THE IMPACT OF INTERNATIONAL OIL PRICE ON NIGERIA'S EXPORT REVENUE

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ABSTRACT
As one of Africa's leading oil producers, Nigeria is heavily reliant on oil exports and this accounts for over 90% of its total export revenue. This study examined the effect of international oil price changes on Nigeria's export revenue and the direction of granger causality between 1985 and 2022. To achieve these objectives, a Vector Autoregressive model was used to capture the dynamic relationship. Independent variables in the model include Gross Domestic Product, inflation rate and exchange rate. Granger causality test was also carried out to detect the direction of causality. Findings showed a positive relationship between changes in international oil price and changes in Nigeria's export revenue in the short run. A one unit increase in oil price leads to a 2.17 unit increase in export revenue. However, the long term results showed a negative relationship between oil price and export revenue. Findings also showed that there is a unidirectional causality running from oil price to export revenue. This study underscored the urgent need for economic diversification strategies to mitigate vulnerabilities associated with over-reliance on oil, thereby fostering a more resilient economic framework.

Keywords: Oil price, Export revenue, Granger causality, Gross domestic product, Vector Error Correction Model
JEL: F31, H20

1. INTRODUCTION
Nigeria is one of the top oil exporters in Africa, with oil accounting for a substantial portion of its total export revenue. According to the Central Bank of Nigeria (CBN 2020), over 90% of Nigeria's export revenue is derived from oil, making it highly susceptible to changes in global oil prices. The country's heavy reliance on oil exports makes its economy vulnerable to external shocks, as observed during periods of drastic declines in oil prices, such as the oil price collapse in 2014.
The historical perspective of Nigeria's reliance on oil is underscored by data from the World Bank, revealing that the oil and gas sector contributed over 90% to Nigeria's export revenue and 60% to the government's revenue between 1971 and 2005 (World Bank, 2021). This severe dependence on oil revenue has been a defining feature of Nigeria's economic structure. The COVID-19 pandemic has showed the vulnerability of Nigeria's economy to oil price volatility, resulting in budget deficits and an increased reliance on foreign loans to finance government expenditures. The average OPEC oil price from 1990 to 2023 stood at 82.95 U.S. dollars per barrel (OPEC, 2023), while the average annual price of Brent crude oil, a benchmark for Nigerian oil prices, was 82.49 U.S. dollars per barrel in 202 (EIA, 2023). These figures highlight how Nigeria's economy is vulnerable to external shocks.

The World Bank, in its report on the Nigerian economy, noted that the pandemic led to a contraction in economic growth, widened fiscal deficits, and increased debt levels (World

Bank, 2022). This aligns with the observations of renowned economists, such as Professor Adebayo Adedeji, who argued that the over-reliance on oil exposes Nigeria to significant economic risks (Adedeji, 2019). The volatility of oil prices has translated into fluctuations in Nigeria's revenue, leading to budget deficits and a heightened dependence on foreign loans. The International Monetary Fund (IMF) highlighted the substantial impact of oil price fluctuations on Nigeria's budgetary framework, emphasizing the need for diversification and reforms to reduce reliance on oil revenue (IMF, 2021). Sule-Iko and Nwoye (2023) revealed that in the long run, the effect of oil prices on Nigeria's real GDP is positive and statistically significant, measuring a 14.67% positive effect on the economy. This suggests that the consequences of oil price fluctuations endure over time, emphasizing the imperative of sustainable economic policies and diversification strategies.

The reliance on oil exports has implications not only for the government's fiscal position but also for the balance of trade. The Central Bank of Nigeria (CBN, 2020) reports that oil exports constitute a substantial portion of the country's foreign exchange earnings, influencing the stability of the Naira. Exchange rate fluctuations affect the prices of imported goods and services, contributing to inflationary pressures in the domestic economy. The need for economic diversification has been recognized by policymakers in Nigeria as a strategy to reduce dependence on oil revenue. The Economic Recovery and Growth Plan (ERGP) initiated by the government aims to diversify the economy by promoting sectors such as agriculture, manufacturing, and services. However, progress in diversification has been gradual, and the impact of these efforts on reducing vulnerability to oil price fluctuations requires thorough examination.

Several factors contribute to the complex relationship between international oil prices and Nigeria's export revenue. Geopolitical events, OPEC (Organization of the Petroleum Exporting Countries) decisions, global demand-supply imbalances, and technological advancements in oil extraction all play significant roles. Olayeni and Ogunnaike (2018) underscored the importance of considering these factors in analyzing the dynamics of oil price movements and their consequences for Nigeria's economy. Crude oil is like the lifeblood of Nigeria's economy, influencing government policies and affecting the daily lives of Nigerians. Despite efforts by the government, the reliance on oil remains a significant factor, causing vulnerability across different economic sectors and leading to hardships. The deregulation of the downstream oil sector in 2003 has made the importance of oil even more pronounced for Nigerians (Temitayo, 2014). With an estimated 37.2 billion barrels of oil reserves in 2011 and an average daily production of 2.13 million barrels, the fluctuating prices of oil on the global market, coupled with economic instability and oil discoveries in other parts of the world, have led to a decline in Nigeria's oil exports, especially to major economies like the United States, worsening the country's economic challenges (Igbeasere, 2013).

