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Effect of Oil Price Fluctuations on Manufacturing Performance in Nigeria (2009-2017)

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Abstract: *Oil is one of the most important raw materials for industrial production, and changes in its price affect both prices of petroleum products and the overall production costs. The debate on the nexus between oil price and manufacturing performance is far from over considering the dynamic nature of the oil market. This paper examined the effect of petroleum price on manufacturing performance (output) in Nigeria from 2009Q1 to 2017Q4. Manufacturing Performance (MPER), Oil Price (OP), Exchange Rate (EXC) and Interest Rate (INT) were the variables of interest and analyzed using Auto regressive Distributive Lag (ARDL) approach. It was found from the bound test that, the variables are co integrated. The findings revealed that oil price has a positive and statistically significant impact on manufacturing output. Furthermore, exchange rate and interest rate were negatively related to manufacturing output at 5% significant level. Therefore, the paper recommends setting a framework that will yield stable and affordable exchange rate and interest rate regimes for manufacturing firms. Steady supply of petroleum product raises the performance of the manufacturing sector; and government should encourage the use of local raw materials and contents in productions oas to ease the operations of manufacturing firms and increase their performance.*

Key words: *Oil Price, Manufacturing Performance, Nigeria, ARDL JEL Code: Q41, C1*

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I. Introduction

Between 2012 and 2013, oil price has been above $ 100 per barrel, suddenly it fell dramatically to $38 per barrel in the third quarter of 2014 and continued to decline until the end of 2015, reaching a new record low of $28 in January 2016 (Organisation of Petroleum Exporting Countries-OPEC, 2016). The fluctuations in oil price experienced during this period tend to have an effect on commodity prices given its role as input in the production process. Numerous factors according to Aleksandrova (2016) contributed to the fall in oil prices, which was the biggest since the 1980s. The global market situation of sharp decline occurred as a consequence of the downward trend of global oil demand, European Union (EU) debt crisis and the slow recovery of the EU economy, appreciation of the US dollar and oil price reaction to a variety of geopolitical and economic phenomena.

Petroleum is an essential raw material for manufacturing industries. The price of petroleum products, energy bills, and other production costs are directly affected by the price of oil (Loungani, 1986). There have been many global shock sin the price of oil in recent decades that have affected the economic performance of developing countries (Al- Risheq, 2016).To be precise, fluctuation sin the price of petroleum affect economic growth through several transmission channels; on the supply side, pump price shocks lead to increases in production cost, resulting in lower output. On the demand side, an increase in the pump price results in an increase in the price of goods which reduces the purchasing power of consumers, and further affects negatively investment and consumption decisions by firms and households (Jiranyakul, 2006).

Nigeria is a net exporter and importer of petroleum and its products. Petroleum is arguably one of the key driving forces and bedrock of the Nigerian economy and changes in its price would have significant effects on the real sectors, economic growth and welfare due to linkage effect (Al-Risheq, 2016). Petroleum is used to power agricultural machines, processing machines, and to transport inputs such as fertilizer, pesticides, and final goods to the consumer. Increases in the price of oil conventionally add on the cost of these operations. Higher oil prices may trigger inflation in the economy, increase cost of input, transport cost and subsequently reduce investment (Inter-agency Report, 2011 cited in Al-Risheq, 2016).

However, the statistical link between petroleum price and industrial output has long been established with convergent and divergent views among scholars (see Lee & Ni, 2002; Jiranyakul, 2006; Kumar, 2009; Eksi, Izgi & Senturk, 2011; Ojapuwa & Ejumedia, 2012; Ahmed, Bashar & Wadud, 2012; Scholsten & Yurtsever, 2012; Jimenez-Rodriguez & Sanchez, 2012; Aye, Gupta & Mamba, 2014; Al-Risheq, 2016). These studies were conducted based on cross country analysis, regional and national economies with different econometric models. Empirical studies on the impact of petroleum price on manufacturing/industrial performance in Nigeria were very scarce if not available. Loto (2012) examined the determinants of output expansion in Nigeria's manufacturing industry, his findings were great in explaining the behavior and structure of the manufacturing industry. The study was flawed to some extents: firstly, it did not accommodate oil (petroleum) price as a determinants of manufacturing output; secondly, it uses Naira nominal exchange rate instead of the market rate of exchange (Bureau De Change) that show the true picture of the exchange rate market; thirdly, it did not accommodate the recent oil price shock in the global market which also affect industrial output for both oil exporting and oil importing countries; finally, the study utilize Ordinary Least Squares (OLS) method with less model diagnostics. It is against this background that this move a step further to examines the impact of petroleum price on manufacturing performance in Nigeria using the Autoregressive Distributed Lag (ARDL) Bound test approach. Furthermore, the paper is organized into five sections including this introduction; section two reviews relevant and related literature; section three contains methods followed the paper to achieve its objective; section four present results and discussion of findings; section five presents conclusion and recommendations.

