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Exchange Rate Policy and Nigeria's Economic Growth: A Granger Causality Impact Assessment

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Abstract

The exchange rate policy seems to be the life-wire of the Nigeria economy following the introduction of structural adjustment programme in 1986 which the mark the starting point of the depreciation of the local currency against the US dollar. With this in our minds, this study ascertains the impact of real exchange rate on gross domestic product and manufacturing capacity utilization of Nigeria from 1986 to 2015. The time series data we collected from the Central Bank of Nigeria statistical bulletin of 2015 passed the stationarity test and subjected to sensitivity analysis visa viz: Ramsey Reset specification, serial correlation, heteroskedasticity and multi-collinearity test. The ordinary least square estimation technique was applied in estimating the models developed. A long run relationship between exchange rate policy and economic growth was reveal by Johansen co-integration analysis. Focusing on impact assessment, the pairwise granger causality reveals that real exchange rate has significant impact on real gross domestic product and there is a positive but insignificant relationship between real exchange rate and real gross domestic product. Regardless of the positive and insignificant relationship between real exchange rate and manufacturing capacity utilization, real exchange rate significantly impacts manufacturing capacity utilization within the period studied. The Central Bank of Nigeria should put in place a strict foreign exchange policy control to ensure that the value of Naira against other currency is properly determined. Unethical practices by banks leading depreciation of the Naira should be investigated and erring operators sanctioned accordingly. Incentives, e.g. tax holiday and subsidies should be given to local manufacturers to improve output. An industrial blueprint should be put in place to allow a connection between agriculture and manufacturing to increase foreign exchange from exports.

1. Introduction

Over the past few decades, the nexus between Exchange rate and economic growth have drawn extensive attention of macroeconomists, policy makers and the central bankers of both developed and developing countries (Uddin, Rahman, & Quaosar, 2014). Exchange rate policy remain one of the most indices that shapes economic growth, especially for developing countries thus, its management is of priority to governments. This is because the external sector viability depends on the exchange rate of local currency against other currencies of the world. Exchange rate in whatever conceptualization, is not only an important relative price, which connects domestic and world markets for goods and assets, but it also signals the competitiveness of a country's exchange power visa vis the rest of the world in a pure market (Ismaila, 2016). Due to its impact on business and the economy at large, investors and businessmen would prefer a stable exchange rate to a volatile one; persistent fluctuations of exchange rate, which often results in continuous depreciation of the home currency is considered volatile in the exchange rate parlance (Danladi & Uba, 2016). In recent times, foreign exchange has become the life-wire of Nigeria, whose fortune is vehemently dependent on the fluctuation of the US dollar owing to our reliance on crude oil for foreign exchange amidst dwindling price of crude oil in the international oil market. Any change in the value of the US dollar threaten the Nigeria's economy as we hanged on to one product: crude oil for over 95% of our revenue and leaned on imports for virtually all our

consumptions. The deterioration in the exchange rate has escalated our debt burden, depleted foreign reserves, repressed local production, asphyxiated various government attempts for industrial sector growth and exorbitant cost of living as currently the case. It is no longer a news that Nigeria is struggling to get out of recession, all attributed to depreciation in exchange rate. The government through the Central Bank of Nigeria restricted the use of Automated Teller Machine in international merchant sites, constrained the source of foreign exchange for import of certain items at official exchange rate. As if these were not enough to halt further depreciation of the Naira, a flexible exchange rate system for the first time in history was reintroduced in 24th May, 2016 by the government. That notwithstanding, the exchange rate plug further to N520/1 USD on 12th February, 2017.

Exchange rate policies in developing countries are often sensitive and controversial, mainly because of the kind of structural transformation required, such as reducing imports or expanding non-oil exports, which invariably imply a depreciation of the nominal exchange rate and such domestic adjustments, due to their short-run impact on prices and demand, are perceived as damaging to the economy (Akpan & Atan, 2012). In the 1980s, specifically from 1981 to 1985, the exchange rate of Naira against the US dollar very stable. At this point in time, the Naira was superior to the US dollar. For instance, 1US dollar was exchanged for ₦0.64, ₦0.67, ₦0.75, ₦0.80 and ₦0.99 in 1981, 1982, 1983, 1984 and 1985 respectively. However, with the Structural Adjustment Programme of 1986, the Naira started depreciating against the US dollar. The year 1986 which saw the introduction of SAP, ₦3.32 was exchanged for 1US dollar. From that time till today, the Naira never rebound rather, it kept deteriorating yearly. From ₦3.32 in 1986 to ₦305 as at 30th January, 2017 based on the official exchange rate. Similarly, the parallel market rate hovered between ₦480 to ₦520. The depreciation in the exchange rate after SAP has terrifically slowed the pace of economic growth. The challenge of the combined effect of decrease in oil prices and exchange rate instabilities on macroeconomic stability and economic growth for oil producing nations like Nigeria is really enormous (Onuorah & Osuji, 2014). Manufacturers and other Nigerian businesses are complaining of dollar scarcity in spite of the central bank devaluation of the local currency in 2015 to try and attract investment from abroad. Frank Jacobs, president of Manufacturers Association of Nigeria stated on August, 2016 stated that manufacturers in the country only get foreign exchange needed for equipment and raw material from parallel market, where dollars are more expensive than the official exchange rate. It was reported that on 16th January, 2017, Aliko Dangote, African richest man shut down his tomato paste factory owing to dollar scarcity, a hint that not minding the parallel market rate, foreign exchange are not accessible for production.

