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ASSESSING THE IMPACT OF EXCHANGE RATE FLUCTUATION ON EXPORT PERFORMANCE IN NIGERIA

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ABSTRACT

This study investigates the impact of exchange rate fluctuations on export performance in Nigeria. The primary objective is to analyze how the exchange rate, crude oil prices, and interest rate influence terms of trade in shaping Nigeria's economic performance. The study employs Vector Error Correction Model (VECM) to examine the relationship between the variables. After confirming the order of integration among the variables which shows I(1) process, the study confirms a long-run, negative, and significant impact of exchange rate depreciation on Nigeria's terms of trade, driven by the country's dependence on imports of capital goods and refined petroleum. Conversely, rising crude oil prices and interest rates positively influence terms of trade, reflecting Nigeria's oil-export reliance and the potential of interest rates to attract foreign capital. The error correction term indicates long-term self-correction in trade dynamics. However, the findings vindicate the critical role of monetary policy and the vulnerabilities of oil dependence in the Nigerian economy. Finally, the study recommends maintaining stable exchange rates, enhancing monetary credibility, and diversifying the economy to strengthen external sector stability in Nigeria.

Keywords: Exchange rate, Terms of trade, VECM, Economic Growth, Heteroskedasticity.

JEL Classification: C1, F31, F41

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1. Introduction

The global economy is deeply interconnected, and exchange rates play a crucial role in shaping the economic interactions between nations. As a key determinant of a country's competitiveness, exchange rate fluctuations can significantly impact trade, especially export performance. In Nigeria, a resource-rich country with a diverse economic landscape, exchange rate volatility has had profound effects on its trade dynamics. A favorable exchange rate can enhance export attractiveness by making products more affordable to foreign markets, boosting export volumes and revenues. Conversely, unfavorable exchange rate movements can erode a country's competitiveness, reducing export performance and hindering economic growth (Islahiyah, 2024). Since adopting a floating exchange rate system in 1973, Nigeria has experienced considerable exchange rate volatility, with implications for its trade sector. The country's economy has struggled with over-reliance on oil exports, which has hindered diversification and left the economy vulnerable to fluctuations in global oil prices. This dependency on oil, combined with an underdeveloped manufacturing sector, has exacerbated the challenges posed by exchange rate volatility. As noted by Ezie *et al.* (2020), Nigeria's inability to reduce import dependence and implement effective export-led growth policies has contributed to its marginalization in global trade. Despite the growing body of literature on exchange rate volatility, the relationship between exchange rate fluctuations and export performance remains a contentious issue, especially in developing economies like Nigeria. While some studies suggest that exchange rate volatility harms trade by increasing uncertainty and transaction costs (Lien *et al.*, 2022), others argue that the impact may be mitigated through mechanisms such as forward exchange markets (Xia *et al.*, 2021). However, in developing countries, where financial markets are often less developed and hedging instruments are not as accessible, exchange rate volatility can have more pronounced negative effects on trade, leading to higher transaction costs and reduced export activity (Dani, 2024).

Nigeria's exchange rate policy has focused largely on monetary targets, often neglecting the broader implications for trade and the balance of payments (BOP). This oversight has contributed to Nigeria's persistent challenges in leveraging international trade for economic transformation (Oduyemi & Owoeye, 2020). Despite various policy measures aimed at stabilizing the exchange rate, including devaluations and market interventions, exchange rate instability continues to affect Nigeria's competitiveness in international markets. The manufacturing sector, in particular, has faced severe challenges due to fluctuating exchange rates, increasing import costs, and limited capacity utilization (Ekpo, 2018). Furthermore, the country's high dependency on imports, especially non-labor inputs, exacerbates the vulnerability of its trade balance to exchange rate fluctuations (Mesagan *et al.*, 2022). The ongoing challenges related to exchange rate volatility in Nigeria underscore the importance of this research. Nigeria, as Africa's most populous nation and its second-largest economy, faces unique economic challenges that make the relationship between exchange rate fluctuations and export

performance particularly relevant. The country's over-reliance on oil exports, compounded by an underdeveloped manufacturing sector, highlights the need for a deeper understanding of how exchange rate volatility affects trade dynamics. Policymakers in Nigeria face the dual challenge of managing exchange rate stability while promoting diversification away from oil dependence.

