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Analysis of the Impact of Exchange Rate Volatility on Manufacturing Output in Nigeria: 1986 – 2016

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Abstract

Since September 1986, adoption of structural adjustment programme (SAP) brought about flexible exchange rate regime which led to continuous depreciation and instability of naira. This instability and continue depreciation has resulted to downturn in manufacturing output in Nigeria. This study sought to examine the assessment of exchange rate volatility on manufacturing output using secondary quarterly data from 1986:1 to 2016:4. Autoregressive conditional heteroscedasticity (ARCH) and Generalized Autoregressive conditional heteroscedasticity (GARCH) model was used to find out whether there is stability in exchange rate in Nigeria. Traditional flow and Monetary approach was the theoretical framework on which this work was based; unit root test was conducted using Augmented Dickey fuller (ADF) and Philip Perron (PP) tests, Autoregressive distributed lag (ARDL) cointegrated test was used to test for the long-run relationship amongst the variables. Empirically, exchange rate volatilities are found to have a negative and insignificant impact on manufacturing output, this result demonstrates that exchange rate volatility create problem of shocks and consequently forces a number of manufacturers out of operation. Inflation and interest rates were found to be negative significant and insignificant respectively, all the variables were all in conformity with the theoretical expectations (appriori). However, this study recommended that, the gap between official and parallel exchange rate market should be breached, also that manufacturers should begin to look inward by sourcing their raw material locally.

Keywords: Exchange Rate, Volatility, Manufacturing, Output
JEL Codes: F31, L6

1. Introduction

Many economies of the world are basically interested in measures that can guarantee them viable and robust economic statues. This quest is more pronounced among the less developed countries (LDCs) than the developed countries (DCs) of the world. To achieve this noble objective, developing economies are constantly implementing policies that would not just increase their output but also, placed them in a very competitive position in the global economy. Among the English speaking countries in the ECOWAS sub-region in Africa, one of the policies embark upon is the management of their exchange rate level to encourage productivity. This step is in line with the understanding that exchange rate volatility (ERV) remain a source of concern as currency values partially determine the price paid or received for output and, consequently, this affects the profits and welfare of producers and consumers (Choudhri and Schembri, 2014). This implies that, exchange rate volatility (ERV) can influence the volume of output a country can produce since the cost of production is been determined by exchange rate. Therefore, there is no doubt, exchange rate, whether fixed or floating, affects macroeconomic

performance such as import, export, national price level, output, interest rate etc as well as economic agents such as individuals' purchasing power, firms' performance etc. Chong and Tan (2008) empirical analysis revealed that the exchange rate volatility is responsible for changes in macroeconomic fundamentals for the developing economies. The volatility of financial assets has been a growing area of research (Longmore and Robinson, 2004). The modeling and forecasting of exchange rates including volatility has important implications from any economic and financial issues.

Exchange rate is one of the economic indicators which directly affect investment as such its role in the overall economic objectives of a country cannot be underestimated. This gives confidence to why the public sectors, foreign investors and private individuals pay a lot of attention to the exchange rate variation. The exchange rate is among the most watched and analyzed, government manipulated macroeconomic indicators. In Nigeria, the naira exchange rate witnessed a continuous decline in all segment of the foreign exchange market (official, bureau de change and parallel markets). Exchange rate depreciates from N0.61 in 1981 to N2.02 in 1986 after which the floating exchange rate was adopted, in 1990 exchange rate depreciated from N7.91 per dollar to N81.20 in 1995 but the policy of guided or managed deregulation pegged the naira at N21.886 in 1994. Also, it was further depreciated concurrently to N93.95in 1999, N120.97 in 2002, N129.02 in 2003, and N135.50 in 2004. Thereafter, the exchange rate appreciated to N 132.15 in 2005 and latter N118.57 in 2008. Towards the end of the year 2008 when Global Financial Crises took its toll, the naira depreciated to N150.0124 at the end of 2009, in 2013 it reached N157.3per dollar and N158.5526 and N193.2792 in 2014 and 2015 respectively. Exchange rate rises to N197 in first quarter, N283 in second quarter, N305 in third quarter as well as N305 in fourth quarter in 2016 (CBN various issues).