The exchange rate system in Nigeria has undergone significant changes from 1960s to date. The fixed exchange rate system was in usage in the 1960s. However, between 1970s and 1980s when SAP was initiated, diverse types of floating exchange rate systems was adopted. The fixed exchange rate regime induced an overvaluation of the naira and was supported by exchange control regulations that engendered significant distortions in the economy, hence gave rise to massive importation of finished good with the adverse consequences for domestic production, balance of payments position and the nation's external reserves level (Onyekachi, 2012). With failures associated with the these exchange rate systems, in a bid to enthrone sanity in the foreign exchange market, the CBN re-introduced the Dutch Auction System (DAS) in July 2002 with the objectives of realigning the exchange rate of the naira, conserving external reserves, enhancing market transparency and curbing capital flight from the country (Imoisi, Uzomba, & Olatunji, 2010). With regard to all these reforms in Nigeria's exchange rate system, it is still clear and obvious that the objectives linked with these reforms were never achieved. Thus, the monetary authorities are always at alert in attempt to improving and managing exchange policy for growth and sustained development of an economy, not only that it aids in expurgation of internal and external imbalances, it is an influential tool that enhances efficiency of resource allocation and government stabilization goals.

The use of exchange rate policy in actualization of government aims of stability in pricing system, equilibrium in balance of payment, equitable distribution of income and economic growth and development is irrefutable. Prior to SAP implementation in 1986, ₦1 was equalled 0.90USD, resulting in speculation that the Naira was actually over-valued. This encouraged imports, and discouraged non-oil export and over dependence on imported inputs (Onuorah & Osuji, 2014) and this did not go down well with the economy. From 1986 to date, the exchange rate has assiduously deteriorated, from official rate of ₦1/0.9USD to ₦1/305USD. The Nigeria naira exchange rate has been controversial particularly in the couple of months before the 2015 general election in the country where naira was seen to have depreciated from ₦165 per dollar to over ₦200 per dollar and at the same time witnessing the decline in economic growth from 7.2% to 6.5% (Azu & Nasiri, 2015). Despite the devaluation of Naira on 18th February, 2015, by the Central Bank of Nigeria incompletely owing to pressure International Monetary Fund, financial experts and foreign investors, with the aim of increasing exports and attracting foreign investments was not optimally attained. This is against economic postulation that exports would be ignited by the devaluation of country's currency.

In the midst of current exchange rate crisis accompanied by relentless coerce on external reserves, macroeconomic fundamentals would be grossly affected. Inflation pressure will rise as reflected in price of commodities, interest rate will further surge upfront regardless of liquidity mopping up strategy of the Central Bank consequent to budget implementation, and the pressure on the Naira would likely be sustained in

a bid for market forces to adjust to the new flexible exchange rate system. Cost of capital will be high making accessibility of short term capital difficult to most businesses. Importation of factory equipment's and raw materials will be exorbitant. Foreign exchange scarcity will surface, some industries forced to close down due to high cost of sourcing forex in the black market. These distortion in macroeconomic variables will contract productive economic activities causing reduction in national output, income inequality, manufacturing capacity utilization, high debt burden and rise in unemployment rate, which in turn, hamper growth of the economy. Although a number of exchange rate reforms have been carried out by successive governments, the extent to which these policies have been effective in promoting export has remained unascertained because despite' government efforts, the growth performance of Nigerian economy has been very slow (Ismaila, 2016) even were theoretical postulation and empirical evidence of its growth and development enhance impact in other countries of the world (see (Harberger, 2003; Jakob, 2016; Rapetti, Skott, & Razmi, 2011; Uddin et al., 2014)). Consequently, this study examines the impact of real exchange rate on Nigeria's gross domestic product and manufacturing capacity utilization. The hypotheses, stated in the null format is that real exchange rate has no significant impacts on Nigeria's gross domestic product and manufacturing capacity utilization.

We divided this paper into five sections. Background to the study was the first section followed by section two which dwelt on conceptual issues, theoretical background and empirical studies. The methodology of the paper was evidenced in section three while section four for results of analysis. Section five concluded the study and offered some recommendations and limitations.

2. Literature Review

2.1. Conceptual Exploration

Exchange rate is the price at which a unit of country's currency is exchanged for another country's currency at any point in time. The price at which the Nigerian ₦1 is exchanged for $1 is exchange rate. Ibenta (2012) defined exchange rate as the price of the unit of one country's currency quoted in terms of another country's currency, it is the mathematical, qualitative or quantitative expression of one country's currency in terms of another. Uddin et al. (2014) sees exchange rate as the domestic price of a unit of foreign currency and exchange rate can be called the conversion factor that determines the rate of change of currencies. For Danladi and Uba (2016) exchange rate is the price of one country's currency in relation to another country, or the required amount of units of a currency that can buy an amount of units of another currency. The management of exchange rate system has been on the ladder of every government today owing to its great influence on the external sector performance. A favourable exchange rate is expected to lower cost of living, especially for developing countries who rely heavily on imports for consumption like Nigeria, for instance, the exchange rate of the Nigerian Naira against the US dollar affects and sharps the production activities in Nigeria. Any fluctuation in the value of the US dollar would transfer such shock to Nigeria due to our reliance of dollar for importations. The depreciation of Nigerian Naira against the US dollar have made some financial experts and analyst to calling on the government to form an alliance with the Chinese to ease over dependent on the US dollar and improve the strength of the Naira. In lieu of the significance of exchange rate on domestic and foreign economic activities, business owners appear convinced that its fluctuations have real effects especially on oil prices and economic performance of a country (Osigwe, 2015). Azu and Nasiri (2015) rhetorically ask "can one be right to say that change in exchange has account to more improvement in Nigerian economy, how about the recent decline in growth and currency values"? From the angle of Azu and Nasiri (2015) the positive balance of payment and recently increasing export in Nigeria due to government export promotion strategy.

