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NAVIGATING THE WAVES: HOW OIL PRICE SHOCKS SHAPE THE NIGERIAN MANUFACTURING SECTOR

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Abstract *This study investigates the impact of oil price shocks on Nigeria's manufacturing sector using quarterly data from 2000Q1 to 2024Q1. A three-step econometric approach is adopted, comprising unit root tests, ARDL bounds testing for cointegration, and estimation of a Vector Error Correction Model (VECM). The ADF results indicate that the variables are integrated of mixed orders, I(0) and I(1), while the bounds test confirms the existence of a long-run equilibrium relationship among the variables. Empirical findings show that oil price volatility exerts a positive but unstable effect on manufacturing output in both the short and long run, underscoring Nigeria's continued structural dependence on oil-driven macroeconomic conditions. Government expenditure emerges as the most immediate and destabilizing transmission channel of oil shocks in the short run, whereas exchange rate dynamics play the most consistently supportive role in fostering long-term manufacturing growth. Variance decomposition results further indicate that oil price volatility becomes increasingly important in explaining forecast error variations in manufacturing output over time, with inflation and exchange rate playing secondary roles. Overall, the impulse response and variance decomposition analyses reveal a manufacturing sector that is internally resilient but externally vulnerable to oil-related fiscal and macroeconomic disturbances. The study concludes that oil price volatility does not inherently impede manufacturing performance; rather, its effects depend on macroeconomic stability and effective policy transmission. Policy recommendations include exchange rate stabilization, improved efficiency of public expenditure, inflation control, and structural diversification to enhance manufacturing resilience and support sustainable industrialization.*

Keywords Oil price volatility; Manufacturing sector; VECM; Impulse response; Variance decomposition; Energy Economics

1.0 Introduction

Crude oil is a vital commodity in every economy of the world due to its function as a leading energy source for both domestic and industrial usage. This is why it is considered an essential factor of economic development of any nation because of its dual roles as an intermediate good and. also as a consumer good. However, prices of crude oil are extremely unsteady and this could have enormous impacts on economic advancement and it stimulates serious wrangling within the circle of researchers and policy makers (Orhewere and Ogbeide-Osaretin 2020; Hammed and Arawomo, 2020; Richard and Muba 2024 .etc).

Nigeria is among the major producers of oil in the globe, and the country relies greatly on crude oil proceeds. This reliance makes the its economy susceptible to global oil price fluctuations. The country enjoys boom when oil price rises and faces economic hardship when there is a decline in oil price. These price fluctuations can lead to severe economic volatility, affecting various sectors, including manufacturing. The Manufacturing sector can be affected directly or indirectly by Oil price shocks. The direct consequence affects the cost of production, oil being important source of energy for transportation and industrial use. The indirect channels through which oil price shocks affect manufacturing sector includes: inflation, exchange rate, government spending and energy cost (Gummi et al (2018).

The manufacturing sector occupies a central place in Nigeria's industrialization and economic diversification strategy. It contributes significantly to GDP, value addition, and employment generation (Onyejiuwa & Jolayemi, 2019; Hammed & Arawomo, 2020). Yet, its performance remains persistently weak. Between 2018 and 2022, manufacturing contributed about 9.0% to Nigeria's real GDP, before declining to 8.23% in Q4 2023 and further to 8.21% by Q3 2024—its lowest in four years (NBS, 2023; 2024). These declining trends highlight the sector's fragility and its susceptibility to macroeconomic shocks, particularly those emanating from oil price volatility.

Although, existing studies have examined the relationship between oil price fluctuations and manufacturing sector performance (Hammed & Arawomo, 2020; Nwosu, 2020; Obi et al., 2023), notable gaps persist. First, a large proportion of previous studies rely on annual data, which obscure short-run fluctuations and limit insights into the timing and speed of policy responses. While a few have used quarterly data (e.g., Orgi et al., 2019; Gummi et al., 2018), their samples do not extend into the post-2020 period—an era marked by unprecedented global and domestic shocks, including COVID-19, fuel subsidy removal, and exchange rate unification. Thus, existing evidence does not fully capture the contemporary dynamics of heightened volatility and policy reforms.

Second, although some studies emphasize channels such as exchange rate or fiscal spending, very few model these transmission pathways jointly. This leaves unresolved questions about which channels most strongly mediate the effects of oil price shocks on manufacturing output. Third, much of the Nigerian literature relies

on ARDL or VAR frameworks that do not explicitly capture long-run macroeconomic relationships, despite theoretical expectations that oil prices, inflation, exchange rates, and output are cointegrated. The application of a VECM-based approach therefore remains underexplored.

To address these gaps, this study investigates the dynamic relationship between oil price shocks and manufacturing sector performance in Nigeria using recent quarterly data and a VECM framework. Specifically, the study seeks to answer the following questions:

i. What are the short-run and long-run impulse responses of manufacturing output to oil price shocks?
ii. Which transmission channels—exchange rate, government expenditure, or inflation—most significantly mediate the impact of oil price shocks on manufacturing performance?
iii. What evidence-based policy interventions can be implemented to enhance the resilience and drive the sustainable industrialization of Nigeria's manufacturing sector against persistent oil price volatility?

