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EFFECTS OF AUTOMOTIVE OIL GAS ON MANUFACTURING PERFORMANCE IN NIGERIA: ARDL APPROACH

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Abstract

The paper investigates the effects of automotive oil gas on manufacturing performance in Nigeria via annual time series dataset spanning as of 1980 - 2020. The study employed Autoregressive Distributive Lag Model (ARDL) for the estimation of the parameters. The long run result shows that there is positive and statistically significant association between automotive oil gas and manufacturing performance in Nigeria. This entails that raise in the price of automotive oil gas influence the performance of manufacturing performance positively via raise in the price of manufacturing output. The short run empirical results revealed that manufacturing performance respond negatively to change in the price of automotive oil gas. Increase in the price of automotive oil gas bring about increases in the cost of manufacturing output which in turn lead to decline in rate of production. This implies that manufacturing performance in Nigeria are prone to negative shock in the price of automotive oil gas because they rely heavily on automotive oil gas to power their manufacturing plant for operation due to inadequate energy substitute. The study recommends that there is need for the African countries to look for energy substitute beside automotive oil gas such as renewable energy for the effective operation of their manufacturing sector.

Keywords: Automotive Oil Gas, ARDL, Cusum, Cusum-q, ECM, Manufacturing Performance.

JEL Classification Code: C22, D24, E23, P48, Q42, Q43

1. Introduction

Automotive oil gas is an indispensable raw material for industrial production. It is one of the most important signs of economic activity in the world, due to its great significance in the provision of energy demand globally. The magnitudes of automotive oil gas go beyond economics aspects as it affects social life in general. Most of the productive sectors in Nigeria depend greatly on the use of automotive oil gas to power their various manufacturing plant in order to meet local and international demand. The heavy reliance on automotive oil gas as input in the manufacturing process, large percentage of firms earning in Nigeria which would have been channel into investment is directed to meet energy deficiency in the form of demand for automotive oil gas. The extensive use of automotive oil gas allows the diverse segment of the country's economy prone to unanticipated price increase in automotive oil gas (Nwosa & Ajibola, 2013; Loungani, 1986).

The volatile nature's automotive oil gas has affected economic growth in the course of diverse spread channels. The price of automotive oil gas upset brings about increases in the manufacturing costs, which bring about decrease in output this is from the supply side. From the demand side, a raise in automotive oil gas led to rise in the price of produce. Thus, consumers lose purchasing power, which in turn affects investment and consumption choice by firms and households (Jiranyakul, 2006; AL-Risheq, 2016).

Many studies have documented the economic effects of automotive oil gas and they typically show that for oil-importing countries increase in the price of automotive oil gas is destructive to macroeconomic indicators, especially GDP, manufacturing performance (Rentschler, 2013) are Increase in automotive oil gas lowers the manufacturing outputs growth, through higher manufacturing costs (Kumar, 2009; Jiménez-Rodríguez & Sanchez, 2012; Wang & Zhang, 2014). According to Bjornland (2009) a raise in the automotive oil gas affects the manufacturing performance negatively leading to reduction in its revenue or income and also rise in cost of output. Theoretically, any raise in automotive oil gas price ought to have unfavorable effect on output of manufacturing performance whereas a fall in automotive oil gas price be supposed to encourage growth of output of manufacturing performance.

Lee et al. (1995) dispute that an automotive oil gas shocks is likely to contain larger impact on real output of manufacturing performance. Shock in the automotive oil gas can also reproduce both unexpected section and the time-varying conditional variance component (Jiranyakul, 2016). The unpredictability element exercises a major impact on output growth. An automotive oil gas shock might have different impacts on different economies due to different characteristics. It is therefore against this background that this study seeks to examine the effects of automotive oil gas on manufacturing performance in Nigeria. However, the paper is divided into five sections, section deals with the introduction, section two present literature review, section three is methodology, section four results and discussions, and finally is section five which present conclusion and recommendation.