In 1986, Nigeria adopted a floating exchange rate regime supported by exchange control regulations (ECR) that brought about significant distortions in the economy prior to the introduction of structural adjustment programme (SAP) in September 1986, which brings about devaluation of naira as a result of floating exchange rate regime (market forces determine foreign exchange market) which causes instability or volatility in exchange rate. But Nigeria economy depends heavily on imports from various countries as most manufacturing industries in Nigeria import their equipment, plants and machineries and other raw materials as well as massive importation of finished goods from foreign countries over the years, these have caused adverse effect on domestic production output, balance of payment position and the nation's external reserve level. Consequently, these affect manufacturing employment rate and also increase in unemployment rate in Nigeria. In light of these economic problems caused by the volatility of exchange rate in Nigeria over the years, studies on this field has not find solution to why depreciation has not favour manufacturing output in Nigeria? The contributions to the elasticity approach by Marshall (1923), Lerner (1936) and Harberger (1950) are often celebrated for formalizing the sufficient condition for a devaluation of the exchange rate to improve the balance of trade. In the course of this study is to determine the impact of exchange rate volatility on manufacturing output in Nigeria, to capture the instability of exchange rate, using the GARCH Model to establish whether volatility is overshooting, present and persistent or indicates no volatility and to examine whether inflation rate, interest rate and financial deepening affect manufacturing outputs. In other to achieve the objectives following questions will be answered, does exchange rate volatility affect manufacturing output? Is there volatility in the exchange rate (Naira /dollar) in Nigeria? And did interest rate, inflation rate and financial deepening affect manufacturing output?

2. Empirical Review and Theoretical Framework

On the empirical side, the controversy of the effect of exchange rate variation on manufacturing output is equally not resolved. Although many researchers found evidence for contractionary effect of depreciation like Aliyu et al., (2013); Elbadawi, Kaltani, and Soto (2012); Elbadawi and Sato (2005); Gnimassoun and Coulibaly (2014); Lensink (1995) and Obadan (2006) maintained that an increase in exchange rate volatility negatively affect volume of outputs.

On the other hand, some scholars in their submissions believed that the relationship between exchange rate volatility and manufacturing output is positive the likes of Coudert, (2013); Division, (2009); Mordi, (2006); Olugbenga and Oluwole, (2011). Also, Diaz-Alejandro (1963), Pierrer-Richard (1991) and Kandil (2004), Yaqub (2010), Bakare (2011) Adelowokan, Adesoye and Balogun, (2015). A pool of studies found evidence for expansionary effects of exchange rate depreciation for example Fry (1976), Edwards (1992), Lyons (1992), Adewuyi (2005) and Bahmani-Oskooee and Kandil (2007), Opaluwa, and Ameh (2010), Ehinomen, and Oladipo (2012) Dixit and Pindyck (1994) suggested that increased uncertainty caused by exchange rate variations reduce investment given the irreversibility of investment projects and, hence, increases the value option of delaying expenditures. Idris et. al (2015) investigated empirically the effect of exchange rate volatility on the output level of the five English speaking countries in ECOWAS, namely Nigeria, Ghana, Gambia, the Sierra Leones and Liberia, over the period 1991 to 2014. Co-integration test and error correction modeling were used as estimation techniques. Estimates of cointegration relations were obtained and the short-run and long-run dynamic relationships between the variables were obtained for each country utilizing the tests. They submitted exchange rate volatility has a significant impact on outputs at least for all the countries considered in the study, with all except Liberia having negative impact.