By addressing these questions, the study provides fresh empirical evidence that captures contemporary macroeconomic conditions and offers guidance for strengthening Nigeria's industrial base. The findings will be valuable to researchers, industry practitioners, and policymakers seeking to build a more resilient and competitive manufacturing sector. The rest of the paper is organized as follows: Section 2 presents the literature review; Section 3 outlines the methodology; Section 4 provides the results and discussion; and Section 5 concludes with key policy recommendations.

2.0 Review of Empirical Literature

2.1 Cross-Country Evidence: Direction of Impact and Sub-Sectoral Effects

International studies on the manufacturing sector present mixed evidence regarding the direction and significance of oil price shocks. A significant theme is the sub-sectoral or industry-specific response to oil price changes.

2.1.1 Negative or Mixed Impact:

Guidi (2009) used a VAR framework in the UK and found that oil price upswings contracted the manufacturing sector, but downswings resulted in no significant output rise, suggesting an asymmetric effect. Similarly, Fukunaga, et al. (2010), examined the influence of fluctuations in oil price on outputs of industries in the United States and Japan. The authors established that industrial output is negatively impacted by changes in the price of oil; however, the negative impact is of varying degrees, contingent on the oil intensity of the industry. This is supported by the studies of Alper and Torul (2010), who investigated the link between the price of oil and the Turkish manufacturing sector, by means of the VAR model using data set covering 1988 to 2006. The authors revealed that in aggregate terms, increases in oil price did not significantly impact the

manufacturing sector; however, the adverse effects on some sub-sectors are significant.

2.1.2 Insignificant or Long-Run Effects: Conversely, some studies find negligible impacts. Aimer (2016) employed a VECM model for Libya and found no significant impact of oil price volatility on the manufacturing sector, though other sectors (agriculture and construction) were affected. Mahboub and Ahmad (2016) also found no short- or long-term **effect** of oil price shocks on Saudi Arabia's manufacturing sector, suggesting a possible insulating effect in other large oil-exporting economies. Shaari, etal (2013) found long-run co-integration effects on Malaysia's economic sectors, including manufacturing, but noted that the effect was most strongly felt in the construction sector.

2.2 Focus on Shock Type: Uncertainty and Specific Channels

A second major theme in the literature distinguishes between a change in the level of oil price and a change in its volatility or uncertainty, and examines specific transmission channels.

2.2.1 Oil Price Uncertainty and Volatility: Studies examining uncertainty often report negative consequences. Aye etal (2014) used a GARCH-in-mean VAR for South Africa and showed that oil price uncertainty had a negative and significant effect on manufacturing output, confirming asymmetric responses to positive and negative shocks. Riaz etal (2016) found a non-linear and negative short-run impact of oil price uncertainty on Pakistan's manufacturing output. Taghizadeh, etal (2015) highlighted that Japan's transport and industrial sectors were particularly responsive to severe oil price volatility. These findings emphasize the importance of modeling uncertainty alongside level shocks.

2.3 Evidence from Nigeria and the Identified Gaps

The Nigerian context presents a highly complex and contradictory picture, especially in recent years, demonstrating the need for a definitive, comprehensive study.

2.3.1 Positive / pro-growth or net positive effects on manufacturing

Gummi, e tal (2018) studied Effect of Oil Price Fluctuations on Manufacturing Performance in Nigeria for the 2009Q1 to 2017Q4 period using ARDL approach the study unveiled that fluctuation in oil price has a significant positive effect on manufacturing output, while interest rate and exchange rate have significant negative outcomes on manufacturing output. Hammed and Arawomo (2020), using a Structural Vector Autoregressive (SVAR) model, investigated the impact of oil price shocks on Nigeria's manufacturing sector; via fiscal variable ranging from 1981 to 2019. The study found that oil prices have short and long run significant impact on government revenue. It revealed that oil price shocks exerted positive net impact on manufacturing output. Besides, the study revealed that manufacturing output is influenced by oil price changes, government revenue and inflation. The results suggest that fiscal policy measures can help in curtailing the negative consequence of oil price swings on the

manufacturing sector. Similarly, Obi, et al (2023) explored the impact of crude oil price fluctuations on the Manufacturing, Agricultural, information and Communication sectors of the Nigerian economy for the 1986 to 2021 period. The results of the study found that crude oil price fluctuations had a positive and statistically significant effect on the manufacturing sector while it had negative and significant effect on agricultural and telecommunication sectors.

