) in relation to non-tradable goods (goods and services produced and consumed locally. The nominal exchange rate therefore refers to the units of a domestic currency that must be given up to get a unit of foreign currency. Hence, nominal exchange rate is the price of domestic currency in relation to a foreign currency. It is denoted as E. The real exchange rate is the relative price of foreign goods in relation to domestic goods. Hence, it is the exchange rate adjusted for price.

It is denoted as; e = Ef/d.

Let; E= exchange rate (nominal), f = foreign price and d = domestic price.

There are however more complex exchange rate measurements which extend bilateral comparisons to multilateral comparisons. An example includes the real effective exchange rate. This rate is a weighted average of the bilateral real exchange rates taking into consideration the trade share of its partners in the country's total trade (Obi *et al.*, 2016).

2.2. Theoretical Framework

2.2.1. Optimal Currency Area (OCA) Theory

The initial and principal theoretical foundation for exchange rate regimes rested on the Optimal Currency Area (OCA) theory which was propounded by Mundell and McKinnonas and quoted by Akpan and Atan (2012) and Ufoeze *et al.* (2018).This theory proposed the stabilization of the business cycle and trade. It is based on concepts of the symmetry of shocks, the degree of openness, and labour market mobility. It stipulates that a fixed exchange rate system can improve the growth in trade and output by decreasing exchange rate risk and therefore, the cost of hedging. It would also improve investment by reducing currency premium from interest rates. Nonetheless, trade and output growth could be reduced by ending or preventing the required relative price adjustment process. Recent

exchange rate policies are based on the monetary theory and the asset market (or portfolio balance) approaches to the balance of payments. They suggest that exchange rate is entirely a financial phenomenon and determined by financial flows. Earlier traditional exchange rate theories suggest that the exchange rate determination is based on trade flows which determine the exchange rate movement in the long run. Most policy makers have however shifted interest to the more exchange rate theories. Notwithstanding, the traditional theories remain crucial in the long run.

2.2.2. Purchasing Power Parity

The purchasing power parity (PPP) shows the association between prices and exchange rate. The origin of the PPP theory can be traced to the Salamanca School in Spain back in the Sixteenth century. However its development as a theory of exchange rate could be attributed to the work of Cassel. Cassel first recommended PPP as a theory of adjusting pre–World War I exchange rates parities. He proposed this theory for countries that resolved to return to the gold standard system after the war ended. Some modification became important because some countries that abandoned the gold standard system in 1914 experienced different inflation rates during and after the war. As an exchange rate determination theory, the simple and most powerful form of PPP (i.e. absolute PPP) was based on the 'law of one price'. The Absolute PPP suggests that exchange rate would amend to equate the prices of national baskets of goods and services between two nations. This occurs as a result of the market forces determined by arbitrage. The purchasing power parity (PPP) is also referred to as the inflation theory of exchange rates. This theory proposes that the exchange rate would adjust so that the price of a specific good or service will be unchanged no matter where you buy it. Consequently, the PPP theory is oftentimes regarded as the 'law of one price'. It can be stated with the equation:

It is simply stated as $E = P / P^*$

Where;

E = Nominal exchange rate

P = Domestic prices in domestic currency

P* = Foreign prices in foreign currency

The equation suggests that E depends mostly on the factors that affect domestic price level. Therefore, 'E' could be said to be determined by endogenous factors (factors derived from within). Another version of PPP theory restates the equation in terms changes in the nominal exchange rate to changes in relative prices. This is known as relative PPP: Showing that;

$\% \Delta E = \%\Delta P - \%\Delta P^*$

Where $\%\Delta$ = Percentage change

2.2.3. The Monetary Model of Exchange Rates

The Monetary Model of Exchange rate suggests that the process of balancing the stock of total demand and supply of money in each country determines the exchange rates. Therefore it is opined that the demand for money in the long term is stable and has a positive relationship with national income. It however proposes inverse relationship with interest rate. The money supply of a country is determined by its monetary base times the multiplier. The monetary base equals the domestic credit created by the monetary authorities in addition to its international reserve. An excess supply of money in the economy usually results in a depletion of reserves, or a balance of payment deficit under fixed exchange rates and a devaluation of the nation's currency under flexible exchange rate. The opposite occurs during an excess demand for money in the economy. This theory therefore propounds that the exchange rate is determined by the domestic monetary authority and is an extension of the simple quantity theory of money:

$Mv = Py$

Where M = Monetary stock; v = velocity of money in correlation; P = price level; Y = full employment of output. With V and Y held constant, the equation provides P = 1/v (M/y), therefore %ΔM = %ΔP

If relative prices are determined by different monetary regimes, then it is easy to make the additional step; using the relative PPP equation, the change in domestic prices can then feed directly and proportionally into exchange rate; i.e. %ΔM = %ΔP = %ΔE. This takes exchange rate to be exogenously determined and its changes have significant effect on economic growth through changes in monetary stock.

