The Presence of Dutch Disease in Nigeria: The Implication of Rise in Oil Revenue

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Abstract: **Nigeria major source of foreign earning has been from crude oil which has caused decline in manufacturing sector output over the years. This situation often leads to oil price fluctuations that adversely affect budget performance. The existing literatures in Nigeria has focused largely on agricultural productivity to determine the existence of Dutch Disease (DD) in Nigeria, but paid less attention to the manufacturing sector output. The study therefore, examined the presence of DD in Nigeria from the scope of manufacturing sector from 1981-2019. The data was sourced from Central Bank of Nigeria (CBN). Thereafter, The Augmented Dickey Fuller (ADF), Phillip Peron (PP) unit root test and Johansen Co-integration for pre-test; while, Toda-Yamamoto (TY) causality test and Vector Error Correction Model (VECM) were used for the formulated objectives.**

The ADF and PP unit root test confirmed stationarity of all the variables at first level difference. The Johansen co-integration established two co-integration relationships at 5% level of significance. The TY confirmed one-way causality from oil revenue to manufacturing sector output in Nigeria. The lagged error correction (ECM$_{-1}$) confirmed that disequilibrium that occurred in the model from the short-run to long-run was corrected at an annual rate of 4.9%. The VECM discovered that natural log of oil revenue and exchange rate were significance and indirectly related to manufacturing sector output; while, natural log of government expenditure was significant and directly relate to it with their absolute t-statistics (1.69764), (9.92788) and (3.2788) greater than t-values (t$_{0.05}$= 2.056, t$_{0.1}$ = 1.706) respectively. Also, trade openness exhibited a direct relationship on manufacturing sector output but non-significance. The study therefore, concluded that the presence of DD in Nigeria was driven by increase in oil revenue. Therefore, recommended that Nigeria's government should continuously encouraging productivity in manufacturing sector through increase in capital expenditure especially on infrastructural development. Also, government should see manufacturing sector as one of the present core sectors that could facilitate development and contribute greater percentage to government revenue through diversification of the economy.

Keywords: **Dutch disease (DD), manufacturing sector output, Toda-Yamamoto (TY) causality test and Vector Error Correction Model (VECM)**

I. INTRODUCTION

Nigeria as one of the sub-Sahara African countries is naturally endowed in terms of resources and human capital. According to Taiwo (2011), the country has more than 89 natural resources that range from cash crop, cocoa, timber, cashew, etc. Also, agricultural sector alone has singled handedly financed Nigeria's yearly budget prior to the discovery of oil in large quantity. For instance, some of the edifice buildings such as Cocoa House in Ibadan, Premier Hotel and many others were built through revenue generated from agricultural produces. Meanwhile, as more crude oil is discovered in large quantity, government is concentrating on this sector to generate more fund by neglecting other productive sectors in the economy. This situation has made the country to depend so much on oil and gas as a major source of revenue ever since its discovery in large quantity in the 1950s. The sector contributes over 80% as annual source of government revenue, with daily production of 2.5 million bbl per day, in which local consumption per day carries 279,000 bbl (Daferighe, Emah & Offiong, 2017).

Meanwhile, with the discovery of oil in commercial quantity, providing approximately 90% of foreign exchange earnings and about 80% of the Federal revenue, Nigerian is still regarded as developing nation compared to other naturally endowed countries like Saudi Arabia, Iran and Qatar amongst others. For instance, in year 2000, approximately 90 million Nigerians live on less than one dollar per day, and as at 2018, 86.9 million Nigerians lived in extreme poverty (World Bank, 2019). Agbaeze and Ukoha (2018) supported the above claims and remark that wealth generated through oil revenues by Nigerian government has not passed down to the citizens as around 70% of the population lives far below the poverty line. Also, Taiwo (2011) remarks that the availability of natural resources may corrode the quality of social, infrastructure, weaken human and physical capital and thus impede rapid socio-economic growth. The term Dutch Disease (DD) was first used in 1977 to describe the problem that was associated with the discovery of new natural resource called natural gas in commercial quantity in the Netherland in the 1960s (Bature, 2013). The presence of Dutch Disease (DD) in an economy, make such economy to rely heavily on export of natural gas as the main engine of growth, by relegating both agricultural and industrial sectors to the background. Therefore, resulting in mass movement of labour from agriculture and industry to the newly discovered gas sector for greener pasture. Javaid (2011) reveals that during this period, agricultural and industrial exports fell drastically while export of natural gas dominated and contributed significantly to their GDP to the extent that gas export almost killed exports from other sectors of their economy.

The impact of crude oil on other sectors has a paradoxical effect in the sense that it should have only positive impact on the economy, the population, and other sectors of the economy but, reverse is the case in Nigerian situation (Igbeasere, 2013). Nweze and Greg (2016) support the claims and argue that the oil boom of the 1970s led to Nigeria's neglect of its agricultural and manufacturing bases in favour of an unhealthy dependence on crude oil. One common attribute of manufacturing process is that it transforms raw or unfinished goods to finished goods through the addition of utility to such goods at different stages of production before reaching final consumer. The growth in Nigeria's manufacturing sectors has been small in the last two decades compared to other sub-Sahara African countries like South African and Botswana. For instance, both South African and Botswana had experienced increase of 6.2% and 4.5% in manufacturing sector in 2001-2009; while that of Nigeria is 3.4% (World Bank WB, 2017).