While the effects of exchange rate volatility on trade have been widely studied in developed economies, there remains a significant gap in the literature regarding the impact on developing countries, particularly those in Africa. Studies in developed economies have yielded mixed results, with some suggesting that volatility impedes trade, while others argue that it may have a positive or negligible effect (Heine & Herr, 2024). However, in less developed countries (LDCs) like Nigeria, where financial markets are less sophisticated and transaction costs are higher, the impact of exchange rate volatility is likely to be more pronounced. In such economies, the lack of forward exchange markets and the limited ability to hedge against exchange rate risk exacerbate the negative effects of exchange rate fluctuations on trade (Dani, 2024). Furthermore, while existing research has largely focused on the experiences of Western Europe and North America, few studies have specifically examined the impact of exchange rate volatility on trade in African countries, despite their unique economic characteristics and challenges (Ramzan, 2021). This research will contribute to filling this gap by focusing on Nigeria, providing insights into how exchange rate fluctuations affect the country's export performance and offering policy recommendations aimed at stabilizing trade and promoting economic growth.

The findings of this study are particularly important in the context of Nigeria's post-COVID-19 economic recovery. The pandemic has further complicated the country's economic challenges, making it even more critical to understand how exchange rate volatility interacts with trade flows in such an environment. By focusing on Nigeria, this research aims to provide valuable insights that can inform policies which would aim at fostering a stable exchange rate, enhancing trade competitiveness, and supporting export-led growth. However, understanding the dynamics of exchange rate volatility and its impact on Nigeria's exports is essential for crafting policies that promote economic diversification and stability. The results of this study will provide policymakers with the knowledge needed to address the challenges posed by exchange rate fluctuations, ultimately contributing to the broader goal of achieving long-term economic growth and stability for Nigeria.

Research Question

- a) What is the impact of exchange rate fluctuations, crude oil prices, and interest rates on Nigeria's terms of trade and export performance in the short run and long run?

Research Objective:

- b) To examine the short-run and long-run impact of exchange rate fluctuations, crude oil prices, and interest rates on Nigeria's terms of trade and export performance.

2. Literature Review

2.1 Conceptual Literature

Concept of Exchange Rate

The exchange rate represents the value of one currency relative to another, determining how much of one currency is needed to purchase a specific amount of another. There are two systems: fixed and floating. In a fixed exchange rate system, a currency is pegged to a major currency like the U.S. dollar, and the central bank intervenes to maintain stability. This offers price stability for trade but requires significant reserves. In a floating system, exchange rates are determined by market forces, fluctuating based on supply and demand. While this system allows for automatic adjustments to balance payments, it can lead to greater volatility. Both systems influence international trade and investment. Exchange rates are influenced by interest rates, inflation, political stability, and investor sentiment. Higher interest rates attract foreign capital, strengthening a currency, while lower inflation enhances its purchasing power (Adubi & Okumadewa, 1999). A weaker currency makes exports cheaper and imports more expensive, potentially improving the trade balance. Stable exchange rates promote foreign investment and economic growth, playing a crucial role in both national and global economic stability. In this study, the exchange rate is regarded as the value of one country's currency expressed in terms of another currency. It determines how much of one currency is needed to purchase a specific amount of another, influencing international trade, investment, inflation, and overall economic stability.

Concept of Economic Growth

Economic growth refers to the increase in a nation's output in terms of goods and services, typically measured by GDP. Thus, it entails increases in per capita income that lead to the attainment of a high standard of living equivalent to that of industrial countries (Todaro & Smith, 2011; Ughulu & Ajayi, 2020). However, exchange rate performance plays a key role in influencing economic growth by impacting trade, investment, and inflation. A stable exchange rate can foster investor confidence, stimulate foreign direct investment (FDI), and improve export competitiveness, contributing to growth. Recent studies show that currencies with higher stability tend to attract more investment, which in turn boosts economic output (IMF, 2023). Conversely, volatile exchange rates can deter investment and increase the cost of imports, leading to inflationary pressures and slowing growth (World Bank, 2022). Therefore, economic growth serves as a key measure of economic performance, reflecting how closely actual output aligns with the maximum potential output achievable, given current demand patterns and the most advanced available technology (Abdullahi & Hamid, 2024). For emerging economies, effective exchange rate management can be a vital tool for promoting sustainable economic expansion in the face of global economic uncertainties (Oyalabu, 2023). In this paper, economic growth represents

the long-term expansion of an economy's productive capacity and the output that could be generated if all resources were fully and efficiently utilized.