2. Literature Review

2.1 Theoretical Framework

Oil price affect manufacturing performance via diverse channel. The rises in the prices of oil lead to raise in the production costs which in turn results in reduction in productivity as well as investment (Brown & Yucel, 2002). Hence, an increase in the costs of producing goods and service, due to rise in oil prices, transforms into higher manufactured goods. Therefore, cumulative production falls (Hunt et al., 2001). An additional significant transmission channel of oil shocks is the wealth effect that affects demand by transferring income from oil-importing to oil-exporting countries. As a result, purchasing power shifts from oil-importing to oil-exporting countries. The wealth transfer decreases summative demand in oil-importing countries, whereas the opposite occurs in oil exporting countries.

The theoretical basis regarding the effects of automotive oil gas on manufacturing performance in Nigeria, there underlying factors, lower price of automotive oil gas may possibly be a reason that driving manufacturing development. The lower price may perhaps be driven by a number of factors which are not connected at all to the existing global economic trend, for instance, owing to the current finding of technical knowhow on oil processing which moved the supply up (Nazir & Qayyum, 2014).

2.2 Review of Empirical Studies

There are scanty empirical works on the effect of automotive of oil in developed, emerging, and developing countries for instance Chen, Gummi, Lu and Mu'azu (2020) investigated the impact of oil price fluctuations on food price in high and low-income oil exporting countries using quarterly panel dataset over the period 2013 – 2019. The study employed fully modified ordinary least square (FMOLS) and Dynamic Ordinary Least Squares (DOLS) for the analysis of the parameters. The empirical findings from the study revealed that there is positive and statistically significant association between oil price and food price in low income exporting countries. Other result shows that there is negative and statistically significant association between oil price and food price in high income exporting countries. In the same development, Gummi et al. (2018) investigates the effect of oil price fluctuations on manufacturing performance in Nigeria from 2009 to 2017using autoregressive distributed lag model (ARDL). Results from work show positive and significant relationship between oil price and manufacturing performance.

Similarly, Jiranyakul (2016) examined the linkages between industrial production and oil price in Thailand for the period 1993 to 2015. The study employs multivariate test techniques for the analysis. Findings indicated that there is positive and significant rapport linking industrial production and oil price in Thailand over the period of the study. Furthermore, Taghizadeh-Hesary and Yoshino (2015) explored the macroeconomic effects of oil movement on emerging and developed economies using annual panel dataset over the period 2000 to 2013. The period cover was divided into two, the first period spanned from 2000 to 2008, and the second period spanned from 2008 to 2013. The study employed Structural Autoregressive (SVAR) for the estimation of the parameters. The result for the first period 2000 to 2008 shows that there is positive and significant association between oil price and economic activity among all the countries. The result for the second period 2008 to 2013 revealed no linkages between oil price and economic activity in China.

Additionally, Hesary (2014) explored the economic impact of oil price volatility in developing and emerging countries of Japan, USA, and China using annual panel dataset over the period 1973 – 2013. The study employed the LR test for the estimation of the parameters under investigation. Result revealed that there is positive and statistically relationship between oil price and economic growth in Japan and USA throughout the sample period. Okoro (2014) explored the effects of oil instability and economic growth in Nigeria by applying annual time series dataset form 1980 - 2010. The study employed VECM 1980 – 2010 for the estimation of the parameters. The work indicated that oil price volatility has positive and significant influenced on economic growth in Nigeria.