2.3. Empirical Framework

Past research on the impact of exchange rate fluctuation on economic growth has reached contrasting results. For instance, a number of empirical evidences showed that real exchange rate fluctuation significantly impacted growth outcomes as shown below;

Oyovwi (2012) studied the effect of exchange rate volatility on economic growth in Nigeria. The study employed time series annual data from 1970 to 2009. The Generalised Autoregressive Conditional Heteroscedasticity (GARCH) technique was used to generate exchange rate volatility. The study found that in the short run, economic growth was positively and significantly related to exchange rate volatility, while in the long run, there was a negative relationship between the two variables.

Azeez *et al.* (2012) investigated the effect of exchange rate volatility on macroeconomic performance in Nigeria. Secondary data was obtained from 1986 to 2010. The variables included; Real GDP as the dependent variable, while Exchange Rate (EXR), Balance of Payment (BOP) and Oil Revenue (OREV) were the independent variables. It employed the Ordinary Least Square (OLS) and Johansen cointegration to test for the short and long run effects respectively. The results revealed EXR was positively related to GDP, that OREV was also positively related GDP while BOP was negatively related to GDP.

Usman and Adejare (2012) investigated the effect of foreign exchange regimes on industrial growth in Nigeria. They used time series data obtained from CBN Statistical Bulletin. The data covered the period 1985 to 2005. Variables for the study included Gross Domestic Product (as dependent variable); World Price Index, Per Capita Income, and Net Export were the independent variables respectively. The OLS and correlation were employed as estimation techniques. The study concluded that Exchange rate had significant effect on the economy (represented by the GDP).

Korkmaz (2013) analysed the effect of exchange rate on economic growth (GDP) for 9 randomly selected European countries (France, Germany, Greece, Hungary, Italy, Spain, Turkey, Poland and United Kingdom). The study used the annual data of 2002-2011. Panel data technique was employed for analysis. The study found that there was causality from exchange rate towards economic growth for the nine European countries.

Tiwari and Sharma (2015) explored the causality relationship between the foreign trade and economic growth of Chinese economy. They used time series data from 1980 to 2013. Cointegration, Granger Causality analysis and Vector Error Correction Mechanism (VECM) were used to analyse the data. The result confirmed that foreign trade and GDP were cointegrated. This indicated an existence of a long run equilibrium relationship between foreign trade and GDP.

Kogid *et al.* (2012) studied the impacts of the exchange rate on economic growth in Malaysia. They employed time series data which covered 1971 to 2009. The ARDL bounds test was used to analyse the data. They found that a long-run cointegration exists between exchange rates (both nominal and real) and economic growth. Therefore exchange rate had a significant effect on economic growth.

Jibrin *et al.* (2017) studied the impact of exchange rate fluctuation on gross domestic product (GDP) and other macroeconomic aggregates in ECOWAS. The study period was from 1990 to 2014 for a sample of ten (10) West African countries. The ten (10) countries included Benin Republic, Burkina Faso, Cape Verde, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria and Sierra Leone. The Ordinary Least Square (OLS) was employed for

analysis. The result showed that exchange rate had a significant impact on GDP in four countries namely Benin, Guinea Bissau, Liberia and Nigeria.

Shehu and Youtang (2012) investigated the causal relationship between exchange rate volatility (ERV), trade flows and economic growth of Nigeria. The research study was based on a time series data which covered 1970-2009. The results showed that exchange rate volatility had a significant impact of on trade flows and economic growth of Nigeria.

However, other studies have revealed that exchange rate had no significant impact on economic growth performance. For example;

McPherson and Rakovski (2000) studied the relationship between the real and nominal exchange rates on GDP growth in Kenya. The study period covered 1970 to 1996. A macroeconomic model, as a single equation instrumental variable estimation, and as a vector-autoregression model were employed to analyse the data. The results showed that there was no significant impact of changes in the exchange rate on GDP growth.

Adeniran *et al.* (2014) studied the impact of exchange rate fluctuation on the Nigerian economic growth. The study employed secondary data from 1986-2013. The ordinary least square (OLS) was used to analyse the data. The study revealed that exchange rate had no significant impact on economic growth in Nigeria.