2.2 Theoretical Literature Review

Purchasing Power Parity (PPP) Theory

Purchasing Power Parity (PPP) theory suggests that exchange rates, in the long run, should adjust to equalize the price of a basket of goods and services between countries. Fluctuations in exchange rates impact relative prices, potentially altering the competitiveness of exports (Umeaduma & Dugbartey, 2023). For Nigeria, this means that exchange rate changes can influence the price of Nigerian goods in global markets, affecting export volumes. PPP serves as a tool for determining the relative value of currencies, asserting that identical goods should cost the same in different countries when priced in a common currency. However, Purchasing Power Parity (PPP) theory suggests that exchange rates between currencies should reflect the ratio of price levels for identical goods in different countries (Vo & Vo, 2023). Based on the "Law of One Price," it includes Absolute PPP, which compares price levels, and Relative PPP, focusing on inflation-driven exchange rate changes over time. Purchasing Power Parity assumes all goods are tradable, but non-traded goods like real estate can cause deviations. Market imperfections, including transportation costs, tariffs, and taxes, prevent the law of one price from holding universally. Additionally, short-term volatility in exchange rates can result from factors like interest rates, speculation, and geopolitical events, further distorting PPP in the near term (Hu, 2022).

Interest Rate Parity (IRP) Theory

Interest Rate Parity (IRP) theory explains the relationship between interest rates and exchange rates between two countries. It posits that the difference in interest rates is offset by changes in the exchange rate, ensuring no arbitrage opportunities in the foreign exchange market (Brown, 2017). According to IRP, if one country's interest rates are higher, it may attract foreign investment, leading to currency appreciation. However, a stronger currency could make exports more expensive, affecting competitiveness. IRP includes two key concepts: Covered Interest Rate Parity (CIRP), where the forward exchange rate eliminates arbitrage opportunities, and Uncovered Interest Rate Parity (UIRP), where the expected future spot exchange rate adjusts to reflect interest rate differentials (Rime et al, 2022). The theory helps determine forward exchange rates, ensuring market equilibrium in the absence of risk-free profit opportunities (Engel, 2016). Transaction costs, taxes, and capital controls can prevent Interest Rate Parity (IRP) from holding perfectly, as these costs reduce potential arbitrage profits. Uncovered IRP assumes no risk preference, but in reality, investors may demand a risk premium for holding foreign currencies, causing deviations. Additionally, market imperfections like liquidity issues,

market sentiment, and speculation can lead to short-term deviations from the IRP condition, distorting exchange rates (Dong, 2018).

Monetary Model of Exchange Rates

The Monetary Model of Exchange Rates explains how exchange rates are determined by the supply and demand for money in different countries, with a focus on the role of monetary policy (Khatat, 2018). According to the model, changes in a country's money supply directly affect inflation and exchange rates. When a country increases its money supply faster than another, its currency tends to depreciate due to higher inflation (Precious, 2020). Conversely, controlling inflation by limiting money supply growth leads to currency appreciation. However, the key concepts of the monetary model include money demand and supply, where money demand is linked to income and interest rates, while the central bank controls the money supply (Dornbusch, 2019). Exchange rates are also influenced by relative price levels. If a country experiences higher prices than another, its currency will depreciate. Expectations about future inflation and money supply growth are crucial, as anticipated changes can cause currency fluctuations before actual changes occur (Frenkel, 2019). This model highlights how fluctuations in exchange rates can affect economic factors such as export competitiveness.

2.3 Empirical Literature Review

Several studies have examined how exchange rate volatility affects the competitiveness of Nigerian exports. Adeniran *et al.* (2014) found that exchange rate fluctuations have a significant and negative impact on Nigeria's export performance. Their study used time series data from 1986 to 2013 and employed an error correction model to analyze the long-term and short-term effects of exchange rate volatility on non-oil exports. The results suggested that exchange rate depreciation, while theoretically beneficial for exports, often leads to increased costs of imported inputs, which in turn hampers export growth. Focusing on non-oil sectors, Aliyu (2011) investigated the effect of exchange rate policies on Nigeria's non-oil export performance. Using annual data from 1986 to 2008, the study employed a Vector Autoregressive (VAR) model to assess the impact of exchange rate changes on non-oil export volumes. The findings indicated that exchange rate depreciation has a significant negative effect on non-oil exports, suggesting that the non-oil export sector is particularly sensitive to exchange rate volatility due to its reliance on imported inputs and the underdevelopment of local industries. The nature of the exchange rate regime also plays a crucial role in determining export performance.