Figure 1: Trend of Oil Revenue and Manufacturing Sector Output in Nigeria
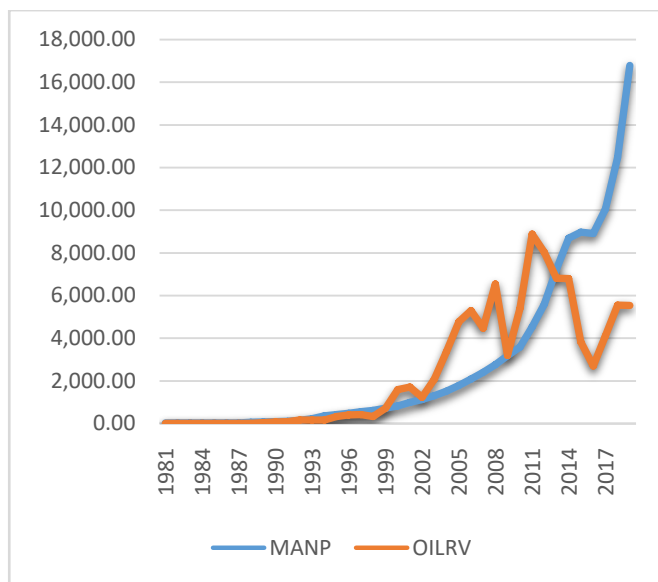
Source: Researcher's Compilation from Excel

The figure 1 above shows the trend analysis of Nigeria's oil revenue and manufacturing sector output from 1981- 2019. Nigeria's manufacturing sector output starts on a good note in 1981 with aggregate output of ₦ 26.89 billion naira while revenue from oil stood at ₦ 8.56 billion naira. It was discovered that year 2000 was the era the country started experiencing a real decline in manufacturing sector output. For instance, oil revenue stood at ₦ 1,591.68 billion naira; while, that of manufacturing performance was ₦ 826.03 billion naira. This implies that increase in oil revenue in that year was greater than manufacturing out by 65.8%. The economic implication of this is that it is during this era Nigeria is moving into what is referred to as Dutch Disease (DD).

Nsor-Ambala (2015) posits that countries that are naturally endowed tend to experience growth slowly compared to others. Anjande and Aor (2017) shows us that despite Nigerian oil riches at the negligence of other sectors, the country has the same gross national product she had forty year ago. Erling (2015) shows that growth in oil rich nation is not encouraging, for instance, Iran and Venezuela only experience 1% growth from 1965-1998, while, that of Iraq and Kuwait is 3%. Erling (2015) emphasizes that this disappointing growth rate occur as a result of negligence of productive sector, especially manufacturing sector. Since, oil is in raw form, and its price is exogenously determined. This does not give major players in the market power to make price but, rather being price takers. The implication of this for mono-economy is that a shock in this sector transmits to the entire economy.

The needs for this study is because of the recent fall in the price of crude oil which has drastically reduced government revenue in order for the government and policy makers to formulate policies that would increase the level of investment in the sector which could go a long way in stimulating economic growth in the country.

Statement of the Problem

Ever since the discovery of oil in large quantity after the civil war in 1967 – 1970, the proceeds from the sector has played significant role towards the development of Nigeria's economy, studies have established it effect as both positive and negative. Studies that include Olusi and Olagunju (2005), Emmanuel, Frederico and Pablo (2008), Edun (2012), Akinlo (2012), Fasanya, Onakoya, and Adabanija(2013), Bitrus (2013) revealed the presence of DD in Nigeria; while, Odularu (2008); Nweze and Greg,(2016) concluded that crude oil consumption and export contributed to the improvement of the Nigerian economy. Also, Is'haq and Mansur (2016) discovered that corruption disease is more prevalent in Nigeria than Dutch disease. According to Neary and Van (1986) the boom of natural resource will affect the naturally endowed country through the spending effect and the resource movement effect. The spending effect occurs when government's expenditure increase occasion by boom, which lead to increase in domestic absorption and exchange rate appreciation; while, the resource movement effect also involves movement of labour away from the non-tradable sector to oil and gas sector thereby reducing output in that sector. With estimated 37.2 billion barrels of oil reserves in 2011, an average of 2.13 million barrels per day and over dependence on oil revenue that tends to discourage sourcing of funds from other source by the government, there is need to be concerned with the nexus between oil revenue and manufacturing sector output in Nigeria. In addition, study on the direction of causality between oil revenue and manufacturing sector output in Nigeria remains scanty. According to Demetriades and Law (2006), the direction of causality between macro-economic variables help to maintain varying causal relationships which reflect differences in the quality of finance of institutions (such as financial regulation

and the rule of law). Hence, this study is also concerned with the direction of causality between the duo.

Objectives of the study

i. To examine the direction of causality between oil revenue and manufacturing sector output.
ii. To examine the effect of oil revenue on manufacturing sector output in Nigeria.