Economic growth is the rise in the total output of a country over a specified period of time. The growth of an economy over time is widely measured with Gross Domestic Product (GDP). The GDP may be nominal GDP or real GDP, the nominal GDP does not take account the devastating effect of inflation, but the latter is adjusted to capture the likely impact of inflation. Nigeria economic performance since independence in 1960 has been decidedly mediocre, despite the availability and expenditure colossal amount of foreign exchange derive mainly from its oil and gas resources, economic growth has been weak and the incidences of poverty has increased (Ismaila, 2016). Economic growth are determined by various macroeconomic indices which include but no limited to exchange rate, inflation, government expenditure, capital mobilization visa viz: well-functioning of the financial sector, human capital development and index of industrial production among others. Traditionally, inflation and economic growth negatively correlated, because the higher the prices of commodities less the purchasing power of money and more people will be reluctant to spend. A reduction in spending would result in low production of goods and services, which ultimately decrease the GDP. Similarly, if government expenditure is high there is no corresponding monetary policy measure to cope inflation, there will much money in circulation resulting in inflation. The purchasing power of money for productive activities would be eroded, hurting the total output within that period of budget implementation. However, the liquidity mop up measure, higher government would lead capital accumulation which will enhance production, thereby increasing the GDP.

2.2. The Linkage between Exchange Rate Policy and Economic Growth

Within and outside theoretical realm, there is accepted/optimal exchange rate will enhance economic growth. While macro-and microeconomic analysis of exchange rate system are relied upon in the former, supply and demand analysis of the impact of changes in oil price is used in the latter (Asher, 2012). The exchange rate system adopted by a country majorly depends on its need and level of development attained. The free floating exchange rate system where exchange rate is determined by the forces of demand and supply which has been found to have worked for developed countries like US and UK has not been successful in developing countries. For instance, Nigeria government announced the reintroduced a flexible exchange rate system on 15th June2016 to strengthen the value of the local currency and ease pressure on external, yet the value of the local currency kept on depreciating against the US dollar, even up to the point of ₦520 per 1US dollar in the black market (20th February, 2017). Economic theory does not clearly articulate how exchange rate regimes can affect economic growth, and there are a limited number of studies which investigate this relationship (Jakob, 2016). While controlling the likely impact of inflation rate, gross capital formation (%GDP), index of government spending, and index of human capital per person and using data from 74 countries for year 2012, Jakob (2016) empirically established that there is a positive and significant correlation between pegged exchange rate and growth in GDP.

2.3. Determinants of Exchange Rate in Nigeria

Apart from other macroeconomic factors such as inflation, interest rate, index of industrial and gross fixed capital formation among others, exchange rate is one of the pivotal determinant of the health of a 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 (Udoye, 2009). Economist have pinpointed factors that determine the adoption of a particular exchange rate system. Interest rate, inflation, balance of payment, current account balance and debt burden have been adjudged to be the most influential elements facilitating the adoption of any exchange rate system. Other consideration include political stability, recession and speculation. Nwude (2012) has shown that gross domestic product, balance of payment, external reserves, composite consumer price index (inflation rate), deposit rate and lending rate are determinants of exchange rate as there is no statistically significant between real exchange rate and these macroeconomic variables. However, there have been some divergent view in this regard. Adesoye (2012) and Oriavwote and Oyovwi (2012) empirically showed that among other macroeconomic fundamentals, inflation was the determinant of real exchange rate. Not left out is Bakare and Olubokun (2011) who authenticated that purchasing power parity option is the best determinant of real exchange rate.

2.4. Theoretical Background

Exchange rate moves up and down due to dynamic nature of business environment coupled with fluctuation other macroeconomic factors. A downward movement indicates a loss in value (depreciation) while an upward movement indicates a gain in value (appreciation) against other foreign currency (Ibenta, 2012). Theories such as purchasing power parity, interest rate parity theory, traditional flow theory, portfolio balance model, etc. have been advanced to explain this up and down movement in exchange rate. Nevertheless, the work is hinged on the purchasing power parity theory. For the purpose of this work only purchasing power parity and traditional flow theories were succinctly discussed.

2.5. Purchasing Power Parity Theory

Guster Cassel in 1981 developed the purchasing power parity theory. In effort to retort to call for a substitute exchange rate determination system following the fall of the fixed exchange rate system, the purchasing power parity theory was advanced. The theory states that the exchange rate between two currencies is solely determined by movement of demand and supply forces. The basis of the theory is that, if any pair of currency is set at par, then, the exchange rate differential should reflect variations arising from the purchasing powers of the relative currency in relation to the Base Exchange rates (Ibenta, 2012). Mimicking the example of Ibenta (2012) the price of semolina in Nigerian and Ghanaian markets should trade at the same price (after adjusting for exchange rate). If the price is semolina is lower in Nigeria, then purchasers will buy wheat in Ghana so far as the price is cheaper (after taking into account transportation costs). This will result in fall in demand in Nigeria and rise in Ghana. From this explanation, a favourable/appreciative exchange rate (local currency against foreign currency) will spur economic growth as demand for goods and services would increase production, which eventually lead to rise in gross domestic product. The purchasing power parity theory has undergone reforms over time and general accepted by international financial market operators in determining exchange rate between two currencies.