Olufayo and Fagite (2014) examined the impact of different exchange rate regimes on Nigeria's trade balance and export performance. Their study covered the period from 1970 to 2012 and utilized a cointegration approach to assess the long-run relationship between exchange rate regimes and trade performance. They found that periods of floating exchange rate regimes were associated with higher export volatility, which negatively affected Nigeria's overall export performance. The authors argued

that the lack of stability in exchange rates under floating regimes creates uncertainty for exporters, thereby reducing their international competitiveness. In another study, Babatunde (2009) explored the long-term effects of exchange rate movements on Nigeria's export performance using a cointegration analysis over the period 1970 to 2005. The study found that in the long run, a stable and competitive exchange rate is essential for improving export performance. The results showed that exchange rate appreciation led to a significant decline in export volumes, particularly in the manufacturing sector. This finding is consistent with the notion that an overvalued currency makes Nigerian goods more expensive on the international market, thereby reducing demand for exports. Oladipupo and Onotaniyohuwo (2011) conducted an empirical analysis to determine the impact of exchange rate fluctuations on export revenue in Nigeria. Using quarterly data from 1986 to 2010, the study employed the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model to assess the volatility of exchange rates and its effect on export revenue. The results indicated that exchange rate volatility leads to a reduction in export revenue, particularly in the oil sector, which dominates Nigeria's export portfolio. The study highlighted the importance of stabilizing exchange rates to enhance export earnings and promote economic growth.

Olamide *et al.* (2022) studied the impact of exchange rate volatility on Nigeria's export performance. They found that exchange rate fluctuations have a significant impact on Nigeria's export performance. Their analysis revealed that depreciation of the naira generally leads to an increase in export volumes in the short term. However, the long-term effects are less clear, with potential negative impacts on export competitiveness due to rising costs of imported inputs. Oladipo *et al.* (2023) analyzed the relationship between exchange rate volatility and export performance for Nigeria over the past two decades. They concluded that while exchange rate depreciation initially boosts export performance, excessive volatility tends to create uncertainty, which can deter long-term investment and hinder export growth. Their study emphasized the need for stable exchange rate policies to sustain export growth. Focusing on Nigeria's agricultural exports, Dada (2022) examined how exchange rate fluctuations affect this sector. They found that a depreciated naira could improve competitiveness for agricultural exports by lowering prices in international markets. However, the impact is moderated by factors such as international demand, production costs, and global commodity prices.

Akpan and Udo (2023) explored the effect of exchange rate volatility on Nigeria's oil exports, which are a significant part of the country's export profile. The researchers found that while a weaker naira can enhance the revenue from oil exports, it also increases the cost of oil exploration and production due to the high cost of imported machinery and technology. The net effect on oil export performance is therefore mixed and influenced by global oil price fluctuations. Moreover, Akinlo and Ojo (2022) investigated the effectiveness of exchange rate policies on export performance in Nigeria. They found that policies aimed at stabilizing the naira had a positive effect on export performance by reducing uncertainty and promoting investor confidence. However, they also noted that the success of these policies depends on broader economic conditions and complementary reforms. Oladipo *et al.* (2023)

examined the impact of exchange rate management strategies on Nigeria's export performance. They reported that managed exchange rate regimes, such as the managed float, have been more effective in improving export performance compared to fixed exchange rate regimes. Their findings suggest that a flexible exchange rate policy, combined with other economic reforms, can better support export growth. Ijirshar *et al.* (2022) analyzed how macroeconomic variables, including exchange rate fluctuations, influence Nigeria's export performance. They found that exchange rate volatility has a significant but varying impact on different sectors. The study highlighted that while depreciation can boost exports, high inflation and unstable macroeconomic conditions often dampen these benefits. Malik (2023) focused on the interplay between exchange rate fluctuations, inflation, and export performance in Nigeria. They observed that while a weaker naira might initially enhance export competitiveness, high inflation associated with currency depreciation can erode the gains by increasing production costs and reducing export volumes in the long run.

3. Methodology

This study analyses the data collected in three stages. First, the data have been subjected to descriptive analysis and stationarity test by checking the properties of the data using the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron test. Second, the study employed the VECM technique following the VAR model developed by Sims *et al.* (1990) in order to examine the long-run properties of the cointegrated series (Johansen and Juselius, 1990). Finally, the study conducts serial correlation test and heteroscedasticity test in order to check whether the results are statistically robust and also to ensure the statistical adequacy of the model.

