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Relationship between volatility in domestic oil prices, international oil prices, and exchange rates: Co-integration and granger causality tests

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ABSTRACT

This study examines the dynamic relationship between exchange rate fluctuations, global oil prices, monetary policy rates, and domestic oil price shocks in Nigeria between January 2012 and January 2025. The Autoregressive Distributed Lag (ARDL) model and Granger causality tests revealed a long-run co-integrating relationship between exchange rate fluctuations, global oil prices, monetary policy rates, and domestic oil price shocks (EXCR, OILP USD, MPR, and DOP). It also reveals a significant negative relationship in the long run between the exchange rate and the domestic oil price, which is insignificant in the short term. It also demonstrates that MPR has a significant positive effect on DOP in the long run but a negligible positive effect in the short run, and global oil price has an insignificant negative effect on domestic oil price in both the short and long run. Granger tests show unidirectional causality from DOP to EXCR, bidirectional feedback between EXCR and MPR, and no causality between OIL USD and DOP. These findings suggest that domestic macro-financial conditions and policy stance dominate long-term DOP movements, with global oil shocks having a short lag effect. To reduce volatility and welfare costs, policy should prioritise Forex market depth, coordinated monetary and fiscal actions, and transparent price smoothing rules.

ARTICLE INFO

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Exchange rate, Domestic oil price, ARDL, Granger causality, Nigeria.

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1. INTRODUCTION

Since its discovery in the nineteenth century, oil has played an enormous role in the global economy. Oil is the "backbone" of many economies around the world, accounting for more than 40% of government revenue in advanced countries and more than 80% in some developing countries. In Nigeria, the oil sector accounts for more than 60% of GDP, 85% of export earnings, and more than 70% of government revenue (National Bureau of Statistics 2017). The global boom that began in the early twentieth century saw oil prices rise to the point where their impact on macroeconomic variables became a source of genuine concern among policymakers, investors, and researchers (Chisadza Dlamini Gupta & Modise 2013); for example, the West Texas Intermediate (WTI) increased from US$12.23 per barrel in 1976 to US$31.07 in 2003. It reached US$41.49 per barrel in 2004, increased to US$56.59 per barrel in 2005, surpassed US$66 in 2006, and reached its peak of US$100.06 in 2008. The exchange rate is an important variable for oil-importing and oil-exporting countries because it affects the current account deficit, inflation, and interest rates, among other things. Amano and Van Norden (1998a) conducted the first Scopus study to connect the variables (oil prices and exchange rates). They investigated Japan, Germany, and the United States' relationships. Similarly, in another study, the authors emphasised the role of energy prices in determining exchange rate movement (Amano and Van Norden, 1998b). The potential impact of exchange rates and global oil prices on real economic activity has piqued the interest of researchers in investigating their relationship with domestic oil price shocks. A few studies, such as Abed et al (2016), have argued that the relationship is asymmetric, implying that the effect of an exchange rate decrease on domestic oil prices differs significantly from that of an exchange rate rise. Other scholars, such as Sohag and Maries (2021), Jin and Xion (2021), and Abubakar (2019), discovered that the relationship is linear or symmetric, implying that the effects of increases and decreases in the oil exchange rate and global oil price on domestic oil price shocks are equal but opposite in sign.

The literature on the effect of exchange rates and global oil prices on domestic oil price shocks is inconclusive. While some authors (e.g., Hussain et al., 2017; Makhtarove et al., 2021; Jin and Xiong, 2021) argued that the relationship is negative, others (e.g., Sohag and Maries, 2021; Pershin et al., 2016; and Abubakar, 2019) maintained that the relationship is positive. Based on this context, this paper investigates the relationship between exchange rates, global oil prices, and domestic oil prices in Nigeria using Autoregressive Distributed Lag and Granger Causality Techniques on new data from the most recent economic recession that gripped Nigeria between 2023 and 2024. The remainder of the paper is divided into five sections to accomplish the aforementioned objectives. Following the literature review in section two, section three discusses methodology. Section four contains the findings and discussion, and Section five includes some conclusions and recommendations.