II. Review of Literature

Petroleum prices affect industrial/manufacturing performance through different transmission channels (Kumar, 2009).On the supply side, increase in petroleum prices raises production costs and leads to a contraction in output. This contraction in output increases further due to a reduction in investment (Brown and Yucel, 2002). On the demand side, an increase in the costs of production, owing to an increase in petroleum prices, translates into higher commodity prices. Thus, aggregate productivity falls due to low demand and revenue (Hunt, Isard & Laxt on, 2001). There exist also wealth effect in petroleum price shock that affects demand by transferring in come from oil-importing to oil-exporting countries. Asa result, purchasing power shifts from oil-importing to oil-exporting countries. The wealth transfer reduces aggregated emand in oil-importing countries, while the opposite occurs in oil exporting countries (Al- Risheq, 2016).

Another transmission channel is there al balance that explains a situation where by an increase in the prices of petrol leads to an increase in demand for real balance (money). When monetary author it iesareno table to meet the money demand for whatever reason, the resulting increase in the inter estratecausesa reduction in output (Brown and Yucel,2002).Conventionally, when interestrate increases, investment falls due to the reduction in producers' profits. Bernanke, Gertler and Watson (1997) asserted that the combination of tight monetary policy and petroleum price shocks depressed the real economy through discouraging investment. Empirical evidences were documented on the nexus between petroleum price and manufacturing/industrial performance as can be seen in Table 1.

Table 2.1 Empirical Literatures on Petroleum Price and Manufacturing Performance

S/N	Author(s)	Year	Study area	Data	Variables	Methods	Findings
1	Aye et al.	2014	South Africa	Time series: Monthly data: Feb. 1974-Dec.2012	OP & IO	VAR, GARCH-in-Mean VAR	OP impacted negatively on IO
2	Mehrara&Sarem	2009	Iran, Saudi Arabia & Indonesia	Panel Data: 1975-2005	OP & IO	Gregory & Hansen Cointegration Test	Positive relationship
3	Kumar	2009	India	Quarterly: 1975Q1-2008Q4	OP & IO	VAR & GCT	Negative relationship
4	Farzanegan&Markward	2008	India	Quarterly: 1975Q2-2006Q4	OP & IO	VAR	Positive relationship
5	Ahmed et al.	2012	USA	Annual: 1980-2010	OP & MP	CGARCH, VAR & IRF	Positive relationship
6	Jimenez-Rodriguez & Sanchez	2012	Japan	Quarterly: 1976Q1-2008Q2	OP & IO	VAR	Negative relationship
7	Scholsten&Yurtsever	2012	38 European Countries	Panel: 1983-2007	OP & IO	VAR & Multivariate regression technique	Impact differs among countries & there were asymmetric impact of OP on IO
8	Papapetrou	2009	Greece	Annual: 1982-2008	OP & MP	RS-T & TA-R	Negative relationship
9	Jimenes-Rodrigues	2008	EMU countries	Annual: 1975-1997	OP & IO	VAR	Different across countries
10	Eksi et al.	2011	OECD oil	Panel: Monthly	OP & IO	Johansen	Short run causality

			exporting countries	Jan.1997-Dec.2008		Cointegration & GCT	from OP to IO
11	Lee & Ni	2002	USA	Monthly: Jan 1957-Sept. 1997	OP & MP	VAR & IRF	Negative impact of OP on MP
12	Jiranyakul	2006	Thailand	Annual: 1990-2004	OP & IO	Johansen Cointegration Test	Positive relationship
13	Kumar	2009	India	Quarterly: 1975Q1-2008Q3	EXCR & IO	Multi-variate VAR & GCT	positive impact
14	Ejapuwa&Ejumedia	2012	Nigeria	Annual: 1970-2010	OP, INT & MP	VAR & IRF	Negative impact
15	Wang & Zhang	2014	China	Monthly: Oct. 2001-Nov. 2011	OP & IO	ACJI & GARCH	Negative relationship
16	Loto	2012	Nigeria	Annual: 1980-2010	EXCR & MP	OLS	Negative relationship
17	Al-Risheq	2016	52 Developing countries	Panel: 1970-2012	OP & IO	Fixed Effect Model	Negative relationship