Akpan and Atan (2012) investigated the effect of exchange rate movements on real output growth in Nigeria. They obtained quarterly data for the period 1986 to 2010. A Generalised Method of Moments (GMM) technique was used to analyse the data. The study found that there was no significant relationship between changes in exchange rate and output growth.

The study also analysed empirical literature relating to the impact of foreign exchange on different sectors of the economy;

Gatawa and Mahmud (2017) analysed short and long-run impacts of exchange rate fluctuations on agricultural exports volume in Nigeria. The time scope covered 1981-2014. The GARCH was used to estimate the volatility of exchange rates, and other diagnostic tests. The ARDL was the technique of analysis. The results revealed that official exchange rate had a significant impact on agricultural export volumes.

Jongbo (2014) studied the impact of real exchange rate fluctuation on industrial output of the manufacturing sector in Nigeria. The Ordinary Least Square (OLS) method of regression was employed in analysing the data. The data set covered the period 1990 to 2012. The results showed that real exchange rate had a significant impact on industrial output.

Akinlo and Lawal (2015) examined the impact of exchange rate on industrial production in Nigeria. The study covered the period 1986- 2010. The Vector Error Correction Model (VECM) was used for data analysis. The study suggested the existence of long run relationship between industrial production index, exchange rate, money supply and inflation rate. It suggested that exchange rate depreciation had no significant impact on industrial output in the short run but had positive and significant impact in the long run.

Olufayo and Fagite (2014) explored the impact of exchange rate volatility on the export performance of both oil and non-oil sectors in Nigeria. The study covered the period from 1980-2011. They used ARCH, GARCH and SUR (Seemingly Unrelated Regression method) to measure the volatility of exchange rate and to estimate the coefficient of the two system equation. The ARCH and GARCH results suggested that the exchange rate was volatile. Also, the SUR model suggested that exchange rate volatility had no significant impact on both oil and non-oil sectors in Nigeria respectively.

3. METHODOLOGY

The theoretical foundation of this study was based on the Monetary Model of Exchange Rate. The research method employed is *ex-post facto* design. The study covered the period 1981-2016. Quantitative technique of data analysis was adopted in investigating the relationship between the dependent variable {agricultural output

(AGDP), manufacturing output (MGDP), petroleum output (PGDP) and service sector output (SGDP) and the independent variables (exchange rate, inflation rate). Data for the study were obtained specifically from CBN statistical bulletin (2016). The model used in this study was adapted from the work of Ufoeze *et al.* (2018). In their model, GDP was the dependent variable while exchange rate, inflation rate, money supply and oil revenue were the explanatory variables. As a modification, this study disaggregated GDP into four component sectors which include the agricultural, manufacturing, petroleum and service sectors. This however differs from most studies which studied GDP in its aggregated form. The framework for these models is structured using ARDL technique. The core advantages of the ARDL technique include robustness in the face of small samples and its ability to contain different orders of integration. It also reduces diagnostic problems such as autocorrelation.

The model is specified thus:

3.1. Specification of the Models

Analytical equation;

$$AGDP = f(EXCH, INF) \quad (1)$$

$$MGDP = f(EXCH, INF) \quad (2)$$

$$PGDP = f(EXCH, INF) \quad (3)$$

$$SGDP = f(EXCH, INF) \quad (4)$$

Mathematical Equation;

$$\Delta AGDP = \beta o + \sum_{i=1}^{m} \beta 1 \Delta Exch + \sum_{i=1}^{n} \beta 2 \Delta inf + \gamma 1 Exch + \gamma 2 inf + \mu$$

$$\Delta MGDP = \beta o + \sum_{i=1}^{m} \beta 1 \Delta Exch + \sum_{i=1}^{n} \beta 2 \Delta inf + \gamma 1 Exch + \gamma 2 inf + \mu$$

$$\Delta PGDP = \beta o + \sum_{i=1}^{m} \beta 1 \Delta Exch + \sum_{i=1}^{n} \beta 2 \Delta inf + \gamma 1 Exch + \gamma 2 inf + \mu$$

$$\Delta SGDP = \beta o + \sum_{i=1}^{m} \beta 1 \Delta Exch + \sum_{i=1}^{n} \beta 2 \Delta inf + \gamma 1 Exch + \gamma 2 inf + \mu$$

Where;

AGDP= Agricultural Contribution to GDP; MGDP = Manufacturing Contribution to GDP; PGDP = Petroleum and Natural Gas Contribution to GDP; SGDP = Service Sector Contribution to GDP; EXCH = Nominal exchanges rate; INF = Rate of inflation