2.3.2 Negative / contractionary impacts

Adedokun (2018), in an ARDL model covering 2009 to 2017, studied how fluctuations in the price of oil impart on Nigeria's manufacturing sector performance. The study found that Oil price fluctuations have a substantial, often negative, effect on Nigerian manufacturing output and performance and recommends diversification of the Nigerian economy to reduce oil dependency. Orgi etal (2019) examines the impact of crude oil price volatility on some selected economic sectors (transport, agricultural and manufacturing sectors) in Nigeria from1981q1 to 2015q4. The outcome revealed that Crude oil price has a negative and statistically significant impact on transportation sector, manufacturing output, and agricultural sector respectively. Also, Nwosu et al (2020) employed annual data covering 1981 to 2018 to estimate the influence of oil price shocks on 3 real sectors of the Nigerian economy, namely: agriculture, manufacturing and, industrial sectors, the outcome unveiled that shocks to oil price exhibited negative impact on the real sectors of the Nigeria economy. Okuneye and Oluwo (2023) studied the response of manufacturing performances to crude oil price fluctuations in Nigeria using annual data covering 1981 to 2019. The results show that oil price fluctuations had negative impact manufacturing performance. Anakwue etal (2025) analyzed how oil price changes affect Nigeria's economy and diversification, finding oil prices impact GDP, make manufacturing increasingly vulnerable, with oil prices explaining significant output variations. Also, it found that oil prices affect government revenue while agriculture is resilient. It advocated for targeted diversification policies. Gelle and Toryila (2025) examined the Dynamic Effects of Crude Oil Price Volatility on Manufacturing Output and Industrial Performance in Nigeria (1994-2024) The study revealed that crude oil price volatility significantly impacts Nigeria's manufacturing output, generally showing a negative link, as high oil prices increase production/input costs (fuel, imported machinery) and reduce consumer purchasing power, thus hindering industrial performance, though oil windfalls can offer short-term revenue boosts,

Based on the above thematic review, the following gaps emerge, especially within the Nigerian context:

i. Use of low-frequency data and Need for Post-Reform Current Data: Many studies use annual data. This causes loss of short-run impulse response detail because low-frequency data limit inference about short-run dynamics (monthly/quarterly shocks) and policy response timing. Thus, Short-run dynamics (impulse responses) require quarterly/monthly

data; While a few have used quarterly data (e.g., Orgi et al., 2019; Gummi et al., 2018), their samples do not extend into the post-2020 period. Crucially, the period after 2020 has seen major global and domestic shocks, including the COVID-19 pandemic and significant domestic policy shifts (e.g., subsidy removal, exchange rate unification). The literature has not yet provided a consensus using data that fully captures the effects of this latest era of heightened volatility and reform.

ii. Lack of Models Capturing Long-Run Equilibrium Relationships: Many existing Nigerian studies rely on ARDL or VAR frameworks that do not explicitly account for long-run cointegration, yet macroeconomic theory suggests that oil prices, exchange rate, inflation, and output share long-run linkages. The need for a VECM/VEC-based approach remains underexplored.

iii. Limited Evidence on Transmission Channels: Although some studies highlight exchange rate or fiscal channels, empirical work rarely models them jointly. This leaves uncertainty about which channels dominate the transmission of oil shocks to manufacturing in Nigeria.

3.0 Methodology

3.1 Types and Sources of Data

The study utilizes quarterly secondary data from the Central Bank of Nigeria's Statistical Bulletin, spanning 2000Q1 to 2024Q1. This quarterly frequency is justified on several grounds: it provides greater variability and richer information necessary to capture the crucial short-run and seasonal dynamics of oil price shocks, which annual data would likely obscure. The 2000–2024 period is structurally relevant as it covers key distinct oil market regimes, including booms, crises, and collapses, making it ideal for identifying transmission mechanisms. Furthermore, the 24-year timeframe yields over 96 observations, ensuring **econometric robustness** for advanced techniques like ARDL and VECM, thereby mitigating degrees of freedom problems. Finally, the higher frequency is essential for policymakers, as quarterly results can inform timely macroeconomic interventions, capturing both short-run adjustments and long-run equilibrium relationships.

This study uses Manufacturing GDP as a measure of the performances of the Nigerian manufacturing sector; other variables include inflation, government expenditure and exchange rate. Also, this study adopts Bonny light crude oil price as data on crude oil price; this is on the basis that the Bonny light crude contributes over 55% of the Nigerian crude oil exports over the years.

3.2 Method of Data Analysis

This study used a three-stage econometric procedure to analyse the effect of oil price volatility on manufacturing output. In the first stage, we ascertain the order of integration in the variables by means of the ADF test. Afterwards, co-integration test is conducted using Pesaran et al. (2001) bounds test. This approach is

advantageous because it remains valid even when the variables in the model comprise different order of integration (either I(0) or I(1)). The existence of long run relationship among the variables is established through the F-statistic or Wald test. However, Narayan (2005) contends that the critical values provided in Pesaran et al, (2001) are based on large sample sizes consisting of 500 and 1000 observations as well as 20,000 and 40,000 replications respectively. The author noted that these critical values are not valid for small sample sizes. Hence, Narayan offers a set of critical values for small sample sizes, ranging from 30 to 80 observations. Since our sample size of 92 observations is reasonably small and closer to the Narayan sample range, we extract the relevant Narayan critical value for cointegration test. Once cointegration is established, we proceed to estimate the Vector Error Correction Model (VECM) to investigate the responses of manufacturing output to innovations in oil price volatility. The Emphasis here will be on the Impulse Response Functions (IRF) and the Variance decompositions. Price volatility in the oil market (OIL_PVOL) was captured by normalizing changes in the price of oil with their GARCH volatility .

