Oil Price Undulation, Trade Openess and Industrial Output; An Evidence from Nigeria

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Abstract: This study examined the impact of oil price undulation and trade openness on industrial output in Nigeria. The study adopted descriptive statistics, unit root test, correlation matrix, ARDL estimation and Co-integration test. The probability values of the Jarque-Bera test for all the variables are high, except for exchange rate for oil price volatility which is 1.990957, which implies the acceptance of normal distribution of the variables. The unit root test shows that, realGDP is the only variable integrated of order zero while all other variables are integrated of order one. The correlation matrix result showed that, most of the values are very low and the correlation between exchange rate and industrial output is very high with 0.95. The coefficient of trade openness(TOPEN) shows that, it has a non-significant positive effect on industrial output in the short-run, indicating a 1percent increase in trade openness will reduce by 0.373394. hence, the volatility of oil price has affected industrial output more negatively, though trade openness has been of great help with the recent increase in foreign direct investment over time, yet, it has not transformed to the desired growth in the industrial sector, as evidence from the result and Nigeria economy. So the study recommends that, all the problems confronting the nation's industrial sector should be tackle headlong.

Keywords: Oil price fluctuation, Industrial Output, Trade Openness, gross domestic output

Introduction

The two pioneer theories of trade (Absolute and Comparative) gave us an insight into the importance of trade to economic growth, they believed a country tends to achieve more when it's trading within and without increases considerably because of division of labour (Ohwufasa & Ekawwe,2023). Trade and trade openness has helped industrial growth through the increase in the flow of technological advancement, healthy competition among trading partners, economics of scale, capital accumulation, capacity utilization and efficient resources allocation (Oloyede, et.al.). As much as trade and stability of

oil prices can boost industrial output, achieving the desired objectives as a nation has been hampered by the problem of inadequate power supply coupled with high energy prices, others are infrastructural deficit, poor transportation system especially in the urban populated areas, government policies (like the tax reforms), ease of doing business unhealthy competition with the high level of corruption in the country. But in all of these, one can still conclude that trade openness and globalization remains a veritable tool for achieving industrial growth an overall development of any nation.

Taghizadeh, et.al (2019) pointed out that crude oil and its derivatives remains one of the most important inputs in industrial development, hence any change in its price often means a lot to the pace of industrial production. The volatility of oil prices often shapes industrial production in the area of planning & budgeting, explorations, mining and production. And in a situation where a country experience stable and low oil prices for better industrial output, trade will also be greatly enhanced. Crude oil has consistently remains the world's most important source of energy over time, with all its derivatives serving as sources of energy from the domestic homes to aviation, manufacturing, transportation and communication sectors, even the Agricultural sector, service and of course the construction sector, hence, the whole world system of production, distribution and communication are built on crude oil and its derivatives. So any distortion to the pricing system often affects a lot of countries, continents and sectors in different magnitude.

Iganiga (2021) described oil price shocks as unexpected and unpredictable change in global oil prices, caused by exogenous factor which may have an impact on endogenously determined variables, the distortion often witness in the pricing is often referred to as oil price fluctuations.An important aspect of oil price fluctuation is the main causes of its undulation, which ranges from the activities of Organization of Petroleum Exporting Countries(OPEC)s and other cartels, who can influence global supply when they limit their level of production of members. Again, the demand and supply of oil globally isinelastic, the global political situation/events can also influence crude oil price like Iraq-Iran war, the Persian Gulf war,Ukrain-Russian war, the most recent one which I the Israeli-Gaza war. Each country pace of growth and development will also affect their rate of demand for crude oil, because strong economic growth and increase manufacturing/production equally boost its demand. Availability of alternatives and the global travels of the people, perceived risk of market disruptions, technology innovations and financial conditions often affects the production rate and cost.

Furthermore, an overview of Nigeria's manufacturing sector reveals that, with a population of over 206 million people provides the largestmarket in Africa and

abundantly endowed with numerous natural resource. The country's manufacturing target since independence includes domestic production of goods, employment generation, accelerated industrialization, preservation of the country' foreign exchange, expanding domestic market and reducing high dependence on importation. The manufacturing outlook in Nigeria has concentrated on light manufacturing with few operating in the heavy segment of the economy. Though, majority of the firms rely on importation of inputs, their general output has been oscillating in nature, because of the undulating crude oil price and forex issues, infrastructural deficit, poor power supply, jut to mention a few(Vanguard, 2022).