Source: Authors' initiative

Note: Oil Price (OP), Industrial Output (IO), Manufacturing Performance (MP), Interest Rate (INT), Exchange Rate (EXCR), Vector Autoregressive (VAR), Granger Causality Test (GCT), Impulse Response Function (IRF), Conditional based Generalized Autoregressive Conditional Heteroscedasticity (CGARCH), Autoregressive Conditional Jump Intensity (AJCI), Regime Switching Regression (RS-R), Organisation for Economic Co-operation and Development (OECD), European Monetary Union (EMU).

III. Data and Methodology

The paper used quarterly data spanning from of 2010Q1 to 2017Q4. The data was sourced from Statistical Bulletin of the Central Bank of Nigeria. The choice of the study period is based on the availability of data in relation to the variables captured in the model and with the consideration of recent downward and upward trends in the Petroleum price and the poor performance of manufacturing sector in Nigeria. The variables in the model are manufacturing performance (MPER), oil price (OP), interest rate (INT) and exchange rate (EXCR). Following the work of Al-Risheq (2016), the paper specifies the following functional model:

MPER = *f* (OP, INT, EXCR) …………………………………... (3.1)

However, the econometric model of the equation (1) is specified as:

$$MPER_t = \beta_0 + \beta_1 OP_t + \beta_2 INT_t + \beta_3 EXCR_t + \mu_t \quad …………………… (3.2)$$

Where

$\beta_0 - \beta_3$ = Coefficients

μ = stochastic disturbance

T = time trend over the study period

The variables captured in equation 3.1 are defined and measured as follows;

-MPER = manufacturing performance capturing the percentage contribution of the manufacturing sector to GDP as in Lee & Ni (2002).

-OP = oil price capturing crude oil spot price (Brent crude) in dollars per barrel as in Aye *et al.* (2014), Kumar (2009) and Al-Risheq (2016).

-INT = interest rate measuring cost of borrowing in broader perspective in terms of Monetary Policy Rate (MPR) as used by Ejapuwa & Ejumedia (2012).

-EXCR = exchange rate measuring the market rate of exchange of Naira in relation to dollar (Bureau De Change- BDC).

3.1 Model Specification

This paper employs Autoregressive Distributed Lag (ARDL) approach developed by Pesaran*et al* (2001) to measure the nexus between oil price and manufacturing performance. The rationale behind the use of the approach is that: ARDL can be applied regardless of whether the variables are stationary at level value I(0) or after first difference I(1) or combination of two mutually. Second, it can generate robust and reliable results even if the sample size is small or large. Finally, it generates dynamic long run and short run result at a time (Pesaran*et al*, 2001). Thus, the ARDL model is specified as:

$$\Delta LMPER_t = \beta_o + \sum_{i=1}^{m} \beta_1 \Delta LMPER_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta OP_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta INT_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta EXCR_{t-i}$$
$$+\alpha_1 LMPER_{t-1} + \alpha_2 OP_{t-1} + \alpha_3 INT_{t-1} + \alpha_4 EXCR + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (3.3)$$

Note that $\beta_{0,}$ toβ_4 and α_1 to α_4 are the coefficients of the explanatory variables. Furthermore, the Error Correction Model of the ARDL approach is specified as:

$$\Delta LMPER_t = \beta_0 + \sum_{i=1}^{m} \beta_1 \Delta LMPER_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta OP_{t-i} + \sum_{i=1}^{m} \beta_3 \Delta INT_{t-i} + \sum_{i=1}^{m} \beta_4 \Delta EXCR_{t-i} + \beta_5 ECM_{t-i} + \mu_t$$
$$\ldots\ldots\ldots\ (3.4)$$