Model Specification

This study considers the empirical modification from the work of Olushola and Uzoma (2018) and Abdullahi and Hamid (2024) and adopts the following equations to achieve its objectives;

$$\Delta Y_t = \alpha Y_{t-1} + X + \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-2} + \dots + \beta_p \Delta Y_{t-p} + \varepsilon_t \dots \dots \dots (3.1)$$

Considering the empirical modification from the work of Raimi and Ogunjirin (2012), the general specification of the model for this study is represented by the following equation;

$$TOT = f(Excr, Cop, Intr) \dots \dots \dots (3.2)$$

Different scholars in the literature have used a single equation model to examine the relationship between the exchange rate and economic growth. Following Upreti (2015), the empirical equation of the model is written as;

$$TOT_t = a_o + \beta_1 Excr_t + \beta_2 Cop_t + \beta_3 Intr_t, \dots\dots\dots(3.3)$$

Given equation (3.3) above, it is clear that with a stable exchange rate and crude oil price as well as effective interest rate, there will be favourable terms of trade through the growth of investment, the manufacturing sector, and gains from international trade. All things being equal, *ceteris paribus*. The econometric equation for the study is modeled as;

$$TOT_t = a_o + \beta_1 Excr_t + \beta_2 Cop_t + \beta_3 Intr_t + \varepsilon_t \dots\dots\dots(3.4)$$

Making equation (3.4) an econometric model for the study, an error term (ε_t) is added to capture the effect of any other omitted variable in the model, as well as the influence of any measurement error that might affect the dependent variable. The error term is assumed to be normally, independently, and identically distributed with zero mean and constant variance, i.e., ($\varepsilon_t \sim NIID(0, I_k)$). However, TOT_t = Terms of trade proxied by the ratio of Nigeria's export prices to import prices, $EXCR_t$ = Exchange rate proxied by the real effective exchange rate, COP_t = Crude oil price proxied by the global crude oil price index, and $INTR_t$ = Interest rate proxied by the CBN Benchmark rate. Furthermore, a_o = parameter to be estimated, $\beta_1 - \beta_3$ = long-term parameter estimators while t = time period.

Data Source and Scope

This study utilizes time series quarterly data covering the period from 1980Q1 to 2023Q4. The data for the study were mainly sourced from the statistical bulletin of the Central Bank of Nigeria (CBN, 2023) and the National Bureau of Statistics database (2023). The choice of this period is based on the availability of data that will permit an empirical analysis of the study. Due to time constraints, inadequate financial capacity, and further unforeseen circumstances, this study is limited to Nigeria and hence cannot be extended to any other economy.

Estimation Method

This study presents the descriptive statistics of the variables in order to visualize the general nature of the series and to identify the pattern and characteristics of the time series data. The study also conducts the stationarity test using Augmented Dickey-Fuller (1997; 1981) (ADF) and the Phillips-Perron (1988) (PP) unit root tests to ensure that the results of the regression analysis are not spurious. In the estimation analysis, the study employed the VECM technique, which is more robust in determining the relationship between the variables of the study. However, any $VAR(p)$ can be rewritten as a VECM, which follows that;

$$y_t = v + A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + \varepsilon_t \dots\dots\dots(3.5)$$

where $\mathbf{y}_t$ is a $K \times 1$ vector of variables, $\mathbf{v}$ is a $K \times 1$ vector of parameters, $\mathbf{A}_1 - \mathbf{A}_p$ are $K \times K$ matrices of parameters, and $\boldsymbol{\varepsilon}_t$ is a $K \times 1$ vector of disturbances. $\boldsymbol{\varepsilon}_t$ has mean 0, has covariance matrix $\boldsymbol{\Sigma}$, and is i.i.d. normal over time. Any VAR_(p) can be rewritten as a VECM. Using some algebra, we can rewrite (3.6) in VECM form as;

$$\Delta \mathbf{y}_t = \mathbf{v} + \boldsymbol{\Pi} \mathbf{y}_{t-1} + \sum_{i=1}^{p-1} \boldsymbol{\Gamma}_i \Delta \mathbf{y}_{t-i} + \boldsymbol{\varepsilon}_t \dots \dots \dots (3.6)$$

where $\boldsymbol{\Pi} = \sum_{j=1}^{j-p} \mathbf{A}_j - \mathbf{I}_k$ and $\boldsymbol{\Gamma}_i = -\sum_{j=i+1}^{j-p} \mathbf{A}_j$. The $\mathbf{v}$ and $\boldsymbol{\varepsilon}_t$ in (3.65) and (3.66) are identical. Engle and Granger (1987) show that if the variables $\mathbf{y}_t$ are I(1), the matrix $\boldsymbol{\Pi}$ in (3.66) has rank $0 \leq r < K$, where r is the number of linearly independent cointegrating vectors. Nevertheless, the study examines the statistical adequacy of the model using different post-estimation methods.

4. Results and Discussion

This section presents and analyses the data used in the study. It begins with descriptive statistics of the variables used, followed by pre-estimation results. The section also discusses the estimation and other relevant results.

