International Journal of Social Sciences and Management Review

Volume: 09, Issue: 02 March - April 2026

ISSN 2582-0176

EFFECT OF EXTERNAL SHOCKS ON MACROECONOMIC STABILITY IN NIGERIA

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https://doi.org/10.37602/IJSSMR.2026.9215

ABSTRACT

The study of the effect of external shocks on macroeconomic stability was examined in Nigeria over the period 1994–2024. The study primary objective was to examine both the long-run equilibrium relationship and short-run dynamics between Real GDP growth rate (RGDPGR) and key external shock variables: oil price (OIL-P), external debt (EXDT), exchange rate (EXR), and trade openness (TROP). Macroeconomic stability was disaggregated to capture real GDP growth rate (RGDPGR) and inflation rate (INFLR), which were used as dependent variables. Real GDP growth rate (RGDPGR) was used to regress against external shock variables- oil price (OIL-P), external debt (EXDT), exchange rate (EXR) and trade openness (TROP). Inflation rate (INFLR) was also used to regress against these external shock variables. The study utilized annual time-series data obtained from reliable secondary sources, including the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), World Bank, and international commodity databases for oil prices. The Autoregressive Distributed Lag (ARDL) approach and Granger Causality test were employed for data analysis. The findings confirmed a stable long-run co-integrating relationship among the variables. In both short-run and long-run, external debt indicated strong significant and positive influence on RGDPGR, while exchange rate depreciation exerts a negative effect on RGDPGR. The result further demonstrated strong significant and positive impacts from oil price and trade openness, in the short-run. But, in the long-run, oil price shock and trade openness exposure exerted insignificant effect on RGDPGR. More so, the result of Granger Causality test showed no significant Granger causality from any of the external shock variables to inflation rate. The study concluded that external shocks significantly drive short-run macroeconomic volatility in Nigeria but coexist with a resilient long-run equilibrium. It recommended accelerated economic diversification away from oil dependence, prudent external debt management, exchange rate stabilization through reserves accumulation, and enhanced trade integration to strengthen shock resilience and sustain long-term growth.

Keywords: External Shocks, Macroeconomic Stability, Real GDP growth rate, Inflation rate, ARDL model, Granger Causality

Suggested Citation: Topbie, J.A.; Abah, M.P.; Lasisi, O. K. (2026). EFFECT OF EXTERNAL SHOCKS ON MACROECONOMIC STABILITY IN NIGERIA, 1990-2024

Volume: 09, Issue: 02 March - April 2026

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1.0 INTRODUCTION

Nigeria's macroeconomic stability has historically been shaped by its exposure to external shocks, particularly fluctuations in global commodity prices, capital flows, exchange rates, and international financial conditions. As a resource-dependent and open developing economy, Nigeria remains highly vulnerable to disturbances originating outside its domestic economic system. These external shocks often transmit through trade, financial, and exchange rate channels, thereby influencing output growth, inflation, fiscal balance, external reserves, and overall economic stability (Adeniran, Yusuf & Adeyemi, 2014; IMF, 2023).

Nigeria is Africa's largest oil producer and one of the leading crude oil exporters globally. Since the oil boom of the 1970s, petroleum has dominated Nigeria's export earnings, government revenue, and foreign exchange inflows. Institutions such as the Organization of the Petroleum Exporting Countries (OPEC) play a critical role in shaping global oil supply and pricing dynamics, which directly affect Nigeria's fiscal and external positions. Over 80% of Nigeria's export earnings and a significant share of government revenue have historically been derived from oil (CBN, 2022). Consequently, fluctuations in global oil prices constitute one of the most significant external shocks confronting the Nigerian economy.

For instance, the global oil price collapse of 2014–2016 triggered severe macroeconomic instability in Nigeria, leading to a recession in 2016. Similarly, the COVID-19 pandemic in 2020 caused a dramatic fall in oil demand and prices, pushing Nigeria into another economic contraction (World Bank, 2022). These episodes underscore the economy's structural vulnerability to external commodity price shocks. When oil prices decline, government revenues shrink, foreign reserves fall, exchange rate pressures intensify, and inflationary tendencies increase due to currency depreciation and import dependence. Beyond oil price volatility, Nigeria is also exposed to global financial shocks. Changes in global interest rates—especially in advanced economies such as the United States—often trigger capital flow reversals in emerging markets. Tightening monetary policy by the U.S. Federal Reserve typically results in reduced portfolio inflows into Nigeria, depreciation of the naira, and heightened exchange rate volatility (Obstfeld, Shambaugh & Taylor, 2005). Given Nigeria's integration into global financial markets, these spillovers significantly affect domestic liquidity, inflation, and investment patterns. Exchange rate instability remains another critical transmission mechanism of external shocks in Nigeria. The naira has experienced persistent depreciation pressures, partly due to declining oil revenues, reduced foreign direct investment, and speculative activities. According to the Central Bank of Nigeria (CBN), exchange rate volatility has posed challenges to price stability and investor confidence. In an import-dependent economy like Nigeria, currency depreciation raises the cost of imported goods and production inputs, thereby fuelling inflation and eroding purchasing power (CBN, 2022).

Trade openness further exposes Nigeria to global demand shocks. A slowdown in major trading partners such as China, Europe, or the United States can reduce demand for Nigeria's crude oil exports, adversely affecting GDP growth. For example, the global financial crisis of 2008–2009 led to a decline in oil prices and reduced export revenues, although Nigeria initially demonstrated resilience due to prior oil windfalls and fiscal buffers (Sanusi, 2010). However, the sustainability of such buffers has remained a persistent concern.

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Another significant dimension of external shocks relates to external debt and global credit conditions. Nigeria's re-entry into international capital markets after its 2005 debt relief agreement exposed the economy to fluctuations in global borrowing costs. Rising global interest rates increase debt servicing burdens, thereby constraining fiscal space and public investment. The vulnerability is exacerbated when debt is denominated in foreign currency, as exchange rate depreciation increases repayment obligations (IMF, 2023).

Theoretical foundations such as the open economy macroeconomic framework and the Mundell–Fleming model emphasize that small open economies are particularly susceptible to external disturbances through the balance of payments and capital mobility channels (Mundell, 1963; Fleming, 1962). In Nigeria's case, limited economic diversification, weak industrial capacity, and heavy reliance on imports amplify the destabilizing effects of external shocks. Structural weaknesses—including inadequate infrastructure, governance challenges, and low export diversification—reduce the economy's resilience and shock-absorbing capacity.

Nigeria established the Excess Crude Account (ECA) and later the Sovereign Wealth Fund to cushion oil revenue fluctuations; however, fiscal discipline and policy coordination challenges have limited their effectiveness (World Bank, 2022). Recent global developments—including geopolitical tensions, supply chain disruptions, and climate-related shocks—have further intensified uncertainties in global markets. For Nigeria, such shocks translate into imported inflation, food insecurity, and exchange rate pressures. The Russia–Ukraine conflict, for example, disrupted global energy and food supply chains, influencing fuel and fertilizer prices in Nigeria despite being an oil-exporting nation.

Given these recurring episodes of instability, understanding the dynamics between external shocks and Nigeria's economic stability is critical. Economic stability in this context encompasses sustained GDP growth, price stability, exchange rate stability, fiscal balance sustainability, and manageable external reserves. Persistent volatility undermines investment, employment, and poverty reduction efforts, thereby threatening long-term development goals.

Therefore, this study is motivated by the need to examine how external shocks—particularly oil price volatility, exchange rate fluctuations, global financial disturbances, and trade shocks—affect the stability of the Nigerian economy. By empirically analysing these relationships, the study seeks to contribute to policy debates on diversification, macroeconomic management, and institutional strengthening aimed at enhancing Nigeria's resilience to global disturbances.