2. LITERETURE REVIEW

Several studies have been conducted to investigate the relationship between international oil prices, exchange rates, and domestic oil prices in both developed and developing countries, as well as Nigeria (see Abubaka., 2019; Anh et al., 2019; Hadi et al., 2019; Jin and Xiong., 2021; Mukhtarov et al., 2021). Abed et al. (2016) used the GJR-GARCH model to examine several MENA countries. The findings revealed the presence of asymmetric adjustment, with rising oil prices leading to currency appreciation in oil exporting economies and falling oil prices leading to currency appreciation in oil importing countries. Chen et al. (2016) investigated the effect of oil price shocks on exchange rates in 16 OECD countries. They discovered that the exchange rate's response to oil price changes differed depending on whether the change was driven by aggregate demand or aggregate supply. There was no evidence that the variables had a non-linear relationship. Hussain et al. (2017) used the detrended cross-correlation coefficient to examine the relationship between oil prices and exchange rates in 12 Asian economies. There were co-movements and a weak negative cross-correlation between the variables discovered. Using the vector error correction model, Jin and Xiong (2021) discovered a strong negative relationship between exchange rates and oil prices in oil exporting countries during the oil price crash but a weaker relationship during other periods. Other comparable studies were published in the same year. Mukhtarov et al. (2021) use the structural vector autoregressive method to analyse the impact of oil price shocks on the Azerbaijani exchange rate, total debt turnover, and GDP per capita from 1992 to 2019. The authors discovered that oil price shocks in oil-exporting countries have a positive impact on GDP per capita and total trade turnover, but a negative impact on the exchange rate. Sohag and Mariev (2021) use the quintile-on-quintile approach to investigate the relationship between oil prices and Russia's exchange rate. Findings indicate that oil prices appreciate the Russian currency. Hadi et al. (2019) used Granger causality and a two-step cointegration test to examine the impact of crude oil prices on Malaysia and Brunei's exchange rates between 1988 and 2018. The results show a long-term relationship between oil prices and the exchange rates of Brunei and Malaysia. In the short run, there was also a unidirectional causality found between oil prices and the exchange rates of both currencies, with oil prices leading to exchange rates.

Using a sample of developing nations. Pershin et al. (2016) investigated the dynamics of the oil price and exchange rate in a sample of African countries and concluded that generalisations about the relationship's behaviour would not be valid across all countries. Currencies of some oil-importing nations was found to appreciate during peak of oil price period. Saidu and Maijama'a (2021) use the Johansen test for cointegration and the Granger causality test of the vector error correction model to investigate the causal relationship between domestic oil price, exchange rate, and inflation rate in Nigeria for annual timeseries data from 1985 to 2019. The Johansen cointegration test revealed strong cointegration between the variables, and the vector error correction model Granger causality result indicates that one-way causalities exist from exchange rate to inflation rate and exchange rate to domestic oil price, with no long-run causalities in the inflation rate and domestic oil price equations, respectively. Again, unidirectional causalities exist from domestic oil price to exchange rate and inflation to exchange rate, as well as long-run causality in the exchange rate equation alone. Umar (2020) investigates the relationship between volatility in Nigerian domestic oil production, oil prices, and the exchange rate. The study used monthly time series data from January 2006 to August 2018. The study used monthly time series data from January 2006 to August 2018. The ARDL empirical results established a long-run co-integrating relationship between DOP, COP, EXR, and DUM, as well as a significant negative relationship between exchange rate and domestic oil production. They also revealed evidence of bi-directional causality between exchange rate and domestic oil production.