Enekwe et. al (2013) examined effects of exchange rate fluctuations on manufacturing sector in Nigeria over a period of 25 years (1985 – 2010). Using variables like manufacturing gross domestic product, manufacturing foreign private investment, manufacturing employment rate and Exchange rate. Ex-post facto research design was used as well as descriptive statistics and multiple regressions were employed and they submitted that manufacturing foreign private investment, manufacturing employment rate and Exchange rate have significant and positive relationship with manufacturing output with R^2 at 80%. Also, Ettah, et.al (2012) studied effects of price and exchange rate fluctuations on Agricultural exports in Nigeria. They observed that exchange rate fluctuations and Agricultural credits positively affect cocoa exports in Nigeria. They also revealed that relative prices of cocoa are insignificantly related to quantity of export, however, it has a negative sign which is in line with *a priori* expectation. This implies volatility on cocoa export in Nigeria.

Owolabi and Adegbite (2013) evaluated 27 years time series data and proved that foreign exchange rate volatility has a significant impact on Nigeria economy. This exchange rate has continuously fluctuating, imagine the country's foreign exchange rate volatility that favour Nigeria between 1981 and 1991 rises from N0.64 to N9.75 encouraged the nation's exportation. This continue, in 1992, the exchange rate rose to N17 to a US Dollar and in 1995 it increased to N21.89 but from 2003 to 2008 it reduces from N135.41 to N117.78 while later rises again to N147.20 and N150.3 in 2000 and 2010 respectively per US Dollar.

Owolabi and Adegbite (2012) also examine the effects of foreign exchange regimes on industrial growth in Nigeria for the period of 21 years (1985 – 2005). This study found out that exchange rate has significant effects on the economics growth with the adjusted R^2

of 69%. Opaluwa, et.al (2010) examined the impact of exchange rate fluctuations on the Nigerian manufacturing sector during a twenty (20) year period (1986 – 2005). The argument was that fluctuations in exchange rate adversely affect output of the manufacturing sector. This is because Nigerian manufacturing is highly dependent on import of inputs and capital goods. These are paid for in foreign exchange whose rate of exchange is unstable. Thus, this apparent fluctuation is bound to adversely affect activities in the sector that is dependent on external sources for its productive inputs. The methodology adopted for the study is empirical. The econometric tool of regression was used for the analysis. In the model that was used, manufacturing output employment rate and foreign private investment were used as the explanatory variables. The results of the regression analysis show 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. Oladipupo and Onotaniyohuwo (2011) in their view, exchange rate has a significant impact on the balance of payments position. The exchange rate depreciation can actually lead to improved balance of payments position if fiscal discipline is imposed. They also found out that improper allocation and misuse of domestic credit, fiscal indiscipline, and lack of appropriate expenditure control policies due to centralization of power in government are some of the causes of persistent balance of payments deficits in Nigeria. Onwusor (2007) examines a granger-cause exchange rate volatility as key amongst other variables on manufacturing output decline in Nigeria. Also GARCH (1,l) model was applied while a single equation isomorphic to integrated data was employed. The GARCH results were found to be stable, results from error correction model unstable he submitted that exchange rate volatility shocks hit manufacturing output by affecting the sector's financial requirements. Jonathan, Emily and Kenneth (2015) undertook an empirical analysis of the link between exchange rate fluctuations and private domestic investment in Nigeria. Descriptive statistics and econometric method were employed. Thus, simple averages of descriptive statistics, and Error Correction Model (ECM) technique within the Ordinary Least Square estimation were employed to analyze the various trends in the data. They submitted that, the depreciation of the currency and interest rate does not stimulate private domestic investment activities in Nigeria. But, infrastructures, government size and inflation rate had a positive effect on private domestic investment in Nigeria.

Theoretical Framework

For the purpose of this study traditional flow theory and Monetary Model will serve as the theoretical backup. The traditional flow model is essentially based on the principle of the interplay of demand and supply. The forces of the market (interaction between demand and supply) determine the rate of exchange. However, when there is speculation or expectation of a change in the rate of exchange, this could lead to the disequilibrium even without any change in the initial determined factors. While the monetary approach to exchange rate determination postulates that the relative supply of and demand for money between two countries is the basis for the determination of exchange rate. It views increase in the supply of money as being able to generate inflation, hence, resulting in exchange rate depreciation. The model opines that a situation of falling prices with a given nominal money supply results in exchange rate depreciation. Exchange rate can adversely affect the ability to import and therefore manufacturing output. Fluctuations in exchange rate will cause instability in purchasing power and hence, negatively impact on investment in import of manufacturing inputs.