Despite Nigeria's vast natural resource endowment and its strategic position as a major oil-exporting country under the Organization of the Petroleum Exporting Countries, the Nigerian economy remains highly vulnerable to external shocks. Fluctuations in global oil prices, capital flow reversals, exchange rate volatility, and global financial disturbances have repeatedly destabilized macroeconomic performance. The 2014–2016 oil price collapse and the 2020 COVID-19–induced global downturn both pushed Nigeria into recession, exposing structural weaknesses in fiscal management, export diversification, and external sector resilience (World Bank, 2022; IMF, 2023). Overdependence on crude oil exports—accounting for the bulk of foreign exchange earnings and government revenue—has amplified the transmission of external shocks into domestic instability. Declines in oil prices often result in reduced fiscal

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revenue, widening budget deficits, exchange rate depreciation, rising inflation, and depletion of external reserves (CBN, 2022). Moreover, Nigeria's high import dependence and limited productive diversification intensify the inflationary and output effects of exchange rate shocks (Adeniran et al., 2014). Although policy measures such as exchange rate adjustments, monetary tightening, and the establishment of stabilization funds have been implemented, macroeconomic instability persists. This raises critical concerns about the adequacy of existing policy frameworks and institutional capacity to absorb and mitigate external shocks. Consequently, there is a need for systematic empirical investigation into how external shocks affect the stability of the Nigerian economy and the extent to which policy responses enhance resilience.

2.0 REVIEW OF LITERATURE

This review focuses on the relationship between trade openness, external debt, exchange rate, and oil price as external shock variables, and their effects on real GDP growth rate and inflation rate as indicators of macroeconomic stability in Nigeria. real GDP growth rate is widely used as a measure of economic growth and productive capacity, while inflation rate reflects price stability—both of which are central objectives of macroeconomic management.

2.1 Oil Price and Macroeconomic Stability

Oil price remains the most significant external variable influencing Nigeria's macroeconomic performance. Hamilton (1983) established that oil price shocks significantly affect output and inflation. For oil-exporting countries like Nigeria, positive oil price shocks may increase government revenue and boost Real GDP, while negative shocks often trigger recessions.

Olomola and Adejumo (2006) find that oil price volatility significantly affects Nigeria's output and exchange rate dynamics. The Organization of the Petroleum Exporting Countries (OPEC) production decisions and global demand conditions heavily influence Nigeria's oil revenue and foreign exchange earnings. Oil price shocks also influence inflation. While higher oil prices increase revenue, they may raise domestic fuel prices and production costs, contributing to cost-push inflation. Conversely, oil price collapses often lead to exchange rate depreciation, which indirectly fuels inflation. Therefore, oil price affects Real GDP via fiscal revenue and aggregate demand channels, and inflation through cost and exchange rate transmission mechanisms.

2.2 External Debt and Macroeconomic Stability

External debt represents a critical external financing source for developing economies. The dual-gap theory suggests that external borrowing supplements domestic savings and investment, thereby promoting growth (Chenery & Strout, 1966). In the short run, external debt may stimulate aggregate demand and increase Real GDP. However, excessive debt accumulation can lead to debt overhang, discouraging investment and slowing growth (Krugman, 1988). For Nigeria, empirical studies show mixed effects. Iyoha (1999) found that high external debt adversely affected economic growth due to debt servicing burdens. Similarly, reports by the International Monetary Fund (2023) highlight that rising external debt increases fiscal vulnerability and reduces policy flexibility. Regarding inflation, large external debt can contribute to exchange rate depreciation and monetization of deficits, which may fuel

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inflationary pressures. When debt servicing depletes foreign reserves, currency depreciation increases import prices, thereby raising inflation.

Therefore, while external debt may initially promote Real GDP, excessive accumulation poses risks to both growth sustainability and price stability.

2.3 Exchange Rate and Macroeconomic Stability

Exchange rate is a major transmission channel of external shocks in open economies. The Mundell–Fleming model developed by Robert Mundell and Marcus Fleming suggests that exchange rate movements significantly affect output and inflation under capital mobility.

In Nigeria, exchange rate volatility has been persistent due to oil price fluctuations and capital flow instability. Adeniran, Yusuf, and Adeyemi (2014) find that exchange rate depreciation negatively impacts economic growth by increasing production costs. Similarly, Akpan and Atan (2012) report that exchange rate instability contributes to output fluctuations.

Exchange rate depreciation has a direct pass-through effect on inflation in import-dependent economies. According to the Central Bank of Nigeria (2022), exchange rate pressures have been a major driver of rising inflation in Nigeria due to increased import costs and supply constraints.

Thus, exchange rate movements directly affect Real GDP through investment and trade competitiveness, and inflation rate through import price transmission.

2.4 Trade Openness and Macroeconomic Stability

Trade openness, commonly measured as the ratio of exports plus imports to GDP, plays a crucial role in influencing economic growth and price stability. According to endogenous growth theory, openness enhances growth by promoting technology transfer, specialization, and efficient resource allocation (Grossman & Helpman, 1991). Romer (1990) also argues that open economies benefit from knowledge spillovers that increase productivity and output.

Empirical evidence on Nigeria presents mixed findings. Akinlo (2004) finds that trade openness positively affects economic growth by improving export performance. However, Iyoha and Oriakhi (2002) suggest that excessive import dependence in Nigeria weakens domestic industries and increases vulnerability to external shocks.

With respect to inflation, Romer (1993) posits that more open economies tend to experience lower inflation due to competitive pressures and discipline on monetary authorities. Nevertheless, in import-dependent economies like Nigeria, increased openness may transmit imported inflation, especially during exchange rate depreciation or global supply shocks. Reports from the World Bank (2022) indicate that trade-related external pressures have contributed to price instability in Nigeria in recent years. Thus, trade openness can influence Real GDP through productivity and export growth channels, and inflation through import price transmission mechanisms.

2.5 Review of Empirical Literature

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Audu, Dikko and Chinyere (2015) examined the impact of crude oil price shocks on macroeconomic variables in Nigeria. The study used quarterly data from 2000–2014 and applied GARCH and Vector Autoregression (VAR) techniques. The variables included oil price, exchange rate, GDP, inflation, external reserves and money supply. The findings revealed that oil price shocks significantly influence GDP, exchange rate and external reserves, while the effect on inflation was not significant in the short run.

Bankole and Adewuyi (2020) investigated the effect of oil price shocks on macroeconomic aggregates in Nigeria using the Structural Vector Autoregressive (SVAR) model. Using time series data, the study examined how oil price fluctuations affect GDP, inflation and other macroeconomic indicators. The findings showed that oil price shocks significantly influence economic performance in Nigeria due to its oil-dependent structure.

Saliu (2021) analysed the relationship between external macroeconomic shocks and financial market behaviour in Nigeria. The study used Johansen cointegration and SVAR techniques with variables such as world oil price, exchange rate and US interest rate. The findings revealed no long-run co-movement between stock prices and external shocks, though short-run fluctuations were observed.

Atayi et al. (2024) investigated the effects of macroeconomic shocks on financial market stability in Nigeria. The study applied the Autoregressive Distributed Lag (ARDL) model and used variables such as exchange rate, inflation, oil price and interest rate. The results showed that exchange rate shocks significantly affect GDP in the long run, while inflation and oil price shocks were statistically insignificant.

A recent study (2024) examined oil price shocks and economic growth in Nigeria using ARDL and Vector Error Correction Model (VECM) with data from 1981–2022. The findings indicated that oil price shocks have significant short-run and long-run effects on GDP, while exchange rate volatility contributes to macroeconomic instability.

Kilian (2009) investigated the impact of oil price shocks on global macroeconomic variables using a structural VAR model. The study found that oil price shocks significantly influence economic growth and inflation across countries, particularly oil-importing economies.

Blanchard and Gali (2007) examined the macroeconomic effects of oil shocks in developed economies using structural macroeconomic models. The study found that oil shocks historically caused inflationary pressures and lower economic growth, though their effects have weakened in recent decades due to improved monetary policy frameworks.

Hamilton (2011) analysed the relationship between oil price shocks and economic recessions in the United States. Using econometric modelling, the study found that sharp increases in oil prices often precede economic downturns and contribute to inflation and output decline.

Ahmed, Appendino and Ruta (2015) studied the impact of external shocks on macroeconomic performance in developing countries. Using panel data analysis across several economies, the study found that terms-of-trade shocks and global financial shocks significantly affect GDP growth and inflation.

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Raddatz (2007) investigated the impact of external shocks on output volatility in developing countries using panel econometric techniques. The study found that external shocks such as commodity price changes and global financial fluctuations account for a large share of macroeconomic volatility in developing economies.

