Does oil price volatility impact on Nigeria's real sector? ARDL Model Approach

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Abstract

Oil price volatility and economic growth relation have been well established in the extant literature without reference to divergent across the countries and sectors. The underlying problem of how the effects of volatility in oil prices vary across economic sectors and how they may have evolved is of particular importance. This paper explores the autoregressive distributed lag model (ARDL) to investigate the influence of oil price volatility on the growth of the real sector in Nigeria. The findings demonstrate that oil price volatility has a positive effect on the selected three real economic sectors (agriculture, manufacturing, and transport) in both the short and long term. Results demonstrate that changes in the real sector are subject to changes in oil prices, and also exert a positive and insignificant effect on the drive of each sector. The paper found that the exchange rate exerts an adverse effect on the manufacturing sector, and a direct effect on the transport sector. Accordingly, the paper offers that the Nigerian government should employ the monetary and fiscal policies policy framework aiming at providing foreign investors with special offers to invest in agriculture; and need to offer interest-free loans and subsidies to the manufacturers, transporters, and farmers.

Keywords: *Realized volatility, base-weighted index, real sector, Nigeria*
JEL Classification: Q43, C43, Q4, E3

INTRODUCTION

A considerable volume of studies have investigated the link between oil prices and economic performance using various econometric methodologies (see Hamilton, 1983; Blanchard & Gali, 2007; Tang, Wu, & Zhang, 2010; Herrera, Lagalo & Wada, 2011; Iwayemi & Fowowe, 2011; Evgenidis, 2018; Artami & Hara, 2018; Lahiani, 2018; Nusair & Olson, 2018; Nusair, 2019; Ahmed, Bhutto, & Kalhoro, 2019; Ogede, George & Adekunle, 2020; among others). The striking inference from the majority of this literature remains that the prices of oil pose a significant impact on the economic performance of both industrialized and emerging nations. Oil, like many other factor input, remains an indispensable source of energy for economic sectors of both developed and developing economies. Remarkably, the recent volatility in the oil price and spillover effects of lockdown initiated to contain the spread of coronavirus pandemic (COVID-19) has precipitated a shocking global crisis for many regions of the world that have been heavily dependent on energy and earnings for their economic survival. It has

sparked fears about how countries that are key players will react and exacerbate volatility and macroeconomic instability caused by an upsurge in global oil prices.

While many of the global players and largest oil-producing countries like the US, Russia, and Saudi Arabia can boast of large financial bolsters during the lockdown measures put in place to contain the spread of COVID-19, but the difference is the case in Nigeria. Nigeria is struggling with how to sustain the economic sectors. The nation is seriously affected by the extreme weakening of government income as a result of the collapse in global oil prices. Over the years, earnings from crude oil have always been the major source of funding for government expenditure and imports of products into the country (Adedokun 2018). Explicitly, the oil sector adds almost ninety per cent and thirty per cent of the total export earnings and gross domestic product respectively. The recent volatilities in the global oil market have constrained the budgetary allocation to various sectors of the economy, which further heighten pressures on aggregate economic output and macroeconomic factors. For instance, a recent stylized fact on the Nigerian oil export and earnings reveals that the initial $57 benchmark in 2020 budget was further reviewed to $30 per barrel while the oil production volume was reduced from 2.18 million barrels to 1.70 million barrels.

However, further exploration of the empirical studies revealed that there is a dearth of studies focusing on the relations between oil price volatility and the economic sector. A few of studies in this regard suggests that there is the underlying problem of how the effects of volatility in oil prices vary across economic sectors (see Guidi, 2009; Shaari, Pei & Rahim, 2013; Taghizadeh-Hesary, Rasolinezhad & Kobayashi, 2015; Aimer, 2016; Yasmeen, Wang, Zameer, et al, 2019; amongst others). Guidi (2009) for instance, contended that positive changes in oil prices exert a direct impact on the manufacturing sector while negative changes in oil prices insignificantly increase production indices. The result further claims the manufacturing sector and services sector is much more impaired whenever there is a plunge in oil prices. Besides, Aimer (2016) argued that there is a long-run nexus between oil prices and various sectors of the economy, such as farming, manufacturing, construction, and transport in Libya from 1968 to 2012. The author resolved that positive oil prices insignificantly influence the manufacturing sector in the aggregate term, but exerts an adverse effect on agriculture and the manufacturing sectors. Recently, Yasmeen et al (2019) studied the short-run and long-run nexus between fluctuations in oil price and growth of the real sector in Pakistan. The study explored four critical economic sectors, ranging from manufacturing, transport, and communications, electricity, and livestock, and the results show that oil prices are hurting the growth of the real sector in the short and long run, with exception of the transport and communication that significantly benefits.