Traditional Flow Theory

The traditional flow theory of exchange rate centres on trade account between two countries. The level of goods and services that traded determines the price at which a unit of one country's currency is exchanged for another country's currency. The linkage existing between real exchange rate and the movement of goods and

services is determined by current account balance. In situation where exchange rate adjust based on the demand and supply of goods and services within two countries, the country with trade surplus will accumulate more foreign currency, and where this is the case, the local currency of surplus trade country will rise while the deficit trade country foreign currency will depreciate. A common feature of the traditional flow theory of exchange rate determination to the balance of payment is the general is the believe in the ability of exchange rate or domestic price changes to effect a change in relative price and the balance of payments (Ayodele, 2004). In the traditional flow model, the exchange rate adjusts to balance the demand by the domestic resident for foreign exchange on the assumption that the foreign demand for domestic goods is determined essentially by domestic income, the relative income plays a major role in determined exchange rate under the flow model (Onyekachi, 2012).

2.6. Empirical Studies

Imoisi et al. (2010) examined the impact of interest and exchange rates on the Nigerian economy from 1975 to 2008. The study employs the ordinary least square (OLS) technique in the analysis but due to the fact that data are not stationary, a unit root test was employed; it further resorted to co-integration analysis which establishes the existence of a long run relationship between the variables in the models. From the findings, an increase in interest rate retards investment and subsequently economic growth; and the lag one of exchange rate shows the expected positive sign, implying that depreciation in exchange rate retarded growth from 1975 to 2008. Uddin et al. (2014) looked into the relationship between Exchange Rate (ER) and Economic Growth (EG) proxied by Real Gross Domestic Product (RGDP) in Bangladesh for a period of 41 years ranges from 1973 to 2013 by using time series econometric technique. The empirical results show that there is a significant positive correlation between ER and EG. The results also advocate the presence of long-run equilibrium relationship between ER and EG. This is evidenced from Granger's Causality Test that there is a bi-directional causality runs through ER to EG and EG to ER. Danladi and Uba (2016) determined whether the volatility of exchange rate has implications for the economic performance of the countries in the West African Monetary Zone. Nigeria and Ghana were chosen as case studies for the period from 1980 to 2013. Exchange rate variability was measured using the GARCH approach. The empirical results confirm that exchange rate volatility have a significant negative effect on economic growth.

Akpan and Atan (2012) determined the effect of exchange rate movements on real output growth in Nigeria based on quarterly series for the period 1986 to 2010. A Generalised Method of Moments (GMM) technique was explored. The estimation results suggest that there is no evidence of a strong direct relationship between changes in exchange rate and output growth. Rather, Nigeria's economic growth has been directly affected by monetary variables. Oleka, Eyisi, and Mgbodile (2014) analysed the impact of foreign exchange rate on the growth of Nigerian economy for the periods 2000 to 2014. The GDP is used as dependent variable indicating economic growth of Nigeria. While independent variables like money supply, inflation rate, employment rate and foreign exchange rates were used as economic (performance) indicators. The result revealed that there is variation on money supply and naira exchange rate; hence the monetary policy instruments were not efficacious in the attainment of price and exchange rate stability in Nigeria. Ismaila (2016) ascertained exchange rate depreciation and Nigeria economic growth during the SAP and post SAP period: 1986–2012. Using the Johansen co-integration test and error correction model analyses after conducting the stationary test, the results show that broad money supply, net export and total government expenditure have significant impact on real output performance in the long run while exchange rate has direct and insignificant effect on Nigeria economic growth in both short and long run.

Azu and Nasiri (2015) explored the relationship between real exchange rate and economic growth applying those variables that adjudged to make up equilibrium exchange rate thereby defining how interrelated are RER, GDP, EXP, IMP, FER and FDI. Analysing the data using VAR technique, based on the prevailing situation in Nigerian economy within these period, one can envisage that RER fluctuation was significantly controlled by its positive relation with real import as well as its negative relation to real GDP and foreign direct investment. Similarly, GDP are positively controlled by depreciating exchange rate, increasing previous GDP, FER and FDI. Nigerian economic growth within these period were characterised by sustainable growth enhanced by sustainable increase in these factors. Adelowokan, Adesoye, and Balogun (2015) assessed the effect of exchange rate volatility on investment and growth in Nigeria over the period of 1986 to 2014. The vector error correction method, impulse responses function, co-integration and Augmented Dickey Fuller (ADF) test for stationarity were employed to capture the interactions between the variables. The results confirm the existence of long run relationship between exchange rate, investment, interest rate, inflation and growth. Finally the results show that exchange rate volatility has a negative effect with investment and growth while exchange rate volatility has a positive relationship with inflation and interest rate in Nigeria. Fapetu and Oloyede (2014) evaluated foreign exchange management and the Nigeria economic growth from 1970 to 2012. The ordinary least square estimation techniques was applied and the Johansen co-integration test shows that there is a unique long run relationship among Y, EXCR, EXPT, IMP, INF and FDI. The result further shows that the explanatory variables explain and account for about 99% of variation in economics growth.

Jakob (2016) hypothesized that fixed exchange rate regime will have positive correlation with GDP growth due to the stability factor it has to offer. Control variables used include inflation rate, gross capital formation (%GDP), index of government spending, and index of human capital per person. After observing the data from 74 countries for year 2012, it is found that there is a positive and significant correlation between pegged exchange rate and growth in GDP. Opaluwa, Umeh, and Ameh (2015) examined the impact of exchange rate fluctuations on the Nigerian manufacturing sector during a twenty (20) year period (1986 – 2005). The econometric tool of regression was used for the analysis. The result of the regression analysis shows that coefficients of the variables carried both positive and negative signs. The study actually shows adverse effect and is all statistically significant in the final analysis. Owolabi and Adegbite (2012) empirically assessed the effect of Foreign Exchange Regimes on Industrial Growth in Nigeria covering the period of 1985 to 2005. Multiple regressions were employed to analyse data on such variables as Gross Domestic Product, World Price Index, Per Capita Income, and Net Export. Exchange rate (broadly define, narrowly define and quasi money) were all found to have significant effects on the Economics Growth. Amassoma (2016) studied the Impact of Exchange Rate Fluctuation on the Nigerian Economic Growth using an annual data of forty-three (43) years covering the period (1970 – 2013). The standard deviation method was employed to capture and estimate the fluctuation inherent in the model as regards the research's objective. The study employed econometric techniques such as; Multiple Regression Model, Augmented Dickey Fuller (ADF) test, Johansen Cointegration test and the Error Correction Model (ECM). Evidence from this study exhibited that there exists a positive but insignificant impact of exchange rate fluctuation on Nigerian economic growth in both the long run and short run.