3.2. A priori Expectation

The *a priori* expectation of the relationship suggested that exchange rate and inflation rate were expected to have a negative relationship with the AGDP, MGDP, PGDP and SGDP respectively. Therefore, an increase in exchange rate should lead to a reduction in output of these sectors *ceteris paribus.*

3.3. Technique of Estimation

Descriptive statistics were employed to determine the characteristics of the data. These included the mean, mode, skewness, kurtosis, Jarque-Bera statistics among others. The study employed the Auto Regressive Distributed Lagged technique for the estimation analysis. The coefficient of determination (R^2), F-test, t-test, beta

and Durbin-Watson were used in the interpretation of the results. The decision rule for test of hypotheses is to rejects the null hypotheses for calculated significance value below 5% level of significance. Student T-Test measures the individual significance of the estimated independent variables. F-Test measures the overall significance. The coefficient is used to measure the individual contribution of the variables to variation in the dependent variable. Durbin Watson (DW) Statistics tests for auto correlation in the regression. The Augmented Dickey Fuller (ADF) unit root test was conducted to test for stationary trend in the series. The decision criteria suggested that the null hypothesis of non-stationary trend is rejected if the ADF test statistic at 5 percent is greater than or equal to the Mac-Kinnon critical value, otherwise it is accepted. Basic descriptive techniques were employed for data presentation.

4. DATA PRESENTATION AND ANALYSIS

4.1. Data Presentation

4.1.1. Agricultural Contribution to GDP (AGDP)

AGDP showed a continuous increase during the study period see Figure 1. The lowest value was N17.05 (Billion) in 1981 and the highest value was N21,523 (Billion) in 2016 see Table 1. The mean value was N5,205 (Billion). The data was positively skewed to the right (S>0) and mesokurtic (k=3). Jarque-Bera (JB) statistics (P<0.05) suggested that the data set was not normally distributed see Table 2.

4.1.2. Manufacturing Contribution to GDP (MGDP)

MGDP showed a continuous increase during the study period see Figure 1. The lowest value was N26.89 (Billion) in 1981 and the highest value was N8,973.77 (Billion) in 2016 see Table 1. The mean value was N1930.96 (Billion). The data was positively skewed to the right (S>0) and leptokurtic (k>3). Jarque-Bera (JB) statistics (P<0.05) suggested that the data set was not normally distributed see Table 2.

4.1.3. Petroleum and Natural Gas Contribution to GDP (PGDP)

PGDP showed a fluctuating movement during the study period see Figure 1. The lowest value was N5.92 (Billion) in 1981 and the highest value was N11315.03 (Billion) in 2012. It however, diminished to N5367 (Billion) in 2016. The mean value was N2611.35 (Billion). The data was positively skewed to the right (S>0) and mesokurtic (k=3). Jarque-Bera (JB) statistics (P<0.05) suggested that the data set was not normally distributed see Table 2.

4.1.4. Service Sector Contribution to GDP (SGDP)

SGDP showed a continuous increase during the study period see Figure 1. The lowest value was N64.24 (Billion) in 1981 and the highest value was N 41,310.78 (Billion) in 2016 see Table 1. The mean value was N8,004.60 (Billion). The data was positively skewed to the right (S>0) and leptokurtic (k>3). Jarque-Bera (JB) statistics (P<0.05) suggested that the data set was not normally distributed see Table 2.

4.1.5. Exchange Rate (EXCH)

EXCH showed a fluctuating pattern during the study period see Figure 1. The lowest value was 0.74 (N/$) in 1995 and the highest value was 131.29(N/$) in 2016 see Table 1. The mean value was 69.01(N/$). The data was negatively skewed to the left (S<0) and platykurtic (k<3). Jarque-Bera (JB) statistics (P>0.05) suggested that the data set was normally distributed see Table 2.

4.1.6. Inflation Rate (INF)

INF showed a fluctuating pattern during the study period see Figure 1. The lowest value was 0.22percent in 1999 and the highest value was 76.76percent in 1994 see Table 1. The mean value was 20.08percent. The data was

positively skewed to the right (S>0) and leptokurtic (k>3). Jarque-Bera (JB) statistics (P<0.05) suggested that the data set was not normally distributed see Table 2.

4.2. Preliminary Test

4.2.1. Augmented Dickey Fuller Unit Root Test

The unit root test showed all variables were stationary at first order see Table 3.

4.3. Data Analysis

The data was analysed using the Auto Regressive Distributed Lagged (ARDL) technique. The dependent variable (AGDP) was log transformed to attain linearity. The lagged variables were included to improve robustness.