Over-reliance on oil revenue creates problems such as neglecting other funding sources, hindering development in infrastructure, private sector investment, and the modernization of agriculture and manufacturing. Additionally, it fosters inflation through low tax rates and high spending on imported goods. Despite the income generated from oil, there's a need to study the connection between oil price and Nigeria's export revenue. This research aims to achieve the following objectives: To examine the effect of oil price on Nigeria’s Export Revenue; to analyze the short and long term response of export revenue to shocks in oil price, gross domestic product (GDP), inflation rate and exchange rate and lastly, to identify the direction of Granger causality between oil price and export revenue. This study is significant because insights gained from it can guide the development of strategies to mitigate the adverse effects

of oil market volatility and fostering economic stability. It would also contribute to efforts aimed at reducing Nigeria's dependence on oil revenue and help in its bid to diversify the economy. It would guide investment decisions, risk assessments, and the development of sustainable business models, contributing to a more robust investment climate.

The rest of this study is organized as follows: Section 1 gave an introduction. Section 2 presents the literature review, section 3 talks about the research methodology while section 4 discusses the result and findings. Section 5 concludes the paper.

2. LITERATURE REVIEW

2.1 Conceptual Review

The concept of Export revenue has to do with the income garnered by a nation through the sale of goods and services to foreign countries. It stands as a pivotal component in a nation's balance of trade, exerting considerable influence on its economic growth and stability. Krugman and Obstfeld (2018) defined export revenue as the comprehensive earnings derived from a country's exports, measured in monetary terms and spanning a specific time-frame. This revenue constitutes a fundamental component of a nation's balance of payments, reflecting the financial gains accrued from international trade activities.

2.2 Theoretical Review

The theory of Price Elasticity of Demand and Supply underscores the responsiveness of quantity demanded and supplied to changes in price. On the basis of this, fluctuations in international oil prices can significantly affect export revenue due to the relatively inelastic demand for oil globally. When oil prices surge, a country's export revenue experiences a boost, reflecting the inelastic nature of global demand for oil. Conversely, when oil prices plummet, export revenue dwindles, underscoring the sensitivity of the country's export earnings to shifts in oil prices. The Dutch disease theory elucidates the impact of international oil prices on a nation’s export revenue. This theory posits that a surge in revenues from natural resources, such as oil, can lead to a decline in the competitiveness of other sectors of the economy, exacerbating economic imbalances. It means that, windfall gains from oil exports can trigger an appreciation of the national currency, making non-oil exports less competitive in international markets. Consequently, the nation’s export revenue from non-oil sectors may dwindle, leading to its dependence on oil exports and rendering its economy vulnerable to fluctuations in oil prices. The Dutch disease theory shall serve as the theoretical framework for this study.

2.3 Empirical Literature

Agya, Samuel and Amadi (2022) investigated the shock and volatility transmission between crude oil price and exchange rate in Nigeria using daily data from October 2009 to November 2020. The research found that previous shocks affect current shocks of exchange rate and oil price. On the other hand, Olayungbo (2019) used the Frequency Domain Causality Approach to examine the Effects of Global Oil Price on Exchange Rate, Trade Balance, and Reserves in Nigeria. Results showed that there is a unidirectional causality running from oil price to exchange rate, trade balance, and foreign reserve in Nigeria. The research also found that the effect of oil price on exchange rate is stronger than its effect on trade balance and foreign reserve. The study concluded that the Nigerian government should diversify its economy to

reduce its dependence on oil exports and stabilize the exchange rate. The results indicated that oil prices have a significant impact on the exchange rate, trade balance, and foreign reserves in Nigeria, with implications for the country's economy and policy decisions. Nwosu, Ihugba and Okonkwo (2019) deduced from their studies that a rise in oil price leads to a rise in industrial production in Nigeria.

What impact does oil revenue have on economic growth? To answer this question, Raifu (2023) used a quantile regression method to examine the relationship between oil revenue and economic growth. He found out that an increase in oil revenue has a positive and significant effect on economic growth. Specifically, an increase in oil revenue by 1% leads to an increase in economic growth by 0.184%. This method allows for a more comprehensive understanding of how oil revenue impacts economic growth, particularly in a country like Nigeria, where the economy is significantly dependent on oil revenue exports. The study also found that human capital and investment spur economic growth while trade openness increases it. The research recommended that policymakers should judiciously use the oil revenue by investing it in the economy, especially during windfall periods and diversify its sources of export to enrich and make its economic growth more efficient. Meanwhile, Okereke and Obinna (2022) observed that an increase in the prices of petroleum products leads to an increase in the prices of food in Nigeria. Grigoli, Herman and Swiston (2019) found out that oil exporters that have stronger fiscal position, a diversified export base, price stability and a flexible exchange rate can weather oil shocks better.