In the work of Nwonso and Ajibola (2013) investigate the connection between gasoline and productive sectors in Nigeria using annual data spanning from 1980 - 2010. The work used cointegration and ECM techniques for the estimation of the parameters. Finding shows that there is positive and significant association between gasoline and productive sector in Nigeria over the period of the study. Ahmed et al. (2012) observed the relationship connecting oil price and industrial production in US using annual data from 1980 - 2010. The study used CGARCH and VAR models for the estimation of the parameters. Result shows that there is significant and positive connection between oil price and industrial production. In addition, Ghalayini (2011) explores the relationships amid oil price and economic development in US economy using quarterly dataset spinning from 2000 - 2010. The study employs granger causality test techniques to estimate the parameters. The result from the study indicated that there is causal connection from oil price to economic growth. Contrary to the work of Chen et al. 2020, Nwonso and Ajibola (2013); Ugbaka, (2020) examined the impact of oil price on manufactrung sector in Nigeria by applying annual time seires dataset over the period 1986 – 2019. The study employed t-test regression techniques for the estimation of the parameters. The empirical result from the study indicated that there is negative and statistically significant association between oil price shock and manufacturing sector performance in Nigeria over the period of the study. Al-Risheq (2016) examine the shock of oil prices on industrial production in developing countries over the period 1970-2002, using fixed effect model for the analysis of the parameters. Results from the findings indicated that oil price has negative and statistically significant effects on industrial production. The study concludes that oil price shock has significant negative effect on industrial production of developing countries.

Likewise, Taghizadeh-Hesary and Yoshino (2015) explored the macroeconomic effects of oil movement on emerging and developed economies using annual panel dataset over the period 2000 to 2013. The period cover was divided into two, the first period spanned from 2000 to 2008, and the second period spanned from 2008 to 2013. The study employed Structural Autoregressive (SVAR) for the estimation of the parameters. Result revealed no linkages between oil price and economic activity in China. Similarly, Wang and Zhang (2014) look into the connection between global oil price shocks and industrial sector of grains, metals, petrochemicals, and oil fats in China using monthly dataset over the period 2001 – 2011. The study used asymmetric ARDL and GRACH for the analysis.

Finding from the work indicated that there is existence of negative and significant relationship between oil prices and the four industrial sectors. This means that oil price had adverse effect on four china's industries over the period of the study. Aye et al. (2014) inspect the link amid oil price and the manufacturing production in South Africa using monthly dataset starting from February 1974 to December 2012. The study used VAR, GARCH-in-Mean VAR, and maximum likelihood for the analysis. Findings revealed that oil prices negatively affect South African manufacturing production.

Similarly, Ojapinwa and Ejumedia (2012) survey the industrial effects of oil price upset in Nigeria by applying annual dataset over the period 1970 to 2010. The study applied VAR for assessment of the effect of industrial sector on oil price. Results show that there is negative and significant connection between industrial sectors and oil price in Nigeria. This means that oil price affects the performance of industries in Nigeria throughout the period of the study. The work of Hesary (2014) explored the economic impact of oil price volatility in developing and emerging countries of Japan, USA, and China using annual panel dataset over the period 1973 – 2013. The study employed the LR test for the estimation of the parameters under investigation. The empirical result from the study revealed that there is no relationship between oil price and economic growth in China. Other result revealed that there is positive and statistically relationship between oil price and economic growth in Japan and USA throughout the sample period.

3. Methodology

3.1 Research Design

This work is a time series analysis which used secondary dataset over the period 1980 to 2020 for the estimation of the parameters. The study employed inferential test statistic to analysis the variables of interest. The Classical Linear Regression Model (CLRM) is going to be employed to establish the existence or otherwise of the relationship, degrees of the relationship, if any, connecting the dependent variable on one hand and a set of independent variables on the other.

3.2 Data and Source

The study used annual time series data spanning over the period 1980 – 2020. The dataset on all the variables such as manufacturing performance, automotive oil gas, exchange rate, inflation rate, and interest rate were all sources from the statistical bulletin of World Bank Indicator. The data type is secondary data.