On the other hand, the effect on manufacturing output and overall income level will also affect investment in import of inputs, exchange rate and consequently

economic growth. This is because among the determining factors of exchange rate, demand for foreign exchange, by manufacturer is high. Hence, manufacturer should source for raw materials locally; by so doing economy will be boosted.

3. Methodology

Data for this study is secondary data and extracted from CBN Statistical Bulletin various issues and National Bureau of statistics as well as from Federal Office of Statistics (FOS) publications. Other reference sources are Journals, Books, Newspapers, Google scholar, and observations E-Views 9.5 will be the main econometric package to be used. Time series properties of the data is used and particularly, tests for stationarity and cointegration between interest rate, inflation, exchange rate volatility, financial deepening and manufacturing output. Generalised Autoregressive Conditional Heteroscedasticity (GARCH) is used other than the other conventional methodologies used in literature, particularly estimating the autocorrelation function and using the standard deviation to extract the volatilities in exchange rate.

Model Specification

To ascertain the relationship between Exchange rate volatility and manufacturing output the model becomes: MFO = *f* (EXRV, INF, INT, FD).

In econometrics form they can be expressed as;

MFO = +EXRV +INF+INT+ FD + μ_t…...3.1

Using Log-liner

LMFO = +EXRV +INF+INT+ FD + μ_t. ...3.2

MFO denotes Manufacturing output, LMFO denotes log of manufacturing output.
EXRV denotes Exchange Rate Volatility, INF denotes inflation.
INT denotes interest rate, FD denotes financial deepening

Measurement of variables

MS/GDP denotes "money supply to gross domestic product ratio" to capture effect-of financial deepening on manufacturing production

$\boldsymbol{\mu_t}$ - denotes stochastic disturbance term.

Capturing Volatility of Exchange rate

In developing an ARCH model, we consider two distinct specifications- one for the conditional mean and the other for conditional variance. Generalizing this, the standard GARCH (p, q) specification is expressed as:

$$\boldsymbol{\gamma_t} = \propto + \sum_{i=1}^{k} \emptyset_i \boldsymbol{\gamma_{t-i}} + \pounds_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{3.3})$$

$$\pounds_t \sim N(0, \sigma^2) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{(3.4)}$$

$$\sigma^2 = \omega + \sum_{i=1}^{\rho} \propto_i \pounds_{t-1}^2 + \sum_{i=1}^{q} \beta_i \sigma_{t-1}^2 \ldots\ldots (3.5)$$

In the above mean equation considered measure of exchange rate volatility at time *t*. denotes autoregressive (AR) structure of order k. is taken as mean if other exogenous variables are assumed to be constant. denotes error term. - is the one-period ahead forecast variance based on past information, it is called *conditional variance.*

4. Presentation and Discussion of Results

For the purpose of investigating the impact of exchange rate volatility on manufacturing output in Nigeria, quarterly time series data covering the period of 1986:1 to 2016:4 was used. This is informed by the sensitivity of various model used in measuring volatility to large frequency data and the believe that, this will solve the problem of degree of freedom usually encountered in the introduction of lags and increase the reliability of the data for analysis.

Stationarity Test of Variables

Unit Root Test

The result of the stationarity test conducted on each variable explained in the model using Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) techniques in testing the hypothesis of unit root or no unit root as the case may be is presented in table 4.1.