4.3.1. ARDL Estimates showing the relationship between exchange rate and AGDP

$LAGDP_t$=	**0.19**	**+0.0004EXCH**	**+0.003INF**	**+0.98$LAGDP_{t-1}$**	**+0.003INF_{t-1}**
	(0.28)	(0.10)	(0.38)	(0.03)	(0.002)
		{0.23}	(2.59)	{32.93}	{2.59}
		[p>0.05]	[p<0.05]	[p<0.05]	[p>0.05]

( ) standard error { } t-stat [ ] Pvalue

R^2 =99.5% Adjusted R^2 = 99.5% F-stat= (1487.5;P<0.05) DW=1.97

The analysis above indicated not significant relationship between exchange rate and Agricultural Contribution to GDP (AGDP). It suggested a positive and significant relationship between Inflation and AGDP. It suggested positive and significant relationship between the lagged value of AGDP and the current values of AGDP. It suggested not significant relationship between one-year lagged values of inflation and AGDP. The coefficient of correlation (99percent) of the equation shows a very strong relationship between the dependent and independent variable. The coefficient of determination suggested that changes in AGDP were accounted for by 99percent of changes in the independent variables. The F-stat suggested that the equation was significant at a 5percent level of significance. Therefore, we can statistically rely on its inference. The Durbin Watson statistics suggested no suspicion of first order autocorrelation. The lagged values were included into the equation to improve its robustness. We concluded that there was no significant impact of Exchange rate on AGDP.

4.3.2. ARDL Estimates showing the relationship between exchange rate and MGDP

$MGDP_t$=	**-43.43**	**+2.25EXCH**	**+0.87INF**	**+2.01$MGDP_{t-1}$**	**-1.09$MGDP_{t-2}$**
	(34.32)	(1.14)	(0.82)	(0.20)	(0.19)
		{1.97}	(1.07)	{10.14}	{-5.85}
		[p>0.05]	[p>0.05]	[p<0.05]	[p<0.05]

( ) standard error { } t-stat [ ] Pvalue

R^2 =99.2% Adjusted R^2 = 99.2% F-stat= (949.76;P<0.05) DW=1.64

The analysis above indicated a not significant relationship between exchange rate and Manufacturing Contribution to GDP (MGDP). It suggested a positive and significant relationship between Inflation and MGDP. It suggested positive and not significant relationship between the lagged value of MGDP and the current values of MGDP. The coefficient of correlation (99percent) of the equation shows a very strong relationship between the dependent and independent variables. The coefficient of determination suggested that changes in MGDP were accounted for by 99percent of changes in the independent variables. The F-stat suggested that the equation is significant at a 5percent level of significance. Therefore, we can statistically rely on its inference. The Durbin

Watson statistics suggested no suspicion of first order autocorrelation. The lagged values were included into the equation to improve its robustness. We concluded that there was no significant impact of Exchange rate on MGDP.

4.3.3. ARDL Estimates showing the relationship between exchange rate and PGDP

$PGDP_t$=	-312.9	+10.68EXCH	+5.90INF	+1.23$PGDP_{t-1}$	-0.38$PGDP_{t-2}$
	(152.15)	(3.72)	(3.17)	(0.21)	(0.22)
		{2.87}	(1.86)	{6.01}	{-1.69}
		[p<0.05]	[p>0.05]	[p<0.05]	[p>0.05]

( ) standard error { } t-stat [ ] Pvalue

R^2 =91.8% Adjusted R^2 = 90.6% F-stat= (76.07;P<0.05) DW=2.14

The analysis above indicated a positive and significant relationship between exchange rate and Petroleum and Natural Gas Contribution to GDP (PGDP). It suggested a positive and not significant relationship between Inflation and PGDP. It suggested positive and significant relationship between the first lagged value of PGDP and the current values of PGDP. It also suggested negative and not significant relationship between the second lagged value of PGDP and the current values of PGDP. The coefficient of correlation (92percent) of the equation shows a very strong relationship between the dependent and independent variables. The coefficient of determination suggested that changes in PGDP were accounted for by 91percent of changes in the independent variables. The F-stat suggested that the equation is significant at a 5percent level of significance. Therefore, we can statistically rely on its inference. The Durbin Watson statistics suggested no suspicion of first order autocorrelation. The lagged values were included into the equation to improve its robustness. We concluded that there was positive and significant impact of Exchange rate on PGDP.