Abubakar, (2019) investigates the asymmetric relationship between oil price and exchange rate in Nigeria using monthly time series data from January 1986 to June 2018. The analysis used three models: threshold autoregressive (TAR), momentum threshold autoregressive (MTAR), and structural vector autoregressive (SVAR). The results of the TAR and MTAR models confirm the absence of asymmetric cointegration, implying that there are no asymmetries in the relationship between oil price and exchange rate in Nigeria. Findings from the SVAR model show gradual appreciation (though with some time lag) of naira following positive shocks to oil price. Anh et al. (2019) examined the impact of global crude oil prices on Vietnam's real effective exchange rate between 1986 and 2019. Using the autoregressive distributed lag model, the authors divided the period into four parts, each representing a different regime of Vietnam's monetary policy. The results showed that there is long-term cointegration across all periods, but the short-term impact was only found in two quarters from 2016 to 2019. Leonard (2015) used 45 years of data (1970–2014) to empirically forecast the causal relationship between oil prices and the Nigerian exchange rate. The study modified Sibanda and Mlambo's (2014) model to estimate the relationship and long-term effects of oil prices and exchange rates in Nigeria.The empirical findings indicate that a unit increase in oil price will lead to 44.91% increases in exchange rate in Nigeria, implying that oil prices have a significant influence on the exchange rate in Nigeria. Overall, the existing body of literature appears to show a scarcity of studies investigating the effect of global oil price and exchange rate changes on domestic oil prices in developed countries and Nigeria. Furthermore, no empirical study has been published to investigate the relationship using new data from the most recent economic downturn and the country's removal of oil subsidies, as well as the implementation of a flexible exchange rate, which gripped Nigeria between 2023 and 2024.

3. METHODOLOGY

3.1 Data Source

Monthly time series data from January 2012 to January 2025 were used in the study. All data were obtained online via the Central Bank of Nigeria's website (www.cbn.gov.ng). This time frame was chosen to capture the independent effects of the foreign exchange rate, domestic oil price, and monetary policy rate on agricultural sector performance in the context of global economic crises, post-global economic crises, the country's recession that began in August 2016, and the removal of oil subsidies in 2024.

3.2 Model Specification

The study's model is described in functional form as follows:

$LDOP_t = f(EXCR_t, LOIL\ USD_t, MPR_t)$.. (3.1)

Thus, the model's econometric specification can be expressed as follows:

$LDOP_t = \beta_0 + \beta_1 EXCR_t + \beta_2 LOIL\ USD_t + \beta_3 MPR_t, + \mu_t$ .... (3.2)

Where;

LDOP = Log of Domestic oil price

EXCR= Exchange Rate

LOIL USD = Log of Global Oil price

MPR = Monetary Policy Rate

β_0, is constant while, β_1, β_2, β_3, are Parameters of the variables captured in the model,

μ= Error Term and t represents Time Trend

The study adopts Autoregressive Distributed Lag (ARDL) approach developed by Pesaran et al (2001) to estimate equation (3.2). The choice of the ARDL is based on the following reasons: first, the model can be applied irrespective of whether the series under investigation are stationary at I (0) or I(1) or mixture of both. Second, it provides robust and high quality result even if sample size is small or large. Finally, it takes into account the error correction model. The analysis of error correction and autoregressive lags fully covers both long-run and short-run relationships of the variable under study (Pesaran et al; 2001 and Villavicencio and Bara; 2008). Following the work of Pesaran et al (2001), the ARDL model of equation (3.3) is given as:

$$\Delta LDOP_t = \beta_0 + \sum_{i=1}^{m} \beta_1 \Delta EXR_{t-i} + \sum_{i=1}^{m} \beta_2 \Delta LOILUSD_{t-1} + \sum_{i=1}^{m} \beta_3 \Delta MPR_{t-i} + \alpha_1 ECXR_{t-1} + \alpha_2\ LOILUSD_{t-1} + \alpha_3\ MPR_{t-1} + \mu_t \ldots\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3.3)$$

where m is the optimum lag length will be determine using Akaike Information Criteria (AIC) and Schwartz Information Criteria (SIC), Δ is difference operator, while β_1 to $\beta_3$are vectors of the coefficient of the first difference lagged values of the variables captured in the model