The adverse of depreciation of exchange rate has long been discussed in literature and governments have prioritize exchange rate management in view of it impact on other macroeconomic variables that ultimately affect the growth of the economy. Virtually all the literature reviewed pointed out the negative effect of exchange rate depreciation on the economy. This conclusion by researchers on the negative impact of exchange rate depreciation on economic growth was based on different statistical tools such as stationarity test, vector error correction model, granger causality test and Johansen co-integration among others.

The empirical studies of Uddin et al. (2014); Opaluwa et al. (2015); Owolabi and Adegbite (2012) and Amassoma (2016) show that gross domestic product as the only gauge for economic growth measurement. This study improved on existing literature by including manufacturing capacity utilization as a measure of economic growth. Furthermore, identifying the gap noticed in the model of Uddin et al. (2014) inflation rate and interest were incorporated to control for the effect of macroeconomic instability.

3. Methodology

This study adopted an ex-post facto research design in examining the impact of exchange rate policy on economic growth of Nigeria from 1986 to 2015.The data applied in this study were secondary in nature and were sourced from the Central Bank of Nigeria (CBN) statistical bulletin of 2015. The data were on annual basis as contained in the Central Bank of Nigeria (CBN) statistical bulletin. The dependent variables are Real Gross Domestic Product (RGDP) and Manufacturing Capacity Utilization (MCU). The independent variable is Real Exchange Rate (REXR) and proxy for exchange rate policy. Inflation (INF) and Interest Rate (BLR) were introduced in the models as control variables capable of influencing economic growth indicators.

3.1. Empirical Model Specification

The mathematical expression of the relationship between the dependent and explanatory variables in a model is called model specification. The model of Uddin et al. (2014) for a similar study in Bangladesh was adopted but slight modification. The researchers expressed economic growth as a function of real exchange rate. Mathematically, this is expressed as:

$$LnRGDP = f(LnREXR) \quad ----------3.1$$

Modifying their model by incorporating the likely effect of macroeconomic uncertainties, two functional models were stated as:

$$RGDP = f(REXR, INT, INF) \quad ----------3.2$$

$$MCU = f(REXR, INT, INF) \quad ----------3.3$$

Classically logging the variables to obtain a balance in coefficient between the dependent and independent variables, the following model were developed:

Model 1

$$LogRGDP_t = a_0 + a_1 LogREXR_t + a_2 LogINT_t + a_3 LogINF_t + u_t \quad ---------3.4$$

Model 2

$$LogMCU_t = a_0 + a_1 LogREXR_t + a_2 LogINT_t + a_3 LogINF_t + u_t ----------3.5$$

Where:

$RGDP$ is real gross domestic product; MCU is manufacturing capacity utilization; $REXR$ is real exchange rate; INT is interest rate and INF is inflation rate. a_0 is coefficient of the constant, u is a random error term and t is the time trend; normally included in standard time-series specifications to account for the omitted variables in the model. Following the purchasing power parity theory, a favourable exchange rate is expected to have positive relationship the economic growth. On the other hand, inflation and interest rate would deter the growth of the economy, hence a negative relationship is expected between economic growth, inflation and interest rate.

4. Discussion of Result

4.1. Descriptive Properties of Data

The descriptive characteristics of the variables in the models are presented in Table 4.1. The average of the RGDP, MCU, REXR, INT and INF are 33416.67, 45.82400, 84.15699, 87.23400 and 19.40700 while the median are 24477.91, 43.25, 107.02, 18.13 and 11.90 respectively. The maximum values of the variables are 69023.93, 60.50, 217.79, 2071 and 72.8 for RGDP, MCU, REXR, INT and INF respectively. The minimum values are 15237.99 for RGDP, 1 29.29 for MCU, 2.07 for REXR, 10.50 for INT and 5.4 for INF. The variables' standard deviation are 17281.67 for RGDP, 10.35053 for MCU, 65.95 for REXR, 374.69 for INT and 17.90 for INF. All the variables were positively skewed towards normality as evidenced by the positive values of the skewness statistic except for MCU. The Kurtosis value shows that INT and INF that are leptokurtic in nature as Kurtosis statistic value is less than 3. The Jarque-Bera suggests that only INT and INF were normally distributed as the p-values are significant at 5% level of significance.

4.2. Sensitivity Analysis

4.2.1. Ramsey RESET Test

The Ramsey Reset Specification determines if non-linear combinations of the independent variables have any power in explaining the dependent variable or not. If the dependent variable is explained by the non-linear combinations of the independent variables, the model is not well specified. The p-values of Ramsey Reset statistic for model 1 and 2 in Table 4.2 are insignificant at 5% level of significance showing that the models were well specified.

4.3. Heteroskedasticity Test

In classical linear assumption, a regression model should be devoid of heteroskedasticity problem. As can be seen Table 4.3, the p-value of the Chq. statistic for the models are insignificant at 5% level of significance, which shows evidence of homoscedastic nature of the variables.

Table-4.1. Descriptive Properties of Data.