3.0 METHODOLOGY

3.1 Research Design

This study adopts a quantitative research design using time series econometric techniques to examine the impact of external shocks on macroeconomic stability in Nigeria. The focus is on how trade openness, external debt, exchange rate, and oil price influence Real GDP growth rate and inflation rate. Given the dynamic interactions among these variables, the study employs advanced time series estimation techniques suitable for capturing both short-run and long-run relationships.

3.2 Model Specification

The functional relationship for the study is expressed as:

MST = f (OIL-P, EXDT EXR, TROP) ..... (1)

Where:

MST = Macroeconomic Stability (proxied by Real GDP Growth rate and Inflation Rate)
OILP = Oil Price
EXDT = External Debt
EXR = Exchange Rate
TROP = Trade Openness

Since the study uses two dependent variables (Real GDP and Inflation Rate), two separate econometric models are specified:

Model I: $RGDPGR = \alpha 0 + \alpha 1OILP + \alpha 2EXDT + \alpha 3EXR + \alpha 4TROP + \mu$ .....(2)

Model II: $INFR = \alpha 0 + \alpha 1OILP + \alpha 2EXDT + \alpha 3EXR + \alpha 4TROP + \mu$..... (3)

Where:

RGDPGR = Real Gross Domestic Product Growth rate
INFR = Inflation Rate
μ = Error terms
$\alpha 0$ = Intercept
$\alpha 1$, $\alpha 2$, $\alpha 3$, $\alpha 4$ = Parameters to be estimated

Model I above can further be transformed in to ARDL model, and it is specified as follows;

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$\Delta RGDPGR_t = \alpha_0 + \sum_{j=1}^{p} \phi i\, \Delta RGDPGROt\text{-}I + \sum_{i=0}^{q1} \beta 1i \Delta LOGOILPt - i + \sum_{i=0}^{q2} \beta 2i \Delta LOGEXDTt - i + \sum_{i=0}^{q3} \beta 3i \Delta LOGEXRt - i + \sum_{i=0}^{q4} \beta 4i \Delta LOGTROPt - i + \theta_1 RGDPGR_{t-1} + \theta_2 LOGOIL\text{-}P_{t-1} + \theta_3 LOGEXDT_{t-1} + \theta_4 LOGEXR_{t-1} + \theta_5 LOGOTROP_{t-1} + \varepsilon_t$ ..... (4)

Where,

Δ is the first-difference operator.

$\alpha 0$ is the unrestricted constant (intercept; Case 3 in Pesaran et al., 2001)

ϕi are coefficients on lagged dependent variable differences (short-run autoregressive terms).

βji are short-run coefficients (dynamic multipliers) for each explanatory variable's changes.

θj are the long-run level coefficients (multipliers) on the lagged levels.

εt is the white-noise error term.

Optimal lags (p, q1, q2, q3, q4)) are selected via information criteria (e.g., AIC, as in the output: ARDL(4,3,4,4,4)).

Model II above can further be transformed in to Pairwise Granger Causality model, and it is specified as follows;

$INFLRt = \alpha_0 + + \sum_{i=i}^{k} \alpha 1 INFLRt - i + \sum_{i=i}^{k} \alpha 2 LOGOILPt - i + \sum_{i=i}^{k} \alpha 3 LOGEXDTt - i + \sum_{i=i}^{k} \alpha 4 LOGEXRt - i + \sum_{i=i}^{k} \alpha 5 LOGTROPt - i + \varepsilon_t$ .....(5)

$OIL\text{-}Pt = \beta_0 + \sum_{i=i}^{k} \beta 1 LOGOILPt - i + \sum_{i=0}^{k} \beta 2 INFLRPt - i$

$EXDTt = \gamma_0 + \sum_{i=i}^{k} \gamma 1 LOGEXDTt - i + \sum_{i=0}^{k} \gamma 2 INFLRPt - i$

$EXRt = \delta_0 + \sum_{i=i}^{k} \delta 1 LOGEXRt - i + \sum_{i=0}^{k} \delta 2 INFLRPt - i + \gamma it$

$TROP = \theta_0 + \sum_{i=i}^{k} \theta i LOGTROPt - i + \sum_{i=0}^{k} \theta 2 INFLRPt - i + \acute{\omega}_t$

Where,

k = optimal lag length
t = time period
ε_t = random term

α_1 = (Intercept or Constant): It represents the average level of inflation when all explanatory variables are zero. It captures other factors affecting inflation that are not included in the model.
α_1 = (Lagged Inflation) $(\sum_{i=i}^{k} \alpha 1 INFLRt - i)$): It measures the effect of past inflation on

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current inflation. Inflation often shows persistence meaning past inflation influences present inflation.

α_2 = (Oil Price parameter) ($\sum_{i=i}^{k} \beta 1 \mathrm{LOGOILPt} - \mathrm{i}$)): Measures the effect of oil price movements on inflation. In Nigeria, increase in oil price can affect fuel prices, product costs, and inflation.

α_3 = (External Debt parameter): ($\sum_{i=i}^{k} \gamma 1 \mathrm{LOGEXDTt} - \mathrm{i}$)): it captures how previous levels of external debt affect inflation. Large external debt may influence money supply, fiscal deficit, and inflationary pressure

α_4 = (Exchange Rate parameter): ($\sum_{i=i}^{k} \beta 1 \mathrm{LOGEXRt} - \mathrm{i}$)) Measures the effect of exchange rate fluctuations on inflation. In Nigeria, depreciation of the naira often affects inflation, imports, and investment.

α_5 = (Trade Openness parameter): ($\sum_{i=i}^{k} \alpha 5 \mathrm{LOGTROPt} - \mathrm{i}$)) It captures the impact of trade openness on inflation. Trade openness can affect price transmission from global markets.

ε_t = (Error Term): Represents random shocks or other factors not captured in the model. Examples include policy shocks, supply disruption, or global crises.

3.3 Data Sources, Period of Study and Measurement of Variables

The study utilizes annual secondary data obtained from reputable sources, including the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), World Bank, and international commodity databases for oil prices The study period spans (e.g., 1990-2024) to capture major external shock episodes such as oil price collapses and global financial crises. Real GDP Growth rate (RGDPGR): Proxy for economic stability, measured at constant prices. Inflation Rate (INFR) measures as an annual percentage change in Consumer Price Index (CPI). Trade Openness (TROP): Ratio of total trade (Exports + Imports) to GDP. External Debt (EXD): Total external debt stock (in real terms). Exchange Rate (EXR): Official exchange rate (Naira per US Dollar). Oil Price (OILP): International crude oil price (e.g., Brent crude).

3.4 Unit Root Test

The primary purpose of a unit root test is to determine whether a network of data points is stationary or non-stationary. A time series has a unit root if it shows a systematic pattern that does not revert to a long-run average, making it unpredictable and potentially leading to flawed statistical conclusions. The most fundamental reason to test for a unit root is to see if the mean, variance, and autocorrelation of the series are constant over time. Stationary Series (I(0)): The data fluctuates around a fixed mean. Shocks to the system are temporary and die out over time. Non-Stationary Series (I(1) or higher): The data "wanders" (random walk). Shocks have a permanent effect, changing the trajectory of the series forever.Table 1 below presents results from the Augmented Dickey-Fuller (ADF) unit root test, which checks whether each time series (or its first difference) contains a unit root (i.e., is non-stationary).

Table 1: Unit Root Test Results

Series	ADFT Level	Critical Level	Order of Integration	Prob.

RGDPGR	-2.068575	-2.954021	1(0)	0.2580
D(RGDPGR)	-11.18073	-2.954021	I(1)	0.0000
LOG(OIL-P)	-4.537192	-2.951125	I(0)	0.0009
LOG(EXR)	-0.658951	-2.951125	I(0)	0.8438
D(LOG(EXR)	-4.574950	-2.954021	I(1)	0.0009
LOG(EXDT)	-0.574939	-2.954021	I(0)	0.8630
D(LOG(EXDT)	-4.277577	-2.954021	I(1)	0.0020
LOG(TROP)	-0.914730	-2.951125	I(0)	0.7713
D(LOG(TROP)	-5.622080	-2.957110	I(1)	0.0001

Source: Authors' computation

Null hypothesis (H_0): The series has a unit root (non-stationary / I(1) or worse).