Given the foregoing, oil price volatility would influence not only the aggregate output but also specific sectors and households in divergent ways. The significant decrease in oil prices will prompt real income from consumers to increase, which further increases consumer spending (Yasmeen, et al, 2019). While the energy sector is adversely impacted by the lessening oil prices, oil-intensive firms as well as transport sector will reap as their key input prices collapse. This paper is motivated by the trend of crude oil prices and also due to the dearth of studies focusing on the relations between the volatilities of oil prices

and the real sector. Hence, this paper therefore argues, using the autoregressive distributed lag model (ARDL), whether the volatility in oil prices impacts the growth of the real sector in Nigeria. The real sector of Nigeria has over the years transformed into an emerging industrial mainstay, perhaps being the engine of the country's economic transformation. This sector comprises agriculture, manufacturing, and transport and communication sectors (Central Bank of Nigeria, 2013). Secondly, it focuses on how the growth of agriculture, manufacturing, and the transport sectors react to the volatilities of oil prices noting the efforts of the Nigerian government in revitalizing the economy for productivity and export-driven. This paper contributes to the body of knowledge by examining whether volatility in the oil prices drives the changes in Nigerian real sectors. The paper is specified as thus: Section 2 focuses on methodological concerns while section 3 focuses on results and discussion. Section 4 closes and offers policy inferences.

METHOD

The basic objective of this paper is to unravel whether the volatilities in the oil price volatility impacts on Nigeria's real sector growth. The paper adopted a multifactor classical typical linear regression model of Yasmeen, et al (2019). In divergent to the authors, this paper introduced the realized volatility measure against the real oil price index explored by Yasmeen, et al (2019). Thus, the employ Autoregressive distributed lag (ARDL) model for the three selected members of the real sector in Nigeria, namely agricultural, manufacturing, and transport sectors following ECMs are stated thus:

Agriculture Sector

$$\Delta agr_t = \alpha_0 + \sum_{i=1}^{n} \beta_{1i} \Delta fdi_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta rv_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta fpi_{t-i} + \delta_1 fdi_{t-i} + \delta_2 rv_{t-i} + \delta_3 fpi_{t-i} + u_t \qquad (1)$$

Manufacturing Sector

$$\Delta man_t = a_0 + \sum_{i=1}^{n} \beta_{1i} \Delta rv_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta cpi_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta reer_{t-i} + \beta_4 rv_{t-i} + \beta_5 cpi_{t-i} + \beta_6 reer_{t-i} + u_t \qquad (2)$$

Transport Sector

$$\Delta Trp_t = a_0 + \sum_{i=1}^{n} \beta_{1i} \Delta rv_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta fpi_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta reer_{t-i} + \beta_4 rv_{t-i} + \beta_5 fpi_{t-i} + \beta_6 reer_{t-i} + u_t \qquad (3)$$

Arising from the above model for agriculture, manufacturing and transport sectors α_0 stands in for constant while $\beta_1 - \beta_4$ represents the error correction dynamics. Likewise, $\delta_1 - \delta_1$ denotes the relation among variables. Subsequent equations (2) to (3) can be elucidated in the same method. While the short-run models are structured as thus:

$$\Delta agr_t = \alpha_0 + \sum_{i=1}^{n} \beta_{1i} \Delta fdi_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta rv_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta fpi_{t-i} + \eta_1 ECT_{t-i} + u_t \qquad (4)$$

$$\Delta man_t = a_0 + \sum_{i=1}^{n} \beta_{1i} \Delta rv_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta cpi_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta reer_{t-i} + \eta_1 ECT_{t-i} + u_t \qquad (5)$$

$$\Delta Trp_t = a_0 + \sum_{i=1}^{n} \beta_{1i} \Delta rv_{t-i} + \sum_{i=1}^{n} \beta_{2i} \Delta fpi_{t-i} + \sum_{i=1}^{n} \beta_{3i} \Delta reer_{t-i} + \eta_1 ECT_{t-i} + u_t \tag{6}$$

ECT represents the error correction term. This explains the extent at which the specific model would reach its equilibrium path in the long-run. While, η_1 represented the coefficient of error correction term. The paper further explored the CUSUM to confirm the stability of the variables in the short-run and long-run for agricultural, manufacturing and transport sector models stated above. The statistics from the three subsectors were transformed to derive a base-weighted index.

The calculated base-weighted indexes for agriculture, manufacturing, and the transport sectors were used as the dependent variables. The real growth of each of the three selected sectors was transformed to gauge a base-weighted index. The base-weighted index was derived at a constant factor cost of the year 1981 by exploring the Laspeyer's formula given as thus:

$$Base\ weighted\ index = \frac{X_n}{X_0} * 100 \tag{8}$$

Where X_n represents the real growth of a sector in a year (n) while X_0 depicts the real growth of a sector in the base year. Likewise, the paper explored the use of realized volatility (RV) model presented by Andersen & Bollerslev (1998) to measure the volatility of oil prices in divergence to the vast number of studies on the subject. This indicator is measured by the number of intra-year returns for more accurate measurements of annual volatility. The advantage of the RV over other volatility measures lies in its ability to report an unbiased and highly efficient estimator of the volatility of returns (Rafiq & Salim, 2014). Following Andersen & Bollerslev (1998), the yearly RV equation is specified as the sum of squared intra-year returns which is thus given as:

$$OPV_t = RV_t^2 = \sqrt{\sum_{t=1}^{D}(logP_{tj} - logP_{tj-1})^2} \tag{7}$$

where P_{tj} is the observed yearly price of the oil at global oil; t and j are the intermediate intra-year time intervals. Other explanatory variables explored in the study included food production index, real exchange rate, consumer price index, and foreign direct investment. The data were sourced from the World Development Indicator, Nigeria Bureau of Statistics (NBS), OPEC Statistical Bulletin (various issues), and Central Bank of Nigeria Statistical Bulletin (various issues).