3.3 Specification of Model

This model aims to explain the behaviour of Manufacturing Output in terms of Oil Price Volatility, Government Expenditure, exchange rate and inflation.

The Vector Error Correction model is specified as given below:

$$\text{MRGDP}_t = \alpha + \sum_{j=1}^{K} \text{MRGDP}_{t-j} + \sum_{j=1}^{K} OIL_PVOL_{t-j} + \sum_{j=1}^{K} GEXP_{t-j} + \sum_{j=1}^{K} EXRT_{t-j} + \sum_{j=1}^{K} INFL_{t-j} + u_t \quad ---------- 3.1$$

Where

MGDP = Manufacturing GDP, OIL_PVOL = Oil Price Volatility, GEXP = Government Expenditure , EXRT = exchange rate, and INFL = Inflation, α = constant term

u_t = stochastic error terms, called impulses or innovations.

Government expenditure is an important driving force of economic activity in Nigeria due to the government's substantial role in the economy. Changes in oil prices affect government revenue, which in turn influences government expenditure. A rise in oil prices can lead to greater revenue for the government, resulting in improved expenditure on infrastructure, social services, and other areas that benefit the manufacturing sector directly or indirectly. On the other hand, a decline in oil prices can generate lower government spending, potentially affecting the manufacturing sector unfavourably. Government expenditure is included in the model to capture these dynamics. Also, the exchange rate is a crucial factor in analysing the impact of oil price volatility on the manufacturing sector. Nigeria relies greatly on oil exports, and variations in oil prices can cause significant fluctuations in the exchange rate. A rise in oil price can cause appreciation of local currency,

leading to cheaper imports and invariably favouring manufacturers who depend on imported machines and raw materials. Conversely, a reduction in oil price can deteriorate domestic currency, resulting in higher cost of imports which is potential harmful to the manufacturing sector.

Inflation is another vital variable that can influence the manufacturing sector. Variations in oil prices can generate inflationary or deflationary pressures. For instance, a surge in oil prices can increase production and transportation costs, culminating in higher prices for goods and services. This can cause decline in the purchasing power of consumers as well as the demand for manufactured goods. Equally, a cut in oil prices can reduce production costs and possibly lower inflation, enhancing demand for manufactured goods. Thus, including inflation in the model helps to understand how oil price volatility affects the manufacturing sector through changes in the general price level.

3.4 Decision Rule

(i) ADF test: The ADF test has a null hypothesis (H0) that the time series has a unit root. The decision rule requires the authors to compare the calculated test statistic with the 5% critical values from the ADF table. If the test statistic is less than the critical value (more negative), reject the null (H0). This implies that the time series is stationary. If the test statistic is greater than the critical value (less negative or positive), fail to reject the null hypothesis (H0) This implies that the time series has a unit root and is non-stationary.

(ii) Bounds Test: To establish the existence of cointegration or otherwise, we Compare the calculated F-statistic with the critical values from the Bound test table, which provides lower and upper bounds. In this approach, long run relationship of the series is said to be established when the F statistic exceeds the upper band critical value.

(iii) Optimal Lag Length Selection:The optimal lag length is conducted for appropriate representation of the model using the following VECM lag order selection criteria: Likelihood Ratio (LR); Final Prediction Error (FPE); Akaike Information Criterion (AIC); Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ).

4.0 RESULTS AND DISCUSSION

4.1Unit Root Test

Table 1: Presentation of ADF Unit-Root Tests

S/N	Variables	Level			First Difference			Order of Integration
1		ADF-Stat	5% Critical value	Unit root	ADF-Stat	5% Critical value	Unit root	

				Present?			Present?	
2	OIL_PVOL	-8.447888	-2.892200	NO	-	-	-	I(0)
3	MRGDP	-1.068453	-2.893230	YES	-3.206286	-2.893230	NO	I(1)
4	GEXP	2.962055	-3.458856	YES	-13.99941	-3.458856	NO	I(1)
5	EXRT	1.845159	-2.892536	YES	3.514075	-2.892536	NO	I(1)
6	INFL	-1.367835	-2.893230	YES	7.374542	-2.893230	NO	I(1)

Source: computed with E-views 9 by author

The study examined the order of integration of the variables using the ADF test, The result as shown in table 1 revealed that the variables were of different order of integration at 5% level of significance. Using the ADF test, oil price volatility was found to be stationary at level while all other variables were stationary after first difference. Consequently, we conclude that the variables used in this study are a combination of I(0) and I(1).