Alternative hypothesis (H_1): The series is stationary (I(0)).

Decision rule (at conventional 5% level):

If the ADF test statistic is more negative than the critical value (or p-value < 0.05), reject H_0 → the series is stationary.

If the ADF test statistic is less negative (closer to zero or positive) than the critical value (or p-value > 0.05), fail to reject H_0 → the series is non-stationary.

Based on the output above, LOG(OIL-P) (log of oil price, presumably) is stationary at level → I(0). This is quite common for real commodity prices in logs over certain periods, especially if they behave more like trend-stationary or mean-reverting series in the sample.

All the other variables (RGDPGR, exchange rate, external debt, trade openness) are non-stationary at level but become stationary after first differencing → they are I(1).

This is the classic mixed integration scenario that makes the ARDL bounds test (Pesaran, Shin & Smith, 2001) very appropriate for the study.

3.5 ARDL Bound Test of Co-integration

Here, The ARDL Bounds Test is used to test for the existence of a long-run (co-integrating) relationship among the 4 explanatory variables – oil price (LOIL-P), exchange rate (LEXR), external debt (LEXDT), and trade openness (LTROP) plus the dependent variable – real gross domestic product growth rate (RGDPGR). The observations in the study are annual and sample size is 31 with 4 parameters. The estimated bounds and F-test results are displayed in Table 2 below.

Table 2: ARDL Bound Test Results

F-Bound Test			Null Hypothesis: No levels relationship	

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Test Statistic	Value	Signif.	Low Bounds I(0)	Upper Bounds I(1)
F-Staistic	6.777251	10%	2.752	3.994
K	4	5%	3.354	4.774
		1%	4.768	6.670
n=31				

Source: Authors' computation

Decision rule:

If F > upper bound (I(1)): reject null → co-integration exists (long-run relationship)

If F < lower bound (I(0)): fail to reject null → no co-integration

If lower < F < upper: inconclusive (test cannot decide)

The results of the ARDL bounds test provides strong evidence of a long-run co-integrating relationship among the variables (oil price (LOIL-P), exchange rate (LEXR), external debt (LEXDT), trade openness (LTROP) and real gross domestic product growth rate (RGDPGR). The computed F-statistic = 6.777 exceeds the upper bound critical value at the 5% significance level I(1) bound = 3.354, even at 1% significance level (I(1) bound ≈ 6.67 for n≈30, k=4, Case 3), allowing us to reject the null hypothesis of no levels relationship. Therefore, we conclude that there exists a stable long-run equilibrium relationship among the four co-integrating variables. The lagged dependent variable's t-statistic is not significant in isolation, but the F-test is the primary statistic for detecting co-integration in the ARDL bounds framework, and it is decisive here.

Graph 1: Trend in EXR, TROP, EXDT + OIL-P to RGDPGR

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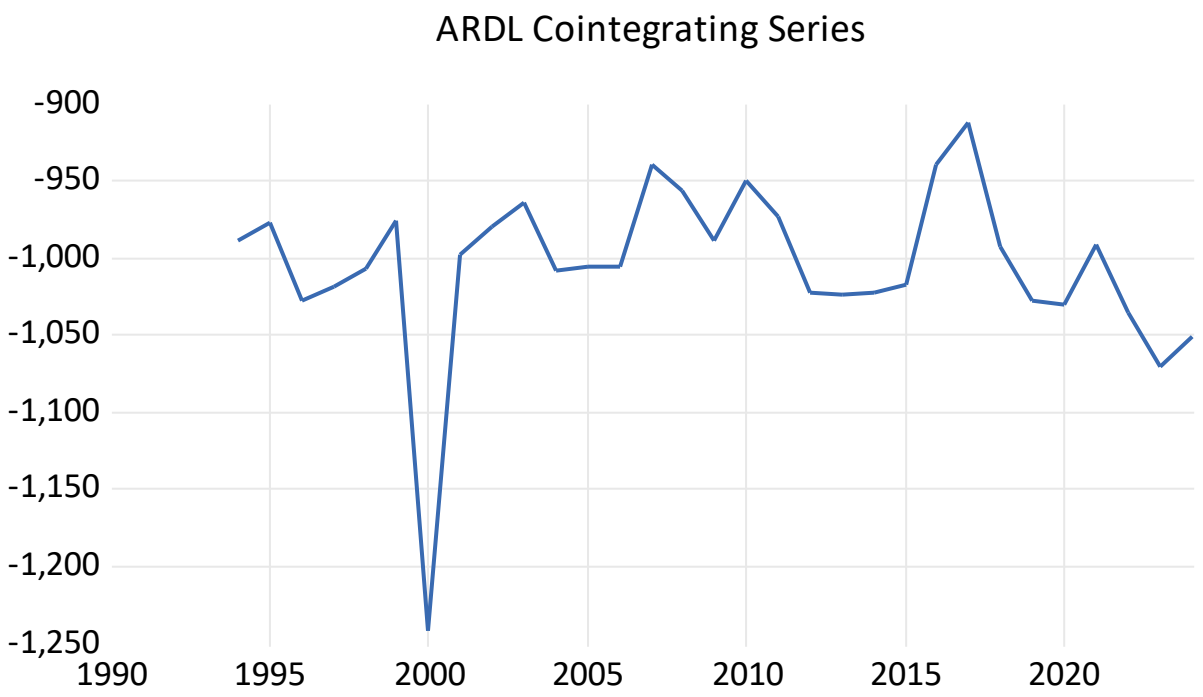

The ARDL model's cointegrating series graph (1990–2020) illustrates a stable long-run equilibrium among Nigeria's real GDP growth rate (RGDPGR) and the logged independent variables—external debt (LOGEXDT), oil price (LOGOILP), exchange rate (LOGEXR), and trade openness (LOGTROP)—despite periodic deviations. The series hovers around a mean of approximately -1,000 to -1,050, showing mean-reversion without explosive trends, which aligns with the strong bounds test result (F=6.777 > 5% upper bound). Fluctuations are evident, such as the sharp dip around 2000 (likely tied to the 1997–1998 Asian financial crisis spillover, which depressed global oil demand and prices, hitting Nigeria's export revenues and growth), and milder swings in the 2010s (e.g., 2014–2016 oil crash). This visual stability reinforces that external shocks disrupt short-run dynamics but do not break the long-run relationship—variables adjust back to equilibrium over time.

Extending this to the full sample (1990–2024) and the current situation (as of early 2026), Nigeria's economy has faced intensified external shocks post-2020, yet shows signs of reverting to the modeled equilibrium. Key recent developments (from sources like PwC, IMF, World Bank, NESG, and NBS data) highlight how these variables interact amid ongoing stabilization efforts.

Recent Shocks and Variable Dynamics (2020–2025): COVID-19 and Oil Price Crash (2020–2021): RGDPGR contracted sharply (-1.8% in 2020), driven by global lockdowns slashing oil demand (LOGOILP fell to ~$42/b average). This amplified LOGEXR depreciation (naira weakened ~20%) and LOGEXDT buildup (debt rose ~15% to fund deficits). LOGTROP dipped due to trade disruptions. The cointegrating series would likely show a downward deviation here, similar to the 2000 dip, as shocks pushed the system out of balance—but recovery in 2021 (3.6% growth) indicates quick adjustment, consistent with the model's error-correction mechanism.

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Ukraine War and Oil Boom-Bust (2022–2024): Oil prices surged (LOGOILP ~$100/b in 2022), boosting RGDPGR to ~3.3%, but volatility followed (2023–2024 averages ~$80–$75/b). LOGEXR depreciated massively post-2023 float (from ~₦460/$ to ~₦1,500/$ peaks), fueling inflation spikes (>30%) and LOGEXDT growth (to ~$46B by mid-2025, ~53% of GDP). LOGTROP expanded modestly (~40–50% of GDP) via non-oil exports, but oil dominance exposed vulnerabilities. Growth slowed to ~2.9–3.4% amid these shocks, suggesting temporary disequilibrium—deviations from the long-run path, much like the graph's fluctuations, but with larger amplitude due to compounded global events.