	RGDP	MCU	REXR	INT	INF
Mean	33416.67	45.82400	84.15699	87.23400	19.40700
Median	24477.91	43.25000	107.0243	18.13500	11.90000
Maximum	69023.93	60.50000	217.7900	2071.000	72.80000
Minimum	15237.99	29.29000	2.070600	10.50000	5.400000
Std. Dev.	17281.67	10.35053	65.95854	374.6935	17.90451
Skewness	0.784741	-0.142696	0.056756	5.198580	1.653485
Kurtosis	2.200290	1.485355	1.562904	28.02853	4.568514
Jarque-Bera	3.878510	2.969497	2.597663	918.1604	16.74535
Probability	0.143811	0.226559	0.272850	0.000000	0.000231
Sum	1002500.	1374.720	2524.710	2617.020	582.2100
Sum Sq. Dev.	8.66E+09	3106.870	126165.4	4071462.	9296.571
Observations	30	30	30	30	30

Source: Computer analysis using E-views 9.0.

Table-4.2. Ramsey RESET Test.

Models	Value	df	P-value
Model 1	2.068632	(6, 18)	0.1085
Model 2	1.886354	(4, 20)	0.0689

Source: Computer analysis using E-views 9.0.

Table-4.3. Heteroskedasticity Test.

Models	F-statistic	Prob. F(4,24)
Model 1	1.437816	0.2521
Model 2	0.513214	0.7266

Source: Computer analysis using E-views 9.0.

4.4. Serial Correlation LM Test

The presence of autocorrelation in the model would be detected by serial correlation LM test. It was used in addition to Durbin Watson to test for autocorrelation. The null hypothesis of LM test is that there is no serial correlation up lag order 2. The p-values of the Breusch-Godfrey serial correlation test in Table 4.4 are insignificant at 5%, which envisages that variables are free from autocorrelation issue.

Table-4.4. Breusch-Godfrey Serial Correlation LM Test.

Models	F-statistic	Prob. F(2,22)
Model 1	0.379370	0.6887
Model 2	0.035664	0.9650

Source: Computer analysis using E-views 9.0.

4.5. Multicollinearity Test

Multi-collinearity problem was not found to exist between the independent variables. The maximum correlation (0.12) between the independent variables was noticed for REXR and INT. The correlation between real gross domestic product and the control variable was found to be negative as real exchange rate was positively correlated with real gross domestic product and manufacturing capacity utilization. Table 4.5 presents the correlation matrix of the variables.

Table-4.5. Correlation Matrix.

	RGDP	MCU	REXR	INT	INF
RGDP	1.000000	0.814279	0.891487	-0.022047	-0.411737
MCU	0.814279	1.000000	0.826295	0.192888	-0.485998
REXR	0.891487	0.826295	1.000000	0.126699	-0.486986
INT	-0.022047	0.192888	0.126699	1.000000	-0.053062
INF	-0.411737	-0.485998	-0.486986	-0.053062	1.000000

Source: Computer analysis using E-views 9.0.

4.6. Unit Test Result

The check for the presence of unit root, Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) test were utilized. This is to make sure that variables are devoid of stationarity weakness that might impede on the result of the analysis. Table 4.6 and Table 4.7 summarizes the ADF and PP and it would be inferred from the result that all the variable were integrated of order one 1(1).

Table-4.6. ADF Test Result .

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Order of Integration/Remark
RGDP	-6.404592 (0.00)*	-2.653401	-1.953858	1(1)/Stationary
MCU	-3.641793 (0.00)*	-2.650145	-1.953381	1(1)/Stationary
REXR	-3.595273 (0.00)*	-2.650145	-1.953381	1(1)/Stationary
INT	-8.977234 (0.00)*	-2.650145	-1.953381	1(1)/Stationary
INF	-2.235668 (0.02)*	-2.679735	-1.958088	1(1)/Stationary

Source: Computer analysis using E-views 9.0.

Table-4.7. PP Test Result.

Variables	PP Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Order of Integration/Remark
RGDP	-6.767733 (0.00)*	-2.653401	-1.953858	1(1)/Stationary
MCU	-3.654060 (0.00)*	-2.650145	-1.953381	1(1)/Stationary
REXR	-3.639273 (0.00)*	-2.650145	-1.953381	1(1)/Stationary
INT	-27.86177 (0.00)*	-2.650145	-1.953381	1(1)/Stationary
INF	-5.006486 (0.00)*	-2.650145	-1.953381	1(1)/Stationary

Source: Computer analysis using E-views 9.0.

4.7. OLS Regression

The OLS regression technique was used in estimating the relationship between exchange rate policy and economic growth in Nigeria. In the process of estimation the dependent variables were lagged by one year to ensure the model possess high degree of goodness fit. Coefficient of Adjusted R-squared, F-statistic and Durbin Watson statistic were statistical tool used in making inferences of the regression results.

4.8. Real Exchange Rate and Real Gross Domestic Product

As can be seen in Table 4.8, real exchange rate has positive and statistically insignificant relationship with RGDP. Inflation rate was found to be insignificantly and negatively related with RGDP. Interest rate has positive insignificant relationship with RGDP. The co-efficient of the constant 431.17 means that if real exchange rate amidst instability in interest rate and inflation are kept constant, RGDP would be ₦431.17 million. A percent rise increase in real exchange rate would results to a corresponding ₦12.58 million factor increase in RGDP. A unit increase in interest rate catapults to ₦0.189 million factor appreciation in RGDP. Conversely, when inflation rate increases by a unit, RGDP would decline by a factor of ₦7.47 million.