4.2 VAR Lag Order Selection Criteria

VAR lag selection was conducted to determine the suitable lag for the model. The result is presented in table 3 and it shows that 3 out of the 5 criteria approved lag 5 as the optimal lag for the estimation of the model.

Table 2 Lag Selection

	LR	FPE	AIC	SC	HQ	Chosen Lag
Selected Lag Order	5	5	6	1	5	**5**

Source: Author's computation using Eviews 9 on the data

4.3 Bound Test for Cointegration

Given the outcome of the unit root test where the variables were found to be a combination of I (0) and I (1) order of integration, we applied the bounds test cointegration technique. The result shows an F sat of 8.432104, which exceeds the Narayan's 5% critical lower and upper bounds values of 2.688 and 3.6988 respectively (see table 4). Hence, we fail to accept the null hypothesis of no cointegration and conclude that there exists a cointegration among the variables.

Therefore, a long- run relationship exists between Manufacturing GDP and the other variables. Consequently, the study employed VEC for the estimation of the model

Table 4 Bound Test for Cointegration

Test Statistic	**Value**	**K**
F-statistic	8.432104	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06
Narayan's critical values		
5%	2.688	3.6988

Source: Author's computation using E-views 9 on the data

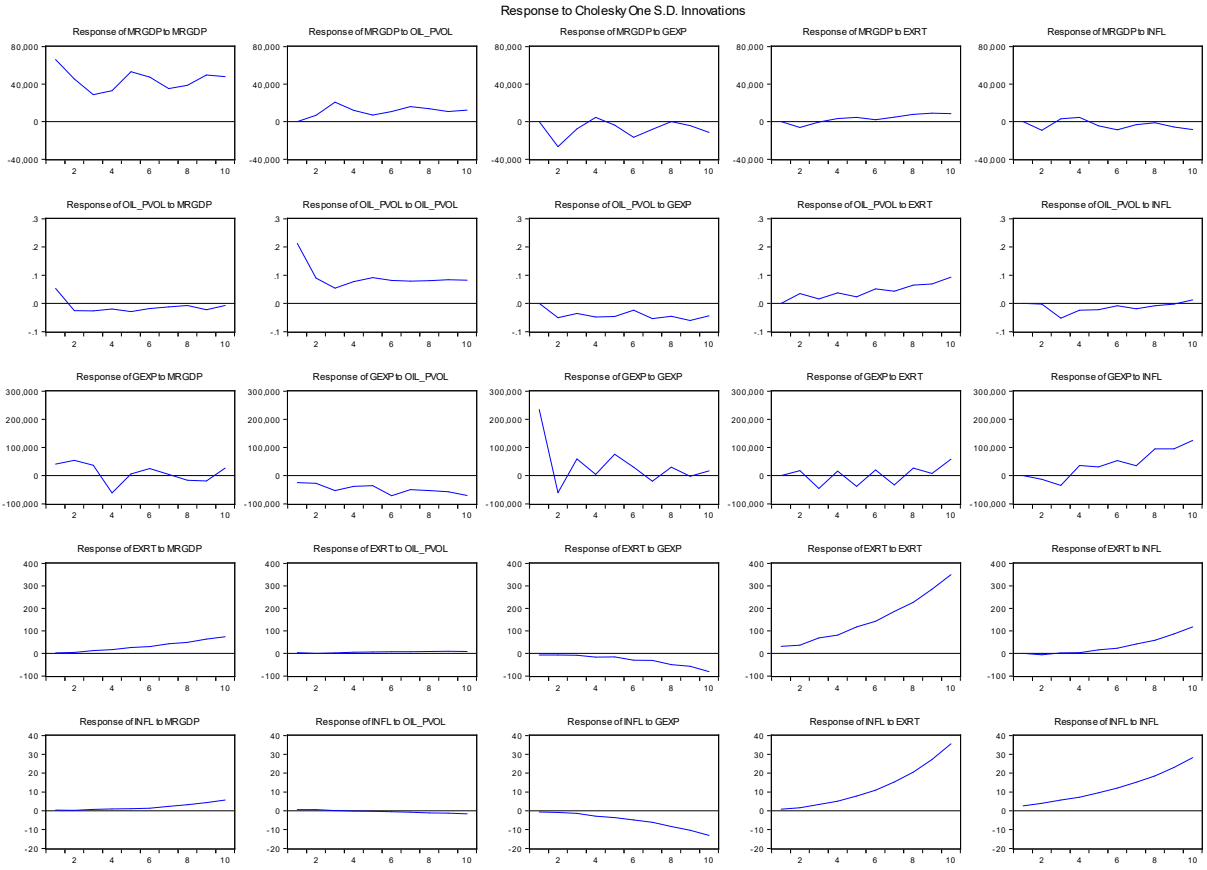
4.4 Impulse Responses to Shocks

Table 5 Impulse response function of Manufacturing GDP

Period	MRGDP	OIL_PVOL	GEXP	EXRT	INF
1	66191.55.	0.000000	0.000000	0.000000	0.000000
2	45531.77	6662.315	-26577.81	-6079.426	-9086.534
3	28786.55	20866.43	-7812.267	-467.4427	3026.555
4	33013.85	11937.53	4466.396	3172.062	4521.054
5	53234.34	7037.786	-3600.073	4407.553	-4521.736
6	47561.98	10646.71	-16742.67	2133.069	-8687.499
7	35322.49	15936.62	-8123.366	4812.953	-3203.926
8	38 629.23	13812.36	158.1541	7765.539	-1240.087
9	49779.52	10656.73	-4076.522	8926.014	-5802.141
10	47902.32	12292.01	-11523.36	8579.578	-8514.708