II. LITERATURE REVIEW

Dutch Disease

Kareem (2010) defines DD as a process in which a boom in a natural resource sector results in shrinking non-resource tradable sector. This situation often cause increase in resource and non-tradable sectors due to specialization that makes the economy more vulnerable to resource-specific shocks. In this study, DD is seen as consistence decline in others sector of the economy (agriculture/ manufacturing) due to increase in price of natural resource sector. Meanwhile, the term DD was first used in 1977 (Forsyth, Dwyer & Spurr, 2013). Meade and Rusell (1957) were the first study on resource boom paradox; while the core model for the DD concept was found in the work of Corden and Neary (1982). The phenomenon was used to explain the problem that was associated with the discovery of new natural resource called natural gas in commercial quantity in the Netherland in the 1960s. According to Corden and Neary (1982), the economy of naturally endowed countries is divided into three sectors that are the booming export sector, the lagging export sector both of which are the traded goods sectors; and the nontraded goods which is major the service session.

Empirical Studies

A study on sustainable development and crude oil revenue was carried out by Ologunde, Kapingura and Kin (2020) using some selected oil-producing African countries from 1992–2017. The study adopted the Pooled Mean Group (PMG) estimators on panel autoregressive distributed lag model (ARDL). Empirical results revealed that there was no long-term relationship between crude oil revenue and sustainable development. A study on DD and remittances in Nigeria from 1980 to 2016 by Adejumo (2018) using the Error Correction Model (ECM) technique discovered that remittance inflows had an adverse effect the real exchange rate in the long run. Also, same conclusion was reached for with other capital flows such as foreign direct investment and foreign portfolio investment. The study concluded remittances exerted higher magnitude of impact on the manufacturing sector competitiveness than the agricultural sector.

Paulo, Jhean, and Guilherme (2017) carried out a study on the resource curse using a Dutch disease and economic complexity analysis for 122 countries from 1963 to 2013. From the study, it was established that oil shares were in excess of 50% of exports in oil exporting countries. It was concluded that big data may offer significant contributions to the still-current debate surrounding the DD. Beine, Coulombe and Vermeulen (2014) evaluated whether immigration can mitigate the Dutch disease effects associated with booms in natural resource sectors. It was discovered that aggregate immigration mitigates the increase in size of the non-tradable sector in booming regions with the conclusion that there was no evidence of such an effect for permanent international immigration on DD.

Nikas and Blouchoutzi (2014) tested the applicability of Dutch disease for two small transition economies under a free-floating exchange-rate regime, namely Albania and Moldova. The study found that the impact of the workers' remittances on the real exchange rate varies among the countries examined. The results confirmed that the macroeconomic implications of these large capital inflows have been different between the countries. Edun (2012) examined the nexus between oil and exchange rate in Nigeria using a Vector Autoregressive Analysis of oil and exchange rate in Nigeria. The study used annual time series data from 1960- 2010. Findings from the study diagnosed the presence of Dutch Disease in Nigeria within the period of 1960- 2010, and concluded that the contraction of the agricultural sector in Nigeria was mainly caused by the sudden windfall from oil. Similar study in Nigeria by Akinwale (2012) discovered the present of Dutch Disease in Nigeria, and recommended that strong institutions are need to provide enabling environment so that fiscal and monetary policy, direct distribution of oil revenue government accountability and transparency could work as all solutions provided to the resource curse.

Bitrus (2013) studied DD and the diversification of an economy, using some case studies. The study discovered that there is present of DD caused by the oil boom in oil sector and recommended that a diversified economy is needed in the selected case study areas. A diversified economy would increase investment in the economy, thereby widening economic activities. Similar study by Olusi and Olagunju (2005) confirmed the presence of DD in Nigeria. Fasanya, Onakoya, and Adabanija (2013)examined the effect of oil discovery on sectoral performance in Nigeria, from the time period of 1975 - 2010. The study employed Vector Error Correction Mechanism (VECM). The VECM confirmed that oil discovery in Nigeria affects both the agricultural and industrial sectors. Therefore, concluded that the existence of DD in Nigeria and recommended that government should give priority to the agricultural sector and general modernization of agricultural activities. Using Autoregressive Distributed Lag (ARDL) approach, Is'haq and Mansur (2016) and time frame of 1981–2014. The findings revealed that Nigeria is affected by corruption disease than DD.

Al-mulah, Usama, and CheSab (2010) investigated the effect of oil prices on the exchange rate from the purview of Dutch Disease in Kuwait using time series data from 1970-2008. The VAR result found no significant effect between oil prices and the exchange rate. Therefore, concluded that there is absence of Dutch Disease in Kuwait, and. Emmanuel, Mandelman,

and Acosta (2008) empirically tested for the DD in Nigeria using the disaggregated sectoral data. The Error Correction Mechanism showed that the presence of long-run relationship with correction 16% dis-equilibrium with the conclusion that (DD) phenomenon survive more strongly under fixed nominal exchange rate measures which Nigeria had used in the past. Mohammed, Pavar and Hassan (2008) used 14 members of oil exporting countries and Autoregressive Distributed lag (ADRL) bound tests to confirmed a long-run relationship between the variables identified in the model and revealed the evidence of the (DD) phenomenon amongst the 14 members of oil exporting countries.