Table 1: Description and measurement of variables

Abbreviation	Variable	Description	Source
AGR	Agriculture sector	Base-weighted index of the agriculture sector	CBN Statistical Bulletins
MAN	Manufacturing sector	Base-weighted index of the manufacturing	CBN Statistical Bulletins

		sector	
		Base-weighted	
TRP	Transport sector	index of the transport sector	CBN Statistical Bulletins
CPI	Consumer Price Index	Consumer price index (2010 = 100)	World Development Indicator (WDI)
FDI	Foreign direct investment	Foreign direct investment (Net)	World Development Indicator
FPI	Food production index	Food production index (2004-2006 = 100)	World Development Indicator (WDI)

Source : Authors

Due to the cutting-edge advantages, it was necessary to use the ARDL technique piloted by Pesaran, Shin & Smith (2001) to gauge the influence of oil price volatility on real sector growth. First, the methodology is more suitable when compare with other techniques and if the variables are strictly stationary at the level I(0) or the first difference I(1) or a mixture of both I(0) and I(1) applies. Given the aforementioned advantages of the ARDL methodology, this paper employs the use of ADF (Dickey and Fuller, 1979) and PP (Phillips and Perron, 1988) unit root test to ensure that all the variables are stationary at I(0), I(1) or mix. These two steps approaches were adopted to fulfill the basic requirement for employing the method. Above all, the existence of a long-term nexus must be investigated using an F-statistic. Hence, following Pesaran et al. (2001), the ARDL model provides statistics for critical values for the bounds. The lower and upper bound coefficients are extracted as I(0) and I(1) respectively. The rule is that the calculated F-statistic value must be higher than the upper bound to affirm that co-integration exists among the variables and if otherwise, compel the rejection of the null hypothesis.

RESULTS AND DISCUSSION

This segment includes an in-depth estimation and analysis of the descriptive statistical results, stationary test, and analysis of results. The outcomes of the descriptive statistics are stated in Table 2 offers crucial evidence regarding the series like the mean, median, minimum and maximum values; and the also the sample gauged by the skewness, kurtosis, and Jaque-Bera statistics. Table 2 demonstrates that the mean and median of all the series in the data set lie within the minimum and maximum values suggesting the high tendency of the normal distribution. Similarly, all sample series were found to be positively skewed series except food production index which returns to be negatively skewed.

Table 2: Descriptive Statistics

	AGR	FPI	MAN	REER	RV	TRP	FDI	CPI
Mean	6.390861	75.75500	1229.190	152.9802	1.213976	923.8503	2.60E+09	46.50561

Median	5.804118	79.06500	216.0674	100.2489	0.998586	166.7477	1.27E+09	26.82232
Maximum	9.537160	125.7700	6067.671	541.4624	3.988784	4193.089	8.84E+09	183.8531
Minimum	4.345869	29.97000	70.78586	50.16822	0.023566	51.38779	1.89E+08	0.489360
Std. Dev.	1.783707	29.95589	1716.039	124.1442	1.021213	1163.986	2.71E+09	52.57034
Skewness	0.486840	-0.046121	1.458961	1.745343	1.265007	1.141582	1.029767	1.079944
Kurtosis	1.688723	1.818421	4.033694	5.139244	4.050752	3.102601	2.710230	3.063868

Source: Author computation using E-views 10

The results of the ADF and PP assessments are shown in Table 3. The results show those entire variables assessed are stationary at I(0), I(1). Reports confirming the pre-condition of the ARDL methodology that entire variables need to be stationary or mixed with I(0), I(1).

Table 3: Unit Test Roots

Descriptor	Augmented Dickey-Fuller (ADF) Test			Phillips-Perron (PP) Test		
	T-stat	Prob.	Order	T-stat	Prob.	Order
AGR	-3.2904	0.0228	I(1)	-3.2904	0.0228	I(1)
MAN	-4.0896	0.0038	I(0)	-6.8351	0.0000	I(0)
TRP	-8.1848	0.0000	I(0)	-4.9666	0.0002	I(0)
REER	-4.1704	0.0024	I(1)	-4.1185	0.0028	I(1)
RV	-5.8096	0.0000	I(0)	-6.2634	0.0000	I(0)
FPI	-4.546769	0.0010	I(1)	-10.37384	0.0000	I(1)

Source: Author computation using E-views 10

The goal of this paper is to investigate whether volatilities in oil prices would impact the real sector growth in Nigeria using an ARDL model. The F-test was explored to determine the long-run level nexus between the variables. Table 4 presents the results of the ARDL bounds test of the three selected real sectors of the economy namely, agriculture, manufacturing, and transport. The ARDL bounds test reveals that the F-statistic is greater than the upper bound of critical value when the base-weighted agricultural sector's index was explored as the dependent variable. The calculated F-statistic is equal to 4.4444, higher than the upper bound critical value (4.35) at the 95% significance level. This result compelled the rejection of the null hypothesis and acceptance of alternative hypothesis (H1) which confirms the presence of the long-run nexus. The diagnostic test and estimated coefficients are provided in the ensuing discussion. In Nigeria, the relevance of oil as a major contributor to the GDP over the years has constrained agriculture to relegation by the government. The agricultural sector provides makeup activities which include livestock, forestry, fishing, and crop production. Amidst the reduction in the global oil consumption initiated as a result of the COVID-19 pandemic, the global oil prices have stemmed up dramatically, resulting in a decline in revenue of the major oil-exporting countries and thus leading to contraction of economic activities across the world. The shock experienced as a result of the plunge in oil price severely impacted the Nigerian economy and the government now looks inward to diversify towards agriculture.