4.3.4. ARDL Estimates showing the relationship between exchange rate and SGDP

$SGDP_t$=	-9.19	-2.05EXCH	+0.08INF	5.5$EXCH_{t-1}$	+1.83$SGDP_{t-1}$	-0.8$SGDP_{t-2}$
	(111.2)	(4.51)	(1.99)	(4.44)	(0.41)	(0.47)
		{-0.45}	(0.04)	{1.24}	{4.45}	{-1.72}
		[p>0.05]	[p>0.05]	[p>0.05]	[p<0.05]	[p>0.05]

( ) standard error { } t-stat [ ] Pvalue

R^2 =99.8% Adjusted R^2 = 99.8% F-stat= (4461.88;P<0.05) DW=1.79

The analysis above indicated a negative and not significant relationship between exchange rate and Service Sector Contribution to GDP (PGDP). It suggested a positive and not significant relationship between Inflation and SGDP. It suggested positive and not significant relationship between the first lagged value of EXCH and the current values of SGDP. It suggested positive and significant relationship between the first lagged values of SGDP and the current values of SGDP. It also suggested negative and not significant relationship between the second lagged value of SGDP and the current values of SGDP. The coefficient of correlation (99.8percent) of the equation shows a very strong relationship between the dependent and independent variables. The coefficient of determination suggested that changes in SGDP were accounted for by 99.8percent of changes in the independent variables. The F-stat suggested that the equation is significant at a 5percent level of significance. Therefore, we can statistically rely on its inference. The Durbin Watson statistics suggested no suspicion of first order autocorrelation. The lagged values were included into the equation to improve its robustness. We concluded that there was no significant impact of Exchange rate on SGDP.

5. SUMMARY, RECOMMENDATION AND CONCLUSION

5.1. Summary of Findings

The study investigated the impact of exchange rate fluctuation on selected sectors of the economy. The scope was limited to the agricultural, manufacturing, petroleum and service sectors of the economy. These sectors were invariably the largest contributors to the GDP of Nigeria. The time scope covered the period1981-2016.The study obtained annual time-series data from Central Bank of Nigeria (CBN) statistical bulletin. Descriptive test, unit root test and other diagnostic test were carried to determine the properties of the data. The data was analysed with the Auto Regressive Distributed Lagged (ARDL) model. The study found that;

1. There was no significant impact of Exchange rate fluctuations on AGDP, MGDP and SGDP respectively. This was possibly due to fact that these sectors were not significant foreign exchange earners for the country. This study agreed with Olufayo and Fagite (2014) who found no significant impact of exchange rate fluctuation on the non-oil sector. It however disagreed with the findings of Gatawa and Mahmud (2017) and Jongbo (2014) who found a significant impact of exchange rate fluctuation on agricultural export and industrial output respectively.
2. There was a positive and significant impact of exchange rate on PGDP. This is possibly due to the fact that the petroleum sector accounts for above sixty percent of the foreign exchange earnings of the country. This result disagreed with Olufayo and Fagite (2014) who found no significant impact of exchange rate fluctuation on the oil sector in Nigeria.

5.2. Recommendation and Policy Implication

The study therefore recommended that Nigeria's economy should be diversified. This would enable the non-oil and service sectors to become significant foreign exchange earners for the country. This has become necessary with the high rate of volatility associated with the oil earnings. Also, with the advent of alternative sources of energy such as solar, wind and nuclear energy; the relevance of crude oil will gradually diminish over the years. Nigeria's economic planners and policy makers should therefore design policies that would shift focus from the oil sector and make non-oil and service sectors in the economy productive.

5.3. Recommendation for Further Studies

The scope of this study was limited to a disaggregated GDP approach of only four sectors of the Nigerian economy namely the agricultural, manufacturing, petroleum and service sectors. An aggregated view of these four sectors could be investigated in further studies. Other sectors of the economy could be investigated in further studies. Also, constrained by the availability of data, the study was limited to the time frame of 1980-2016. This date period could be updated in further studies. The independent variables employed in this study were the exchange rate and inflation rate. Other variables could be included in further studies such as money supply and oil revenue. A suggested topic for further analysis could be "the impact of exchange rate fluctuation on selected economic sectors of the Nigeria; an aggregated approach".

5.4. Conclusion

The study concluded that the exchange rate did not significantly impact the non-oil sectors namely the agricultural, manufacturing and service sector. However, the petroleum and natural gas sector had been significantly impacted by exchange rate fluctuations. This was probably because the non-oil sectors had not been significant foreign exchange earners over the years. This suggested that Nigeria had abandoned other viable economic sectors during the "oil rain" thereby stifling the potentials of other sectors of the economy. To boost the economy, these non-oil sectors have to be repositioned. For the agricultural sector to become a major foreign exchange earner, the government would have to introduce better technologies that would ensure increased quantity and quality of food. The manufacturing sector could benefit immensely from its foreign exchange potential if the

appropriate technology and infrastructure were put in place. The service sector is also an important potential foreign exchange earner if encouraged.