Table 4.1: Unit Root Test Result

Variable	Augmented Dickey-Fuller (ADF) Test			Phillip-Perron (PP) Test		
	@ Level	@ 1st Diff.	Status	@ Level	@ 1st Diff.	Status
LMFO	-0.570554	-4.960775*	I(1)	-3.599021*	-	I(0)
EXR	-1.596546	-9.231906*	I(1)	-1.441764	-9.1781*	I(1)
INF	-3.255909**	-	I(0)	-2.180318	-6.9314*	I(1)
INT	-3.439549**	-	I(0)	-3.4098**	-	I(0)
FD	-2.355927	-13.126050*	I(I)	-2.400989	-1305068*	I(1)
Asymptotic Critical Values						
1%	-3.484198	-3.484198		-3.484198	-3.484198	
5%	-2.885051	-2.885051		-2.885051	-2.885051	
10%	-2.579386	-2.579386		-2.579386	-2.579386	

** Implies significant at 1% level and **Implies significant at 5% level; Source: Author's computation, 2017*

From the result presented in table 4.1, ADF result revealed that, INF and INT variables were stationary at level which means that they were integrated of order zero I(0), while LMFO, EXR and FD were not stationary at level until they were differenced once and they were said to be integrated of order one I(1). For the PP test, LMFO and INT were stationary at level, while EXR, INF and FD were stationary after first difference meaning that they were integrated of order one I(1). Given the mix results as shown by ADF and PP tests as well as the order of integration of the variables, the long run relationship among the variables will be tested using the ARDL model which can capture the characteristics of a mixture of I(0) and I(1) of the variables as postulated by Pesaran, et al. (2001).

Table 4.2: Lag selection criteria

AIC*	BIC	HQ	Adj. R-sq	Specification Value
2.336233*	2.567290	2.430074	0.819244	ARDL(2, 1, 0, 1, 1)
2.349974	2.604136	2.453199	0.818108	ARDL(2, 1, 1, 1, 1)
2.352372	2.560323	2.436829	0.814909	ARDL(2, 0, 0, 1, 1)
2.367068	2.598126	2.460910	0.813583	ARDL(2, 0, 1, 1, 1)
2.397299	2.605250	2.481756	0.806404	ARDL(2, 1, 0, 0, 1)
2.403787	2.588633	2.478860	0.803649	ARDL(2, 0, 0, 0, 1)
2.410035	2.641092	2.503876	0.805399	ARDL(2, 1, 1, 0, 1)

*Note: * Means that ARDL model selected by the selection criteri.*; *Source: Author's computation using E-views 9.5, 2017.*

Cointegration Test (ARDL Approach)

Lag selection criteria

The information criterion in table 4.2 showed that ARDL (2, 1, 0, 1, 1) is appropriate for the model in this study. This explains the advantage of an ARDL methodology as it is not necessary for all the variables to have the same lag(s) contrary to that of Vector Autoregressive (VAR) which all variables are given the same lag(s). The optimal lag selection must be considered as this may result to the problem of misspecification and autocorrelation if ignored.

Bound Test Approach to Cointegration

The long run relationship between the variables in the model can be tested using ARDL bound test. This is done by testing if the coefficients of β's are equal to zero in our estimated model or not. The F-Statistic value from the E-views result is shown in table 4.3

Table 4.3: ARDL Bound Test Result

Test Statistic	Value	K
F-statistic	0.738808	4
	Critical Value Bounds	
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Author's computation using E-views 9.5, 2017.

Table 4.3 revealed that, the estimated result of the F-statistics is less than the critical values of the lower bound at 1%, 2.5%, 5% and 10% significance level, and thus, inferring that there exists no co-integrating relationship among the variables.

Discussion of Regression Results

Expected short run equation and ARDL error correction form; short-run coefficient and error correction term

From the table 4.4, in the short run, all the variables have the expected sign as suggested by the *apriori* expectation, they are all significant in explaining manufacturing output in Nigeria except EXRV and INF. One period lag of LMFO and FD showed a positive and significant impact on LMFO. This means that a percentage increase in LMFO(-1) and FD will lead to 0.55 and 0.02 per cent increase in LMFO respectively.