Table 4: ARDL Bounds Test

Sector (F-statistic)	Critical Value	I (0) Bound	I (1) Bound
Agriculture (4.4444)	10%	2.72	3.77
Manufacturing (12.6364)	5%	3.23	4.35
Transport (7.69815)	1%	4.29	5.61

Source: Author computation using E-views 10

Given the above experience, the paper investigated whether oil price volatility drives the growth of the agriculture sector of Nigeria. The paper explored the base-weighted index of the agriculture sector as the dependent variable while realized oil volatility (RV), foreign direct investment (FDI), and food production index (FPI) as explanatory variables. The detailed results are presented in Table 5. The analysis shows that oil price volatility (RV) has a direct impact on the agricultural sector's index. The coefficient is significant at the 5 % and 10% level for the short run and long run respectively. The results indicate that a 1% increase in agricultural growth is associated with a 3% and 5% increase in volatilities of oil prices. Besides, the findings also indicate that both foreign direct investment (FDI) and food production index (FPI) have a positive effect on the long-term and short-term growth of the agricultural sector. The results are insignificant at the 5 % level of significance. However, the direct nexus between agricultural growth and food production index suggests agriculture growth translates into food production. Any changes in the food production compel by changes in agricultural growth may lead to higher prices and volatility in food markets. Perhaps, the contributory effects of agriculture can improve the employment capacity in rural areas and also enhance the rural income, which further boosts access to food. Moreover, by exporting surplus agricultural products and services, it could provide an opportunity to earn more foreign exchange and thus ensure a better rural livelihood. Furthermore, FDI has an insignificant direct effect on the growth of agriculture. This implies that there is a direct relationship between foreign investment and agriculture in Nigeria. Additionally, FDI has an insignificant direct effect on agricultural growth. This means that the foreign investment and agriculture in Nigeria are directly linked. The ECM term included in the equation is statistically significant at the 1% significance level.

Table 5: Results of oil price-agriculture sector nexus using the ARDL equation model (1).

| Variables	Long Run Coefficients		Short Run Coefficients	
	Coefficient	Prob.	Coefficient	Prob.
RV	0.0528	0.0773	0.030508	0.0481
FDI	0.00003	0.8711	0.00002	0.8711
FPI	0.0022	0.1019	0.001286	0.1225
ECT_{t-i}			-0.577626	0.0008

Dependent Variable: D(AGR)
Source: Author computation using E-views 10

Figures 1 and 2 present the plot of the CUSUM and CUSUM of squares statistics for Equation (1). The plot of CUSUM and CUSUM of squares statistics are within the critical 5% bounds, confirming the existence of the long-run relationships among variables and also affirming the stability of coefficients.
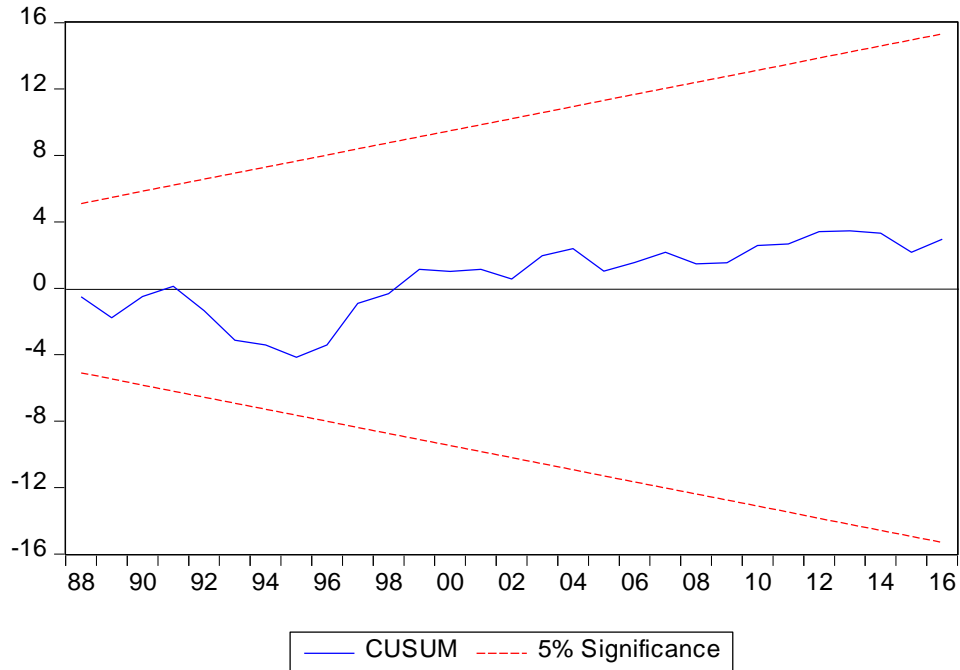
Figures 1: CUSUM
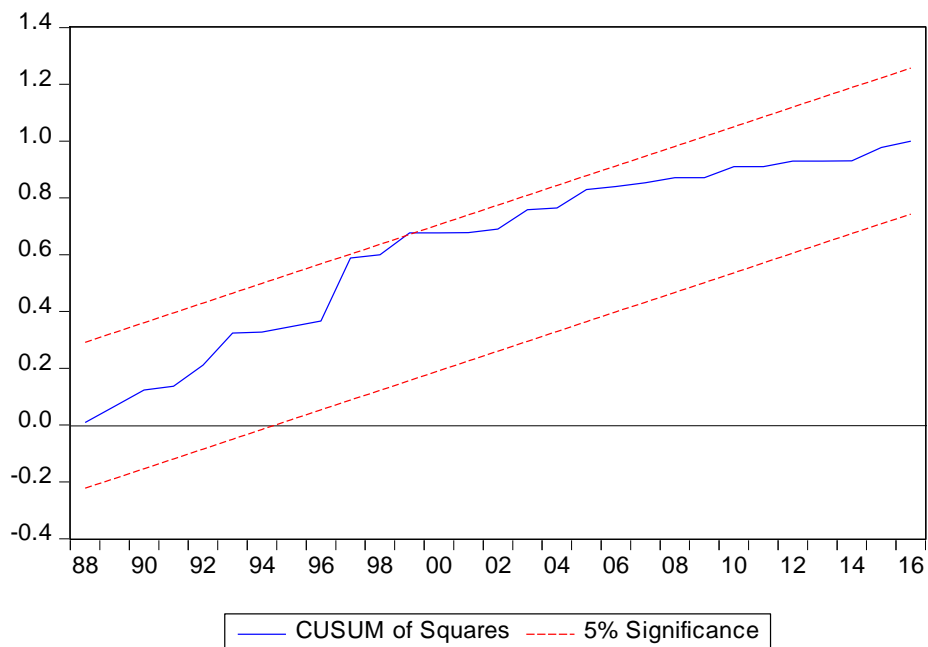
Figures 2: CUSUM of squares