Thus the short run equation and error correction model is expressed as follows:

$$\Delta LDOP_t = \theta_0 + \sum_{i=1}^{m} \theta_1 \Delta\ EXR_{t-i} \sum_{i=1}^{m} \theta_2 \Delta\ LOILUSD_{t-1} + \sum_{i=1}^{m} \theta_3 \Delta MPR_{t-i} + \theta_4 ECM_{t-1} + \mu_t \ldots\ldots\ldots\ldots\ldots \ldots \ldots \ldots.... (3.4)$$

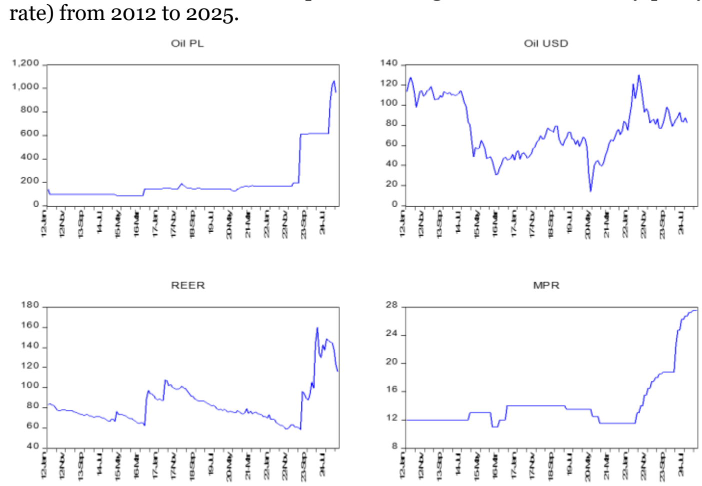
Where, θ_0 is the coefficient of constant term, θ_1 toθ_3 is the coefficient of short run variables, ECM is the Error correction model of one period lag estimated from equation.

The ARDL model's first part (β_1 to β_3) represents short-run dynamics, while coefficients (α_1 to α_3) represent long-run dynamics. The null hypothesis (H_0: $\alpha_1 = \alpha_2 = \alpha_3 = 0$) implies no long-run relationship among variables, so rejecting H_0 indicates evidence of a long-run relationship. The study will begin by conducting co-integration test of a bound testing approach for finding the evidence of long run relationship. To do that, the calculated F- statistics would be compared with two critical values (lower and upper bound); the null hypothesis of no relationship would be rejected if the calculated F- statistics is greater than the upper bound critical value, whereas if it falls below the lower critical values, the null hypothesis of no relationship cannot be rejected.

The inclusion of OIL USD and MPR as control variables acknowledges that domestic oil price in Nigeria is influenced not only by exchange rate fluctuations, but also by international energy prices and monetary policy stance. While the exchange rate primarily influences trade competitiveness and the cost of imported inputs, global oil price (OILP USD) captures the international energy component, whereas monetary policy rate (MPR) reflects the cost of credit. They work together to provide a more complete picture of the macroeconomic conditions that influence domestic oil price.

4. RESULTS AND DISCUSSION

Figure 1 below shows a graphical representation of the variables (Domestic oil Price, Global oil price, exchange rate, and monetary policy rate) from 2012 to 2025.



1. Sharp Rise in Domestic Oil Prices (DOP) Post-2023

Domestic oil prices were relatively stable until mid-2023. The sharp increase in 2024 is primarily due to the elimination of the petrol subsidy, which allows prices to adjust to market levels. Policy implications: Deregulation in the downstream sector increased price volatility, exposing consumers and the economy to fluctuations in global oil prices.

2. The global oil price (OILP USD) is volatile with a recovery trend.

Reason: The OILP_USD trend reflects global market behaviour: a drop in 2020 due to COVID-19, followed by a rebound in 2021-2023 due to increased demand and OPEC+ supply cuts. Recent Volatility: Price fluctuations in 2024-2025 could be influenced by geopolitical tensions, energy transition policies, and global inflationary trends.

3. Effective Exchange Rate (EXCR) Stability, then Depreciation (2022-2024)

REXCR remained relatively stable between 2012 and early 2022 as a result of partial exchange rate controls and oil inflows. Post-2022 depreciation: A steep decline occurred as a result of the exchange rate unification policy and declining foreign reserves. The naira fell because of increased USD demand, low oil production, and reduced CBN intervention. Influencing Events: The currency crisis, combined with speculative attacks and dollar scarcity, accelerated this trend.