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APPENDIX

Table-1. Showing AGDP, MGDP, PGDP, SGDP, EXCH and INF

DATE	AGDP	MGDP	PGDP	SGDP	EXCH	INF
1981	17.05	26.89	5.920	64.24	110.4	NA
1982	20.13	29.09	4.931	73.93	109.9	NA
1983	23.80	31.13	4.280	75.03	109.8	NA
1984	30.37	27.12	5.235	78.78	113.2	NA
1985	34.24	37.14	6.589	83.03	99.90	1.031
1986	35.70	38.65	5.537	89.65	51.89	13.67
1987	50.29	43.22	15.48	96.33	14.72	9.695
1988	73.76	63.52	17.30	110.5	12.97	61.21
1989	88.26	72.90	44.33	130.2	8.875	44.67
1990	106.6	84.27	58.06	158.4	7.717	3.614
1991	123.2	110.6	67.50	185.1	6.342	22.96
1992	184.1	153.5	143.0	277.6	3.742	48.80
1993	295.3	221.2	140.2	370.8	2.967	61.26
1994	445.3	354.7	126.9	482.5	2.958	76.76
1995	790.1	414.1	444.0	658.1	0.742	51.59
1996	1071	477.9	670.7	800.5	30.17	14.31
1997	1211	546.7	619.2	895.1	28.83	10.21
1998	1341	620.2	426.8	1236	28.32	11.91
1999	1427	713.8	593.4	1517	73.91	0.224
2000	1508	826.0	1267	2146	77.21	14.53
2001	2015	989.1	966.8	2748	81.30	16.49
2002	4252	1127	1042	3217	88.95	12.17
2003	4586	1304	1588	3795	100.6	23.81
2004	4935	1516	2461	5210	107.1	10.01
2005	6032	1779	3281	7129	106.6	11.57
2006	7513	2082	4045	9136	105.0	8.549
2007	8552	2401	4364	11020	106.4	6.564
2008	10100	2762	5270	13233	79.69	15.06
2009	11625	3171	4297	15951	94.30	13.93
2010	13049	3579	8403	18967	96.74	11.80
2011	14038	4527	11039	21085	102.3	10.28
2012	15816	5589	11315	24890	98.08	11.98
2013	16817	7233	10296	29283	95.64	7.957
2014	18019	8685	9616	33730	94.05	7.978
2015	19637	8974	5990	37933	102.0	9.550
2016	21524	8903	5367	41311	131.3	18.55

Source: CBN Statistical Bulletin 2016.
Note; AGDP- Agricultural Contribution to GDP (N'BILLION); MGDP- Manufacturing Contribution to GDP (N'BILLION); PGDP- Petroleum And Natural Gas Contribution TO GDP (N'BILLION); SGDP- Service Sector Contribution to GDP (N'BILLION); Exch- Nominal Exchange Rate; INF- Inflation Rate.

Table-2. Descriptive Statistics.

Variable	AGDP	MGDP	PGDP	SGDP	EXCH	INF
Mean	5205.183	1930.962	2611.345	8004.597	69.01718	20.08453
Median	1384.007	667.0126	644.9795	1376.357	91.50082	12.07481
Maximum	21523.51	8973.773	11315.03	41310.78	131.2967	76.75887
Minimum	17.05218	26.88596	4.280034	64.24217	0.741667	0.223606
Std. Dev.	6716.332	2712.764	3563.470	11968.36	43.10667	19.43992
Skewness	1.104396	1.618552	1.312194	1.528524	-0.511935	1.586013
Kurtosis	2.823687	4.402892	3.423060	4.115694	1.609187	4.341561
Jarque-Bera	7.364770	18.67042	10.59959	15.88548	4.474002	15.81538
Probability	0.025163	0.000088	0.004993	0.000355	0.106778	0.000368
Sum	187386.6	69514.63	94008.43	288165.5	2484.618	642.7051
Sum Sq. Dev.	1.58E+09	2.58E+08	4.44E+08	5.01E+09	65036.47	11715.23
Observations	36	36	36	36	36	32

Source: Author's Compilation.

Table-3. Showing Augmented Dickey Fuller Unit Root Test.