The ARDL model is divided into two parts as in equation 3.3; the first part of the equation with β_0 to β_5 denotes the short-run dynamics of the model, while the coefficients α_1 to α_5 signifies the long-run coefficients of the model. The null hypothesis of the foregoing model is defined as H_0: $\alpha_{1=}\ \alpha_{2=}\ \alpha_{3\ =}\ \alpha_{4\ =\ 0}$ which expresses that there is no long run association among the variables. Moreover, this study started the analysis by conducting bound test of the ARDL in order to identify the evidence of long-run relationship. The calculated F-statistics is compared with the Critical Value as tabulated by Pesaran*et al.* (2001). If F-statistics is greater than the upper critical value, then the decision will be to reject the null hypothesis of no long-run relationship, while if it falls below a lower critical value, then the null hypothesis cannot be rejected and if it falls within these two critical bounds, then the result is inconclusive (Pesaran*et al*., 2001). Also, prior to model estimation, the properties of the variables under study were tested in order to know the stationarity levels. The econometrics techniques used in the process were Augmented Dickey-Fuller (ADF) and Phillips-Perron (P-P).

IV. Discussion of Findings

In any study that deals with time series data, it is very important to test the nature of the series so as to know the order of integrations. This was done using ADF and P-P unit root testing approaches and the results are presented in Table 4.1. the result of the test from the two approaches indicates that manufacturing performance, pump price and interest rate were stationary after taking the first difference (i.e. I (1)), while exchange rate was stationary at level value.

Table 4.1: Unit Root Test (Augmented Dickey-Fuller and Phillips-Perron)

Variables	Augmented Dickey- Fuller		Phillips-Perron	
	Level	**First Diff.**	**Level**	**First Diff.**
LMPER	-2.008045	-4.660780***	-2.172622	-4.627609***
OP	-1.801732	-4.264399**	-1.801732	-4.206696**
INT	-2.421689	-4.064427**	-1.839796	-3.881313**
EXCR	-4.809779***	-4.661673***	-1.556944	-3.908767**
*Note: ***, ** and * indicate significant at 1%, 5% and 10% respectively.*				
Source: *Authors' computation from Eviews output.*				

From the unit root test results in table 4.1, we established that series were integrated of different orders, some are I(0) and others are I(1). Thus, ARDL model is the appropriate technique to handle the result of this nature. We therefore, move forward to conduct the co integration (bounds) test of the ARDL. The result indicated that there is an evidence of co integration among the series. This is due to the fact that the F-Statistics value (5.93) is greater than the lower and upper critical bounds for all the significant levels. This lead to the rejection of null hypothesis of no co integration. The result is summarized and presented in Table 4.2.

Table 4.2 : ARDL Bounds Test

Test Statistics		
F-Statistics	5.93	
Critical Value Bounds		
Significance levels	I(0) Bounds	I(1) Bounds
10%	2.37	3.2
5%	2.79	3.67
1%	3.65	4.66

Source: *Authors' Computation using Eviews Version 9.*

Meanwhile, the bounds test in Table 4.2 confirms the presence of co ntegration among the variables, we then go further to estimate the long run coefficients of the ARDL and the results are presented in Table 4.3. The results show that, pump price has positive and statistically significant impact on manufacturing performance in Nigeria. This is in tandem with findings of Kumar (2009), Farzanegan & Mark ward (2008) and Ahmed *et al*. (2012), and contradicts the findings of Papapetrou (2009), Aye *et al.* (2014) and Al-Risheq (2016). An increase in pump price by 10% will lead to increase the manufacturing output by about 0.022%. This reflect the inelastic nature of manufacturing output. Furthermore, the result is in consistent with the assertion that increase in the price of inputs will lead to increase the price of output vis-à-vis profits. Profits been the motivating factor, will serve as an inducement for the manufacturing firms to produce more even at higher costs of production. Interest rate has negative and statistically significant effect on manufacturing performance in Nigeria throughout the sample period. This confirms the findings of Kumar (2009) and Loto (2012). A 10% increase in interest rate will derive the manufacturing performance to reduce by almost 0.32%.