4. Monetary Policy Rate (MPR) Stable, Then Rising (After 2022).

Reason: Between 2012 and 2022, MPR remained relatively stable at 11%-14%, indicating a cautious monetary stance. Rise beyond 2022: The increase since late 2022 reflects the Central Bank of Nigeria's inflation-fighting monetary tightening in response to rising fuel costs (after subsidy removal), exchange rate depreciation, and imported inflation.

Table 1: Descriptive Statistics result

	DOP	OIL USD	EXCR	MPR
Mean	183.3549	76.85336	81.78579	13.87171
Median	145.4050	74.63500	76.58500	13.00000
Maximum	617.0000	130.1000	159.9000	26.75000
Minimum	86.50000	14.28000	58.51000	11.00000
Std. Dev.	151.8553	26.07120	18.50820	3.195478
Skewness	2.379177	0.120392	1.959630	2.443718
Kurtosis	7.055158	2.038935	7.543906	9.174836
Jarque-Bera	247.5462	6.216947	228.0487	392.7656
Probability	0.000000	0.044669	0.000000	0.000000
Sum	27869.95	11681.71	12431.44	2108.500
Sum Sq. Dev.	3482066.	102635.8	51725.56	1541.873
Observations	152	152	152	152

Table 1 shows that domestic oil price (DOP) appears to have higher mean, maximum, and minimum values, as well as a higher standard deviation, than the other variables, followed by exchange rate. Furthermore, the positive skewness of all variables indicates that the distribution has a long right tail, implying that the variable distributions are rightward skewed; the kurtosis of DOP, EXR, and MPR exceeded 3, indicating that the distribution is peak relative to the normal; on the other hand, the kurtosis of OIL USD. The Jarque-Bera test results show that all of the series are not normally distributed, implying that they are significant at the 1% and 5% probability levels, rejecting the null hypothesis regarding the distribution of DOP, EXC, and OILP USD. As a result, the variables cannot be characterised as normally distributed.

Table 2: Result of Unit root test

The result of both Augmented Dickey fuller and Phillip Perron Unit root test are presented in table 2 below:

Variables	ADF Unit root Test				PP Unit root Test			
	Intercept		Intercept &Trend		Intercept		Intercept & Trend	
	Level I(0)	1st diff I(1)	Level I(0)	1st diff I(1)	Level I(0)	1st diff I(1)	level I(0)	1st diff I(1)
DOP	1.912	-10.736***	-0.068	-8.197***	1.424	-17.894***	-0.682	-11.094***
EXCR	-3.346***	-2.803	-3.476**	-3.324	-1.666	-12.322***	-2.177	-12.335***
LOIL US	-2.485	-9.143***	-2.13	-9.217***	-2.037	-15.965***	-1.924	-12.346***
MPR	1.325	-6.511***	0.146	-6.965***	1.457	-10.444***	-0.265	-11.022***

*Note: ***, ** Denoted the series are stationary at 1% & 5% probability levels.*

According to table 2, all variables are stationary at first difference with the exception of (EXCR) under ADF. However, PP has demonstrated that all of the variables are stationary at the first difference, both with intercept and trend with intercept. Thus, we have a combination of variables (DOP, OIL USD,) that are I (1) and another variable (EXCR) that is I (0). This allows the use of ARDL model to ascertain the co integration relation among the series found to have a different order of integration.

Table 3: Presents the ARDL Bound test result

Test statistics	Value	K	Significance level	I (0) Lower Bound	I (1) Upper Bound
F- statistics	4.755	3	10%	2.37	3.3
			5%	2.79	3.67
			1%	3.65	4.66

Source: Authors Computation Using Eviews Version 10 (2024)

Table 3 demonstrates that the calculated F statistic of 4.755 exceeds both the lower and upper critical values at the (1%) significance level, which are 3.65 and 4.66, respectively. This means that in the long run, all of the variables are co integrated.