Unlike other studies that sought to find out the impact of oil revenue on economic growth, Sule-Iko and Nwoye (2023) decided to find out the effect of international crude oil prices on Nigeria's Gross Domestic Product. The research spanned from 1985-2020. The study used a vector autoregressive (VAR) model. Findings revealed that crude oil prices have a significant positive impact on Nigeria's economy. Humbatova and Hajiyev (2022) employed the Autoregressive Distributed Lag (ARDL) bound testing approach to analyze the effect of oil price shocks on GDP per capita, exchange rates, and total trade turnover within both short-term and long-term perspectives. Their findings indicated that negative oil price shocks had a significant impact on national income in Azerbaijan during the observed time frame. Similar to Humbatova and Hajiyev (2022), Yildrim and Arifli (2021) observed that negative oil price shocks cause deterioration in trade, rise in inflation, low economic growth and currency depreciation.

Adejola et al. (2022) had mixed results in their investigation of the oil price-exchange rate nexus for Nigeria. Similarly, Alekhina (2018) employed a Vector Autoregressive (VAR) methodology along with a Taylor rule equation to examine how oil price fluctuations influence the real Gross Domestic Product (GDP), Consumer Price Index (CPI) inflation rate, interest rate and exchange rate of an energy exporting country that is not a member of the Organization of the Petroleum Exporting Countries (OPEC). Based on the results, it was observed that oil price fluctuations significantly affect the real GDP, consumer price index, interest rate, and exchange rate of energy exporting economies. Senhadji (2017) took a different dimension by considering the role of government size in the relationship between government size, oil price shocks, and non-oil output growth. The findings indicated that government size plays an important role in explaining the transmission of oil price shocks to non-oil GDP. Specifically, the study observed that non-oil output growth tends to be greater when the government size is larger, and output volatility is higher. Additionally, an unexpected increase in oil prices leads to an expansion in government expenditure, with the expansion being larger for larger governments. The immediate impact of the oil price shock on non-oil output and government

expenditure seems to be similar for small and large governments. However, over time, the size of the government significantly influences how government expenditure and non-oil output evolve in response to an oil price shock. Larger governments tend to experience more significant growth in total and current expenditure in the medium to long run compared to smaller governments.

Contrary to the findings of Raifu (2023), Ologunde (2020) used Pooled Mean Group estimators on panel autoregressive distributed lag model to examine the relationship between crude oil revenue and sustainable development and found no long-term relationship in the selected African countries. His findings suggested that crude oil revenue have a potential negative effect on sustainable development, implying that over-reliance on crude oil revenue could negatively impact the economy in the long run.

Does crude oil price volatility affect only revenue and GDP? This was the question Ahmad (2022) posed when he used a Vector Autoregression (VAR) model to assess the link between oil price volatility and macroeconomic variables. The result of the research showed that there is a significant relationship between crude oil price volatility and key macroeconomic indicators such as gross domestic product (GDP), inflation rate (IR), interest rate, and exchange rate in South Asian countries. The impulse response function revealed considerable variance among macroeconomic indicators in response to crude oil price shocks. Additionally, the variance decomposition analysis demonstrated that each country in the region reacts differently to crude oil price volatility based on their macroeconomic fundamentals, independent policies, sector structures, and other country-specific differences. The findings suggest the need for policy changes to reduce dependency on oil energy and promote the transition towards renewable and green energy sources for better environmental outcomes and sustainable development in the region.

Akinsola and Odhiambo (2020) observed a negative relationship between oil price and economic growth for a panel of seven African countries in the long run. Meanwhile, Castro and Jimenez-Rodriguez (2020) used a Time-Varying Parameter Vector Autoregressive model to examine the effect of oil price shock on United States real effective exchange rate. The result of the research indicated that for an oil-importing country like the U.S., there is a short-term depreciation of the effective exchange rate following an oil price shock. However, the long-term responses of the U.S. EER vary across different time periods, with periods of appreciation observed before the mid-2000s and after the mid-2010s, and depreciation between both periods. This diversity of response suggests that policymakers may need to adopt different strategies to counteract such shocks effectively.