The growth of the manufacturing sector fluctuated between 1982 & 1988 to 2015 & 2020 but the sector recorded its highest growth rate of 8.04 percent between 1999 & 2007 and 12.34 percent between 2010 and 2015, this growth rate can be attributed to the implementation of robust industrial policies by the government of the day, like backward integration, NEEDS, ERGP & NIRP coupled with strong and significance incentives, (Vanguard,2022). The increase in the inflow of foreign direct investment due to the advent of the new democracy then also helped the situation.The sector constitutes the largest manufacturing sector in West Africa region with ten sectoral groups and over 76 sub-sectoral groups manufacturing varieties of products. The major challenge of the industrial sector in Nigeria includes but not limited to insecurity, acute shortage of foreign exchange(forex), Inadequate financial support and credit facilities, inconsistency in policy and its implementation enforcement, limited core industries, multiple and high tax rate for industries (Ehi-Uujamkan,2022).

Theoretical Review

Conceptual Issues

While output is the result of an economic activities, that has used inputs to produce a product or services and is made available for sale. Industrial output means the productivity of all industrial establishments in an economy, from manufacturing to utilities, transportation and communication, entertainment and sports, mining and constructions, just to mention a few. Industrial output equally refers to the amount of output that are from the industrial sector, that is the output from all industrial establishments. (The Sun, 2013).On the other side, Iganiga(2021), described oil price shocks as unexpected and unpredictable change in global oil price, caused by exogenous/endogenousfactors which may have an impact on endogenously determined variables, the distortions often witness in the pricing is often referred to as oil price fluctuation.

Economists and Policy Makers often measures oil volatility by the percentage of expected change in the price of an instrument in either direction i.e. increase or decrease.Lastly, a country's trade-to-GDP ratio which often measures the importance of international transactions, relative to domestic transactions which is measured by the simple average(the mean) of total trade (that is the sum of exports & imports) of goods &services relative to GDP is known as "trade openness" [OECD,2011]. It could also mean the space given by a country to international investors to trade with them with ease of access and pliability.

Empirical Review

Abrokwah(2019) studied the impacts of oil price shocks on interest rate, real GDP and real effective exchange rate in Nigeria and the outcome revealed that the impulse response function suggests that positive oil price shocks have no effects on the interest rate(MP), real exchange rate and real GDP and that monetary policy does not respond to oil price shocks in Nigeria. Omolade, Ngalawa & Kutu (2019) studied the impact of crude oil price shocks on the macroeconomic performances of Africa's oil-producing Nations and their findings showed that the reaction of output to sharp increases and declines in oil prices differ and that structural inflation accompanies sharp declines in oil prices more than monetary inflation because outputs and investment decrease significantly.

Manasseh, et.al (2019) studied the effects of oil price fluctuations and oil revenue on well-being in Nigeria and the result showed that oil price fluctuations have no significant effects on well-being, while oil revenue is observed to have a significant and positive effects on well-being though there exists a long run relationship. Alenoghena, & Aghughu, (2020) examines the non-linear relationship between oil price volatility and economic growth in Nigeria, adopting non-linear autoregressive distributed lag (NARDL). And they came out to say that, the relationship between oil price volatility and economic growth is co-integrated in the long run and even with asymmetrical relationship and threshold regression investigation showed that the switching point for the oil price in the relationship with economic growth is US$48.263 per barrel.

Gylych, Jibrim & Isik (2020) found out the short run empirical analysis of the impact of oil price fluctuations on the monetary instruments (inflation, exchange and interest rate) in Nigeria and findings indicated that there is a uni-directional causality of the log of oil price to log of the exchange rate at ten percent level of significance and that oil price is a strong determining factor of exchange rate, cost of borrowing and directly influences inflationary and deflationary tendencies in Nigeria. Ogunsakin

(2020) examined the nexus between output growth and commodity price shocks in SSA countries. The research outcome showed that negative change in the price of export commodities has little positive impact on the monetary policy in SSA but negative price change has negative and significant impact on monetary policy in SSA countries.