This is true because interest rate been the cost of borrowing for the manufacturing firms, has negative effect on investment. An increase in the rate of interest in the economy will bring about reduction in the power of investors (manufacturing firms) to borrow and that affect their ability to produce more and maximize their objectives. Additionally, exchange rate exerts negative influence on the manufacturing performance in Nigeria during the sample period. This conforms to the findings of Loto (2012) and contradicts the findings of Wang & Zhang (2014). It shows that, a 10% change in exchange rate is associated with 0.033% decrease in manufacturing performance in Nigeria. According to the result an appreciation (depreciation) in exchange rate may lead to decrease (increase) in manufacturing output in Nigeria. Ideally, exchange rate appreciation is expected to accompany the increase in manufacturing performance. But in Nigeria the opposite is case because manufacturing firms depend heavily on inputs from the foreign countries adding up to the production cost. Thus, manufacturing firms find it difficult to produce at moderate costs of input.

Table 4.3: Result of the Estimated Long-Run Coefficients of the ARDL

Dependent Variable: LMPER				
Variables	Coefficients	std. Error	t-Statistics	Prob.
PUMP	0.002164	0.002103	3.406345	0.0093
INT	-0.031805	0.011391	-2.790160	0.0235
EXCR	-0.0033487	0.00456	-7.642804	0.0001
R^2 = 0.76, Adj. R^2 = 0.49, AIC = -3.2868, SIC = -3.06863, HQC = -2.5731, DW = 1.91, F-Stat. = 2.87 (0.0327)				
Source: *Author's computation Using Eviews Version 9.*				

The estimated short-run results are presented in Table 4.4. It was revealed that pump price has negative and statistically insignificant influence on manufacturing firms' performance, while interest rate and exchange rate have positive effect on manufacturing output Nigeria in the short run. The Error Correction Model (ECM) has the correct sign that is less than one, negative and significant at 1% level. This confirms the evidence of long-run relationship among the variables and it implies that in the case of any disequilibrium in the economy the system will correct itself from the short-run towards reaching long-run equilibrium at the speed rate of 67% every quarter.

Table 4.4: Estimated Short-Run Coefficients of the ARDL Model

Dependent Variable: ΔLMPER				
Variables	Coefficients	std. Error	t-Statistics	P-value
Δ(LMPER(-1))	0.8677	0.2275	3.8139	0.0051
Δ(OP(-1))	-0.0093	0.0019	-4.8610	0.0013
Δ(INT(-1))	0.0351	0.0109	3.1875	0.0129
Δ(EXCR(-1))	0.0039	0.0007	5.4557	0.0006
ECM(-1)	-0.6709	0.3037	-2.2092	0.0003
Source: Author's computation Using Eviews Version 9.				

To ensure that the estimated model is reliable and consistent, the paper conducted diagnostic tests for serial correlation, heteroscedasticity and normality as shown in Table 4.5. The results indicated that the model passes all the tests because the null hypotheses of all the tests cannot be rejected due to insignificant p-values.

Table 4. 5: Results of the Diagnostic Tests

Tests	Test Statistics	Prob. Value
Serial correlation	1.1368	0.3814
Heteroscedasticity	0.9401	0.4565
Normality	4.2791	0.1177
Source: Author's computation Using Eviews Version 9.		

Similarly, the study carried out the stability tests with the use of Cumulative Sum of recursive residual (CUSUM) and Cumulative Sum of Squares of recursive residual (CUSUMQ) in order to know the stability or otherwise of the model and parameters in the system equation. The test shows that the estimated model and parameters were stable because the recursive error fall between the two critical lines in both the tests as depicted in Figures 1 and 2.

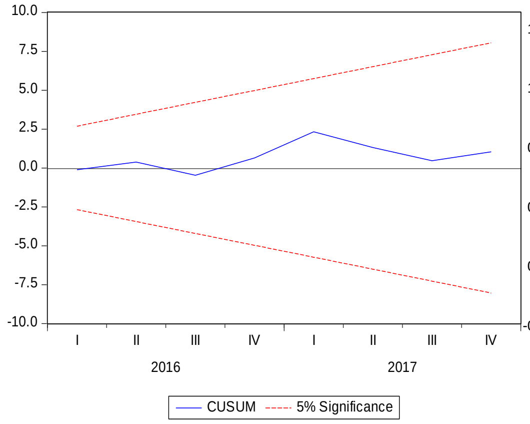

Figure1.