High oil prices are associated with high economic growth rates in Nigeria. These were the findings of Ahmed and Habiba (2022) and Emediegwu and Okeke (2017). Similarly, Edeh, Iloka and Nnamani (2017) examined the relationship between oil prices and investment in Nigeria. Results indicated that higher oil prices are associated with higher levels of investment. Furthermore, Adedokun (2018) investigated the effects of oil shocks on the relationship between government revenue and government expenditure. Results indicated that oil price shocks could not determine the changes in government expenditure in the short run. Charfeddine and Barkat (2020) discovered asymmetric impact of oil price shocks. The responses of GDP to the negative shock were greater than the positive shocks.

2.4 Gaps in the Literature and Value addition

While the existing literature have examined the impact of oil price instability on numerous macroeconomic variables, there is a significant research gap in understanding its specific impact on export revenue in Nigeria. Most studies have focused on the aggregate impact of oil price shocks on the overall economy, neglecting the distinct effect on export revenue. This study aims to address this research gap by investigating the impact of oil price instability on export revenue in Nigeria; thereby contributing to knowledge.

3. METHODOLOGY

3.1 Model Specification

The model used was adopted from the work of Akalpler and Nuhu (2018) with slight modification. The model is specified as:

$$Exportrev_t = \beta_0 + \beta_1 Oilprice_t + \beta_2 Exchangerate_t + \beta_3 Inflation_t + \beta_4 GDP_t + \varepsilon_t$$

Where:

Export revenue$_t$ is the export revenue at time t and it is the explained variable. The explanatory variables are Oil price, exchange rate, inflation rate and Gross domestic product. Oil price$_t$ is the international oil price at time t; Exchange rate$_t$ is the exchange rate at time t; Inflation rate$_t$ is the Inflation rate at time t; GDP$_t$ is the GDP at time t. β_0 is the intercept; β_1, β_2, β_3, and β_4 are the coefficients of the independent variables. ε_t is the error term at time t. The inclusion of these variables are justified based on economic theory and the literature such as Akalpler and Nuhu (2018) and Grigoli, Herman and Swiston (2019). Table 1 presents a description of the variables used and the sources of data.

Table 1: Variables and their measurement

Variable	Description	Measurement	Source of Data
Export revenue	Total Income generated from the sales of goods and services to foreign countries	Measured in U.S. dollars (USD) over a specific period (yearly)	World Bank
Oil price	The cost of purchasing one barrel of oil in international market	Recorded in currency units (USD per barrel of oil)	Central Bank of Nigeria Bulletin
Exchange rate	The value of domestic currency (Naira) relative to foreign currency (USD)	Determined by comparing the domestic currency worth (Naira) against a specific foreign currency exchange rate (USD)	Central Bank of Nigeria Bulletin
Inflation rate	The percentage change in the general price level of goods	Calculated as the year-over-year percentage increase in a price index (e.g	World Bank

	and services over a specifi period	consumer Price Index)	
GDP	The market value of all goods and services produced within a country in a specific time period	Calculated as the sum of consumption, investment, government spending, and net exports	World Bank

Source: Authors' computation, 2024

On an A-Priori ground, it is expected that: β1 (Oil price): Positive (+): An increase in oil prices is expected to increase export revenue, as many countries rely on oil exports. β2 (Exchange rate): Negative (-): An appreciation of the exchange rate (strengthening of the currency) is expected to decrease export revenue, making exports more expensive for foreign buyers. β3 (Inflation rate): Negative (-): High inflation rates can lead to decreased export revenue, as higher production costs and prices may make exports less competitive. β4 (GDP): Positive (+): An increase in GDP is expected to increase export revenue, as a growing economy typically leads to increased production and exports.

3.2 Method of Estimation

This study employed Vector Autoregressive (VAR) model, Impulse Response Analysis, Granger Causality Test to ascertain the impact of international Oil Price on Nigeria's Export Revenue. The VAR model was used to estimate specific parameters. Before conducting the VAR, we applied the Augumented Dickey Fuller (ADF) unit root test to ascertain whether the time series exhibit stationarity. Additionally, Granger causality test was carried out to determine the direction of causality. **Cointegration Test**: After testing for order of integration, the next step is to test for co-integration. **Impulse Response Analysis**: After testing for order of integration, the next step is to understand the dynamic relationship between variables in a system, particularly in the context of vector autoregression (VAR) models. Impulse Response Analysis aims to explore how a shock or impulse to one variable affects the behavior of all variables in the system over time.

Granger Causality Test: After the impulse Response Analysis, the Granger Causality Test is used to determine whether one variable (e.g., international oil prices) "Granger causes" another variable (e.g., Nigeria's export revenue). **Vector Autoregressive Model**: VAR model would be used to analyze the dynamic relationships among multiple time series variables. Specifically, it allows for the simultaneous modeling of the interdependencies between variables over time. The VAR model is specified by defining the endogenous variables (variables influenced by the model) and potentially exogenous variables (external factors not influenced by the model). In this case, international oil prices and Nigeria's export revenue are chosen as endogenous variables.