However, the experience from developed and emerging Asian economies indicates that there is a direct relationship between the manufacturing sector and

regional growth (Simbo, Iwuji & Bagshaw, 2012). Hence, the development of the manufacturing sector is a vital tool for development in Nigeria. Following the same methodology elucidated above, the paper presents the results of the estimation of the impact of oil price volatility on the manufacturing sector in Nigeria. The F-bound test is reported in Table 4. The test explored the base-weighted manufacturing sector growth as the dependent variable while RV, CPI, and REER were adopted as explanatory variables. Table 4 provides that the calculated F-statistics (12.636) from bound testing is greater than the upper bounds at a 5 per cent significance level. Thus, signifying rejection of the null hypothesis and affirm the presence of the long-run relationship. The results of the oil price-manufacturing sector nexus using the ARDL equation model (2) are presented in Table 6. The results indicate that oil price volatility (RV) exerts a direct effect on the manufacturing sector index. The findings in tandem with the studies of Jiranyakul (2006), Gummi, Adamu & Asiya (2018), and opposes the findings of Papapetrou (2009) and Aye, Dadam, Gupta & Mamba (2014). The above findings reflect that the manufacturing sector is inelastic nature and is consistent with the view that an intensifying price of factor inputs will compel a further surge of the output price as well as the firm profits. Profits remain a crucial determining influence for the firms to remain in business even at a difficult time and increasing the production cost.

Table 6: Results of oil price-manufacturing sector nexus using ARDL equation model (2)

| Variables	Long Run Coefficients		Short Run Coefficients	
	Coefficient	Prob.	Coefficient	Prob.
D(RV)	9.2097	0.8060	11.74056	0.8073
D(REER)	-1.0607	0.1907	-1.352221	0.2177
D(CPI)	17.9135	0.0154	22.83628	0.0232
ECT_{t-i}			-1.274805	0.0000

Dependent Variable: *LNMAN*
Source: Author computation using E-views 10

Also, REER exerts a negative and insignificant effect on the manufacturing sector index in Nigeria. This suggests that fluctuations in the exchange rate would impact the manufacturing sector development in both the short-run and long-run. The coefficients of the real exchange rate assume values of -1.352221 and -1.0607 for the short-run and long-run respectively. This suggests that, on average, a unit change in the exchange rate will decrease the manufacturing sector by 13.5% and 10.6%, holding all other variables constant. The variable REER is negatively related to MAN, and this does not conform to a priori expectation. The finding is in tandem with Opaluwa, Umeh, & Ameh (2010); Dhasmana (2013); and Ikpefan, Isibor & Okafor (2016). However, in Nigeria, this finding could be linked to the fact that fundamentally infrastructure required to enhance the manufacturing sector's activities are scarce and neglected. Additionally, another predictor of Nigeria's negative nexus emerges from Nigerian stagnant mindset. Currently, individual citizens who obtain loans do not