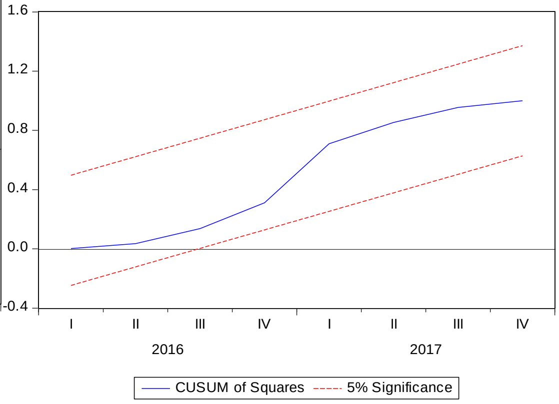

Figure2.

V. Conclusion and Recommendations

The paper examines the impact of petroleum price on manufacturing performance in Nigeria covering the period 2010Q1 – 2017Q4. The variables captured in the model are manufacturing performance, pump price, interest rate and exchange rate. After series of econometric tests, the study found co integration (long run equilibrium relationship) among the variables through the bound test. Oil price has positive and statistically significant impact on manufacturing performance. However, interest rate and exchange rate have negative and statistically significant influence on manufacturing performance in Nigeria.

Form this view, various macroeconomic and industrial policies were adopted by the government to improve the performance of the manufacturing sector in the form of subsidies, tax waivers, and credit incentives but the yielded results were below expectations due to some structural rigidities (corruption and mismanagement) in the economy. Therefore, the paper via its findings recommends a framework that will yield stable and affordable exchange rate and interest rate regimes for manufacturing firms. Steady supply of petroleum product raises the performance of the manufacturing sector based on the nature of their products; the government should also encourage the use of local raw materials (inputs) in productions oas to ease the operations of manufacturing firms and increase their performance.

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APPENDIX

ARDL MODEL
ESTIMATION
Test Equation:
Dependent Variable: D(LMPER)
Method: Least Squares
Date: 02/21/18 Time: 11:39
Sample: 2011Q1 2017Q4
Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMPER(-1))	-0.147695	0.184638	-0.799916	0.4381
D(LMPER(-2))	-0.131022	0.184015	-0.712019	0.4890
D(LMPER(-3))	-0.435594	0.204281	-2.132333	0.0526
D(PUMP)	0.001738	0.001181	1.472033	0.1648
D(PUMP(-1))	-0.003217	0.001526	-2.108744	0.0549
D(PUMP(-2))	-0.001820	0.001448	-1.256646	0.2310
D(PUMP(-3))	-0.003910	0.001382	-2.828829	0.0142
D(EXCR)	-0.000302	0.000488	-0.620067	0.5459
D(EXCR(-1))	0.001030	0.000520	1.979838	0.0693
D(EXCR(-2))	0.001329	0.000438	3.037164	0.0095
C	4.734598	1.794251	2.638760	0.0204
PUMP(-1)	0.004324	0.001383	3.127272	0.0080
INT(-1)	0.002115	0.010189	0.207619	0.8387
EXCR(-1)	-0.000912	0.000242	-3.771341	0.0023
LMPER(-1)	-0.349357	0.136869	-2.552487	0.0241

R-squared	0.755674	Mean dependent var	0.017371
Adjusted R-squared	0.492554	S.D. dependent var	0.056402
S.E. of regression	0.040178	Akaike info criterion	-3.286809
Sum squared resid	0.020986	Schwarz criterion	-2.573128
Log likelihood	61.01532	Hannan-Quinn criter.	-3.068629
F-statistic	2.871975	Durbin-Watson stat	1.907139
Prob(F-statistic)	0.032694		

BOUND TEST RESULTS

ARDL Bounds Test
Date: 02/21/18 Time: 11:39
Sample: 2011Q1 2017Q4
Included observations: 28
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	5.925635	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

ARDL Cointegrating And Long Run Form
Dependent Variable: LMPER
Selected Model: ARDL(3, 4, 4, 4)
Date: 02/21/18 Time: 11:46
Sample: 2010Q1 2017Q4
Included observations: 28