Table 4: Result of Long Run Coefficients of ARDL

Dependent Variable: Domestic Oil Price (LDOP)			
Variables	Coefficient	t- statistic	P- Value
EXCR(-1)	-0.953	-3.758	0.000***
LOIL USD(-1)	-0.071	-0.600	0.549
MPR(-1)	9.673	4.083	0.000***
C	-29.583	-1.066	0.288

*Note: ***, ** &* indicate significance at 1, 5 and 10 percent level respectively.*
Source: Authors Computation Using Eviews output Version 10 (2025)

According to the results in Table 4 above, there is a negative and significant long-run relationship between exchange rate and domestic oil price (LDOP) in Nigeria at the 1% probability level over the study period, implying that a 1% increase in exchange rate would reduce domestic oil price by approximately 0.953%. The findings were consistent with those of Umar (2020), Hussain et al (2017), and Jin and Xiong. (2021), who discovered a negative relationship between exchange rate and domestic oil price in Nigeria and Asian countries, but contradicted those of Sohag and Mariev, (2021); Abubakar, (2019), and pershin et al (2016), who discovered a positive effect. On the other hand, the coefficient of global oil price shows an insignificant negative correlation with domestic oil price, indicating that global oil price is not the primary determinant of domestic oil price during the study period. At 1% provability levels, the monetary policy rate has a significant positive correlation with the domestic oil price, implying that a 1% increase (decrease) in the monetary policy rate will cause the domestic oil price to rise by 9.673.

Table 5's short-run estimates show that the exchange rate has an insignificant negative relationship with domestic oil price, implying that a 1% increase in exchange rate resulted in a decrease in domestic oil price by roughly (-0.381). In contrast, lags 1 and 2 of the exchange rate have an insignificant positive relationship with domestic oil prices. The global oil price (OIL USD) coefficient has an insignificant negative relationship with domestic oil price, whereas lag 1 of it has a significant positive relationship with domestic oil price at the 5% probability level, implying that a 5% increase in global oil price results in a (0.902) increase in domestic oil price. Global oil price at lag 2 also has an insignificant relationship with domestic oil price. Furthermore, the coefficient of MPR has an insignificant positive correlation with domestic oil price, whereas lag 1 of MPR has a significant negative relationship with DOP at the 10% probability level, indicating that a 1% increase in MPR results in a decrease in domestic oil price by (-12.169), while lag 2 of MPR has an insignificant negative relationship with DOP. The error correction term, as expected, is less than one with a negative sign (-0.092) and statistically significant at 1% (0.000).

This suggests that if the Nigerian oil price falls in the next 12 months, the system will correct itself at a monthly rate of approximately 92% for the exchange rate, monetary policy rate, and global oil price.

Table 5: Short Run Coefficients of ARDL and Error Correction Mechanism result

Variables	Coefficient	t- statistic	P- Value
Δ LDOP(-1)	-0.009	-0.101	0.919
Δ (EXCR)	-0.381	-0.744	0.458
Δ EXCR (-1)	0.250	0.479	0.633
Δ EXCR (-2)	0.710	1.436	0.153
Δ (LOIL USD)	-0.241	-0.583	0.561
Δ LOIL USD (-1)	0.902	2.168	0.032**
Δ LOIL USD (-2)	0.103	0.243	0.808
Δ (MPR)	9.032	1.403	0.163
Δ (MPR(-1))	-12.169	-1.888	0.061*
Δ (MPR(-2))	-3.846	-0.645	0.520
ECM (-1)	-0.092	-4.870	0.000***

*Note: ***, ** &* indicate significance at 1, 5 and 10 percent level respectively.*
Source: Authors Computation Using Eviews output Version 10 (2025)

Table 6: Diagnostic test Result

Test	LM version	F. Statistics
Normality (Jarque Bera Test Statistics)	JQ= 56106.84 [0.000]	Not applicable
Serial Correlation (Breusch Godfrey LM Test)	CHSQ (2) = 2.066 [0.356]	F(2,132) = 0.928 [0.398]
Heteroscedasticity (Breusch pagan Godfrey)	CHSQ (14) = 27.134 [0.019]	F (14,134) = 2.131 [0.014]