Empirical Gap

Past studies carried out within Nigeria's context mainly focused on agricultural sector to test the presence of DD in the country. This therefore, creates a gap in literature for this present study to test the presence of DD in Nigeria using manufacturing sector as the case study.

III. METHODOLOGY

Theoretical Framework

This study adopted Dutch-Disease as the theoretical framework. The DD is associate with adverse effect of natural resource boom on the manufacturing sector of natural resource-rich country. The pioneer work on DD was carried out by Corden and Neary (1982). Corden and Neary (1982) theoretical analysis is based on the assumption that the naturally endowed country has three sectors known as the non-tradable sectors (NTS), manufacturing sector(MANP) and resource sector (RSEC). The boom of Natural resource will affect the naturally endowed country through the spending effect and the resource movement effect. The spending effect occurs when government's expenditure increase occasion by boom, which lead to increase in domestic absorption and exchange rate appreciation. The resource movement effect also involves movement of labour away from the non-tradable sector to oil and gas sector thereby reducing output in that sector (Neary &Van1986). For the purpose of this study, the manufacturing sector(MANP) is modeled and expressed mathematically below

MANP = f (NRS, EXCH, TEXP, LAB) … … … i

Where; MANP = Manufacturing sector output, NRS = natural resource, EXCH = Exchange rate, TEXP = Government expenditure and LAB = LABOUR

The schema for the equation i hold as follow

MANP↓ →NRS↑→ EXCH↑→ TEXP↑,LAB↓ --- (ii)

The above schema is based on certain assumption that hold that; labour is perfectly mobile among all the three sector and make sure that wage equalize across them, all goods are for final consumption, trade is always balance as national output always equal expenditure and commodity and factor price are

not distorted. In the above equation i, there is decline in manufacturing sector output caused by negligence of the sector by government due to increase in natural resources. According to Michael (2013), increase in oil sector output in Nigeria caused impediment to growth in other sectors as a result of easy money, lack of good policies from government could have removed these obstacles and produced a more balanced pattern of growth. The continuous increase in this phenomena lead to exchange rate appreciation and total expenditure of government (spending effect); therefore, leads to movement of labour from manufacturing sector to booming sector (natural resource). A situation known as resource movement effect.

The model for this study is underpinning on the theoretical framework of manufacturing sector of Dutch-Disease as propounded by Corden and Neary (1982). The basic model of Corden and Neary (1982) is given below in a linear model.

MANP = f (NRS, EXCH, TEXP, LAB) … … … iii

The modified model for this study is given below as follow;

MANP = f (OILRV, EXCH, TEXP, TOP) …. … … iv

Where; MANP = Manufacturing sector output, OILRV= Oil Revenue, EXCH = Exchange rate, TEXP = Total government expenditure and TOP= Trade openness

The econometric form of the model is given as:

$$ln\ MANP = \Omega_0 + \Omega_1 ln OILRV + \Omega_2 EXCH + \Omega_3 TEXP + \Omega_4 TOP + \mu_t \ldots\ldots\ldots.(v)$$

In the equation iv above, three of variables that include manufacturing sector output, oil revenue and total government were converted into natural log form in order to avoid scaling problems that occur due to high variables. The rationale for converting them was that they all have high values compare to other variables in the model that were in ratio form. Therefore, it helps to eliminate having estimated co-efficient values more than 100% in their absolute values. Otherwise known as scaling problem

The related a priori expectations are: $\Omega_1>0$, $\Omega_2 > 0$, $\Omega_3>0$, and $0> \Omega_4 >0$

*Justification of the Variables in the Model:*Manufacturing sector output, Exchange rate (EXCH) and Total government expenditure were all included to the model based on the base line model of DD manufacturing sector in order to determine the presence of DD through productivity, exchange rate appreciation and increase in government.

Oil Revenue: Oil Revenue was included because of the objective two in order to act as proxy for Nigerian oil revenue.

Trade Openness (OPEN): This variable was included in the model because of the theory adopted by this study. The DD is part of the neo-classical theory assumes free-trade.

Definition and Measurement of Variable

Variables	Measurement	Source
MANP	The sum of value of manufacturing sector output to gross domestic product.	CBN Statistical Bulletin 2019
OILRV	The sum of proceeds revenue from the sale of oil.	CBN Statistical Bulletin 2019
EXCH	Yearly average official exchange rate of naira relative to US dollar (₦/$)	CBN Statistical Bulletin 2019
EXP	Total value of capital and recurrent expenditure of government	CBN Statistical Bulletin 2019
OPEN	The sum of imports and exports of goods and services divided by GDP in constant prices	CBN Statistical Bulletin 2018

Sources: Researcher's compilation (2021)

IV. DATA ANALYSIS AND DISCUSSION OF RESULT

Correlation Matrix

Variable	lnMANP	lnOILRV	EXCH	lnTEXP	TOP
lnMANP	1.000000				
lnOILRV	-0.962349	1.000000			
	0.0000				
EXCH	0.905310	0.811470	1.000000		
	0.0000	0.0000			
lnTEXP	0.299113	0.583259	0.873195	1.000000	
	0.0000	0.0000	0.0000		
TOP	-0.075423	0.108779	0.137788	0.104384	1.000000
	0.6481	0.5098	0.4029	0.5271	