3.3 Model Specification

This study adapts econometric model with modification which is in line with the work of Nazir and Qayyum (2014). The model is also based on the modified endogenous growth framework of Nazir and Qayum (2014). The preferred model is specified as:

$$MP = f\ (MP,\ AG,\ EXR,\ INFR,\ INR) \quad (1)$$

Where MP represent the Manufacturing performance, AG denote the Automotive Oil Gas, EXR is the Exchange rate, INFR represent Inflation Rate and INR is Interest Rate. Thus, the equation above can be rested into econometric model as follows:

$$MF = \beta_0 + \beta_1 AG + \beta_2 EXR + \beta_3 INFR + \beta_4 INR + \delta_t \quad (2)$$

Where β_0 is the Constant term, β_{1-4} represent Parameters to be estimated, δ_t connote the Error term or Disturbance term. Equation (4) can be restated to capture the natural log as:

$$lnMP = \beta_0 + \beta_1 lnAG + \beta_2 lnEXR + \beta_3 lnINFR + \beta_4 lniNR + e_t \quad (3)$$

Where: *lnMNP* is the logarithm of manufacturing performance, *lnAG* represent the logarithm of automotive oil gas, *lnEXR* is the logarithm of exchange rate, *lnINFR* represent the logarithm of inflation rate and *lnINR* denote the logarithm of interest rate.

3.4 Methods of Data Analysis

This study applied Multicollinearity test, unit root test, Autoregressive Distributed Lag Model (ARDL) estimation technique, diagnostic test and stability test for the analysis of the parameters.

3.4.1. Multicollinearity Test

One of the postulations of the classical linear regression model is that there is no perfect Multicollinearity among the explanatory variables. The term Multicollinearity refers to the situation where there is either an exact or nearly exact linear relationship among some or all explanatory variables of a regression model (Gujarati, 1995). If explanatory variables are highly correlated among themselves, it will be difficult to estimate the parameters of the model with greater precision i.e., with smaller standard errors (Gujarati, 1995). That is, we cannot isolate individual influence of independent variables on a dependent variable. Correlation will be employed to detect the presence of Multicollinearity among the parameters.

Correlation measures the degree of associations among variables under consideration via correlation analysis, the measure of the correlation is known as the correlation coefficients. The correlation ranges from -1 to +1, the level of significance start from 0.01 to 0.05. The level of significance above 0.05 indicates insignificant association among variables. The positive (+) and Negative (-) mathematical sign shows the direction of relationship, the positive indicate positive perfect relationship while the negative sign shows negative perfect associations. On the other hand, the zero value (0) indicates no relation among variables under consideration (Zakari, 2017).

3.4.2 Unit Root Test

It requires that the variable ought to be stationary by certain level and the probability value should also be significant at that level. Unit root test is a test for stationary and stationary is attained where the value of the test statistics must be negative and greater than the critical value of the chosen level of significance. This study employed augmented dickey fuller and Philips person test for the stationary test. These tests are carried out to know the order of integration of a variable, that is to say how many times a given variable has to be differenced or not to become stationary (Philips 1988). The equation of ADF with constant terms and trend is stated as follow:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{k=1}^{m} Y_i \, \Delta Y_{t-1} + \mu_t \qquad (4)$$

Where: $\Delta Y_t =$ First difference of Y_t, $Y_{t-1} =$ Lagged value of Y_t , $\delta =$ Test coefficient, $\mu_t =$ Error term, $\beta_1 =$ Constant, $\beta_2 =$ Coefficient of time variable. The Phillips Perron test (1988) approach makes a correction to the t statistic to account for the serial correlation. The PP test can be specified as:

$$\Delta \text{MP}_t = \partial_t + \beta_t + (\rho - 1)\gamma_{t-1} + \varepsilon_t \qquad (5)$$

Where: MP_t = Manufacturing performance, ∂_t = intercept, β_t = linear time trend, Δ = first difference operator, ε_t = the error term.