use loans to improve industrial sector activity, but instead to divert such funds to non-manufacturing ventures or perhaps to exploit them to support consumer spending, thus suppressing the intention in which the loans were authorized and therefore establishing an adverse connection between private sector credit and manufacturing in Nigeria The government will explore the advantage of growing the inflation and exchange rate by encouraging strategies towards export promotion in the country. The government should intervene and ensure all the moribund technological plants are restored to meet the needs of the local needs. CPI exerts a positive and significant effect on the manufacturing sector index in Nigeria. The coefficients of a consumer price index (CPI) assume values of 17.9 and 22.8 for the short-run and long-run respectively. The finding demonstrates that inflation has a positive impact on the manufacturing sector growth in Nigeria. This result suggests that intensifying inflation will induce a further rise in the manufacturing growth, and the firms would have to deploy means of averting the effect to remain in the business and enjoy the profit. Figures 3 and 4 plot the CUSUM and CUSUM of squares statistics for Equation (2). The findings suggest that the plot of CUSUM and CUSUM of squares statistics are within the critical 5% bounds, which affirms the presence of the long-run relationship among variables and confirm the stability of coefficient.
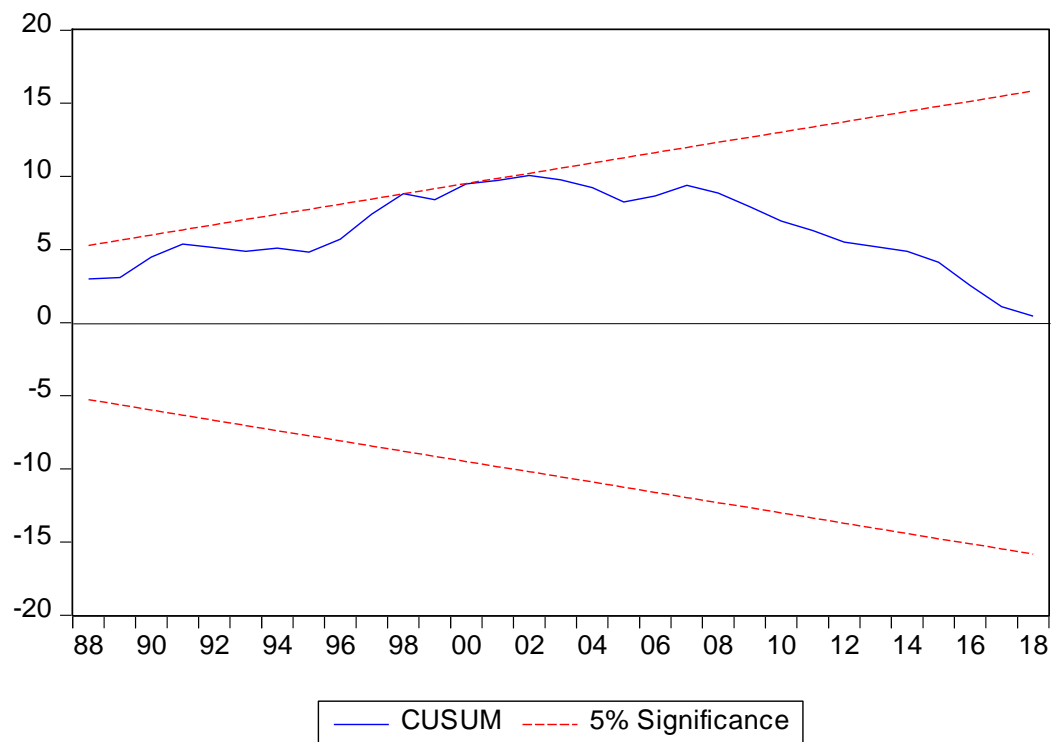
Figures 3: CUSUM
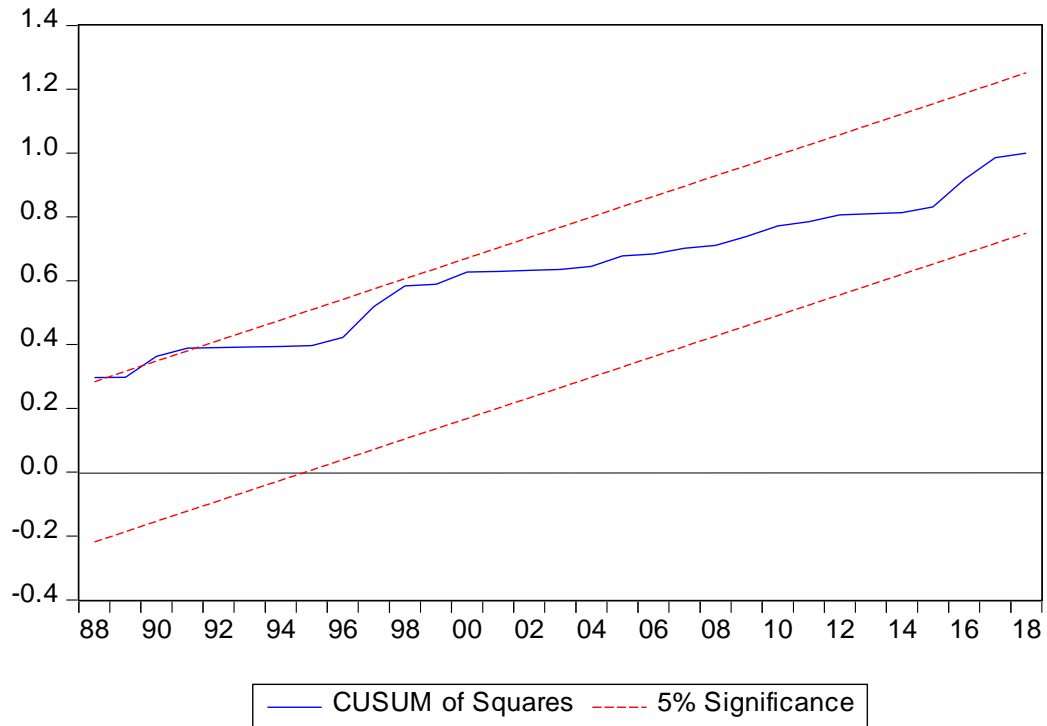
Figures 4: CUSUM of squares