Source: computed with E-views 9 by author

Figure 10 Impulse response function (Graph)



Source: Author's computation using Eviews 9 on the data

Table 5 and figure 9 present the impulse response function (IRF) of Manufacturing GDP (MRGDP) to one-standard-deviation shocks in oil price volatility (OIL_PVOL), government expenditure (GEXP), exchange rate (EXRT), and inflation (INFL) over a ten-quarter horizon. The IRFs trace both the **short-run and long-run dynamic responses** of manufacturing output to these shocks, consistent with the study's objectives.

i. Response of Manufacturing Output to Oil Price Volatility

The impulse response results indicate that manufacturing output responds positively but unevenly to oil price volatility shocks. In the short run (Periods 2–4), oil price volatility exerts a positive and rising effect on manufacturing GDP, peaking around Period 3 (20,866.43). This suggests that initial oil price shocks may stimulate manufacturing activity through increased oil revenues, improved foreign exchange availability, and enhanced fiscal capacity.

In the medium to long run **(**Periods 5–**10)**, the response remains persistently positive, though fluctuating. This persistence indicates that oil price volatility has lasting implications for manufacturing output, reinforcing Nigeria's structural dependence on oil revenue for industrial activity. The outcome of positive response of manufacturing GDP to OIL_PVOL is consistent with the findings of Gummi, etal (2018), Hammed and Arawomo (2020), Obi, et al (2023) who documented positive

response of manufacturing sector in Nigeria. Overall, the findings imply that oil price shocks do not immediately harm manufacturing output; rather, their effects are transmitted through macroeconomic channels that can either amplify or dampen industrial performance over time.

ii. Transmission Channels of Oil Price Shocks

Government expenditure shocks initially exert a negative effect on manufacturing output (Periods 2–3), suggesting inefficiencies, delays, or misallocation of public spending. Although a temporary positive response occurs in Period 4, the effect quickly turns negative and remains largely unstable thereafter. This pattern indicates that government spending is a weak and inconsistent transmission channel, possibly due to fiscal leakages, pro-cyclical spending behaviour, and limited capital expenditure directed toward manufacturing-enhancing infrastructure.

The exchange rate exhibits a consistently positive and strengthening influence on manufacturing output from Period 4 onward, with responses rising steadily to 8,579.58 by Period 10. This suggests that exchange rate movements—particularly depreciation—may enhance manufacturing competitiveness by encouraging import substitution and boosting export-oriented production. Among the channels considered, the exchange rate appears to be the most effective and sustained mediator of oil price shocks to manufacturing performance.

Inflation shocks exert a predominantly negative effect on manufacturing output across most periods, with pronounced declines in Periods 2, 6, 9, and 10. This reflects rising production costs, reduced purchasing power, and macroeconomic uncertainty, all of which constrain manufacturing activity. The brief positive responses observed in Periods 3 and 4 are short-lived, underscoring inflation's destabilizing role in the transmission of oil price shocks.

4.5 Variance Decomposition

Table 6 and figure (11) present the forecast error variance decomposition (FEVD) of Manufacturing GDP (MRGDP), showing the proportion of variations in manufacturing output attributable to its own shocks and to shocks from oil price volatility (OIL_PVOL), government expenditure (GEXP), exchange rate (EXRT), and inflation (INFL) over a ten-quarter forecast horizon. FEVD complements the impulse response analysis by quantifying the relative importance of each shock in explaining fluctuations in manufacturing output.

Table 6 variance decomposition of the forecast error

S.E. Period	S.E.	MRGDP	OIL_PVOL	GEXP	EXRT	INFL
1	66191.55	100.0000	0.000000	0.000000	0.000000	0.000000

2	85584.78	88.11850	0.605978	9.643736	0.504582	1.127206
3	93055.03	84.10820	5.540836	8.862345	0.429344	1.059275
4	99710.12	84.21799	6.259224	7.919450	0.475150	1.128182
5	113482.9	87.02143	5.216728	6.214459	0.517662	1.029720
6	124956.8	86.26174	5.028639	6.920866	0.456100	1.332658
7	131207.0	85.48664	6.036254	6.660521	0.548239	1.268344
8	137695.8	85.48976	6.486972	6.047698	0.815841	1.159732
9	147246.9	86.18794	6.196503	5.365225	1.080905	1.169429
10	156225.1	85.96806	6.123825	5.310344	1.261837	1.335934