3.4.3 Autoregressive Distributed Lag Model (ARDL)

The Model was advocated by Pesaran and Shin (2000) and then by Pesaran *et al* (2000). This approach has an advantage that it does not necessitate entire variable to be integrated of the same order I (1). It is applicable if there is a mixture of I (0) and I (1). The ARDL equation (2) is given as follows:

$$\Delta LMP_t = \beta_0 + \sum_{i-1}^{n} \beta_1 \, \Delta LMP_{i-1} + \sum_{i-1}^{n} \beta_2 \Delta LAG_{i-1} + \sum_{i-1}^{n} \beta_3 \Delta EXR_{i-1} + \sum_{i-1}^{n} \beta_4 \, \Delta INFR_{i-1} + \sum_{i-1}^{n} \beta_5 \Delta INR_{i-1} + \alpha_1 LMP_{i-1} + \alpha_2 AG_{i-1} + \alpha_3 EXR_{i-1} + \alpha_3 INFR_{i-1} + \alpha_4 INR_{i-1} \qquad (6)$$

Where: n is optimal lag length, Δ is the Difference operator, β_0 represents the Constant Parameter, β_1 - β_5 denote the coefficient of the first difference lagged value of long run dynamic and β_1-$\beta_4$is the coefficient of the short run dynamic of the parameter.

3.4.4 Diagnostic Test

There are some basics assumptions that have to be fulfilled for any analysis to be applicable. When the analysis did not correspond to these basic statements, the forecast and inference possibly will turn out to be spurious and bias which may result to increase in type I and type II error. Thus, it becomes imperative to conduct diagnostic tests to confirm the breakdown of the regression model in an attempt to correct the breakdown. This diagnostic test includes normality of the residuals and Heteroskedesticity test.

4. Results and Discussions

4.4.1 Multicollinearity Test (Correlation Test)

Table 1: Multicollinearity Test

Variables	LMG	LAGO	EXR	INFR	INR
MP	1	-0.1607	0.6632	-0.9133	0.3258
AG	-0.1607	1	-0.1607	-0.1607	-0.1607
EXR	0.6632	0.6632	1	0.6632	0.6632
INFR	-0.9133	-0.9133	-0.9133	1	-0.9133
INR	0.3258	0.3258	0.3258	0.3258	1

Source: Author's Computation, *Eviews 10*

Table 1 revealed that there is no excessive correlation among the parameters. The correlation between automotive oil gas (AG) and manufacturing performance (MP) is -0.1607. This shows that there is inverse connection amid automotive oil gas and manufacturing performance but the value of the coefficient is very low, as the coefficient value indicated weak correlation between automotive oil gas and manufacturing performance.

The coefficient value of other variables such as exchange rate, inflation rate and interest rate are 0.6632, -0.9133, and 0.3258. The result shows that there is positive correlation between exchange rate, interest rate and manufacturing performance. Other results also revealed negative and very low correlation between inflation rate and manufacturing performance. The empirical result from the Pearson correlation revealed that there is no presence of Multicollinearity among the estimated parameters. This is because the Multivariate coefficient values of automotive oil gas, exchange rate, inflation rate and interest rate are less than 0.7.

4.4.2 Unit Root Test

Table 2: Unit root Result

Augmented Dickey Fuller Test (ADF)										
.	Level					First Diff.				
Var.	Inter.	P-val.	Trend	P-val.	Ord	Inter.	P-val.	Trend	P-val.	Ord.
LMP	-3.6974	0.008	-6.2561***	0.000	I(0)	-6.2605***	0.000	-7.2014***	0.000	I(1)
LAG	-1.5446	0.501	-1.5545	0.793	I(0)	-5.0726***	0.000	-4.9985***	0.001	I(1)
EXR	-3.7461***	0.007	-3.0738	0.126	I(0)	-4.2938***	0.001	-4.8622***	0.002	I(1)
INFR	-4.0069***	0.003	-3.7303**	0.032	I(0)	-3.2625**	0.024	-3.4558*	0.059	I(1)
INR	-1.4845	0.531	-2.7045	0.240	I(0)	-	0.000	-5.8382888	0.000	I(1)