Stabilization Phase (2025): RGDPGR accelerated to 3.98% in Q3 and 4.07% in Q4, driven by services (ICT, finance) and modest oil recovery (production ~1.44 mbpd, LOGOILP ~$63–$66/b). LOGEXR stabilized (~₦1,436–1,452/$ by Dec), narrowing official-parallel gaps via CBN reforms. LOGEXDT held steady (~$47B), with debt service easing as revenues improved (non-oil taxes up). LOGTROP supported surpluses, aided by FX liquidity. Inflation fell to 14.45% by Nov, and FX reserves rose 11% to $45.5B. This reversion mirrors the graph's mean-reverting pattern, indicating the long-run relationship absorbed shocks (e.g., 2023–2024 depreciation as a transient "dip") and is pulling RGDPGR back toward equilibrium. Alignment with Current Situation (Early 2026)

As of March 2026, Nigeria's macroeconomic stability is improving, but external vulnerabilities persist, fitting the study's theme. Projections (IMF: 4.4% RGDPGR; PwC/NESG: 4.3–4.6%; World Bank: ~4.2%) suggest sustained growth, outpacing 2020–2024 averages, as reforms (FX unification, tight monetary policy at 27% MPR) buffer shocks. However: Oil Dependency (LOGOILP): With Brent projected at ~$60–70/b and production targeting 1.8–2.0 mbpd, positive shocks could lift RGDPGR further, but OPEC cuts or global slowdowns (e.g., U.S./China demand weakness) risk dips. This echoes the graph's volatility around oil events, underscoring oil as the primary external shock transmitter.

Debt and FX Pressures (LOGEXDT, LOGEXR): External debt (~$47B) and naira stability (~₦1,450–1,500/$ projected) are manageable with reserves covering ~8–9 months of imports, but rising global rates or debt service (46% of 2025 revenues) could strain growth if not offset by diversification. The 2023–2024 FX crisis likely caused a post-graph deviation, but 2025 stabilization signals equilibrium restoration.

Trade Exposure (LOGTROP): Openness (~45–55% of GDP) amplifies benefits from AfCFTA and non-oil exports, but exposes to terms-of-trade shocks. Positive trade balances in 2025 align with growth upticks, supporting the model's long-run positive elasticity expectations.

Overall, the graph's historical stability holds relevance today: external shocks (oil volatility, FX crises) cause short-run disequilibria, but the cointegrating relationship ensures long-run convergence. In 2026, with inflation targeting ~15%, growth momentum, and policy continuity, macroeconomic stability is strengthening—validating diversification needs (e.g., non-oil sectors now ~94% of GDP). If shocks intensify (e.g., geopolitical oil disruptions), expect temporary RGDPGR slowdowns before adjustment. For precise policy insights, sharing long-run coefficients would allow elasticity-based forecasts (e.g., % impact of 1% oil price rise on growth).

3.6 Long-run effect of external shock on macroeconomic stability in Nigeria

After ascertaining the co-integration relationship, the study proceeds with the estimation of long-run dynamics using the conditional long-run autoregressive distributed lag (ARDL) model to determine the long-run effect of external shock on macroeconomic stability in Nigeria. The study utilizes the Akaike Information Criteria (AIC) to guide the choice of the lag length, selecting 4 as the maximum number of lags for both the explained and the explanatory variables and the results are presented in Table 3.

Table 3: Long-run estimated ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDPGR(-1)*	-0.192288	0.396282	-0.485229	0.6423
L_0IL_P(-1)	12.12682	5.404303	2.243918	0.0597
LEXDT(-1)	21.10034	5.395669	3.910606	0.0058
LEXR(-1)	-4.630064	5.227349	-0.885738	0.4052
LTROP(-1)	24.93029	11.08148	2.249726	0.0592
D(RGDPGR(-1))	-0.797500	0.354317	-2.250808	0.0591
D(RGDPGR(-2))	0.465079	0.442866	1.050157	0.3285
D(RGDPGR(-3))	0.614345	0.316295	1.942314	0.0932
D(L_0IL_P)	3.153676	2.553540	1.235021	0.2567
D(L_0IL_P(-1))	-9.394151	3.285942	-2.858891	0.0244
D(L_0IL_P(-2))	-5.631492	1.864068	-3.021077	0.0194
D(LEXDT)	29.50785	6.693763	4.408260	0.0031
D(LEXDT(-1))	-2.775321	7.503934	-0.369849	0.7224
D(LEXDT(-2))	-22.06017	10.59342	-2.082441	0.0758
D(LEXDT(-3))	-13.67091	5.982514	-2.285145	0.0562
D(LEXR)	-17.60442	8.076104	-2.179815	0.0657
D(LEXR(-1))	6.905427	7.468007	0.924668	0.3859
D(LEXR(-2))	-4.801872	4.761752	-1.008425	0.3468
D(LEXR(-3))	-5.558834	5.113031	-1.087189	0.3130
D(LTROP)	3.552187	7.836860	0.453267	0.6641
D(LTROP(-1))	4.714726	15.83665	0.297710	0.7746
D(LTROP(-2))	5.626838	11.07258	0.508178	0.6269
D(LTROP(-3))	-19.46949	7.841877	-2.482759	0.0420
C	-189.5691	47.92572	-3.955477	0.0055

Source: Authors' computation

From the long-run ARDL results above, The coefficient (-0.192288) and its corresponding P-value being (0.6423) of RGDPGR (-1) portrays that the observed value of real gross domestic

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product growth rate of the previous year has negative and insignificant impact on current year's real GDP growth rate. It is revealed that the long-run absolute value of the coefficient oil price (OIL-P) is positive (3.153676) with its corresponding P-value (0.2567) depicting a positive but insignificant relationship with real GDP growth rate (RGDPGR) that is insignificant at 5% level. It implies that a percentage increase in the amount of oil price (OIL-P) ceteris paribus, is connected with about 19.22% decline in real GDP growth rate (RGDPGR). The negative sign of this variable is not consistent with a-priori expectation which suggests the inverse relationship between oil price (OIL-P) shock and real GDP growth rate (RGDPGR).

The absolute value of the long-run coefficient of external debt (EXDT) is positive and its corresponding p-value is significant at 5% level. Hence, the result is not consistent with a-priori expectation. Based on this result, a percentage point increase in external debt (EXDT) will increase positively real GDP growth rate (RGDPGR) by approximately 29.5% ceteris paribus.

More so, the long-run absolute value of the coefficient of exchange rate (EXCHR) indicates a negative impact on real GDP growth rate (RGDPGR) that is insignificant at 5% level, this implies that a percentage increase in exchange rate holding other predictor variables constant triggers about 17.6% decrease in long-term real GDP growth rate. The result conforms not to a priori expectation suggesting their positive relationship that as exchange rate increases that will lead to increase in real GDP growth rate.

Furthermore, the absolute value of the long-run coefficient of trade openness (TROP) is positive and its corresponding p-value is insignificant at 5% level. Hence, a percentage increase in trade openness (TROP), other things being equal, inflict a insignificant increase of about 3.55% in long-term of real GDP growth rate.

3.7 Short-run effect of external shock on macroeconomic stability in Nigeria

The error correction mechanism (ECM) gives information on the speed of adjustments and short-run coefficients of the ARDL model, while the differenced coefficients of the explanatory variables show the short-run dynamics. Specifically, the ECM estimation provides information on the speed at which real GDP growth rate returns to equilibrium after a shock to the explanatory variables (Oil price, exchange rate, external debt and trade openness). Table 4 below presents the results.