The VAR model is:

$$\begin{bmatrix} ERE_t \\ OPC_t \\ INF_t \\ GDP_t \\ EXC_t \end{bmatrix} = \begin{bmatrix} \alpha ERE \\ \alpha OPC \\ \alpha INF \\ \alpha GDP \\ \alpha EXC \end{bmatrix} + \begin{bmatrix} A_{11} & A_{12} & A_{13} & A_{14} & A_{15} \\ A_{21} & A_{22} & A_{23} & A_{24} & A_{25} \\ A_{31} & A_{32} & A_{33} & A_{34} & A_{35} \\ A_{41} & A_{42} & A_{43} & A_{44} & A_{45} \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} \end{bmatrix} \begin{bmatrix} ERE_{t-1} \\ OPC_{t-1} \\ INF_{t-1} \\ GDP_{t-1} \\ EXC_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon ERE_t \\ \varepsilon OPC_t \\ \varepsilon INF_t \\ \varepsilon GDP_t \\ \varepsilon EXC_t \end{bmatrix}$$

Where ERE_t, OPC_t, INF_t, GDP_t and EXC_t represent export revenue, oil price, inflation rate, Gross Domestic Product and exchange rate at time t respectively.

αERE αOPC, αINF, αGDP, and αEXC are the constant terms for each equation.

In case there is cointegration among variables, Vector Error Correction Model (VECM) would be adopted. VECM, which is an extension of VAR, takes into account the cointegrating relationships between variables and allows for short-term dynamics and long-term equilibrium relationships.

4. RESULTS AND DISCUSSION OF FINDINGS

This section presents an analysis of the results and its discussion. It begins with the Augmented Dickey Fuller (ADF) Unit root test result presented in table 2.

Table 2: Unit Root Test with ADF

Method	Statistic	Prob.**
ADF - Fisher Chi-square	81.9120	0.0000
ADF - Choi Z-stat	-7.59718	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(UNTITLED)

Series	Prob.	Lag	Max Lag	Obs
D(EX__RATE__)	0.0015	0	2	36
D(EXPORT_$)	0.0000	0	2	36
D(GDP $)	0.0092	0	2	36
D(INF__R__)	0.0001	1	2	35
D(OIL_PRICE)	0.0001	0	2	36

Source: Authors' computation, 2024

The unit root test was conducted for Export revenue, oil price, GDP, inflation rate, and exchange rate. Table 2 shows that the probability values at the first difference confirm the

stationarity of all variables. The Fisher Chi-square value is 81.9120 with a probability of zero, and the Choi Z-statistic is -7.75 with a probability of zero. The results indicate that the time series for exchange rate, exports, GDP, inflation rate, and oil price are all stationary at first difference.

Table 3: Johansen-Fisher Cointegration Test Results: Trace and Maximum Eigenvalue

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.672624	98.63589	69.81889	0.0001
At most 1 *	0.480113	59.55328	47.85613	0.0028
At most 2 *	0.413965	36.65828	29.79707	0.0069
At most 3 *	0.348912	17.95514	15.49471	0.0209
At most 4	0.080471	2.936297	3.841466	0.0866

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.672624	39.08261	33.87687	0.0109
At most 1	0.480113	22.89500	27.58434	0.1780
At most 2	0.413965	18.70314	21.13162	0.1058
At most 3 *	0.348912	15.01884	14.26460	0.0379
At most 4	0.080471	2.936297	3.841466	0.0866

Source: Authors' computation, 2024

With the model's stability established, assessing long-term becomes important. Employing the Johansen cointegration test methodology, this study evaluates null hypotheses of "r" cointegrating vectors against alternatives of "k" cointegrating associations equations. Results from the Trace and Max-Eigen tests, akin to Johansen's approach, demonstrate significant Fisher statistics, indicating long-run relationships.

Table 4: Impulse Response Test

Period	EXRATE	GDP	INFLATION	OILPRICE
1	-5.988223	21.60858	-0.658324	8.661591
	(2.98658)	(4.07667)	(2.28345)	(1.78573)
2	-8.955095	22.72135	-2.088623	4.139936
	(4.37159)	(6.55048)	(3.16537)	(3.01772)
3	-10.46429	31.37753	-1.924659	5.227989
	(5.00617)	(8.32339)	(2.93574)	(3.39382)
4	-9.519491	26.96884	-0.735776	2.119538
	(6.19094)	(11.4861)	(3.03160)	(3.88293)
5	-6.406144	17.79156	0.540785	-0.513451
	(6.87894)	(13.7438)	(2.61800)	(4.12362)
6	-3.153572	8.199500	1.353405	-2.148290
	(7.46676)	(15.7114)	(2.37464)	(4.25372)
7	-0.539294	0.701739	1.611847	-2.836467
	(7.85502)	(17.0420)	(2.30902)	(4.30981)
8	1.269579	-4.384154	1.430164	-2.925526
	(8.02669)	(17.9113)	(2.09333)	(4.23763)
9	2.387518	-7.364693	1.047777	-2.654723
	(8.04496)	(18.4004)	(1.76350)	(4.03314)
10	2.958762	-8.637998	0.658817	-2.165108
	(7.95297)	(18.5190)	(1.43964)	(3.75049)