						5.7166***				
Significant at 1% (***), 5% (***), 10(*), Source: Eviews 10										

Source: Author's Computation, Eviews 10

Table 3: Philips Peron Test Result

Philip Peron Test (PP)										
. Var.	Level Inter.	P-val.	Trend	P-val.	Ord	First Diff. Inter.	P-val.	Trend	P-val.	Ord.
LMP	-2.8130*	0.065	-2.7825	0.212	I(0)	-4.0487***	0.003	-3.9933**	0.017	I(1)
LAG	-1.6413	0.453	-1.7316	0.718	I(0)	-5.0726***	0.000	-4.9985***	0.001	I(1)
EXR	-4.2806***	0.002	-8.1011***	0.000	I(0)	-4.3198***	0.001	-4.7818***	0.002	I(1)
INFR	-4.8506***	0.000	-4.5417**	0.004	I(0)	-2.9876**	0.045	-3.2283*	0.094	I(1)
INR	-1.6159	0.465	-2.6444	0.264	I(0)	-5.6935***	0.000	-5.8624	0.000	I(1)
Significant at 1% (***), 5% (***), 10(*), Source: Eviews 10										

Source: Author's Computation, Eviews 10

*T*able 2 and Table 3 revealed that some of the variables are stationary at a level and some are stationary after first difference which is in conformity with the autoregressive distributed lag model (ARDL) requirement. The coefficient value and p-value of all the variables were said to be negative and statistically significant at most 5% level. Therefore, the null hypothesis that there is no stationarity among the variables is rejected and accepts the alternative hypothesis that there is stationarity among the variables.

4.4.2 Cointegration Bound Test (ARDL)

Having determined the stationary of the time series variables, the next thing is to check for presence of co-integration amongst the variables. The essence of the co-integration bound test is to ascertain whether there is long run connection between the variables.

Table 4: Co-integration Tests (Bound Test Result)

Test Stat.	Value	Sign. Level	Upper Bound	Lower Bound
F-Statistics	25.1	1%	4.4	3.3
K	4	5%	3.5	2.6
		10%	3.1	2.2
Significant at 1% (***), 5% (***), 10(*), Source: Eviews 10				

Source: Author's Computation, Eviews 10

Table 4 illustrates the present of co-integration among time series variable. This is for the reason that the F-statistic of 25.1 exceed the critical value of the upper bound I (1) of 4.4, 3.5, 3.1 at 1%, 5%, 10% and the lower bound I (0) of 3.3, 2.6, 2.2 at both 1%, 5%, 10% level of significance. Thus, the null hypothesis that there is no co-integration is rejected and accepts the alternative hypothesis that there is co-integration among the variables at most 5% level of significance. The implication is that exchange rate, interest rate, inflation rate and export, all have equilibrium condition that keep them together in the long run.

4.2.4 Long run and short run ARDL Estimation Test

Table 5: ARDL Estimation Test

LONG RUN ARDL				
Variables	Coefficient	Std. Error	t-Statistic	P-value
AG	0.2605	0.0839	9.9952	0.0004
EXR	-0.0048	0.0012	-4.0781	0.0008
INFR	0.0106	0.0019	5.4556	0.0001
INR	-0.0458	0.0089	-5.1474	0.0001
SHORT RUN ARDL				
Variables	Coefficient	Std. Error	t-Statistic	P-value
ΔAG	-0.0901	0.0504	-1.7893	0.009
ΔEXR	-0.0037	0.0007	-5.0258	0.0001
ΔINFR	-0. 0106	0.0019	-5.4556	0.0000
ΔINR	-0.0360	0.0071	-5.0941	0.0001
ECM	-0.6261	0.0441	-14.1997	0.0000
RESULT OF THE OVERAL MODEL				
R^2		0.98		
Adjusted R^2		0.95		
Dubin Watson St.		2.9732		
F-Statistics		45.3833		
F-Statistics		0.0000		
Significant at 1% (***), 5% (**), 10% (8), Source: Eviews 10				
Diagnostic Test				
Heteroskedesticity Test		0.9986		
Nor. Test		0.3617		