Cointegrating Form

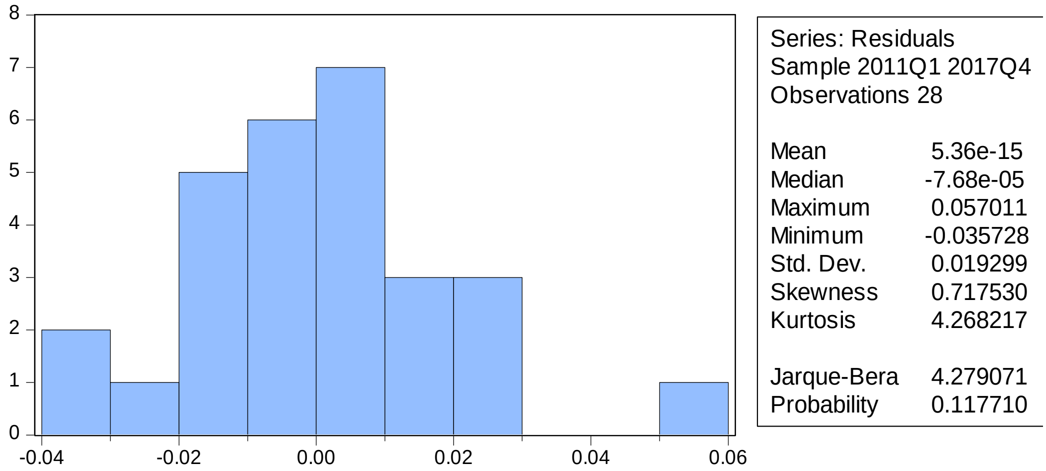
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LMPER(-1))	0.867714	0.227515	3.813885	0.0051
D(LMPER(-2))	0.622929	0.156293	3.985645	0.0040
D(PUMP)	0.005859	0.001328	4.412393	0.0022
D(PUMP(-1))	-0.009256	0.001904	-4.861019	0.0013
D(PUMP(-2))	-0.007026	0.001887	-3.723468	0.0058
D(PUMP(-3))	-0.002407	0.000748	-3.217324	0.0123
D(INT)	0.020078	0.009104	2.205456	0.0585
D(INT(-1))	0.035054	0.010997	3.187476	0.0129
D(INT(-2))	0.063159	0.017017	3.711590	0.0059
D(INT(-3))	0.073776	0.020813	3.544680	0.0076
D(EXCR)	0.000349	0.000454	0.769066	0.4640
D(EXCR(-1))	0.003942	0.000723	5.455701	0.0006
D(EXCR(-2))	0.003797	0.000604	6.284952	0.0002
D(EXCR(-3))	0.004442	0.001061	4.186600	0.0031
C	26.186291	4.209108	6.221339	0.0003
CointEq(-1)	-0.675672	0.303734	-2.209265	0.0003

Cointeq = LMPER - (0.0072*PUMP -0.0318*INT -0.0035*EXCR + 0.0393
*@TREND)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PUMP	0.007164	0.002103	3.406343	0.0093
INT	-0.031805	0.011391	-2.792160	0.0235
EXCR	-0.003487	0.000456	-7.642804	0.0001
@TREND	0.039324	0.003874	10.151112	0.0000