Source: Authors' computation, 2024

Initially, in the first period, the results show that a shock in the exchange rate significantly reduces Nigeria's export revenue, reflecting the country's sensitivity to exchange rate fluctuations. Concurrently, an increase in GDP leads to a substantial rise in export revenue, indicating the positive relationship between economic growth and export performance. Oil prices also contribute positively, although the impact is less pronounced than GDP. On the other hand, inflation has a minor negative effect on export revenue, suggesting that higher domestic prices may slightly hinder export competitiveness. As the analysis progresses to the second period, the adverse effect of exchange rate shocks on export revenue intensifies. This trend highlights the growing vulnerability of Nigeria's export sector to exchange rate instability. GDP continues to exert a strong positive influence, reinforcing the crucial role of economic growth in boosting exports. However, the positive impact of oil price shocks diminishes, reflecting possible volatility or adjustments in the global oil market. Inflation's negative impact becomes more pronounced, indicating that inflationary pressures could further erode export gains.

By the third period, the negative impact of exchange rate shocks reaches its peak, underscoring the critical challenge posed by exchange rate volatility. Meanwhile, GDP's positive influence on export revenue is at its highest, showcasing the importance of sustained economic growth. Oil price shocks begin to regain some positive influence, hinting at a potential stabilization or improvement in global oil prices. Interestingly, the negative impact of inflation reduces slightly, suggesting some degree of adaptation to inflationary conditions. In the fourth period, the negative effect of exchange rate shocks starts to ease, although it remains significant. GDP's influence on export revenue weakens, which might be attributed to cyclical economic factors

or external influences. The positive impact of oil price shocks continues to decline, possibly due to ongoing volatility in the oil market. Inflation's impact remains minimal, indicating that other factors may overshadow its influence on export revenue.

Moving into the fifth period, the negative impact of exchange rate shocks continues to diminish, suggesting a potential stabilization in exchange rates. GDP's positive effect on export revenue further reduces, which could be a sign of economic slowdowns or external economic pressures. Notably, oil price shocks turn negative, indicating a detrimental effect on export revenue. This shift might reflect adverse developments in the global oil market or Nigeria's reliance on oil exports. Interestingly, inflation begins to show a positive impact on export revenue, potentially indicating adjustments or adaptations in the economy. In the sixth period, the adverse impact of exchange rate shocks further reduces, and GDP's influence continues to decline. Inflation's positive impact increases, which could suggest that domestic economic conditions are stabilizing. However, oil price shocks have a stronger negative effect, emphasizing the persistent volatility in the global oil market and its implications for Nigeria's export revenue.

By the seventh period, the negative impact of exchange rate shocks is minimal, indicating a significant reduction in exchange rate volatility. GDP's effect on export revenue becomes negligible, reflecting possible stagnation or external economic pressures. Inflation's positive impact increases further, suggesting improved domestic economic conditions. However, oil price shocks exert a larger negative effect, underscoring the ongoing challenges in the global oil market. In the eighth period, exchange rate shocks start to have a positive impact on export revenue, signaling potential benefits from exchange rate stabilization or favorable adjustments in exchange rates. However, GDP shocks negatively influence export revenue, indicating economic challenges. Inflation continues to show a positive impact, and oil price shocks remain negative, reflecting persistent volatility in the oil market.

By the ninth period, the positive impact of exchange rate shocks strengthens, while GDP's negative effect increases. Inflation's positive impact decreases slightly, and oil price shocks continue to have a negative effect. This period reflects the ongoing complexities in the global oil market and their implications for Nigeria's export revenue. In the final, tenth period, the positive impact of exchange rate shocks peaks, indicating significant benefits from exchange rate stabilization. GDP's negative influence on export revenue is at its highest, suggesting ongoing economic challenges. Both inflation and oil price shocks show decreased impacts, reflecting potential stabilization or adaptation to these economic conditions.

In conclusion, the research reveals that Nigeria's export revenue is highly sensitive to shocks in exchange rate, GDP, inflation, and oil prices, with varying impacts over time. In the short term, exchange rate and GDP shocks have the most significant effects, while oil price shocks become more influential in the long term. Overall, Nigeria's export revenue tends to respond positively to GDP growth and negatively to exchange rate depreciation and oil price shocks over time. This analysis highlights the critical importance of maintaining economic stability and addressing vulnerabilities to enhance export performance.