Source: Author's Computation, *Eviews 10*

Table 5 indicated the long run and short run estimation of the effect of automotive oil gas on manufacturing performance in Nigeria. Results confirm positive and statistically long run association connecting automotive oil gas and manufacturing performance in Nigeria. A 1% increase in the price of automotive oil gas will bring about 46% increases in the cost of manufacturing performance. High price of automotive oil gas will make the manufacturing performance to increase the price of their product to enable them stay in the business otherwise the reverse is the case. This is in conformity with the work of Ceylan and Dogan (2010). Thus, the null hypothesis that there is no significant long run relationship linking automotive oil gas and manufacturing performance in Nigeria is rejected and accepts the alternative hypothesis that there is long run significant association between automotive oil gas and manufacturing performance in Nigeria. Result indicated that there exist negative and statistically significant short run relationship between automotive oil gas and manufacturing performance in Nigeria. A 1% increase in the price of automotive oil gas will lead to about 09% decrease in the performance of manufacturing sectors in Nigeria, justifying the theoretical argument that an increase in the price of automotive oil gas affects the performance of the manufacturing performance. This implies that there is inverse relationship between automotive oil gas and manufacturing performance. An increase in the price of automotive oil gas decreases the manufacturing performance. This is due to the fact that most of the manufacturing sector in the country depends largely on automotive oil gas to power there manufacturing plant due to irregular supply of power from the power holding company (electricity) and inadequate energy substitute. This is in conformity with the work of omolade and Ngalawa (2014), Nwonso and Ajibola (2013), Wang and Zhang (2014). Hence, the null hypothesis that there is no short run impact between exchange and export development in Nigeria is rejected and accept the alternative hypothesis that there is short run impact between exchange rate and export performance in Nigeria. Therefore, the study concludes that all the regressor has significant impact on exports performance in Nigeria.

Table 5 shows the result of the Error Correction Model (ECM). The ECM is negative and statistically significant which implies that the model is a good fit. This suggests that automotive oil gas and manufacturing performance converge to long run equilibrium. The ECM result confirms that there is long run association between automotive oil gas and manufacturing performance from the unit root test and the co-integration bound test respectively.

In Table 5 the regressor result produced an R^2 of 98%, this means that 98% of the changes in manufacturing performance are explained by the variables capture in the model while the remaining 2% represents other variable not capture in the model, but accounted for by the error term. This shows a very goodness of fit of the regression.

The adjusted R^2 coefficient determination of 95% means that the model can accommodates more variables conveniently without the R^2 declining beyond 95%. Also, the F-statistics coefficient of 45.3833(0.0000) and is regarded as commendable being positive and statistically significant. This implies that there is statistically significant association between dependent variable and the explanatory variables. The overall F statistics of 0.0000 is rightly sign and statistically significant at 1% level. The Durbin Watson of 2.9732 revealed that there is no evidence of autocorrelation among the variables or chosen data.

Table 5 indicated the result of the diagnostic test. The test was carried out using Heteroskedesticity and Normality test. The primary rationale to test for Heteroskedesticity is to detect violation of assumption of the linear regression, which is one of the suppositions required for linear regression to be valid. The F-statistics value of 0.9973 and the probability value of 0.5058 therefore since, the F-probability value is greater than 0.05, the null hypothesis of no serial correlation is accepted and reject the alternative hypothesis that there is serial correlation is rejected.

4.2.4 Stability Estimation

In order to test for the stability of the estimated parameter CUSUM and CUCUMQ test techniques was employed.