Table 4.4: Short Run Equation and ARDL Error Correction Form

Dependent Variable: LMFO				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMFO(-1))	0.558541	0.067183	8.313707	0.0000***
D(EXRV)	-0.008988	0.006902	-1.302338	0.1955
D(INF)	-0.002699	0.003981	-0.677925	0.4992
D(INT)	-0.098469	0.033058	-2.978686	0.0036***
D(FD)	0.029364	0.006715	4.373006	0.0000***
ECM(-1)	-0.095134	0.045583	-2.087049	0.0021***

*R^2=55% D.W = 2.2 F-statistics = 14.95; Note * (**) (***) denotes null hypothesis at 10%, (5%) and (1%) respectively; Source: Author's computation using E-views 9.5, 2017.*

Also, INF and INT with negative relationship with LMFO showed that one per cent increase in INF and INT will cause a decrease in LMFO by 0.002 and 0.09 respectively. Also, the result indicated that the coefficient of the error correction term ECM (-1) had a correct sign and significant at 1% level. The value of the coefficient is-0.095134; this means that, about 9.5% of the disequilibrium in the level of manufacturing output (LMFO) of previous year's shock adjust back to the long run equilibrium in the current year. In another word, the level of stock market volatility adjust to equilibrium with lags and only about 9.5% of the discrepancy between long and short run manufacturing output (LMFO) in Nigeria is corrected within a year.

Volatility and Its Interaction with Manufacturing Output

Generation and Establishment of EXR Volatility

The result in the table 4.5 is the conditional mean equation result of EXR regressed on its lagged value.

Table 4.5: EXR Volatility Equation (Mean Equation)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.665879	0.775516	0.858627	0.3905
EXR(-1)	1.008071	0.008684	116.0887	0.0000***
	Variance Equation			
C	0.078025	0.025945	3.007316	0.0026***
RESID(-1)^2	-0.042842	0.003608	-11.87398	0.0000***
GARCH(-1)	1.085206	8.04E-05	13503.38	0.0000***

Source: Author's computation from E-Views 9.5, 2017.

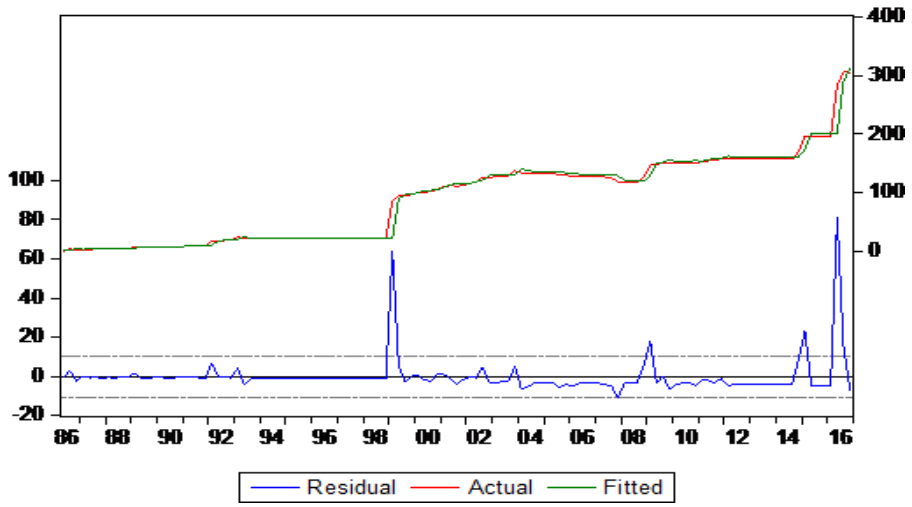

Figure 4.1: Graph of Volatility in Exchange rate.
Source: E-view 9.5 generated graph (2017).

This was made known by Engle (1982) who suggested that the residual of autoregressive process is liable to reveal volatility more than any other method. GARCH variance series volatility as shown in the graph was generated from the model and it served as the pure volatility (with neither exogenous nor endogenous) of EXR as it was also made known by Bollerslve (1986). Also, the graph depicts that the process of volatility is stationary as it possesses no trend pattern. It can be shown that all the variables in the model were statistically significant at 1%, 5% and 10% conventional level.