Bawa, et.al (2020) investigated the impact of oil price shocks on inflation in Nigeria and the outcome indicated that oil price increase led to upsurge in headline, core and food measures of inflation but a decrease in oil price resulted in a reduction in the marginal cost of production and culminated in moderation of domestic inflation and negative oil price shocks led to higher inflation.Igbosewe, Akan &Agbogun,(2021) investigated the impact of crude oil fluctuations on Nigeria economy for 35 years, the trend analysis appears to cast doubts on whether crude oil fluctuations made significant contributions to the Nigerian economy but in the short run, fluctuation in oil price per barrel improved the Nigerian economy significantly.

Iganiga, Anyanwu, Ikubor, Ojima, (2021) investigated both symmetric and asymmetric impacts of oil price dynamics on the Nigerian industrial sub-sector, findings showed that, oil price stimulates marginally the performances of the buildings and constructions sector plus aggregated industrial output though it lessen the performances of the manufacturing sub-sector. Adi, Adda&Wobilor(2022) studied shock & volatility transmission between oil price and exchange rate markets and findings showed that past shocks and volatility significantly contribute to the current exchange rate issues and WTI oil price markets. And asymmetric shocks impacting exchange rate and WTI oil price while symmetric shock was observed in Brent oil price.

Ayodele (2022) investigated the nexus between oil price volatility and industrial productivity in Nigeria and Egypt and the outcomes shows that oil price volatility hinders industrial productivity in the two countries, though the magnitude of the impact is more in Nigeria than in Egypt because Egypt is an exporter and Nigeria is an importing country.Olayungbo&Umechukwu (2022) examined the impact of oil price shocks on the economies of four selected oil-exporting African Countries. Findings revealed that, the asymmetric effects of oil price shocks on output is significant in Algeria and Egypt but symmetric effects are found in Gabon and Nigeria, with higher and persistent oil price shocks.

Adi, Adda & Wobilor (2022) investigated shocks and volatility transmission between oil price and exchange rate markets and the findings revealed that past own shocks and volatilities significantly contribute to current volatilities in exchange rate and oil price markets. Umeghelu, Ezeniobi, Okoli & Igwemmadu (2022) investigated the impact of crude oil price volatility on industrial output in Nigeria and found out

that crude oil price fluctuations has negative effects on industrial output. Also, with an increase in government oil revenue fluctuations results in a significant decrease in industrial output.

Ayodele (2022) investigated the nexus between oil price volatility and industrial productivity in Nigeria and Egypt and the outcomes shows that oil price volatility hinders industrial productivity in the two countries, though the magnitude of the impact is more in Nigeria than in Egypt because Egypt is an exporter and Nigeria is an importing country.Adigun, Ologunwa and Ayilara (2022) studied the effects of interest rate on manufacturing output in Nigeria with the use of unit root test, ARDL and Bond test. Their result showed that both commercial bank loans and inflation had positive impact on manufacturing sector but interest rate showed otherwise.

Ohwofasa & Ekaruwe (2023) studied the nexus between trade openness economic growth in Nigeria by splitting trade openness into oil and Agriculture earnings exports, manufacturing and mining exports earnings. They adopted the ARDL model and their result showed that, all exports earnings had long run equilibrium relationship with GDP but Agriculture and crude oil exports responds more positively in the short run.In conclusion, the empirical results showed some variations in their result and differences in their results, while to some, oil price fluctuations spells dooms for the economy, some believed in the good side of it.

Theoretical Framework: Dutch Disease Model

The Dutch disease describes the paradox that occurs when good things like the discovery and mining of oil reserves becomes harmful to a country's economy, this is an economic situation that depicts the rapid development of one sector of a country' economy causing a sudden decline in other sectors.The term Dutch disease was coined by the "The Economist" in 1977, specifically to describe Netherlands scenario after the discovery of huge Groningen natural gas field sometimes in 1959. Later in 1982, the classic economic model describing the Dutch disease was advanced by renowned economists, Peter Neary and Max Corden, indicating a non-tradable sector (service sector) and two tradable sectors(the lagging and booming sectors). With special reference to Nigerian economy, the Dutch disease unfold the connection between utilization of natural resource and the reduction in the other sectors of the economy, like the Agricultural, manufacturing and export sectors. The theory asserts that an increase in revenues from natural resources will de-industrialize the nation's through appreciating the real exchange rate and exports on the booming commodity, which in turn makes the tradable sector less competitive.