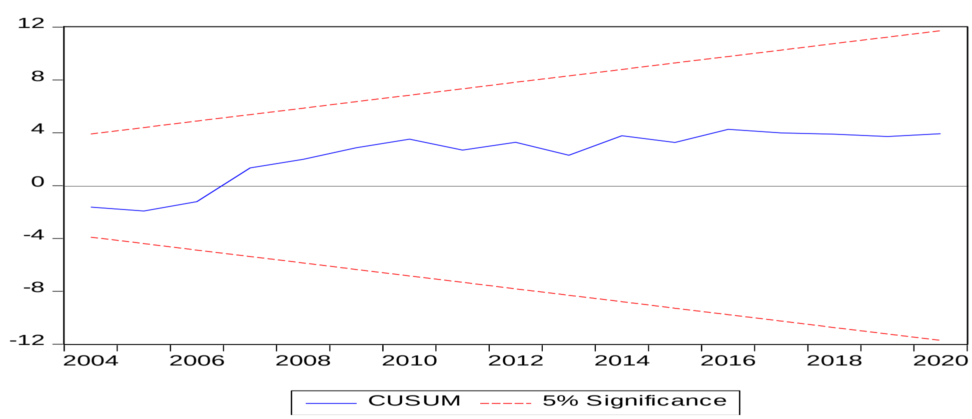

Figure 1: Cusum Result

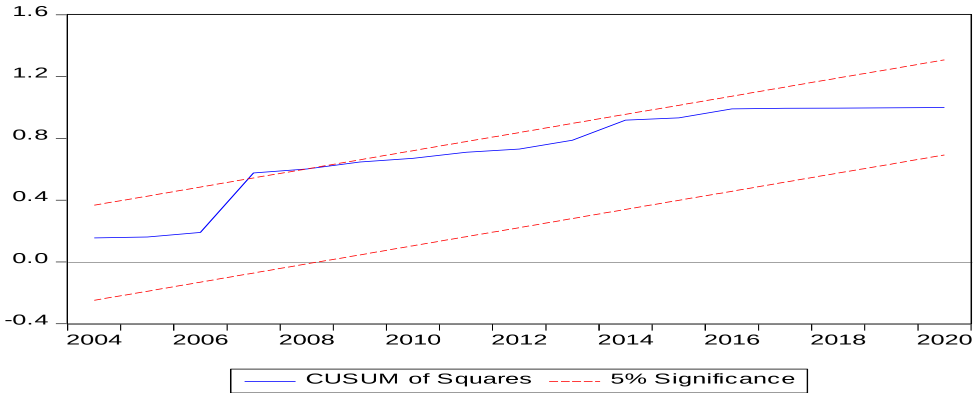

Figure 2: Cusum-Q Result

Fig. 1 and 2 demonstrate result of Cusum and Cusum q test of the parameters. The parameters under study are said to be stable if the sum of recursive errors fall within the two critical lines. Result revealed that parameters under study were stable; this is because the sums of recursive errors fall between the two critical lines.

5. Conclusions and Recommendations

This study examines the long run and short run effects of automotive oil gas on manufacturing performance in Nigeria. The study employed time series regression approach such as ARDL for the estimation of the parameters. Result of the long run estimation shows positive and significant association linking automotive oil gas and manufacturing performance in Nigeria. In the long run the manufacturing sectors respond positively to rise in the price of automotive oil gas through increase in the price of manufacturing output for them to be able to stay in the business or otherwise force to close down. The short run estimation result revealed negative and statistically significant connection involving automotive oil gas and manufacturing performance. This implies that manufacturing sectors in Nigeria respond negatively to change in price of automotive oil gas. The performance manufacturing sectors in Nigeria are prone to negative shock in the price of automotive oil gas; this is because they rely heavily on automotive oil gas for operation due to lack energy substitute. The study recommends that there is need to look for energy substitute beside automotive oil gas such as renewable energy for the effective operation of their manufacturing sector.

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