Source: Authors Computation Using Eviews Version 10 (2024)
Note: values in parenthesis are p-values

JQ demonstrated statistical significance, revealing that the series were not normally distributed. As a result, we reject the null hypothesis of normal distribution in favour of the alternative hypothesis that the series' frequency distributions are not normal. The Breusch-Godfrey serial correlation test revealed that both the F and LM versions were statistically insignificant, indicating that the series are not serially correlated. This also implies that the error terms are independent, which means that one period's error term has no effect on the next. As a result, we can conclude that there is no autocorrelation at the 5% level. The Breusch-Pagan-Godfrey test is a Lagrange multiplier that evaluates the null hypothesis of no heteroscedasticity. The heteroscedasticity test yielded a statistically significant p-value at the 5% probability level. This means we reject the null hypothesis and conclude that the residual variance is constant (homocedasticity). To evaluate the structural break, a stability analysis was carried out using graphs depicting the cumulative sum of recursive residuals and the cumulative sum of squared residuals (see figures 2a and 2b).

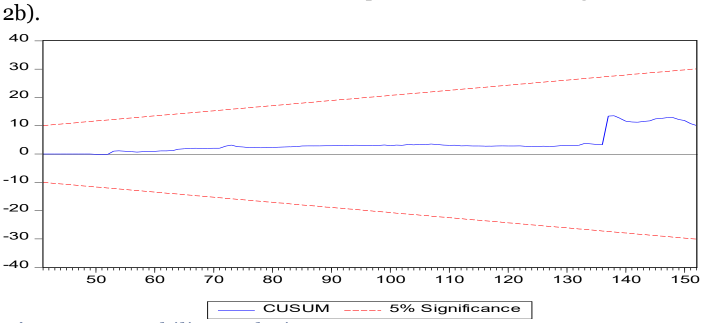


Figure 2a: Stability analysis

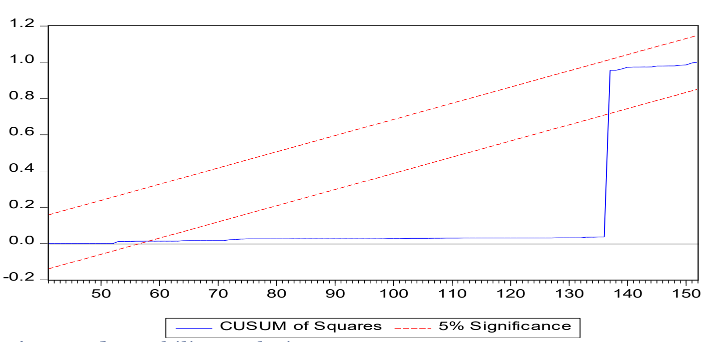


Figure 2b: Stability analysis

The CUSUM test graph shows that the model is still stable, with the lines remaining within the (5%) critical boundaries denoted by blue lines. In contrast, the CUSUMQ graph shows that the model is unstable during the observation period, with the red line occasionally exceeding the (5%) critical upper and lower limits. This instability may be related to periods of global economic crisis, as well as political instability and economic difficulties in the country, such as oil theft, which could influence future exchange rate predictions.

Table 7: Pairwise granger causality test result

Null hypothesis	F- sta	P-value	Hypothesis Accept/Reject	Causality
OIL USD does not granger Cause DOP	0.000	0.991	Accept	No Causality
DOP does not granger Cause OIL USD	0.561	0.455	Accept	No Causality
EXCR does not granger Cause DOP	0.001	0.973	Accept	No Causality
DOP does not granger Cause EXCR	12.896	0.000***	Reject	Unidirectional
MPR does not granger Cause DOP	17.999	4.E-05	Accept	No Causality
DOP does not granger Cause MPR	1.738	0.189	Accept	No Causality
EXCR does not granger Cause OIL USD	0.593	0.443	Accept	No Causality
OIL USD does not granger Cause EXCR	0.431	0.513	Accept	No Causality
MPR does not granger Cause OIL USD	0.240	0.624	Accept	No Causality
OIL USD does not granger Cause MPR	3.121	0.079*	Reject	Unidirectional
MPR does not granger Cause EXCR	4.023	0.047**	Reject	Bi-Directional
EXCR does not granger Cause MPR	3.371	0.068*	Reject	