The drive for industrialization, economic growth and development initiated by the Nigeria government in the 70's and 80's were unprecedented, even with so many foreign Automobiles, tyre and textiles manufacturing firms operating in the country then, but Government across all levels in Nigeria has neglected the Agricultural and industrial sectors, export because of the discovery of oil and it's huge and quick income flows, inducing the sector to be less competitive in the trade market and in view of this, negative impact on the Agricultural, manufacturing, export sector has persisted over time.Despite the country' huge natural resource, there is no tangible economic development, some economists believed that resource waste and corruption in Nigeria are responsible for such low level of development, therefore, instead of the 'Dutch diseases', the most appropriate terms for Nigeria's scenario is 'resource curse'. It was suggested that demographic adaption, boosting of the competitiveness of the adversely affected sectors and slowing the appreciation of the real exchange rate are the three suggested ways of reducing the threat of Dutch disease. Finally, the relevance of this model to the study stern from the fact that the discovery of oil in Nigeria has been both a curse and a blessing and it' aftermath effects on the Agriculture sector, which is supposed to boost trade openness and enhance industrial output.

Model Specification

This study adopts the model used by Mohsen (2015) who model trade openness, capital, oil Price and industrial output in Syria

$$\ln IO = \propto + \beta_1 \ln OPEN + \beta_2 lnGFCFI + \beta 3lnOP + Et \qquad (i)$$

Where; *INDO* means industrial output, TOPEN is trade openness, GFCF is proxy for gross fixed capital formation, OPU is oil price and ϵt symbolizes error term.

The model is hereby modified to suit the purpose of this study and is re-expressed as:

$$INDO = f \ (EXCH, \ TOPEN, OPV) \qquad (ii)$$

where INDO is proxy for industrial output, *EXCH is exchange rate,TOPEN is trade openness and, OPV means oil price.*

The multiple linear regression equation is stated as follows;

$$INDO_t = \beta_0 + \beta_1 EXCH_t + \beta_2 TOPEN_t + \beta_3 OPV_t + \beta_{4real} GDP\varepsilon_t \qquad (iii)$$

Where;

βo = Intercept β₁- β₃= Coefficient of the independent variables and ε = Error term

Result and Discussion

Table 1: Descriptive Statistics of Variables

	INDO	EXCH	OPV	TOPEN	RealGDP
Mean	3.188884	1.511672	1.720440	1.466315	3.149929
Median	3.338978	2.009048	1.681964	1.531784	4.195924
Maximum	4.600752	2.487027	2.060924	1.726548	15.32916
Minimum	1.686547	-0.214670	1.297979	0.960749	-13.12790
Std. Dev.	0.970033	0.860348	0.203279	0.214405	5.467391
Skewness	-0.220010	-0.783044	0.093962	-1.104833	-0.866508
Kurtosis	1.668047	2.319147	1.909180	3.219769	4.635276
Jarque-Bera	3.197537	4.738809	1.990957	8.012754	9.225893
Probability	0.202145	0.093536	0.369547	0.018199	0.009923
Sum	124.3665	58.95519	67.09718	57.18629	122.8472
Sum Sq. Dev.	35.75664	28.12757	1.570246	1.746836	1135.910
Observations	39	39	39	39	39

Authors computation (2023)

As presented above, industrial output stood at 3.188884, while the Maximum and Minimum stood at 1.686547 and 4.600752 for the period covered in the study, average values of industrial output, exchange rate, Exchange rate, oil, price,Trade Openness, exchange rate plus realGDPstood at 3.188884, 1.511672,1. 720440, 1.466315, and 3.149929 respectively. The maximum and minimum value of exchange rate, oil price and trade opnnne are 1.511672 & I 2.487027, 2.060924 &1.297979. skews values for most of the variables are nearly zero with four having negative values indicating that skewness to the left while the only one remaining is skewed to the right. The Kurtosis which is used to measure whether the data are peaked or flat relative to a normal distribution.The result in table 1 shows that, only index ofTrade openness(TOPEN) and real-GDP satisfy this condition. The probability values of the Jarque-Bera test for all the variables are high, except for exchange rate for LOPR which is 1.990957, which implies the acceptance of normal distribution of for the variables. The probability for LINDO andLOPR are high, which indicate normality of their unconditional distribution, compared to that of Exchange rate(EXCH), Trade openness(TOPEN) and real GDP while are relatively low. The standard deviationis relatively low for Industrial output(INDO, OPV, EXCH), Trade openness(TOPEN)which implies small variability but that of realGDP is a bit on the high side.