Source: Researcher's Compilation from E-view-9

From the correlation matrix result the natural log of manufacturing sector output coefficient was in line with the Pearson's correlation assumption that states that there must be a perfect and strong relationship between a variable and against itself (i.e. X1 against X1). Therefore, implies that continuous increase in finished goods produced by manufacturing sector is perfectly proportional to factors inputs. For natural log of oil revenue, it implies that declining in manufacturing output in Nigeria is due to increase in revenue generation from oil and gas industries which resulted in government not providing enable infrastructural development for the sector. The exchange rate shows that exchange rate appreciation in term of naira relative to US dollar (₦/$) encourages manufacturing output in Nigeria. The government expenditure shows that the contribution for manufacturing sector to government expenditure through GDP is infinitesimal compared to other source of revenue. Furthermore, the trade openness established negative relationship between the duo.

Results of Unit Root Test

	Augmented Dickey Fuller (ADF)				*Phillip Perron*			
Variable	*Test Statistic*	*5% critical value*	*Level*	*S/NS*	*Test Statistic*	*5% critical value*	*Level*	*S/NS*
lnMANP	/4.510603/	/2.943427/	I(1)	S	/4.473264/	/2.943427/	I(1)	S
lnOILRV	/6.172436/	/2.943427/	I(1)	S	/6.172436/	/2.943427/	I(1)	S
EXCH	/4.263488/	/2.943427/	I(1)	S	/4.165247/	/2.943427/	I(1)	S
lnTEXP	/3.967304/	/2.954021/	I(1)	S	/7.323788/	/2.943427/	I(1)	S
TOP	/3.840101/	/2.943427/	I(1)	S	/3.845558/	/2.943427/	I(1)	S
Where; S indicates Stationary; NS non Stationary								

Source: Researcher's Compilation from E-view-9

The unit root result of ADF and PP showed that all the five variables identified in the model that include natural log of manufacturing sector output, natural log of oil revenue, exchange rate, natural log of government expenditure and trade openness were integrated of order ($\Delta = 1$). The implication of this is that other economics variables do not cause change among the variables identified in the model; therefore, become independent of themselves at first level difference.

Lag Order Selection (Max 2)

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-223.1162	NA	0.155873	12.33061	12.54830	12.40735
1	-37.33991	311.3009	2.66e-05	3.639995	4.946145*	4.100474*
2	-10.40700	37.85167*	2.59e-05*	3.535513*	5.930121	4.379725
* indicates lag order selected by the criterion						

Source: Researcher's Compilation from E-view-9

The lag order selection resultshowed that majority of the criteria selector selected the maximum lag order of 2. Therefore, the study selected maximum lag order of 2 for the VECM

Johansen Co-Integration Test

Traces Statistics				
r = 0	r = 1	r = 2	r = 3	r = 4
87.53885 (69.81889) {0.0010*}	55.71467 (67.85613) {0.7107}	27.08201 (29.79707) {0.0996}	11.55259 (15.49471) {0.1797}	0.522441 (3.841466) { 0.4698}
Max-Eingen Statistics				
r = 0	r = 1	r = 2	r = 3	r = 4
31.82418 (24.87687) {0.0302*}	28.63266 (34.58434) {0. 0836}	15.52942 (21.13162) {0.2535}	11.03015 (14.26460) {0.1527}	0.522441 (3.841466) {0.4698}
* denotes rejection of the null hypothesis at the 0.05 level, Critical value at 5% level in ( ) , & Prob in { }				

Source: Researcher's Compilation from E-view-9

The results confirmed a long-run relationship between the variables and the use of VEC.

Toda-Yamamoto (TY) Causality Test

Dependent variable : lnMANP			
Variable	Chi-sq	Df	Prob.
lnOILRV	1.495064	2	0.4735
EXCH	2.743401	2	0.0537*
lnTEXP	4.253501	2	0.0192**
TOP	1.214393	2	0.5449
All	12.19419	8	0.1427
Dependent variable: lnOILRV			
LNMANP	2.563865	2	0.0675*
EXCH	0.056434	2	0.0972*
LNTEXP	7.562629	2	0.0228**
TOP	2.365507	2	0.0306**
All	17.14947	8	0.0286**
* & ** indicate statistically significant and rejection of the null hypothesis at 0.05 & 0.1 level			

Source: Researcher's Compilation from E-view-9

The Toda-Yamamoto test result shows that natural log of manufacturing sector output as dependent variable did not granger cause natural log of oil revenue and trade openness in the model at conventional level of 0.05 and 0.1 level significance. While, it granger caused natural log of government expenditure and exchange rate at 5% and 10% significance level respectively. This implies that the null hypothesis that states that manufacturing sector output does not jointly granger cause natural log of oil revenue was accepted. This is possible because the *p*-value (*p*= 0.4735) of natural log of oil revenue was greater than 0.05 significance level. The economic implication of this finding is that increase or decrease in manufacturing output have no effect on oil revenue generation. The non-significance of this variables could be because oil sector is in primary production section; while, manufacturing sector belong to secondary production.