However, the review of the extant literature shows that there is a dearth of studies focusing on the impact of oil price volatilities on the transport sector. Hence, this paper aimed at addressing the lacuna through the developed ARDL model equation (3). Following the previous discussion of results, the base-weighted index of the transport sector was explored as the dependent variable while realized oil volatility (RV), food production index (FPI), and real exchange rate (REER) were used as explanatory variables. Table 4 provides that the calculated F-statistics (7.698152) from bound testing is greater than the upper bounds at a 5 per cent significance level. Thus, signifying rejection of the null hypothesis and affirm the presence of the long-run relationship. Table 7 presents the estimation results of the oil price volatility and the transport sector using the ARDL model equation (3).

Table 7: Results of oil price-transport sector nexus using ARDL equation model (3)

| Variables	Long Run Coefficients		Short Run Coefficients	
	Coefficient	Prob.	Coefficient	Prob.
D(RV)	23.0698	0.7179	9.867967	0.7145
D(REER)	1.0197	0.1910	0.436169	0.1416
D(FPI)	-5.66467	0.5257	-2.423043	0.5160
ECT_{t-i}			-0.427745	0.0001

Dependent Variable: TRP
Source: Author computation using E-views 10

The results show that the uncertainty of oil price (RV) has a direct and insignificant effect on output in the transport sector. Not only does the transport sector have a direct effect as a result of the continued volatility of oil prices, but the expected increase in demand will also have an effect on both the overall economy and foreign trade. FDI has a direct and insignificant influence on the expansion of the transport sector. REER hurts the transport sector growth. While the link between the food production index and transport sector growth is negative. Surprisingly, when the base-weighted index of the transport sector was adopted as a dependent variable, the REER exerts a positive and statistically insignificant impact on the transport sector index in Nigeria. This suggests that fluctuations in the exchange rate would negatively impact the transport sector development in both the short-run and long-run. The variable REER is positively related to TRP conforms to an a priori expectation. The finding opposes the studies of Opaluwa, et al (2010); and Ikpefan, et al (2016). Besides, figures 5 and 6 present the CUSUM and CUSUM of squares statistics for Equation (3). Figure 5 suggests that the plot of CUSUM stays within the critical 5% bounds which affirm the long-run nexus among variables and thus shows the stability of coefficient. Nevertheless, CUSUMSQ figures surpass the 5 per cent critical parameter stability limits, thus defining the coefficient instability.
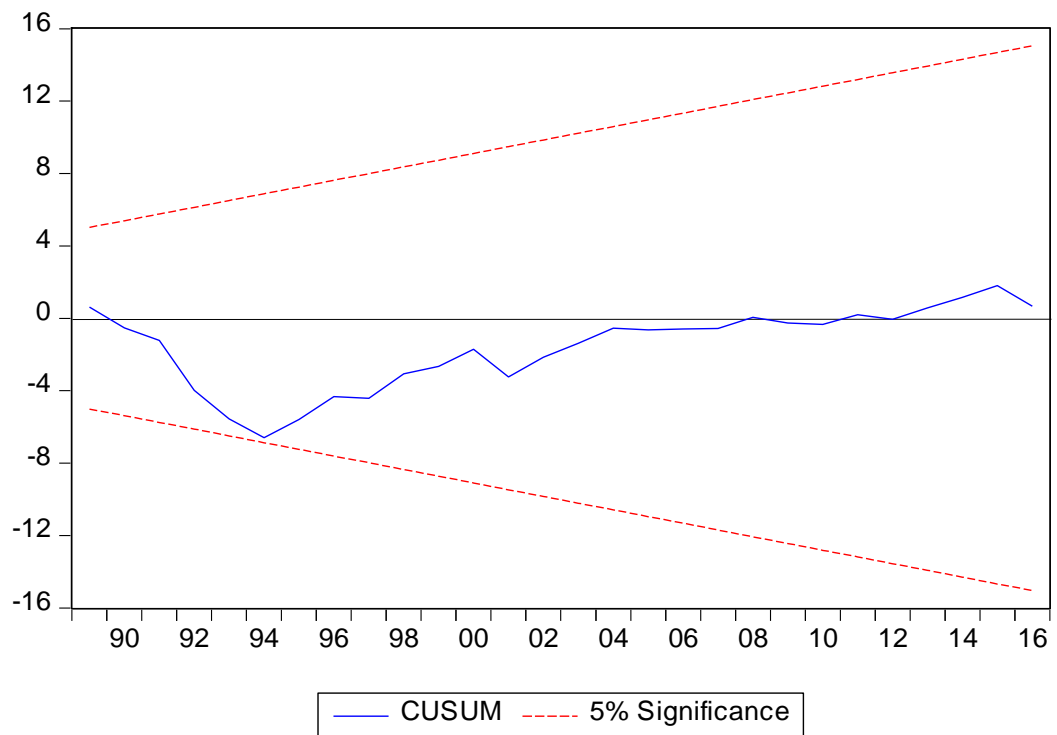
Figures 5: CUSUM
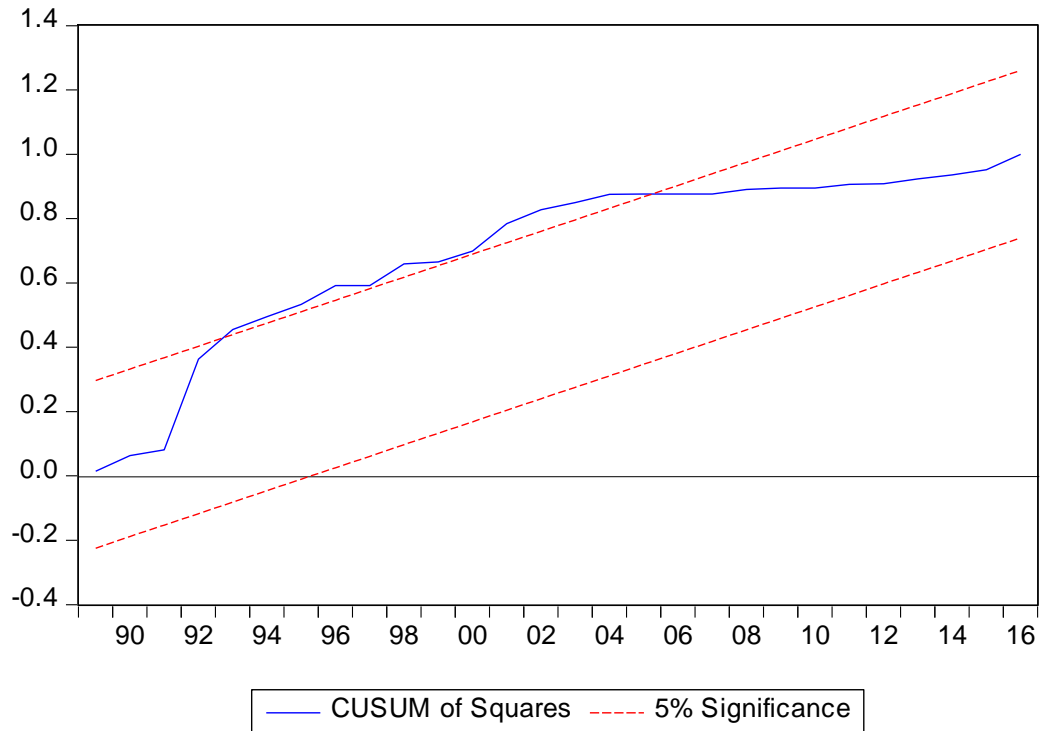
Figures 6: CUSUM of squares