*Note: ***, **,* donate significance at 1%, 5% and 10% level*
Source: Authors Computation Using Eviews (10) Output

As shown in Table 7, the Granger causality result shows that there is no causal relationship between global oil price (OIL USD) and domestic oil price (DOP). This is because the F-statistic does not show a significant event at the 10% level. As a result, the null hypothesis could not be rejected based on their respective p-values of (0.991 and 0.455). The p-value of (0.000) indicates that there is a unidirectional causality between domestic oil prices (DOP) and exchange rates (EXCR), which contradicts Umar's (2020) finding of bidirectional causality between EXCR and DOP in Nigeria, but supports Hadi et al., 2019 in Malysia and Saidu and Maijama'a, 2021 in Nigeria. Furthermore, the p-values (4.E-05 and 0.189) show that there is no evidence of causality between the Monetary Policy Rate (MPR) and the Domestic Oil Price (DOP). In addition, OIL USD and EXCR have p-values of (0.443 and 0.513, respectively). At a 10% significance level, the causal relationship between monetary policy rates and global oil prices is from MPR to OIL USD, not the other way around. Again, evidence of bidirectional causality between exchange rates and monetary policy rates extends from EXCR to MPR, i.e. the feedback effect.

5. CONCLUSION AND RECOMMENDATIONS

This study used monthly data from 2012 to 2025 to examine the dynamic relationship between Nigeria's domestic oil price (DOP), exchange rate (EXCR), international oil price (OIL USD), and monetary policy rate (MPR). The period includes major policy and economic events such as the 2016 recession, exchange rate liberalisation from 2023 to 2024, and the removal of fuel subsidies in 2024. Using the ARDL bounds testing approach, the results confirm the presence of a long-run equilibrium relationship between the variables. Specifically, EXCR reduces DOP, MPR increases DOP, and OIL USD has no significant long-run impact, though its lagged short-run effect is positive. The term "error-correction" indicates a relatively quick adjustment to equilibrium. Granger causality tests reveal that changes in DOP significantly predict movements in EXCR, whereas EXCR and MPR exhibit bidirectional causality, and OIL USD has no causal relationship with DOP. These findings indicate that domestic macroeconomic conditions and monetary policy stances are more important drivers of DOP than external oil price shocks. The findings show that Nigeria's domestic oil pricing mechanism is more sensitive to exchange rate movements and monetary policy conditions than to global oil price changes. The evidence of unidirectional causality between DOP and EXCR emphasises the impact of domestic fuel pricing on foreign exchange market pressures. Similarly, the feedback between EXCR and

MPR demonstrates the interdependence of monetary policy and currency management. As a result, while global oil shocks have a short-term impact, structural and policy-driven domestic factors are the primary drivers of DOP.

5.1 Recommendations

- Improve forex market stability: Increase transparency and liquidity in the foreign exchange market to reduce volatility, which influences domestic oil prices.
- Coordinate monetary and fiscal policies: Because MPR has a significant influence on DOP, monetary policy decisions should be aligned with fiscal and pricing strategies to avoid exacerbating inflationary pressures.
- Implement a rule-based fuel pricing framework. Implement a transparent adjustment mechanism (for example, moving average pricing) to mitigate the impact of global oil price fluctuations without resorting to unsustainable subsidies.
- Encourage risk-hedging strategies: Increase the use of hedging instruments and improve import logistics to mitigate the short-term effects of global oil price volatility.
- Implement periodic policy reviews: Policy adjustments should be guided by regular structural break and stability tests, especially during reforms such as subsidy removal and changes in exchange rate regime.

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