Also, the result reveals that natural log of oil revenue did granger cause all the identified variables in the model. For natural log of manufacturing sector output, its *p*-value (0.0675) was less than 0.1 significance level. This implies that the null hypothesis that states 'natural log of oil revenue does not granger cause natural log of manufacturing sector output was rejected at 0.1 significance level. The economic implication of this finding is that increase in revenue from oil leads to negligence of manufacturing output; thereby reduces its annual contribution to   value of goods and services produced in the country. Evidence of this may be seen from the above graph in figure 1 from 2002-2012, when the aggregate oil revenue received by Nigeria's government was ₦ 53,196.38 billion naira; while, that of manufacturing sector output was ₦ 29,837.04 billion naira billion. This implies a one-way causality between oil revenue and manufacturing sector output in Nigeria. Also, the significance nature of all the causality of all the variables in the model could attributed to over dependency on revenue from oil and mono-economy nature of Nigeria.

Vector Error Correction Estimates

CointEq1:	-0.049352 (0.01215) [-4.00619]	R^2 : 0.764678		
		Adj R^2squared: 0.613206		
		F-statistic : 1.100176		
Δ(*ln*MANP(-1))	Δ (*ln*OILRV(-1))	Δ (EXCH(-1))	Δ (*ln*TEXP(-1))	Δ (TOP(-1))
0.128811 (0.07277) [1.77012*]	-0.076920 (0.04531) [-1.69764*]	-0.017870 (0.00180) [-9.92788**)	0.228860 (0.06980) [3.2788**]	0.505634 (1.61206) [0.31366]
Δ (LNMANP(-2))	Δ (*ln*OILRV(-2))	Δ (EXCH(-2))	Δ (*ln*TEXP(-2))	Δ (TOP(-2))
0.634160 (0.21655) [2.29851**]	0.004322 (0.06533) [0.06616]	0.002510 (0.00250) [1.00596]	0.539870 (0.11990) [4.50268**]	-0.073982 (1.36086) [-0.05436]
Standard errors in ( ) & t-statistics in [ ], t-value ($t_{0.05}$= 2.042, & $t_{0.1}$ = 1.697				
** & * indicate statistically significant at the 0.05 and 0.1 level				

Source: Researcher's Compilation from E-view, 2021

Error Correction ECM

The findings showed that the lagged error correction $ECM_{(-1)}$ included in the model to capture the long run dynamics between the co-integrating series were correctly signed (negative) and statistically significant judging from the t-value. The absolute estimated coefficient value of the lagged error correction ECM $_{(-1)}$ was approximately 0.0494 with the absolute t-statistic (4.0062) greater than the *t*-value ($t_{0.05}$= 2.042) at 5 % level. This finding implies that the disequilibrium that occurred due to change in the identified independent variables from short-run to long-run was corrected at an annual rate of 4.9%. The economic implication of this finding is that a long run causality ruined from natural log of oil revenue, real exchange rate, natural log of government expenditure and trade openness to natural log of manufacturing sector output.

Lag for Natural Log of Manufacturing Sector Output Result

The results for natural log of manufacturing sector output for immediate past year and second year were significant with a direct effect. For the immediate past year, it *t*-statistics

(1.77012) was greater than the *t*-value ($t_{0.1}$= 1.697) at 10% significance level with a co-efficient value of 0.128811. While, that of second year was significant at 5% significance level with a value of 0.634160. In economic term, this implies that increase in yearly value of goods produced by manufacturing sector within an economy in previous year and last two years, to a large extent influenced its current year. The direct and significant nature of manufacturing sector output could be attributed to two reasons. First, manufacturing sector output comprises of four segments (machining, joining, forming and casting) that jointly contribute to GDP. Secondly, manufacturing sector output is a production making process in which all raw materials are transformed into finish goods; therefore, serves as an essential tool to increase capital accumulation within the economy.

Oil Revenue and Manufacturing Sector Output

For the oil revenue variable, the finding confirmed an indirect and statistically significant effect on natural log of manufacturing sector output with absolute *t*-statistic of 1.69764 and *t*-value of $t_{0.1}$= 1.697 for the immediate past year; while, lag two of oil revenue was non-significant. The non-significant nature of the lag two of oil revenue could be attributed to the fact that crude oil price is highly volatile and non-sustainable when there is increase in its price. For the immediate past year, the finding was in support of the formulated *a priori* expectations. The indirect and significant nature of the finding was not surprising when looking at the fact that there was a drastic decline in manufacturing sector output from years 2002-2012 when compared with geometric increase in oil revenue during the same years. The economic implication of this finding is that increase in revenue from oil affect provision of enabling environment for manufacturing sector by government as a result of negligence of the sector; therefore, reduces manufacturing sector contribution to GDP. Evidence of this is seen in figure 1 from year 2002-2012, when there was a drastic decline in manufacturing sector when compared with geometric increase in oil revenue during the same years. Given this, Kojo (2015) reveal that DD is associated with extra wealth from an export boom which cause decrease to other tradable activities.