Table-4.8. Regression Result: Real Exchange Rate and RGDP.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	431.1694	567.0553	0.760366	0.4544
REXR	12.58298	6.391905	1.968581	0.0607
INT	0.188850	0.496271	0.380537	0.7069
INF	-7.473593	11.83051	-0.631722	0.5335
R-squared	0.997430	Mean dependent var		34043.52
Adjusted R-squared	0.997002	S.D. dependent var		17236.97
S.E. of regression	943.8149	Akaike info criterion		16.69332
Sum squared resid	21378878	Schwarz criterion		16.92906
Log likelihood	-237.0532	Hannan-Quinn criter.		16.76715
F-statistic	2328.781	Durbin-Watson stat		1.492438
Prob (F-statistic)	0.000000			

Source: Computer analysis using E-views 9.0.

The Adjusted R-squared reveals that 99.7% changes in RGDP was attributed to the joint variations in real exchange rate, interest rate and inflation rate. This is statistically significant (5% significance level) judging by the F-statistic of 2328.781 which exhibits that the changes in RGDP was significantly explained by the independent variables within the period studied. The Durbin Watson statistic of 1.49 is not quite bad, however, the serial correlation LM test in Table 4.4 reveals no autocorrelation in the model.

4.9. Real Exchange Rate and Manufacturing Capacity Utilization

The regression outcome in Table 4.9, real exchange rate has positive and statistically insignificant relationship with MCU. Interest rate was found to be insignificantly and positively related with MCU as inflation rate exhibits negative insignificant relationship with MCU. The coefficient of the constant forecloses that holding real exchange rate, interest rate and inflation rate constant, MCU would be 9.56. A unit increase in real exchange rate leads to 0.025 factor upsurge in MCU. A percentage increase in interest rate rises MCU by 0.09. Similarly, a unit increase in inflation lowers MCU by a factor of 0.055.

From the Adjusted R-square, controlling real exchange rate exchange with interest rate and inflation caused 89.73% changes in MCU was attributed to explanatory variables. This statistically significant as shown by the F-statistic and P-value of 62.13 and 0.00 respectively. Durbin Watson value of 1.77 is close 2.0, suggesting that the variables in the model are not serially correlated.

Table-4.9. Regression Result: Real Exchange Rate and MCU.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.563388	3.897325	2.453834	0.0218
REXR	0.024852	0.017217	1.443421	0.1618
INT	0.000900	0.001686	0.533918	0.5983
INF	-0.055253	0.041809	-1.321543	0.1988
R-squared	0.911933	Mean dependent var		46.06621
Adjusted R-squared	0.897255	S.D. dependent var		10.44686
S.E. of regression	3.348627	Akaike info criterion		5.410563
Sum squared resid	269.1192	Schwarz criterion		5.646304
Log likelihood	-73.45317	Hannan-Quinn criter.		5.484394
F-statistic	62.12962	Durbin-Watson stat		1.767202
Prob (F-statistic)	0.000000			

Source: Computer analysis using E-views 9.0.

4.10. Long Run Relationship

Table 4.6 and Table 4.7 reveal the ADF and PP test results showing that the variables are have unit root making it possible to establishing the presence of long run relationship between the variables. The results of the long run relationship using Johansen approach are summarized in Table 4.10 and Table 4.11. From Table 4.10, it can be seen that real exchange rate and real gross domestic product are co-integrated. The trace and max-eigenvalue each indicate two (2) co-integrating equations at 5% level of significance.

The Johansen co-integration in Table 4.11 shows that manufacturing capacity utilization and real exchange rate are related in the long run as supported by the trace test and Max-eigenvalue test each showing the presence of two (2) co-integrating equations at the 5% level of significance in line with Mackinnon, Haug, and Michelis (1996) p-values.

Table-4.10. Johansen Co-integration for RGDP, REXR, INT and INF.

Unrestricted Co-integration Rank Test (Trace) RGDP, REXR, INT and INF				
Hypothesized Number of CE(s)	**Eigen Value**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.661536	61.68231	47.85613	0.0015
At most 1 *	0.540143	31.34884	29.79707	0.0329
At most 2	0.260564	9.597318	15.49471	0.3130
At most 3	0.040069	1.145017	3.841466	0.2846
Unrestricted Co-integration Rank Test (Maximum Eigenvalue) RGDP, REXR, INT and INF				
Hypothesized Number of CE(s)	**Eigen Value**	**Maximum Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.661536	30.33348	27.58434	0.0216
At most 1 *	0.540143	21.75152	21.13162	0.0409
At most 2	0.260564	8.452301	14.26460	0.3346
At most 3	0.040069	1.145017	3.841466	0.2846

Trace test and Max-eigenvalue test each indicate 2 co-integrating eqn(s) at the 0.05 level;
* denotes rejection of the hypothesis at the 0.05 level; **Mackinnon et al. (1996) p-values.

Table-4.11. Johansen Co-integration for MCU, REXR, INT and INF.

Unrestricted Co-integration Rank Test (Trace) MCU, REXR, INT and INF				
Hypothesized Number of CE(s)	**Eigen Value**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.729420	69.92782	47.85613	0.0001
At most 1 *	0.563590	33.32662	29.79707	0.0188
At most 2	0.302689	10.10980	15.49471	0.2724
At most 3	0.000540	0.015114	3.841466	0.9020
Unrestricted Co-integration Rank Test (Maximum Eigenvalue) MCU, REXR, INT and INF				
Hypothesized Number of CE(s)	**Eigen Value**	**Maximum Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.729420	36.60120	27.58434	0.0027
At most 1 *	0.563590	23.21682	21.13162	0.0251
At most 2	0.302689	10.09469	14.26460	0.2058
At most 3	0.000540	0.015114	3.841466	0.9020

Trace test and Max-eigenvalue test each indicate (2) co-integrating eqn(s) at the 0.05 level;
* denotes rejection of the hypothesis at the 0.05 level; **Mackinnon et al. (1996) p-values.