Descriptive Statistics

The descriptive statistics of the variables used in the study are presented in Table 1 below. The variables used are abbreviated as *TOT* (Terms of trade), *EXCR* (Exchange rate), *COP* (Crude oil price), and *INTR* (Interest rate).

Table 1: Descriptive Statistics

	TOT	EXCR	COP	INTR
Mean	369.4934	115.5370	46.76421	11.90843
Median	11.33787	114.7364	37.71643	12.00000
Maximum	3369.363	416.8765	99.24310	20.50000
Minimum	3.295304	0.546781	15.89000	6.000000
Std. Dev.	780.5235	118.0298	25.24306	3.464836
Skewness	2.645375	0.967269	0.656279	0.235154
Kurtosis	9.178160	2.988985	2.129242	3.021216
Jarque-Bera	474.1589	26.82166	17.78069	1.588415
Probability	0.000000	0.000001	0.000138	0.451939
Sum	63552.86	19872.36	8043.444	2048.250
Sum Sq. Dev.	1.04E+08	2382205.	108963.3	2052.870
Observations	172	172	172	172

Source: Researcher's computation using E-views 10 (2024).

Table 1 above shows that, on average, the mean, median, maximum, and minimum of the variables exhibit different trending shapes, with some median values close to the mean in the case of EXCR, COP, and INTR. However, the maximum in the case of TOT is very far away from the mean. Only the standard deviation for EXCR is not far away from the mean, while the Kurtosis in the table shows that

only EXCR and COP have positive values less than 3. The Jarque-Bera test for normality indicates the rejection of the null hypothesis among the variables employed, as their p-values are less than 5% except for INTR.

Table 2: Unit Root Test

Variables	Test at the level		Test at first difference		Order of Integration
	ADF test	PP test	ADF test	PP test	
TOT	-0.918725	-0.712143	-7.486353**	-3.406353**	I(1)
EXCR	-0.721087	-1.520043	-6.224757**	-7.234503**	I(1)
COP	-3.700361	-1.847465	-4.606523**	-4.476074**	I(1)
INTR	-7.618563	-2.492631	-5.537022**	-5.740286**	I(1)

Source: Researcher computation using E-views 12.

Asterics ** indicates stationary 5% level of significance.

The above results of the Augmented Dickey Fuller (ADF) and Phillips-Perron tests indicate the order of integration and the statistical significance for each variable. However, the result shows that all the variables under study are stationary at the first difference. Hence, the justification for conducting the VAR model.

Lag Length

After the unit root, the next step is to select the lag length order, which is the condition for the cointegration test of the model.

Table 3: Lag Length Order

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3526.460	NA	1.64e+13	41.78059	41.85467	41.81065
1	-2271.994	2434.702	7079797.	27.12420	27.49460	27.27451
2	-2184.434	165.7953*	3036508.*	26.27732*	26.94405*	26.54789*
3	-2177.338	13.10029	3376690.	26.38270	27.34574	26.77352

Source: Researcher computation using E-views 12.

Asterics * indicates a stationary 5% level of significance.

From Table 3 above, the lag length order of the study is selected to be two, which is indicated by the result above. Therefore, the next step is the cointegration test.

Table 4 Cointegration Rank (Trace) Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.117395	48.47237	47.85613	0.0437
At most 1	0.075753	27.36813	29.79707	0.0929
At most 2	0.074195	14.05495	15.49471	0.0814
At most 3	0.006056	1.026544	3.841466	0.3110

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Researcher computation using E-views 12.

The result above in Table 4 indicates one cointegrating vector, hence justification for conducting the VECM model. However, the result indicates that the null hypothesis of no cointegration among the variables is rejected at 5% significant level.

Table 5: Normalized Cointegrating Coefficient

Target Variable	Response Variables		
TOT	EXCR	COP	INTR
1.000000	2.464296 (1.48683)	-4.555221 (6.01216)	-159.3003 (32.6896)

Source: Researcher computation using E-views 10 (2024).

From the above, the normalized cointegrating equation follows that;

$$\text{TOT} = 2.464296\text{EXCR} - 4.555221\text{COP} - 159.3003\text{INTR}$$

The result of the cointegrating coefficient above is reversed in the normalized cointegrating equation of the Johansen model. The result is the long-run equation of the model. TOT is the target variable; therefore, EXCR has a negative and significant impact on TOT in the long run, which means that an increase in EXCR will lead to a decline in TOT. The COP and INTR have a positive and significant impact on TOT, which reveals that an increase in COP and INTR will lead to an increase in TOT.