This finding has two economic effects on manufacturing sector output. First, it reduces manufacturing sector performance which affect its over-all output. According to Corden and Neary (1982), the presence of DD drastically reduces the manufacturing sector of natural resource–rich country. Secondly, it encourages labour mobility from the manufacturing sector to boom sector (oil and gas industries). Given this, Kareem (2010) remarks that DD encourages the movement of labor away from manufacturing and to the non-tradable sector and shrinking manufacturing and expanding the non-tradable sector. In Nigeria, studies like Ijirshar (2015), Fasanya, *et al.* (2013), Edun (2012), Akinwale (2012) Kareem (2010) and Emmanuel, *et al.* (2008) discovered in their separate studies that DD exists in Nigeria through a decline in manufacturing sector output/industrial output and agricultural

in Nigeria. On the contrary note, Is'haq and Mansur (2016) discovered that Nigeria is suffering more from corruption disease. The differences in their findings may be due to time frame of the studies, methodology of analysis, etc.

Real Exchange Rate and Manufacturing Sector Output

The immediate past year of the exchange rate had an inversely co-efficient (-0.017870) and statistically significant with *t*-value ($t_{0.05}$= 2.042) less than the absolute *t*-statistic (9.92788) at 5% level. while, that of last two years was non-significant at the conventional level of 5% and 10%. The immediate past year, the negative sign of the exchange rate was contrary with *a priori* expectation formulated for this study. The economic implication of this finding is that appreciation of currency value (say naira ₦) in relation to other currency (say dollar $), reduces manufacturing for local production. This finding negates the formulated *a priori* expectations. This could be attributed to the fact that Nigeria's government adopts floating exchange rate system that allows market forces to determine the exchange rate. Given this, Emmanuel, *et al.* (2008) made it known that DD phenomenon survive more strongly under fixed nominal exchange rate measures which Nigeria had used in the past.

The finding has two economic implications on Nigeria's manufacturing output. The first economic implication, is that higher exchange rate causes fall in net exports, therefore, reduce the injection of net exports that would facilitate increase in output of manufacturing industries in the economy. A fall in net exports has a tendency of slower growth of real GDP. Secondly, it reduces performance of small scale manufacturing industries due to consumption of imported made good. This finding was contrary to the study of Kojo (2015), Gill *et al.* (2014), Edun (2012), Ghani *et al.* (2012) that identified that DD leads to a contraction of other tradable activities by giving rise to a real appreciation of the home currency.

Government Expenditure and Manufacturing Sector Output

Natural log of government expenditure at immediate past year and second year were positive and significance at 5% significance level. The *t*-value ($t_{0.05}$= 2.042) was less than the *t*-statistic for both at 5% level. The implication of the positive is that both steady increase in manufacturing sector output to GDP and high increase in oil revenue increase government spending on recurrent and capital expenditure. On capital expendituire, we have expenditures on health, welfare, defence and education; while, on recurrent, we have salary, adminstration, pension, etc. The positive and significant nature of government expenditure is attributed to two reasons. First, increase in oil revenue. The oil and gas sector alone contributed high percentage revenue to government compared to other sector in the economy. For instance, Daferighe, *et al.* (2017), reveal that oil and gas sector contributes nothing less than 80% to Nigeria's revenue yearly. Secondly, manufacturing sector output also contributes to government's coffer through it sectoral contribution to real gross domestic product as proxy for economy growth. In view of this, studies