4.1 Granger causality Test

To identify the direction of Granger causality between oil price and Export Revenue, Granger causality Test was conducted. Result is presented in table 5.

Table 5: Pariwise Granger causality Test (10 lags)

Null Hypothesis:	Obs	F-Statistic	Prob.
OILPRICE does not Granger Cause EXPORTR	28	7.41156	0.0072
EXPORTR does not Granger Cause OILPRICE		4.33685	0.0320

Source: Authors' computation, 2024

For the hypothesis that oil price does not Granger-cause export revenue in Table 5, the F-statistic is 7.41156 with a corresponding p-value of 0.0072. This p-value is well below the 5% significance level thresholds (such as 0.05), indicating that we reject the null hypothesis. In other words, there is statistically significant evidence to suggest that past values of oil price can predict export revenue in Nigeria. This finding aligns with the intuitive understanding that oil price fluctuations, given Nigeria's reliance on oil exports, significantly influence the country's export revenue. With a lag of 10, significant Granger causality is found. This indicates that over a longer period, past values of oil price do provide significant information to predict export revenue.

4.2 Vector Error Correction Model (VECM)

To examine the effect of oil price on Nigeria's Export Revenue a VECM was estimated and the result is presented in Table 6. The Vector Error Correction Model (VECM) is used to identify both the short-term and long-term relationship among the variables. The model includes export revenue (EXPORTR), exchange rate, GDP, inflation, and oil prices. By examining these variables at their lagged levels, the VECM captures the influence of past values on the current period. This method is particularly useful for understanding how oil price changes impact export revenue over different time horizons. The analysis revealed significant long-term and short-term relationships between oil prices and export revenue. The cointegrating equations showed that in the long run, higher oil prices negatively impact Nigeria's export revenue. This is in line with the finding of Adedokun (2018)

Specifically, in one of the cointegrating equations (CointEq3), the coefficient for oil prices is notably negative (-14.79002), indicating that a rise in oil prices leads to a substantial decrease in export revenue over time. This negative long-term impact is also supported by the coefficient in CointEq1 (-5.881168), underscoring the adverse effect of oil price increases on export revenue. The error correction terms indicate how quickly the variables return to equilibrium after a disturbance. For example, the negative and significant coefficient (-0.1306) for the error correction term in the export revenue equation suggests a rapid adjustment towards equilibrium.