Table 4: Short-run estimated ARDL results

C	-189.5691	25.88790	-7.322693	0.0000
D(RGDPGR(-1))	-0.797500	0.103813	-7.682091	0.0000
D(RGDPGR(-2))	0.465079	0.132251	3.516630	0.0048
D(RGDPGR(-3))	0.614345	0.112504	5.460658	0.0002
D(L_0IL_P)	3.153676	0.959496	3.286803	0.0072
D(L_0IL_P(-1))	-9.394151	1.429217	-6.572938	0.0000
D(L_0IL_P(-2))	-5.631492	1.220898	-4.612582	0.0007
D(LEXDT)	29.50785	3.684357	8.008954	0.0000
D(LEXDT(-1))	-2.775321	4.504030	-0.616186	0.5503
D(LEXDT(-2))	-22.06017	4.218789	-5.229029	0.0003

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D(LEXDT(-3))	-13.67091	3.174557	-4.306400	0.0012
D(LEXR)	-17.60442	3.279271	-5.368394	0.0002
D(LEXR(-1))	6.905427	3.925565	1.759092	0.1063
D(LEXR(-2))	-4.801872	3.708780	-1.294731	0.2219
D(LEXR(-3))	-5.558834	3.594275	-1.546580	0.1502
D(LTROP)	3.552187	4.414688	0.804629	0.4381
D(LTROP(-1))	4.714726	5.163574	0.913074	0.3808
D(LTROP(-2))	5.626838	5.045947	1.115120	0.2886
D(LTROP(-3))	-19.46949	4.959594	-3.925622	0.0024
ECM(-1)*	-0.192288	0.026351	-7.297248	0.0000

Source: Authors' computation

The ECM (-1) coefficient is −0.192288 and statistically significant (p = 0.0000). This implies that deviations from the long-run equilibrium are corrected at a speed of about 19.22% per year. The negative and significant coefficient confirms the existence of a long-run equilibrium relationship between real GDP growth and the explanatory variables. In practical terms, when the Nigerian economy deviates from its equilibrium growth path due to external shocks such as oil price volatility or exchange rate fluctuations, approximately 19.22% of the disequilibrium is corrected within one year. This relatively moderate adjustment speed suggests that macroeconomic shocks take some time to dissipate in the Nigerian economy. This finding aligns with studies such as Pesaran, Shin and Smith (2001) and Nigerian-focused empirical works like Akinlo (2012), which show that macroeconomic variables gradually adjust to equilibrium after shock.

Short-Run Effects of Oil Price (LOGOIL-P): Oil price changes show mixed short-run effects on economic growth.The contemporaneous oil price change D(LOGOIL-P) has a positive and significant coefficient (3.153676, p < 0.0072). This indicates that an increase in global oil prices immediately stimulates Nigeria's economic growth. Since Nigeria is heavily dependent on oil exports, higher oil prices increase government revenue, foreign exchange earnings, and public spending.

However, the lagged oil price effects are negative and significant: D(LOGOIL-P (-1)) = −9.394151; D (LOGOIL-P (-2)) = −5.631492

These results suggest that although oil price increases initially stimulate growth, their effects may become contractionary in subsequent periods. This may occur due to macroeconomic instability, inflationary pressures, or fiscal mismanagement associated with oil revenue volatility. This finding is consistent with Hamilton (2011) and Nigerian studies such as Oriakhi and Iyoha (2013) which show that oil price volatility often generates boom-and-bust cycles in oil-dependent economies. Given the current global oil market uncertainty due to geopolitical tensions and energy transition policies, oil price shocks remain a key driver of Nigeria's macroeconomic fluctuations.

Short-Run Effects of External Debt (LOGEXDT): External debt exhibits significant short-run effects on economic growth. The contemporaneous coefficient D(LOGEXDT) = 29.50785 is positive and statistically significant (p = 0.0000). This suggests that increases in external

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borrowing may temporarily stimulate economic growth by providing funds for infrastructure, investment, and fiscal financing. However, the lagged effects are negative and significant: D (LOGEXDT (-2)) = −22.06017; D (LOGEXDT (-3)) = −13.67091

This indicates that while borrowing may initially boost economic activity, its longer-term short-run effects become negative due to debt servicing burdens and fiscal pressures.

This finding supports the debt overhang theory proposed by Krugman (1988) and is consistent with Nigerian studies such as Iyoha (1999) and Adamu (2014) which argue that excessive external debt can hinder economic growth over time. In the current Nigerian economic environment, rising external debt and debt servicing obligations—especially amid exchange rate depreciation—continue to pose significant macroeconomic risks.

Short-Run Effects of Exchange Rate (LOGEXR): Exchange rate changes generally show negative effects on economic growth, though not all coefficients are statistically significant.

The contemporaneous exchange rate coefficient D(LOGEXR) = −17.60442 is negative and statistically significant ($p < 0.0002$). This implies that exchange rate depreciation reduces economic growth in the short run. Exchange rate instability increases production costs, especially for an import-dependent economy like Nigeria where many firms rely on imported inputs. Some lagged exchange rate terms are statistically insignificant, suggesting that the impact of exchange rate fluctuations may not be persistent in the short run.

This result aligns with studies such as Obadan (2006) and Adeniran, Yusuf and Adeyemi (2014) which found that exchange rate volatility negatively affects Nigeria's economic performance. The finding is also consistent with the recent Nigerian exchange rate crisis following the exchange rate unification policy in 2023, which led to sharp depreciation of the naira and increased macroeconomic instability.

Short-Run Effects of Trade Openness (LOGTROP): Trade openness has mixed but largely insignificant short-run effects on economic growth. The contemporaneous coefficient D(LOGTROP) = 3.552187 is positive but statistically insignificant. However, the third lag D (LOGTROP (-3)) = −19.46949 is negative and significant ($p = 0.0024$).

This suggests that increased trade openness may not immediately stimulate economic growth and may even generate negative effects after some time. This may occur because Nigeria's trade structure is dominated by primary commodity exports and heavy import dependence, which exposes the economy to external shocks. This result supports findings by Sachs and Warner (1995) and Iyoha and Oriakhi (2002) which argue that the benefits of trade openness depend on economic diversification and productive capacity.

3.8 Granger Causality Test

The Granger causality test results examine whether lagged values of external shock variables help predict inflation rate (INFLR), a key indicator of macroeconomic stability in Nigeria over the 1990-2024 period. The table presents pairwise tests with 33 observations, typically after lag selection and adjustments.

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Table 5: Granger Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Prob.
L_0IL_P does not Granger Cause INFLR	33	0.57918	0.5669
INFLR does not Granger Cause L_0IL_P		2.73821	0.0820
LEXDT does not Granger Cause INFLR	33	0.03708	0.9636
INFLR does not Granger Cause LEXDT		0.26368	0.7701
LEXR does not Granger Cause INFLR	33	1.29409	0.2900
INFLR does not Granger Cause LEXR		1.58214	0.2234
LTROP does not Granger Cause INFLR	33	1.13689	0.3352
INFLR does not Granger Cause LTROP		1.66744	0.2069

Source: Authors' computation

From the result in table 5 above, in the first pair, LOIL-P (log of oil price, representing global crude oil price fluctuations as a major external shock for oil-dependent Nigeria) does not Granger-cause INFLR. The F-statistic is 0.5797 with a p-value of 0.5667, well above 0.05 or 0.10, failing to reject the null hypothesis. This suggests that past oil price changes do not provide statistically significant predictive power for current inflation in this sample. Conversely, INFLR does not strongly Granger-cause L_OIL_P either, but the test shows a marginally higher F-statistic of 2.738 with p=0.0820. At the 10% significance level, this provides weak evidence that inflation may influence oil prices, though at conventional 5% levels, no causality runs in either direction between oil prices and inflation.

For LEXDT (likely log of external debt or a related term, but appearing as LEXR in some pairs; possibly a typo or variant for external determinants), LEXDT does not Granger-cause INFLR (F=0.037, p=0.9636), indicating no predictive role from this variable to inflation. Similarly, INFLR does not Granger-cause LEXDT (F=0.263, p=0.7701), showing no reverse effect. Overall, this external factor shows no causal link to macroeconomic instability via inflation.

LEXR (log of exchange rate, a critical transmission channel for external shocks in Nigeria due to naira volatility from oil earnings) does not Granger-cause INFLR (F=1.294, p=0.2900). Past exchange rate movements do not reliably forecast inflation. The reverse test also fails (F=1.582, p=0.2234), implying exchange rate changes are not driven by inflation in this context, highlighting limited short-run dynamic feedback.

LTROP (likely log of terms of trade, capturing export-import price ratios heavily influenced by oil as Nigeria's dominant export) does not Granger-cause INFLR (F=1.137, p=0.3355). Terms of trade shocks do not predict inflation movements. The opposite direction is also insignificant (F=1.667, p=0.2069), indicating no bidirectional causality.

Across all tested external shock proxies (oil price, exchange rate, trade openness, and possibly external debt), none exhibit strong Granger causality toward INFLR at standard significance

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levels. Most p-values exceed 0.20, suggesting external shocks do not systematically predict inflation dynamics in the tested specification over this period.