like Kojo (2015), Akinwale (2012), Jakob (2012), Kareem (2010) and Nina and Gaobo (2006) that identified that the boom of natural resource will affect the naturally endowed country through the spending effect that occurs when government's expenditure increase occasion by boom, which lead to increase in domestic absorption and exchange rate appreciation.
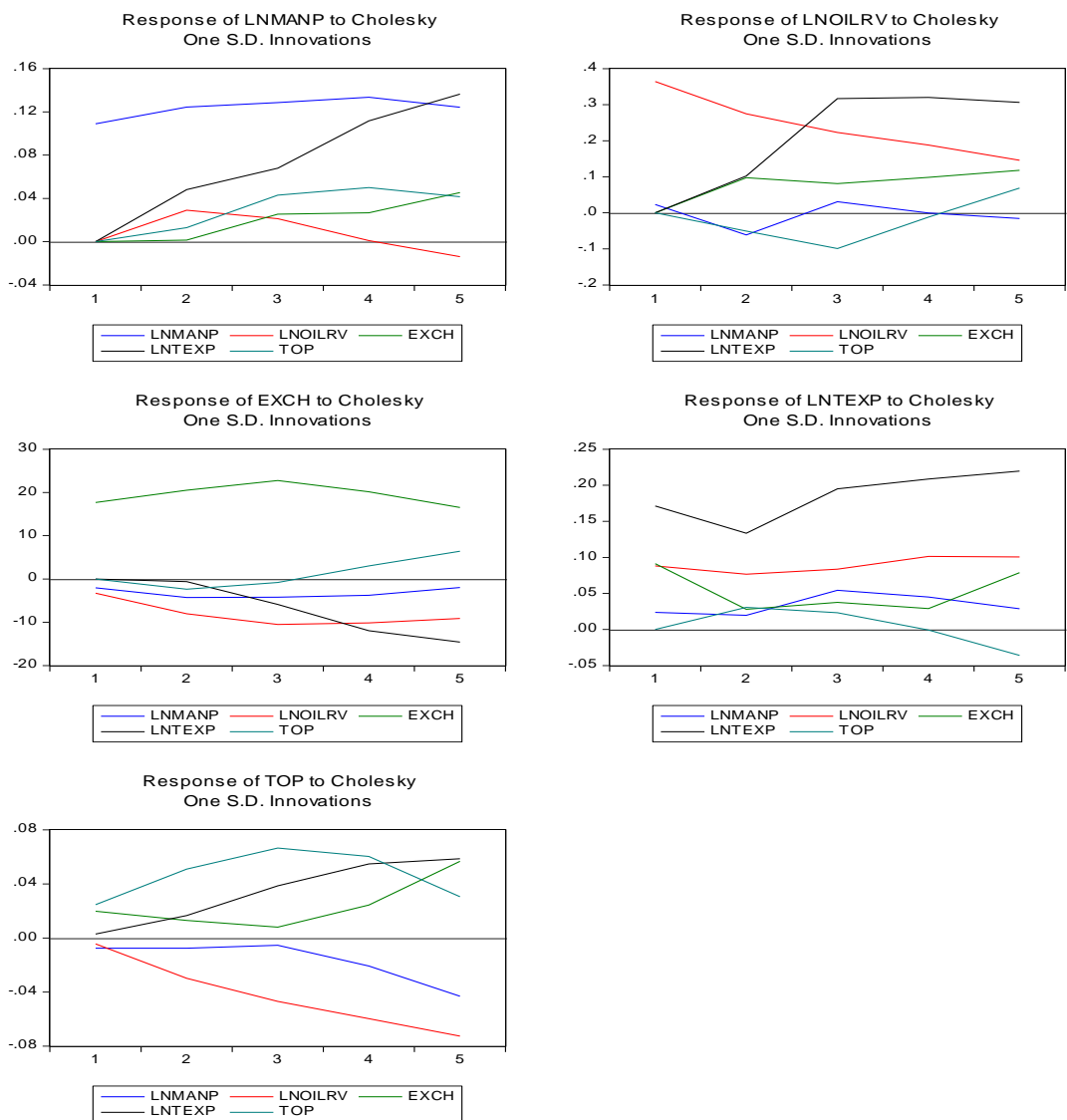
Trade Openness and Manufacturing Sector Output

Furthermore, trade openness was directly related to manufacturing sector output but non-significance at both 0.05 & 0.10 level. From the finding, it was established that *t*-value ($t_{0.05}$= 2.042, &$t_{0.1}$=1.697) was greater than the *t*-statistic (0.31366). Thus, implying that the aggregate value of both the import and export coupled with gross domestic product do not influence manufacturing sector output. The economic implication of this finding was that change in import of goods

and services couple with export of oil and non-oil has zero effect on manufacturing sector output. The non-significance nature of trade openness on manufacturing sector output could be attributed to fall in price of crude oil over the years. For instance, the average closing price of crude oil was $ 43.29, $50.80, $ 65.23 and $39.68 in year 2016-2020 respectively; therefore, lead to a situation where there is fall in export of oil and non-oil good. Also, price of crude oil is highly volatile in world market couple with other goods which their process is exogenously determine by world market.

Impulse Response Result

Impulse response result is shows below to explain shock from one variable to others. The method of impulse response adopted in this study was multiple bar chart and the decomposition employed is Cholesky –dof adjusted method for 5 years period.

The impulse response result table shows the response of natural log of manufacturing sector output, natural log of oil revenue, exchange rate, natural log of government expenditure and trade openness for the period of five (5) exhibited both negative and positive sign. Therefore, implies that all the identified variables have the tendency to cause increase or decrease in improve manufacturing sector output (provided that all other variables affecting it is held constant).

V. CONCLUSION AND RECOMMENDATIONS

The findings from this study confirmed that oil revenue and exchange rate had negative and significant effect on manufacturing sector output; while government expenditure had positive and significant effect on it with trade openness exhibiting non-significance. This study therefore, concludes that the presence of DD in Nigeria was driven by increase in oil revenue. Therefore, the following recommendations are made from the findings;

Nigerian government should continuously encouraging productivity in manufacturing sector through increase in capital expenditure especially on infrastructural development. Finding from this study have established synergy between government spending on infrastructure and manufacturing sector performance. Therefore, increase in government spending in this area would encourage more investment by both local and international investors which increase output in this sector .Manufacturing sector must be seen as one of the present core sectors that could facilitate development and contribute greater percentage to government revenue through diversification of the economy. Nigeria's economy is a mono-economy with 80% of government's revenue coming from crude oil. This over dependency on oil revenue has adverse effect on economy due to volatile nature of crude oil price. This result to budget deficit, re-selection of crude oil bench mark or lack of funds to achieve 100% of the estimated budget. Therefore, diversification of the economy through manufacturing sector and others would make the economy to stay healthy. Also, Nigeria's government should continuously adopt floating exchange rate system that would allow the market forces to determinate the exchange rate in order to reduce the severity of DD on the economy. Since DD phenomenon survive more strongly under fixed nominal exchange rate measures.

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