Variable	ADF Stat	1%	5%	10%	Pvalue	Inference
LAGDP	-2.16	2.63	-1.95**	-1.61*	0.03<0.05	I(1)
LMGDP	-2.09	-2.63	-1.95**	-1.61*	0.04<0.05	I(1)
LPGDP	-4.77	-2.63***	-1.95**	-1.61*	0.00<0.01	I(1)
LSGDP	-2.97	-3.64	-2.95**	-2.61*	0.05	I(1)
EXCH	-3.95	-2.63***	-1.951**	-1.61*	0.00<0.01	I(1)
INF	-5.09	-2.65***	-1.95**	-1.61*	0.00<0.01	I(1)

Source: Author's Compilation.
*** Pvalue Significant at 1% level of significance
** Pvalue Significant at 5% level of significance
*Pvalue Significant at 10% level of significance.

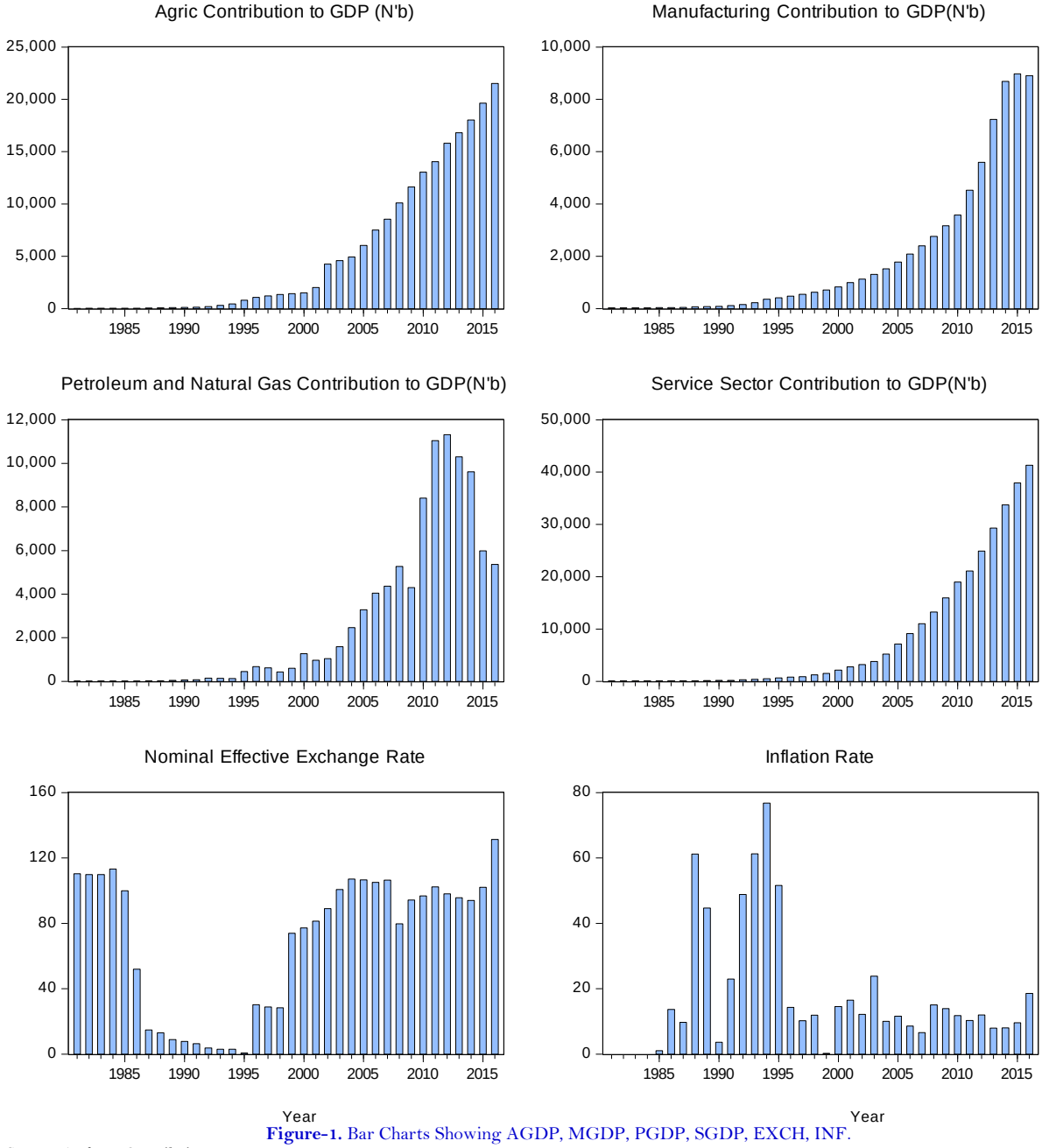

Figure-1. Bar Charts Showing AGDP, MGDP, PGDP, SGDP, EXCH, INF.

Source: Author's Compilation.