Table 6: Reduced Form Vector Error Correction Estimates

Variable	Long Run Dynamic Coefficients			
	D(TOT)	D(EXCR)	D(COP)	D(INTR)
CointEq1	-0.137900	0.000128	0.001391	-5.36E-05
P-value	(0.03598)	(0.00035)	(0.00043)	(7.5E-05)
t-statistics	[-3.83252]	[0.37091]	[3.21677]	[-0.71988]

Source: Researcher computation using E-views 10 (2024)

From the above, the error correction coefficient gives the speed of adjustments within which the model will restore to normal equilibrium following any disturbances. The coefficient of ECT (CointEq1) with TOT and INTR is negative and statistically significant, indicating that there is a convergence from short dynamics towards equilibrium in the long run. However, EXCR is positive and insignificant while COP is positive and significant, indicating their lack of adjustment towards long run equilibrium in any disequilibrium situation.

Table 7: Long Run and Short Run Coefficients of Adjustment

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.137900	0.035981	-3.832524	0.0002
C(2)	0.079553	0.076229	1.043611	0.0982
C(3)	7.092160	5.023382	1.411830	0.0599
C(4)	10.17819	5.798676	1.755262	0.0311
C(5)	-70.92562	38.03178	-1.864904	0.0440
C(6)	-33.95118	25.58088	-1.327209	0.1863

Source: Researcher computation using E-views 10 (2024)

From the above table, C(1) is negative and significant, which shows long-run causality between EXCR, COP, and INTR to TOT. The coefficient should have a negative sign, showing the ability to bounce

back to equilibrium. The positive sign indicates movement away from equilibrium. The short-run coefficient C(2) is a percentage increase in TOT itself, which indicates that an increase in TOT will lead to an increase in TOT by 0.079%. Therefore, C(3), C(4), and C(5) are the coefficients for EXCR, COP, and INTR, respectively. They indicate the percentage level and magnitude of change in TOT due to a change in the dependent variable. However, C(6) is the constant or intercept in the model.

Post Estimation Diagnostic Checks

After the above estimations, the study conducts serial correlation test and heteroscedasticity test in order to check whether the results are statistically robust and also to ensure the statistical adequacy of the model.

Table 8: Breusch-Godfrey Serial Correlation

F-statistic	0.846923	Prob. F(2,159)	0.4307
Obs*R-squared	1.770860	Prob. Chi-Square(2)	0.4125

Source: Researcher's computation using E-views 13 (2024)

From the above table, the result shows that the Null hypothesis of no serial correlation cannot be rejected at any significant level for up to 2 lags, which indicates that the model is free from serial correlation.

However, for a model to be stable, good, and fit for policy making, it must be free from heteroscedasticity, which is referred to as heterogeneity of variance in econometric analysis (Engle, 2003).

Table 9 Heteroskedasticity: Breusch-Pagan-Godfrey

Statistics	Values	Prob.
F-statistic	1.158719	Prob. F(6,161)
Obs*R-squared	6.954288	Prob. Chi-Square(6)
Scaled explained SS	90.15408	Prob. Chi-Square(6)

Source: Researcher's computation using E-views 13 (2024)

From the above table, the result shows that the Null hypothesis of Homoskedasticity cannot be rejected at any level of significance, which indicates that the model is free from heteroscedasticity.

4.2 Discussion of the Findings

This study examines the long-run and short-run relationships between the exchange rate, crude oil price, interest rate, and Nigeria's terms of trade. The results show that exchange rate depreciation has a negative and significant long-run effect on terms of trade. Due to Nigeria's heavy reliance on imports, especially capital goods and refined petroleum, a weaker naira raises import costs and weakens trade performance. Given the country's dependence on crude oil exports and structural constraints in non-oil sectors, depreciation does not necessarily improve competitiveness and may worsen trade imbalances through imported inflation.

Crude oil price has a positive and significant long-run impact on terms of trade. As a major oil exporter, Nigeria benefits from oil price increases through higher foreign exchange earnings, improved reserves,

and stronger fiscal balances. However, this also highlights the economy's vulnerability to global oil price shocks and structural dependence on a single commodity.

Interest rate also shows a positive and significant long-run relationship with terms of trade. Higher interest rates may attract capital inflows, support currency stability, and indirectly improve trade outcomes, underscoring the importance of credible monetary policy.

The negative and significant error correction term confirms a stable long-run equilibrium, indicating that short-run distortions are temporary. In the short run, oil prices remain significant, while exchange rate effects are insignificant, suggesting that oil price shocks exert a stronger immediate influence on trade dynamics. Overall, sustainable trade improvement requires structural reforms alongside a stable exchange rate and monetary policies.