NORMALITY TEST

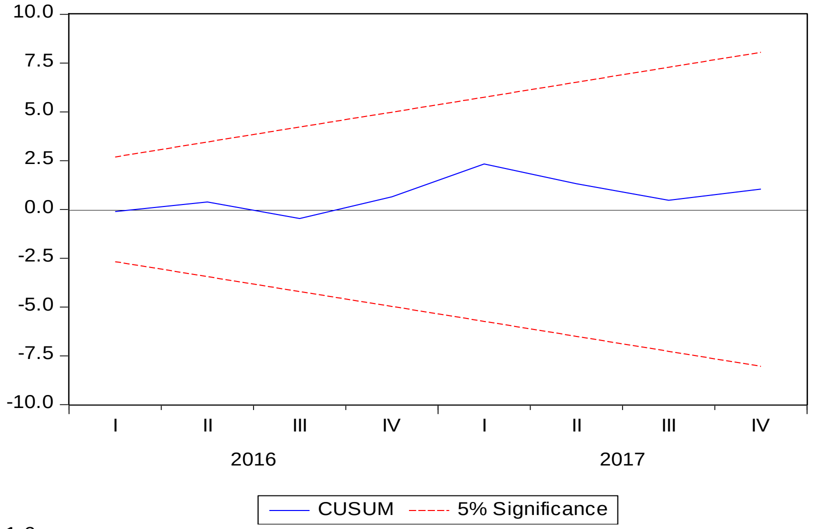


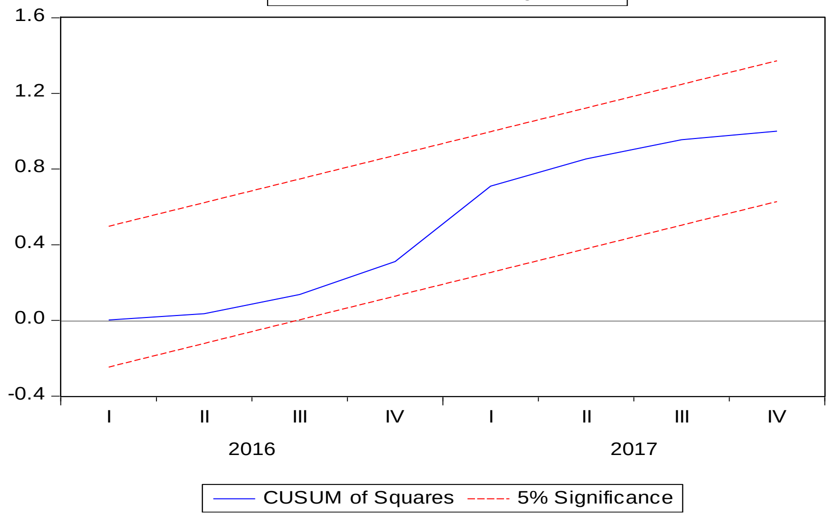
SERIEL CORRELATION TEST

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.136756	Prob. F(2,6)	0.3814
Obs*R-squared	7.694233	Prob. Chi-Square(2)	0.0213

STABILITY TEST





Heteroscedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

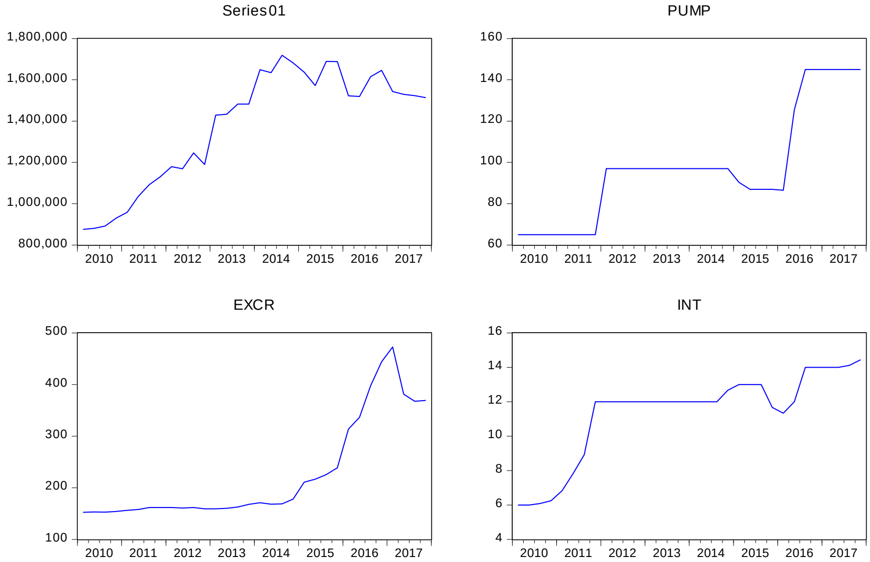
F-statistic	0.917926	Prob. F(14,13)	0.5640
Obs*R-squared	13.91929	Prob. Chi-Square(14)	0.4557
Scaled explained SS	1.319629	Prob. Chi-Square(14)	1.0000

Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.427538	Prob. F(4,9)	0.1238
Obs*R-squared	14.53138	Prob. Chi-Square(4)	0.0058

Series Plot



Gummi, U. M. "Effect of Oil Price Fluctuations on Manufacturing Performance in Nigeria (2009-2017)." IOSR Journal of Economics and Finance (IOSR-JEF) , vol. 9, no. 6, 2018, pp. 71-80.