The establishment of the volatility of exchange rate requires checking whether the series is characterized by ARCH effect. In other words, we need to firstly ascertain if the variable (Exchange rate) is volatile or not. Following the graph shown in figure 4.1, it is clearly shown that there are period with larger and smaller volatility in the sample i.e there is a prolonged period of low volatility at some point and a prolonged period of high volatility (volatility cluster). In other words, the period of high volatility are followed by the period of high volatility and the period of low volatility are followed by that of low volatility. Therefore, the result suggests that residual or error term is conditionally heteroscedastic and it can be represented by ARCH and GARCH model.

ARCH and GARCH Model Analysis

From table 4.6, the result revealed that the ARCH effect is found significant. This means that information about previous year's

exchange rate volatility influences this year's manufacturing output.

Table 4.6: ARCH and GARCH Model Result

Dependent Variable: LMFO				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Mean Equation		
C	4.341994	0.205926	21.08525	0.0000
EXRV	0.093689	0.014408	6.502568	0.0000***
		Variance Equation		
C	2.497895	0.226112	11.04718	0.0000***
ARCH(-1)	0.294641	0.106310	2.771526	0.0003***
GARCH(-1)	0.569797	0.138308	4.119771	0.0000***
INF	-0.015490	0.005932	-2.611362	0.0090***
INT	-0.034170	0.017414	-1.962215	0.0497***
FD	0.008990	0.003651	2.462085	0.0138***
		Residual Diagnostic Test Result		
Normality Test Result:	JarqueBera Test		2.761081	
	Probability		0.251443	
Heteroscedasticity Test:	F- Statistic		0.011465	
ARCH	Probability		0.914900	

Source: Author's computation using E-views 9.5, 2017.
*Note * (**) (***) denotes null hypothesis at 10%, 5% and 1% respectively.*

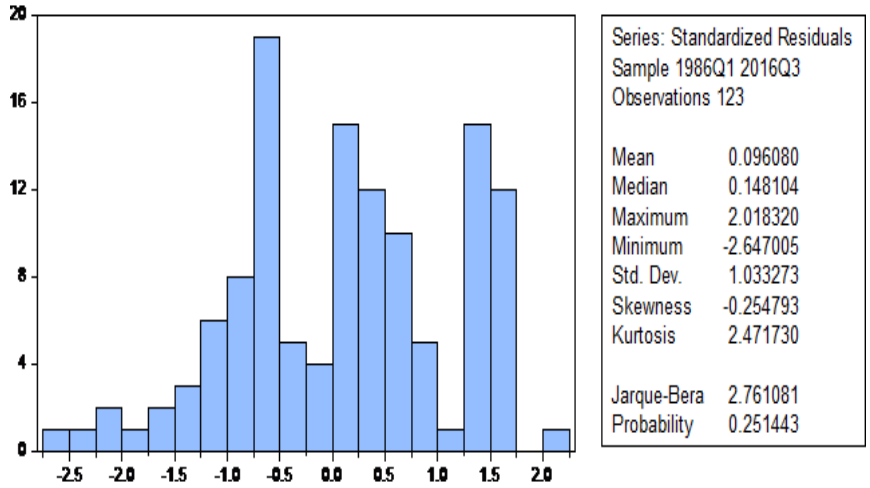

Figure 4.2: Jarque Bera Normality Test.
Source: E-view generated graph (2017).

Also, GARCH is found significant which is a pointer to the fact that, previous period exchange rate volatility can influence this year's manufacturing output. Also, the

results of the Generalised Autoregressive Conditional Heteroskedasticity (GARCH) suggests that the volatility shocks are quite persistent because the associated coefficient of GARCH (1, 1) approximately equals unity (0.85). We can therefore conclude that, manufacturing output in Nigeria is influence by exchange rate volatility. In the same vein, inflation, interest rate and financial deepening are also significant in the model. Inflation and interest rate showed negative relationship with the manufacturing output which is in line with the *apriori* expectation and is significant at both 1% and 5%. It then means that, one per cent increase in interest rate and inflation rate will lead to 0.034 and 0.015 per cent decrease in manufacturing output. While financial deepening showed positive and significant impact on manufacturing output and one per cent increase in financial deepening will cause 0.008 per cent increase in manufacturing output.