The findings of this study are largely consistent with earlier empirical works on Nigeria's export performance. The long-run negative and significant effect of exchange rate depreciation on terms of trade aligns with Adeniran et al. (2014), Aliyu (2011), and Oladipupo and Onotaniyohuwo (2011), who found that exchange rate volatility and depreciation adversely affect export performance and revenue. Similar to Babatunde (2009), the present result reinforces the importance of exchange rate stability for sustaining trade competitiveness. It also supports Malik (2023) and Ijirshar et al. (2022), who emphasized that depreciation-induced inflation and macroeconomic instability often offset expected export gains.

However, the short-run insignificance of the exchange rate differs slightly from Olamide et al. (2022) and Oladipo et al. (2023), who reported short-term export gains following depreciation. This divergence may stem from differences in model specification, dependent variables (terms of trade versus export volume), or sample periods.

The positive and significant impact of crude oil price strongly corroborates findings by Dada (2022) and Akpan and Udo (2023), who highlighted Nigeria's heavy reliance on commodity exports and sensitivity to global price movements. The present study similarly underscores structural vulnerability arising from oil dependence.

Furthermore, the significance of the error correction mechanism is consistent with prior cointegration-based studies such as Olufayo and Fagite (2014) and Babatunde (2009), confirming stable long-run relationships among macroeconomic variables.

Where this study differs is in explicitly incorporating the interest rate into the trade dynamics framework. While Akinlo and Ojo (2022) acknowledged the role of monetary stability, few earlier studies directly modeled interest rate alongside exchange rate and oil price in explaining terms of trade. Thus, this study extends the literature by integrating monetary policy effects into the external sector analysis within a unified long-run equilibrium framework.

5. Conclusion and Recommendations

5.1 Conclusion

Based on the findings of this research, the study confirms the presence of long run negative and significant impact of the exchange rate on terms of trade, which reveals that depreciation in the naira leads to a deterioration in Nigeria's terms of trade. This is because Nigeria relies heavily on imports for capital goods and refined petroleum; therefore, a weaker naira means higher costs for imports, hence worsening trade balance and persistent naira depreciation without structural reforms may erode export competitiveness, especially in non-oil sectors. Moreover, the result points to an increase in crude oil price and interest rate have positive and significant impact on terms of trade, which indicates that an increase in global oil prices improves Nigeria's terms of trade due to its heavy reliance on crude oil exports. Therefore, oil price booms boost forex inflows, improve trade balance, and provide fiscal balance, while overreliance on oil revenue makes the economy vulnerable to external shocks due to volatility in oil prices. Additionally, higher interest rates may attract foreign capital, strengthen the naira, and thus improve terms of trade.

Nevertheless, the coefficient of the error correction term (CointEq1) concerning terms of trade and interest rate is negative and statistically significant, which indicates that any short-run disturbances in trade dynamics will eventually correct themselves, especially those driven by interest rate fluctuations in the long run. The study suggests the effectiveness of monetary policy in influencing long-term trade performance, reinforcing the need for stable interest rate frameworks. However, the exchange rate is positive and insignificant, while the crude oil price is positive and significant, hence indicating their lack of convergence towards equilibrium dynamics in the long run. In general, the direction and strength of these macroeconomic variables significantly affect trade dynamics, which have consequences for investment dynamics, policy credibility, external sector stability, and exchange rate regime effectiveness in the Nigerian economy.

5.2 Recommendations

Based on the findings of this study, the following policy recommendations are proposed to improve Nigeria's terms of trade and enhance external sector stability.

- a) Given the negative long-run effect of exchange rate depreciation on terms of trade, Nigeria should reduce its heavy reliance on crude oil exports by diversifying into non-oil sectors such as agriculture, solid minerals, and manufacturing. Strengthening value addition, improving infrastructure, and supporting export-oriented industries will help ensure that currency depreciation translates into real competitiveness rather than higher import costs.

- b) Since naira depreciation worsens terms of trade largely due to high import dependence (especially on capital goods and refined petroleum), policies should focus on reviving domestic refineries and supporting modular refinery projects, as well as providing incentives for industries that substitute imports with locally produced alternatives. This will reduce vulnerability to exchange rate shocks and imported inflation.
- c) Exchange rate stability should be prioritized over persistent depreciation. Authorities should improve foreign exchange market transparency and efficiency by building adequate foreign reserves during oil booms and limiting speculative pressures through credible macroeconomic policies.

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