Source: Author's computation using Eviews 9 on the data

Short-Run Dynamics

In the first period, fluctuations in manufacturing output are explained entirely by its own innovations, with MRGDP accounting for 100 percent of the forecast error variance. This indicates strong inertia and highlights the dominance of internal sectoral dynamics in the very short run, where external macroeconomic shocks have not yet materialized. By the second period, the explanatory power of MRGDP declines to approximately 88.12 percent, while government expenditure emerges as the most influential external source of variation, accounting for 9.64 percent of fluctuations in manufacturing output. Oil price volatility contributes marginally (0.61 percent), while exchange rate and inflation effects remain limited. This suggests that fiscal policy shocks transmit relatively quickly to the manufacturing sector compared to other macroeconomic variables.

Medium-Run Dynamics

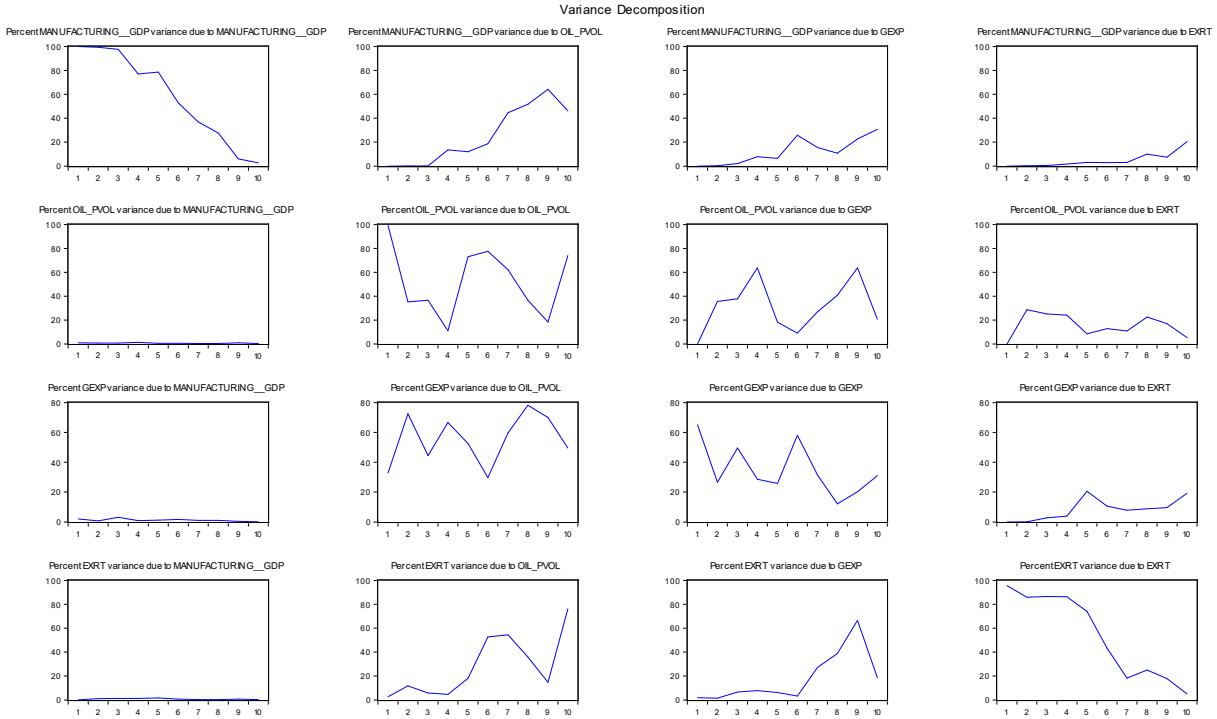
From periods three to six, the share of MRGDP's own shocks stabilizes between 84 and 87 percent, indicating persistent internal momentum within the manufacturing sector. However, the contribution of oil price volatility increases substantially, rising to over 6 percent by period four. This reflects the growing influence of oil market dynamics on manufacturing output as oil price shocks propagate through fiscal, external, and cost channels. Government expenditure continues to play a significant role in the medium run, contributing between 6 and 9 percent of the forecast error variance. This confirms the relevance of fiscal policy as a transmission mechanism, although its declining share over time suggests diminishing effectiveness or leakages in translating public spending into manufacturing output gains. Exchange rate and inflation remain relatively minor

contributors during this horizon, each accounting for less than 1.5 percent of output fluctuations. This indicates that their effects on manufacturing output are more indirect and gradual compared to oil price volatility and fiscal shocks.