Table 6: **Vector Error Correction Model (VECM)**

Cointegrating Eq:	CointEq1	CointEq2	CointEq3		
EXPORTR(-1)	1.000000	0.000000	0.000000		
EXRATE(-1)	0.000000	1.000000	0.000000		
GDP(-1)	0.000000	0.000000	1.000000		
INFLATION(-1)	9.168316	-14.45691	12.44617		
	(3.64757)	(5.77376)	(5.21794)		
	[2.51354]	[-2.50390]	[2.38527]		
OILPRICE(-1)	-5.881168	3.435997	-14.79002		
	(2.68331)	(4.24743)	(3.83855)		
	[-2.19176]	[0.80896]	[-3.85302]		
C	58.91614	-22.53806	229.0010		
Error Correction:	D(EXPORTR)	D(EXRATE)	D(GDP)	D(INFLATION)	D(OILPRICE)
CointEq1	0.575486	-0.481681	1.511986	-0.072902	0.619979
	(0.14914)	(0.16497)	(0.28045)	(0.16604)	(0.11513)
	[3.85866]	[-2.91977]	[5.39129]	[-0.43906]	[5.38514]
CointEq2	0.250759	-0.126619	0.560182	-0.001734	0.259650
	(0.05960)	(0.06592)	(0.11207)	(0.06635)	(0.04601)
	[4.20748]	[-1.92067]	[4.99848]	[-0.02614]	[5.64382]
CointEq3	-0.130631	0.182401	-0.455595	0.028206	-0.147349
	(0.04436)	(0.04907)	(0.08342)	(0.04939)	(0.03424)
	[-2.94482]	[3.71730]	[-5.46178]	[0.57113]	[-4.30307]
D(EXPORTR(-3))	-0.136408	-0.020676	0.385618	-0.046360	-0.170549
	(0.23043)	(0.25489)	(0.43331)	(0.25654)	(0.17788)
	[-0.59197]	[-0.08112]	[0.88994]	[-0.18071]	[-0.95880]
D(EXPORTR(-4))	-0.244230	-0.259915	0.418804	-0.049568	-0.025223
	(0.20288)	(0.22441)	(0.38149)	(0.22587)	(0.15661)
	[-1.20384]	[-1.15821]	[1.09780]	[-0.21946]	[-0.16106]
D(EXRATE(-3))	-0.391497	0.341263	-0.578819	-0.073335	-0.364287
	(0.20294)	(0.22448)	(0.38162)	(0.22594)	(0.15666)
	[-1.92911]	[1.52022]	[-1.51675]	[-0.32458]	[-2.32537]
D(EXRATE(-4))	-0.325424	0.083256	-0.416011	-0.134228	-0.168739
	(0.21949)	(0.24279)	(0.41274)	(0.24436)	(0.16943)
	[-1.48263]	[0.34292]	[-1.00793]	[-0.54930]	[-0.99591]
D(GDP(-3))	-0.735904	0.417708	-1.022208	-0.025402	-0.210824
	(0.15640)	(0.17300)	(0.29409)	(0.17412)	(0.12073)
	[-4.70540]	[2.41455]	[-3.47583]	[-0.14589]	[-1.74628]
D(GDP(-4))	0.600421	-0.306825	0.886258	-0.115843	0.266938
	(0.14789)	(0.16359)	(0.27810)	(0.16465)	(0.11416)
	[4.05982]	[-1.87555]	[3.18679]	[-0.70355]	[2.33819]
D(INFLATION(-3))	0.125004	-0.454205	0.296356	-0.028361	0.058351
	(0.16422)	(0.18165)	(0.30880)	(0.18282)	(0.12676)
	[0.76122]	[-2.50049]	[0.95972]	[-0.15513]	[0.46031]
D(INFLATION(-4))	0.072906	0.116166	0.194014	-0.023053	0.135926
	(0.16734)	(0.18511)	(0.31468)	(0.18631)	(0.12918)
	[0.43567]	[0.62756]	[0.61655]	[-0.12374]	[1.05223]
D(OILPRICE(-3))	2.017678	-0.820858	2.334555	0.054484	0.997402
	(0.41098)	(0.45460)	(0.77281)	(0.45755)	(0.31725)
	[4.90948]	[-1.80567]	[3.02086]	[0.11908]	[3.14393]
D(OILPRICE(-4))	0.354056	0.743150	-1.396387	0.303747	-0.094063
	(0.34379)	(0.38029)	(0.64648)	(0.38275)	(0.26539)
	[1.02985]	[1.95419]	[-2.15999]	[0.79358]	[-0.35444]
C	8.828923	8.201226	22.89803	2.269190	6.185678
	(4.73327)	(5.23568)	(8.90057)	(5.26967)	(3.65378)
	[1.86529]	[1.56641]	[2.57265]	[0.43061]	[1.69295]

Source: Authors' computation, 2024

Additionally, the short-term analysis shows that oil prices can temporarily boost export revenue. The positive and significant coefficient (2.017678) for the lagged oil price (D(OILPRICE(-3))) indicates that in the short-term, an increase in oil prices can have a positive effect on export revenue. The study also considered the influence of other economic variables on export revenue. The exchange rate and GDP exhibited significant relationships with export revenue, highlighting the interconnectedness of various economic factors.

5. CONCLUSION AND POLICY RECOMMENDATIONS

This study examined how international oil prices affect Nigeria's export revenue from 1985 to 2022. Based on secondary data, the research used a time series analysis to explore the

relationship between oil price and export revenue. Specifically, a Vector Error Correction model was employed. The cointegration test indicated the presence of a long-term equilibrium relationship between oil prices and export revenue. The results showed that rising oil prices have a significant long-term negative impact on Nigeria's export revenue and this is in line with the findings of Adedokun (2018). An increase in oil price leads to a substantial decrease in export revenue over time, with a coefficient of -14.79002. This long-term negative relationship highlights Nigeria's economic vulnerability due to its heavy reliance on oil exports.

Meanwhile, in the short term, the analysis reveals a different trend. Increase in oil price leads to an increase in export revenue, indicated by the positive coefficient of 2.017678 for the lagged oil price. The results are in line with the findings of Charfeddine and Barkat (2020). This suggests that while oil price hikes may provide immediate revenue gains, these benefits are not sustainable in the long run. The study also examined the roles of exchange rates and Gross Domestic Product, showing their significant influence on export revenue and demonstrating the interconnected nature of these economic factors.

The results emphasize the need for Nigeria to pursue a comprehensive economic diversification strategy to reduce its reliance on oil exports and mitigate the risks associated with oil price and exchange rate fluctuations. Policymakers in Nigeria should focus on implementing policies that promote the development of non-oil export sectors, such as manufacturing, agriculture, and services. This could involve measures to improve infrastructure, enhance productivity, and increase the competitiveness of Nigerian exports in global markets. Additionally, the study underscored the importance of effective exchange rate management and macroeconomic stabilization policies to support the growth and resilience of Nigeria's export sector. Maintaining a stable and competitive exchange rate, as well as controlling inflationary pressures, can help to strengthen the price competitiveness of Nigerian exports and contribute to the country's overall economic development.

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