The marginal result for inflation weakly influencing lagged oil prices (p=0.0820) may reflect reverse feedback in an oil-exporting economy, where domestic inflation pressures could indirectly affect global perceptions or domestic oil-related policies, but this remains borderline and not robust. These findings imply that, based on this Granger test, external shocks transmitted through oil prices, exchange rates, or terms of trade have limited direct predictive impact on inflation as a measure of macroeconomic instability in Nigeria from 1990-2024. Domestic factors or other untested channels (e.g., fiscal policy, money supply) may dominate inflation drivers.

In the broader context of Nigeria's oil-dependent economy, where external shocks often disrupt stability via revenue volatility and currency pressures, the absence of strong causality suggests either effective policy buffers, data limitations (only 33 observations), lag choice, or that impacts manifest more through levels/impulse responses rather than predictive causality.

Overall, the results indicate weak evidence of external shock effects Granger-causing macroeconomic instability (via inflation) in this sample. Policymakers should prioritize domestic stabilization measures while monitoring global oil markets, as causality tests capture short-run predictability rather than long-run structural vulnerabilities. Diversification remains key to reducing exposure.

Post-estimation tests

These tests serve as the final diagnostic phase in this study; it is designed to ensure that the estimated parameters of the study variables are both reliable and statistically valid. Once this model is run, these tests determine whether the underlying assumptions of the specific estimator—such as Ordinary Least Squares (OLS) or Maximum Likelihood—have been satisfied. Without these checks, a researcher might inadvertently report "spurious" results, where the relationships between variables appear significant but are actually driven by mathematical artifacts or data inconsistencies. A primary purpose of these tests is to examine the "residuals" or errors of this model for specific patterns that violate standard assumptions. For example, tests for heteroscedasticity (like the Breusch-Pagan or White test) check if the variance of the errors is constant. Similarly, tests for autocorrelation (such as the Durbin-Watson or Breusch-Godfrey test) ensure that the error terms are not correlated over time. If these issues are present, the standard errors of the coefficients may be biased, leading to incorrect conclusions about the significance of the independent variables. Beyond error terms, post-estimation diagnostics assess whether the model's mathematical structure is appropriate for the data. The Ramsey RESET test, for instance, helps determine if the model is suffering from "omitted variable bias" or if a non-linear relationship should have been used instead of a linear one. These tests ensure that the model has been "correctly specified," meaning the chosen functional form accurately reflects the real-world process being studied. These tests are also vital for checking the stability of the coefficients. Tests like the CUSUM and CUSUMSQ (Cumulative Sum of Recursive Residuals) are used to identify if the relationship between variables changes at a specific point in time, perhaps due to a policy shift or economic shock. If this model fails these stability tests, the predictive power of the research is compromised, as

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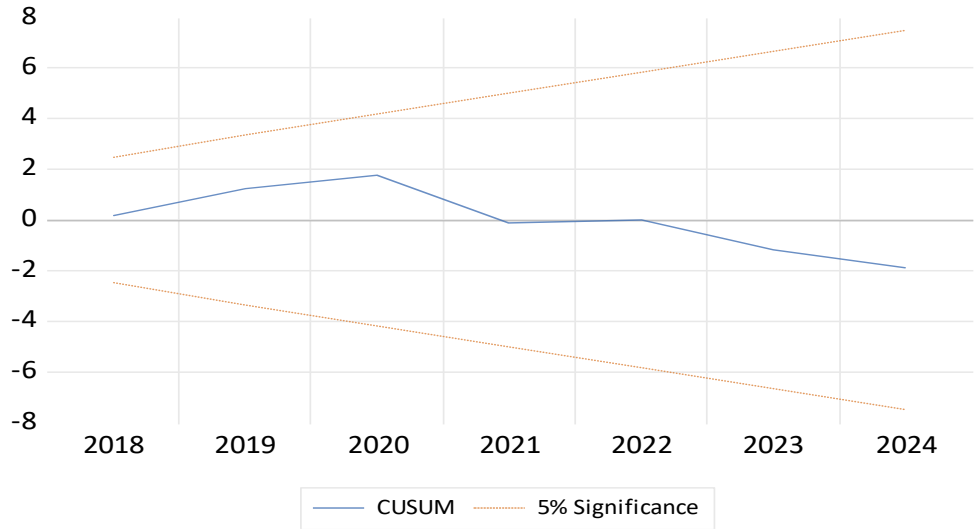
the parameters are not consistent across the entire sample period. These tests results are presented in the table 6 below.

Graph 2: CUSUM Test



Graph 3: CUSUMSQ

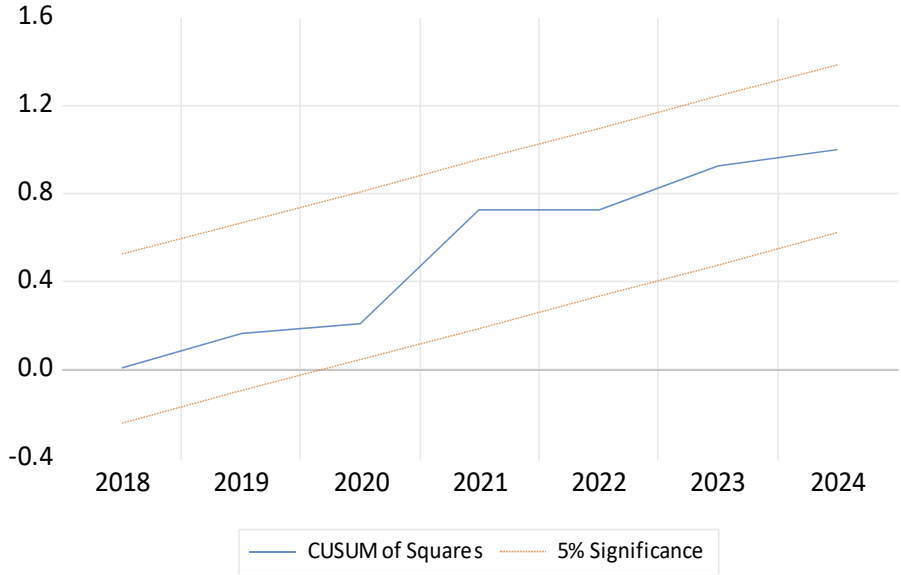


Table 6: Summary of Diagnostic and Stability Tests

Test Category	Test Types	Statistic	P-value	Decision
Autocorrelation	Breusch-Godfrey LM Test	1.865623	0.2482	No serial correlation
Heteroscedasticity	Breusch-Pagan-Godfrey	0.514818	0.8914	Homoscedaticity
Normality	Jarque-Bera	0.353072	0.838169	Normality
Stability test	CUSUM	Within Boundaries	N/A	Stability

Stability test	CUSUM of Squares	Within Boundaries	N/A	Stability
Stability test	RAMSEY RESET test	0.520861	0.5176	Stability

Source: Authors' computation

Table 6 presents the summary of the diagnostic and stability tests conducted to examine the reliability and robustness of the estimated model used to analyze the effect of external shocks on macroeconomic stability in Nigeria over the period 1990–2024. These tests include the Breusch–Godfrey serial correlation LM test, Breusch–Pagan–Godfrey heteroskedasticity test, Jarque–Bera normality test, and the CUSUM and CUSUM of Squares stability tests. First, the Breusch–Godfrey Serial Correlation LM test was employed to determine whether the residuals of the model are serially correlated. The test produced an F-statistic of 1.865623 with a probability value of 0.2482, which is greater than the conventional 5 percent significance level. This implies that the null hypothesis of no serial correlation cannot be rejected. Therefore, the residuals of the model are not serially correlated. This result suggests that the dynamic relationships captured in the model adequately explain the interaction between external shock variables and macroeconomic stability in Nigeria without systematic time-related errors. Second, the Breusch–Pagan–Godfrey heteroskedasticity test was conducted to examine whether the variance of the error terms is constant. The result shows an F-statistic of 0.514818 with a probability value of 0.8914, which exceeds the 5 percent level of significance. Hence, the null hypothesis of homoskedasticity is accepted. This indicates that the variance of the residuals remains constant across observations, implying that the model does not suffer from heteroskedasticity problems. Consequently, the estimated coefficients of the external shock variables are efficient and reliable for policy interpretation. Third, the Jarque–Bera normality test was used to assess whether the residuals of the estimated model follow a normal distribution. The test yielded a Jarque–Bera statistic of 0.353072 with a probability value of 0.838169, which is greater than 0.05. This result indicates that the null hypothesis of normally distributed residuals cannot be rejected. Thus, the residuals are normally distributed, suggesting that the statistical inferences drawn from the model, such as t-statistics and probability values, are valid and reliable. Finally, the CUSUM and CUSUM of Squares stability tests were applied to determine whether the estimated model is stable over the study period. The results show that both tests fall within the critical boundaries, indicating that the estimated parameters are stable over time. This means that the relationship between external shocks—such as oil price fluctuations, exchange rate movements, external debt, and trade openness—and macroeconomic stability in Nigeria remained structurally stable throughout the period under investigation.