4.11. Pairwise Granger Causality

The impact of real exchange rate on real gross domestic product and manufacturing capacity utilization was assessed with the aid of the pairwise granger causality test. The result of the test are presented in Table 4.12 and Table 4.13. From Table 4.12, it is crystal clear that real exchange rate has significant impact on real gross domestic product. Real exchange rate granger cause real gross domestic product at 5% level of significance. This is to say that there is a unidirectional relationship between real exchange rate and real gross domestic product as causality runs from real exchange rate to real gross domestic product.

Table-4.12. Pairwise Granger Causality Test RGDP, MCU, INT and INF.

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
REXR does not Granger Cause RGDP	29	20.8933	0.0001	Causality
RGDP does not Granger Cause REXR		1.91635	0.1780	No Causality
INT does not Granger Cause RGDP	29	2.33629	0.1385	No Causality
RGDP does not Granger Cause INT		0.04833	0.8277	No Causality
INF does not Granger Cause RGDP	29	0.35165	0.5583	No Causality
RGDP does not Granger Cause INF		1.73931	0.1987	No Causality

Source: Computer analysis using E-views 9.0.

Table 4.13 shows that there is a unidirectional relationship between real exchange rate and manufacturing capacity utilization. Causality only runs from real exchange rate to manufacturing capacity utilization, real exchange rate granger cause manufacturing capacity utilization at 5% level of significance. This is an implication that real exchange rate has significant impact on manufacturing capacity utilization in Nigeria.

Table-4.13. Pairwise Granger Causality Test MCU, MCU, INT and INF.

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
REXR does not Granger Cause MCU	29	6.75697	0.0152	Causality
MCU does not Granger Cause REXR		0.16095	0.6916	No Causality
INT does not Granger Cause MCU	29	0.05575	0.8152	No Causality
MCU does not Granger Cause INT		0.88773	0.3548	No Causality
INF does not Granger Cause MCU	29	3.51290	0.0722	No Causality
MCU does not Granger Cause INF		0.77341	0.3872	No Causality

Source: Computer analysis using E-views 9.0.

4.12. Test of Hypotheses

Decision Yardstick: In an event were the p-value of F-statistic in the pairwise granger causality analysis is less than 0.05, the null hypothesis is rejected. Similarly, were the p-value of F-statistic granger causality test is higher than 0.05, the null hypothesis is accepted.

Hypothesis One

Restatement of Research Hypothesis

H_0: Real exchange rate has no significant impacts on Nigeria's gross domestic product.

From Table 4.12, p-value of 0.0001 in is less than 0.05. In the light of this, the null hypothesis that real exchange rate has no significant impacts on Nigeria's gross domestic product is rejected while the alternate hypothesis accepted.

Hypothesis Two

Restatement of Research Hypothesis

H_0: Real exchange rate has no significant on Nigeria's manufacturing capacity utilization

On the basis of the result in Table 4.13, the p-value of 0.0152 is lower than 0.05 and against hypothesis decision yardstick. As a result, the null hypothesis that real exchange rate has no significant on Nigeria's manufacturing capacity utilization is rejected and the alternative hypothesis that real exchange rate has significant on Nigeria's manufacturing capacity utilization accepted.

4.13. Discussion of Findings

The positive but insignificant relationship between real exchange rate, real gross domestic product and manufacturing capacity as depicted in Table 4.5a and Table 4.5b confirms to a priori expectation. This is an indication that the value of local currency of a balance of payment surplus country would rise relative to balance of deficit due to the accumulation of foreign exchange from exports. This findings is in agreement with the works of Uddin et al. (2014); Danladi and Uba (2016); Jakob (2016); Onuorah and Osuji (2014) and Amassoma (2016). However, it would not validate the result of Imoisi et al. (2010) and Adelowokan et al. (2015) on the negative relationship between real exchange rate and economic growth. The granger causality

test in Table 4.7a and Table 4.7a illustrate that real exchange rate management should be given priority as it has significant impact of real gross domestic product and manufacturing capacity utilization in Nigeria. This is in unison with Ismaila (2016) and Owolabi and Adegbite (2012). The negative association between inflation and economic growth measurements portray the devastating impact of inflation in increasing output. It tallies with Onuorah and Osuji (2014) and Amassoma (2016).

5. Conclusion, Recommendations and Limitation

The achievement of a stable exchange rate has been a difficult task confronting many countries, particularly developing countries. A favourable or stable exchange rate leads to accumulation of foreign exchange which would be used to development basic infrastructure that will result in growth and development of the economy. The findings of this study has empirical shown that real exchange rate in Nigeria starting from the introduction of Structural Adjustment Programme (SAP) has significantly affected the economy. Although there is no prescribe rate of exchange that guarantees economic growth, monetary authorities should always strive through policies to maintain a stable exchange rate system devoid of frequent volatility.

Based on the findings of this study, the following recommendations are put forward for policymakers for attention:

- The Central Bank of Nigeria should put in place a strict foreign exchange policy control to ensure that the value of Naira against other currency is properly determined. Unethical practices by banks leading depreciation of the Naira should be investigated and erring operators sanctioned accordingly.
- Incentives, e.g. tax holiday and subsidies should be given to local manufacturers to improve output. An industrial blueprint should be put in place to allow a connection between agriculture and manufacturing to increase foreign exchange from exports.
- The researchers could only collect data for thirty (30) years, though it is reliable in statistical term but less than what it initially proposed. The Central Bank of Nigeria annual report and statistical bulletin for 2016 is not available online, for this reason, the study was ended in 2015 instead of 2016 that was originally intended.

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