Long-Run Dynamics

In the long run (periods seven to ten), manufacturing output remains predominantly explained by its own shocks, accounting for about 85 to 86 percent of the forecast error variance. Among the external variables, oil price volatility becomes the most influential, consistently explaining over 6 percent of manufacturing output fluctuations. This underscores the persistent dependence of Nigeria's manufacturing sector on oil market conditions. Government expenditure ranks as the second most important external factor, contributing approximately 5 to 6 percent in the long run. The declining influence of fiscal shocks over time reinforces concerns about inefficiencies in public spending and the limited long-term productivity impact of government expenditure on the manufacturing sector. Exchange rate and inflation contribute modestly but steadily, together explaining about 2 to 3 percent of variations in manufacturing output in the long run. Although their individual shares are small, their cumulative effect is non-negligible, reflecting the role of macroeconomic stability in shaping manufacturing performance over extended horizons.

figure 11 **variance decomposition of the forecast error**



5.0 Conclusion

This study utilized a Vector Error Correction (VEC) model and employed Impulse Response Function (IRF) and Variance Decomposition (VDC) analysis to investigate the impact of oil price volatility and its transmission channels on the performance of the Nigerian manufacturing sector (MRGDP) from 2000Q1 to 2024Q1.

A key insight from this study is that manufacturing output in Nigeria is largely driven by its own structural and internal dynamics, as evidenced by the consistently high proportion (over 85 percent) of forecast error variance explained by its own shocks. Nonetheless, among external factors, oil price volatility and government expenditure emerge as the most important sources of manufacturing output fluctuations. While, oil price volatility generates a significant, positive impulse on manufacturing in both the short-run and long-run period, GEXP is the most immediate and destabilizing channel linking oil shocks to manufacturing performance in the short run. Besides, the VDC reveals that the shock**s** from oil price volatility become progressively more important in explaining manufacturing forecast error variance. This confirms that the sustained uncertainty created by oil price volatility is a major factor driving long-term unpredictability in the manufacturing sector**.**

Exchange rate and inflation play supportive but less dominant roles. The Exchange Rate is the most consistently beneficial long-term channel for manufacturing growth. The combined IRF

and FEVD results thus reveal a sector that is internally resilient but externally vulnerable to oil-related fiscal and macroeconomic disturbances.

Overall, the findings suggest that oil price volatility does not automatically depress manufacturing activity in Nigeria; rather, its effects depend on the efficiency of fiscal transmission and the stability of the macroeconomic environment. Exchange rate dynamics amplify positive adjustments, while inflationary pressures and inefficient public spending dampen manufacturing performance. These results underscore the importance of coordinated fiscal, monetary, and exchange rate policies, alongside structural diversification efforts, to enhance the resilience and sustainability of Nigeria's manufacturing sector in the face of persistent oil price volatility.

Evidence-Based Policy Interventions

Based on the empirical evidence from the impulse response and variance decomposition analyses, the following policy measures are recommended to enhance the resilience and promote the sustainable industrialization of Nigeria's manufacturing sector in the face of persistent oil price volatility.

i. Enhance Structural Resilience**:** Since over 85% of MGRDP's forecast variance is due to its own shocks, the primary focus must be on deep structural reforms to boost productivity and internal market stability. This includes massive investments in power generation, transportation logistics, and human capital development specific to the manufacturing sector.
ii. Mitigate Government Expenditure Disruption**:** To remove the disruptive short-run impact of GEXP, the government must delink public spending from oil revenue volatility. This can be achieved through:

    a. Fiscal Policy Rule**:** Institute a strict, enforceable Oil Revenue Stabilization Fund to save oil windfalls and smooth expenditure. This will eliminate the large, initial destabilizing shocks observed in the IRF and VDC analyses.
    b. Spending Quality**:** Re-prioritize spending towards capital projects that directly reduce manufacturing costs (e.g., ports, rail modernization).

iii. Harness the Exchange Rate Advantage to Foster Long-Run Growth: Given the strong positive long-run response to the EXRT, policy should focus on maintaining a competitive (non-overvalued) exchange rate without excessive volatility. The Central Bank of Nigeria (CBN) should manage the foreign exchange market to prevent sudden, artificial appreciations of the Naira during periods of high oil prices, thereby actively counteracting the "Dutch Disease" effect that penalizes exporters and local producers.
iv. price stability should be treated as a core industrial policy objective. Coordinated monetary and fiscal policies are required to contain inflationary pressures arising from oil

price shocks and exchange rate pass-through, thereby reducing cost pressures on manufacturers and supporting long-term industrial investment.

In conclusion, achieving sustainable industrialization in Nigeria requires transcending the immediate, negative volatility transmitted through government spending, while capitalizing on a competitive exchange rate regime, all underpinned by deep, productivity-enhancing structural reforms.

This current study provides a robust foundation by utilizing time series analysis (VEC, IRF, VDC) on macroeconomic aggregates (GDP, inflation, exchange rate) to identify key transmission channels. The current study uses Manufacturing GDP as a single measure. The impact of oil shocks often differs vastly across sub-sectors. Future research can build upon these findings by focusing on disaggregation, micro-level mechanisms, and specific policy impacts to provide more granular, actionable insights for industrial policy.

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