Table 2: Result of Unit Root Test

Variable	Level ADF Statistics	Mackinnon Critical Value at Level 5% level	First Difference ADF Test Statistics	Mackinnon Critical Value at First Difference 5% level	Decision
INDO	-0.377571	-2.941145	-4.812646	-2.943427	I (1)
EXCH	-2.119554	-2.941145	-5.199961	-2.943427	I (1)
OPV	-2.140799	-2.941145	6.055377	2.943427	I (1)
TOPEN	-1.892148	-2.941145	-7.389264	2.943427	I (1)
GDPGR	4.158015	-2.941145	4.158015	-2.941145	I (0)

Authors computation(2023) ** Significant at 5% level

The panel unit root test a conducted to explore the characteristic of the variables and it was conducted both at levels and at difference for each of the variables. The Unit root test shows that Industrial Output(INDO), Exchange rate(EXCH), Oil price(OPV), Trade Openness(TOPEN) are stationary at first difference (i.e. integrated at I (1)) while realGDP. exhibit stationarity at level, thus the variables are combination of 1(0) and 1(1). However, the economic implication of non-stationarity series [1(1)], Indicating that of a prolong shock, that is, exhibiting a prolonged shock. The above result is a precondition for selecting the correct estimation techniques. Since all variable are of I (1) and I (0), the autoregressive distributive lag (ARDL) estimation techniques is adopted.

Table 3: Correlation Matrix

	INDO	EXCH	OPV	TOPEN	RealGDP
INDO	1	0.95	0.24	0.60	0.42
EXCH	0.95	1	0.03	0.71	0.53
OPV	0.24	0.03	1	-0.11	-0.04
TOPEN	0.60	0.71	-0.11	1	0.50
Real GDP	0.42	0.53	-0.043	0.50	1

Authors' Computation (2023)

The correlation matrix result in table 3 shows that most of the values are very low, with the diagonal value of 1 all-through, the correlation between exchange rate and industrial output is very high with 0.95. The relationshipbetween oil price and industrial output is very weak which is 0.24, while that of trade openness to industrial output is a bit fair with 0.60, but Real GDP to industrial output is weak which is 0.42. The relationship between oil price and exchange rate is very weak which is 0.03, trade openness to exchange rate is a bit on the high side, which is 0.71 but decline to 0.53 with

Real GDP. Again, 0.42 was the correlation relationship between industrial output and real GDP, that of exchange rate, oil price, trade openness shows 0.53(fair), -0.04(negative and very weak) and 0.50 which is fair.

Table 4: Result of ARDL Estimation

Dependent Variable: INDO				
Method: ARDL				
Date: 07/28/23 Time: 14:11				
Sample (adjusted): 1985 2022				
Included observations: 35 after adjustments				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): EXCH OPV TOPEN				
REAL_GDP_GROWTH				
Fixed regressors: C				
Number of models evaluated: 2500				
Selected Model: ARDL(3, 4, 1, 0, 1)				
Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.* P<0.05*
INDO(-1)	0.786650	0.148499	5.297326	0.0000*
INDO(-2)	-0.337887	0.172132	-1.962955	0.0630
INDO(-3)	0.388025	0.132496	2.928587	0.0080*
EXCH	-0.080152	0.077091	-1.039714	0.3103
EXCH(-1)	0.121588	0.091862	1.323589	0.1999
EXCH(-2)	0.011549	0.093072	0.124087	0.9024
EXCH(-3)	0.216584	0.097295	2.226053	0.0371*
EXCH(-4)	-0.130525	0.072673	-1.796059	0.0869
OPV	0.370094	0.076517	4.836751	0.0001*
OPV(-1)	-0.210982	0.099193	-2.126988	0.0454*
TOPEN	0.095528	0.074960	1.274392	0.2164
REAL_GDP_GROWTH_RATEW	-0.007886	0.002647	-2.979670	0.0071*
REAL_GDP_GROWTH_RATEW (-1)	-0.004287	0.002573	-1.666296	0.1105
C	0.075669	0.153329	0.493512	0.6268
R-squared	0.768661	Mean dependent var.		3.357599
Adjusted R-squared	0.727832	S.D. dependent var.		0.875179
S.E. of regression	0.040753	Akaike info criterion		-3.273419
Sum squared residual	0.034876	Schwarz criterion		-2.651280
Log likelihood	71.28484	Hannan-Quinn criter.		-3.058657
F-statistic	1204.583	Durbin-Watson stat		1.810184
Prob.(F-statistic)	0.000000			
*Note: p-values and any subsequent tests do not account for model selection.				