The residual diagnostic test result revealed that the null hypothesis of normally distributed and no ARCH effect is accepted. This means that the model is normally distributed and possesses ARCH effect.

Discussion of Findings

This section discusses the results from the short run and ARDL error correction form equation in table 4.5. A priori, the entire variable satisfied the theoretical expectations and they are all significant in explaining manufacturing output except exchange rate and inflation. Exchange rate volatility and interest rate were negatively related to manufacturing outputthis is because Nigerian manufacturing is highly dependent on import of inputs and capital goods. Monies are paid for in foreign exchange whose rate of exchange is unstable.These results were in line with submission of Onwuso (2007), Opaluwa et al (2010) and David et al (2010). Inflation rate has a negative effect on manufacturing output this shows that inflation rate is a threat to the manufacturer in Nigeria as this will reduce the purchasing power of buying raw material input for production. The autoregressive {LMFO(-1)} is positively related to manufacturing output which is a reflection of the backward-looking nature of manufacturing output that will improve the current state of manufacturing output in Nigeria.

The financial deepening (FD) was positively related to Manufacturing output (MFO), this means if market is more deepened, investment resources will be mobilized for lending to manufacturers and consequently market size will expand in the non-oil sector.

In terms of significance, interest rate, financial deepening as well as manufacturing output in previous years were significant at 5% significance level. However, exchange rate and inflation rate were negatively related and they are only variable factors that were not statistically significant. This was so for a number of reasons, first, exchange rate volatility creates the problem of shocks and consequently forced a number of manufacturer concern out of operation. Second, inflation pose a threat to the investors as it reduces purchasing power of procuring raw materials and other critical manufacturing inputs such as machine equipments etc. The standard GARCH (1,1) model used to measure volatility estimates shows that exchange rate volatility was present and persistent in exchange rate (see table 4.6). The three important conditions for stability were met that is, the constant was positive, the sum of ARCH and GARCH parameter were tend to unity (0.85) and their coefficients are statistically significant.

Implication of Findings

From the analysis, we discovered that effect of exchange rate volatility on manufacturing output is not favourable to economic activities in the manufacturing industry. It was also discovered that the performance of the manufacturing sector was affected as a result of continuous fluctuations of foreign exchange rate which bring about volatility clusters in exchange rate which hinders procurement of raw materials and machineries required for optimum production.

We equally find out that high inflation is not investment friendly, because as inflation increases manufacturing output will be affected in all ramifications from production down to output consequently, manufacturing employment generation will be affected adversely which may increase unemployment rate in Nigeria.

5.0 Conclusion and Recommendations

To achieve higher levels of manufacturing output, manufacturer must begin to look inward to source for their raw materials locally, the consumers or the Nigeria populace must buy made in Nigeria products to boost the sales revenue of the manufacturing sector which will bring about increase in production and consequently more labour force will be required in the manufacturing sector which will bring about unemployment decrease.

As a result there will be increase in aggregate income and gross domestic product. However, manufacturers must focus on good quality that will meet international standard, this will encourage consumer to buy made in Nigeria goods if all these are achieved and sustained it will bring about a sustainable naira appreciation as well as balance of payment favourable. Following from the findings, this study makes the following recommendations that will propel production in the manufacturing sector consequently, economic growth and development in Nigeria; the following recommendations were proffer:

- The wide gap between official and parallel market should be closed in order to bring proper stability in exchange rate in Nigeria. This can be achieved by making dollar accessible, available and cheaper in the official market.
- For manufacturing sector to provide inclusive growth, exchange rate must be stable. This is needed to enable investors form correct expectations in taking economic decisions, for instance, if the exchange rate depreciates instantaneously, borrowers may be in great difficult repaying their debts.
- It is high time manufacturers begin to look inward by sourcing their raw materials locally in order to be free from wild effect of exchange rate volatility which affect their output adversely.
- Manufacturers should focus on international good quality standard products so as to encourage consumer locally and internationally. Thereby, consumers will find made in Nigeria good more attractive and cheaper than foreign products. This can be achieved if adequate power supply, infrastructural facilities as well as adequate security can be provided by government.

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