CONCLUSION

This paper explored the relationship between oil price volatility and real sector growth in Nigeria. In relation to existing research on the impact of oil price volatility on economic effects, this paper analyzed the impact of oil price volatility on real sector growth in Nigeria using the Autoregressive Distributive Lag model. The model was examined to determine the long-term and short-term impact of oil price volatility and real sector growth in Nigeria. Results have shown that oil price volatility has positively affected the three selected economic sectors (agricultural, manufacturing, and transport) over the long and short term. Oil price volatility has an impact on Nigeria's real sector from the supply and demand sides, as positive changes in oil prices contribute to higher cost of production and lower consumption. However, it concluded that the growth of the selected sectors reveals that all three sectors, namely the growth of the agricultural, manufacturing, and transport sectors, are exposed to changes in oil prices and that shifts in oil prices have a positive, insignificant effect on the drive of each sector. Besides, the real exchange rate exerts a negative and positive impact on the growth of the manufacturing and transport sectors. It is also noted that an increase in oil prices would lead to inflationary burdens and, perhaps, household consumption spending tends to suffer. The results cited above give rise to some important policy inferences. The positive effect of oil prices shows that all the selected sectors are vulnerable to oil price volatility. The supply-side effect is witnessed when there are positive oil prices, resulting in an increase in the prices of alternative energy sources as a result of increased demand. Given that the main source of electricity generation in Nigeria is gas, which accounts for around 86 percent of the energy produced. Volatilities in oil prices would lead to a further increase in energy tariffs, which businesses and households will inevitably

bear. Also, the result shows that manufacturing is exposed to competition both on the global and domestic markets. Given the mixed results regarding the REER on the selected real sector growth indexes, the paper offers some policy thrust. The stakeholders and policymakers should explore the advantage of growing the inflation and exchange rate by encouraging strategies towards export promotion in the country. The government should intervene and ensure all the moribund technological plants are restored to meet the needs of the local needs. Accordingly, the paper offers that the Nigerian government should employ the monetary and fiscal policies policy framework aiming at providing foreign investors with special offers to invest in agriculture; and need to offer interest-free loans and subsidies to the manufacturers, transporters, and farmers.

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