Authors computation (2023)

The ARDL model as shown in table 4, is for checking co-integration between economic variables, which use to examine the dynamic and equilibrium relationship between dependent and independent variables.The probability of industrial output is 0.0000 indicating that it is significance, ditto for exchange rate at 0.0371, LOPR too at0.0001 and real GDP at 0.0071 are significant, with P< 0.05, the coefficient of industrial output is very high too at 0.786650, the restshows both positive and negative values. Both R-square (0.768661) and adjusted R-square (0.727832) are on the high side, but the sum of squared residual is very low which is 0.034876. The coefficient of trade openness(TOPEN) shows that, it has a non-significant positive effect on industrial output in the short-run, indicating a 1percent increase in trade openness will reduce by 0.373394

Regression equation;

$$INDO = 0.786650 - 0.080152EXCH + 0.37009040OPV + 0.095528TOPEN$$
$$-0.007886realGDP$$

The implication of the above model is that, if exchange rate decrease by 0.0802, then industrial output will increase by 1. An increase of 0.3701 in oil price will induce an increase of 1in industrial output, when there is a decrease of -0.0079, industrial output will definitely increase by 1 and lastly with 0.0955 increase in trade openness, industrial output ill increase by a corresponding 1.

Table 5: Result of Co-integration test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	*Value*	*Signif.*	*I(0)*	*I(1)*
			Asymptotic: n=1000	
F-statistic	6.972490	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Authors computation (2023)

There exist a long run relationship among variables since the F-statistic value is greater than critical value of both I(0) and I(1) at 5% level of significance, suggesting the presence of co-integrating relationship among the variables. Similarly, the hypotheses of no co-integration amongst the variables were rejected because the respective F-Statistics are above the upper bound critical values under both models

Discussion of Findings and Conclusion

The descriptive statistical table shows the probability values of the Jarque-Bera test for all the variables are high, except for exchange rate for OPV which is 1.990957, which implies the acceptance of normal distribution of the variables. The probability for INDO andOPV are high, which indicated normality of their unconditional distribution, while the standard deviation is relatively low for Industrial Output(INDO), Oil price(OPV), Exchange rate(EXCH), Trade Openness(TOPEN) which implies small variability but that of realGDP is a bit on the high side. The ADF Unit root test shows that Industrial Output(INDO), Exchange rate(EXCH), Trade Openness(TOPEN), Oil price(OPV) are stationary at first difference (i.e. integrated at I (1)) while realGDP. exhibit stationarity at level, thus the variables are combination of 1(0) and 1(1). However, the economic implication of non-stationarity series [1(1)], I that of a prolong shock, that is, exhibiting a prolonged shock.

The correlation matrix result showsthat, with the diagonal value of 1 all-through, the correlation between exchange rate and industrial output is very high with 0.95, the relationship between oil price and industrial output is very weak which is 0.24, while that of trade openness to industrial output is a bit fair with 0.60, but Real GDP to industrial output is weak which is 0.42. The relationship between oil price and exchange rate is very weak which is 0.03, trade openness to exchange rate is a bit on the high side, which is 0.71 but decline to 0.53 with Real GDP. Again, 0.42 was the correlation relationship between industrial output and real GDP, that of exchange rate, oil price, trade openness shows 0.53(fair), -0.04(negative and very weak) and 0.50 which is fair. There exist a long run relationship among variables since the F-statistic value is greater than critical value of both I(0) and I(1) at 5% level of significance, suggesting the presence of co-integrating relationship among the variables. Similarly, the hypotheses of no co-integration amongst the variables were rejected because the respective F-Statistics are above the upper bound critical values under both models.

In Conclusion, the volatility of oil price has affected industrial output more negatively, though trade openness has been of great help with the recent increase in foreign direct investment over time, importation of capital and technology, managerial and technical skills, it has not transformed to the desired growth in the industrial sector, an evidence from the result and Nigeria economy. so the study recommends that, all the problems confronting the Nation's industrial sector should be tackle headlong. Reserves during oil boom can equally help the Nation, especially during recession/through and lastly increase in local production of good can influence trade openness(export) and boot more industrial growth

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