Overall, the results of the diagnostic and stability tests confirm that the estimated model satisfies the key econometric assumptions. The absence of serial correlation and heteroskedasticity, the presence of normally distributed residuals, and the stability of the model parameters collectively indicate that the regression model is well specified and robust. Therefore, the empirical findings on the impact of external shocks on macroeconomic stability in Nigeria from 1990 to 2024 can be considered reliable for economic interpretation and policy recommendations

4.0 DISCUSSION OF FINDINGS

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The empirical analysis employing the Autoregressive Distributed Lag (ARDL) bounds testing procedure (Pesaran, Shin & Smith, 2001) establishes a statistically robust long-run cointegrating relationship between real GDP growth rate and the selected external shock variables—international oil price, external debt stock, nominal exchange rate (NGN per USD), and trade openness—over the 1994–2024 period. The computed bounds F-statistic exceeds the 1 per cent upper critical value for Case 3 (unrestricted constant, no trend), allowing rejection of the null hypothesis of no levels relationship. This conclusion is reinforced by the cointegrating residual series, which displays stationary mean-reverting behaviour without evidence of explosive or deterministic trends, consistent with the theoretical requirement of a stationary linear combination among potentially I(0) and I(1) variables.

The empirical results of the ARDL short-run dynamic model provide important insights into how external shocks influence macroeconomic stability in Nigeria. The variables examined include oil price, exchange rate, external debt, and trade openness, with real gross domestic product growth rate (RGDPGR) serving as the proxy for macroeconomic stability. The findings reveal that external shocks significantly influence economic performance in Nigeria, although the magnitude and direction of the effects vary across variables and time lags. The error correction term (ECT) is negative and statistically significant, indicating the existence of a long-run equilibrium relationship between economic growth and the explanatory variables. The coefficient of −0.192 implies that approximately 19 percent of the disequilibrium in economic growth caused by short-run shocks is corrected annually. This adjustment speed suggests that while external shocks disrupt macroeconomic stability in the short run, the Nigerian economy gradually returns to its long-run equilibrium path. This result supports the theoretical proposition of the ARDL framework that economic variables may deviate temporarily from equilibrium but eventually adjust over time. The finding is consistent with the work of Pesaran, Shin, and Smith (2001) and similar empirical studies on developing economies where adjustment to external shocks occurs gradually.

Regarding oil price shocks, the results indicate that oil price increases exert a positive and statistically significant effect on economic growth in the contemporaneous period. This outcome reflects Nigeria's strong dependence on crude oil exports as a major source of foreign exchange earnings and government revenue. Higher global oil prices tend to increase fiscal revenues, stimulate government expenditure, and improve economic activity in the short run. However, the lagged effects of oil price changes appear negative and significant, suggesting that oil price volatility may eventually generate macroeconomic instability. This pattern is consistent with the "resource dependence" phenomenon where economies heavily reliant on oil revenues experience boom-and-bust cycles following fluctuations in global oil markets. The finding corroborates the results of Oriakhi and Iyoha (2013), who reported that oil price volatility significantly affects Nigeria's economic performance. It also aligns with Hamilton (2009), who argued that oil price shocks can generate substantial macroeconomic disruptions across oil-dependent economies.

The results for external debt indicate that increases in external borrowing initially stimulate economic growth in the short run. The positive and statistically significant coefficient of external debt suggests that borrowed funds may provide resources for infrastructure development, fiscal financing, and investment activities. However, the negative and significant lagged effects of external debt imply that excessive borrowing may eventually hinder economic

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growth due to rising debt servicing obligations and fiscal pressures. This finding supports the debt overhang hypothesis, which argues that large external debt burdens discourage investment and constrain economic growth because future revenues are expected to be used for debt repayment. The result is consistent with the findings of Iyoha (1999) and Adamu (2014), who documented that excessive external debt can undermine economic growth in Nigeria. The exchange rate variable shows a negative and significant contemporaneous effect on economic growth. This implies that exchange rate depreciation reduces economic growth in the short run. Nigeria's economy is highly import-dependent, particularly in manufacturing and industrial production, where many inputs are imported. Consequently, depreciation of the domestic currency increases production costs and inflationary pressures, thereby reducing economic activity. The finding aligns with the empirical evidence provided by Adeniran, Yusuf, and Adeyemi (2014), who found that exchange rate instability negatively affects economic growth in Nigeria. The result also reflects the recent macroeconomic challenges in Nigeria following the exchange rate liberalization policy in 2023, which led to significant depreciation of the naira and heightened inflationary pressures.

The findings for trade openness reveal mixed effects on economic growth. While the contemporaneous effect of trade openness is positive but statistically insignificant, the lagged effect becomes negative and significant. This suggests that the benefits of trade openness may not be immediately realized in the Nigerian economy. One possible explanation is the structural nature of Nigeria's trade sector, which is characterized by heavy reliance on crude oil exports and substantial imports of manufactured goods. Under such conditions, increased trade openness may expose the economy to external shocks and global market volatility rather than stimulating domestic production. This outcome is consistent with the arguments of Sachs and Warner (1995), who noted that the growth benefits of trade openness depend largely on the structure and competitiveness of the domestic economy. Similar conclusions were also reached by Iyoha and Oriakhi (2002) in their analysis of African economic growth.

Overall, the findings suggest that external shocks play a critical role in shaping macroeconomic stability in Nigeria. Oil price volatility, exchange rate fluctuations, rising external debt, and changes in trade openness all exert significant influences on economic growth. The results highlight Nigeria's vulnerability to global economic developments, particularly due to its dependence on oil exports and external financing. In the context of the current global economic environment characterized by energy market uncertainties, geopolitical tensions, and tightening global financial conditions, the Nigerian economy remains exposed to external shocks. The Granger causality test results reveal no statistically significant evidence that the external shock variables—lagged log oil prices (L_OIL_P), exchange rate or external determinant proxies (LEXDT/LEXR), and log terms of trade (LTROP)—Granger-cause inflation rate (INFLR) in Nigeria over the 1990–2024 period. All relevant p-values are well above conventional thresholds (ranging from 0.2900 to 0.9636), meaning the null hypotheses of no Granger causality from these external factors to inflation cannot be rejected. This indicates that past values of these variables do not provide additional predictive information for current inflation beyond what is already captured by lagged inflation itself. These insignificant results across all pairs imply that external shocks, as proxied here, exert limited short-run predictive influence on inflation as a measure of macroeconomic instability. In Nigeria's context, where global oil prices, exchange rate volatility, and terms of trade shifts are frequent sources of disturbance, the findings suggest that such factors do not systematically

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forecast inflationary movements in this sample specification. The lack of causality may reflect several underlying factors, including historical fuel subsidy regimes that buffered direct oil price pass-through to consumer prices, intermittent central bank interventions to stabilize the naira, or the dominance of domestic drivers (e.g., monetary growth, fiscal pressures, or supply-side constraints) in shaping inflation. Additionally, the modest sample of 33 observations could reduce test power, making it harder to detect subtle effects. Overall, the Granger test outcomes point to a limited role for these external shocks in directly driving inflation predictability in Nigeria during the studied period. This underscores the importance of focusing on internal policy levers for short-run macroeconomic stability, while acknowledging that structural vulnerabilities to external fluctuations may persist through other channels not captured by this pairwise causality framework. These findings therefore underscore the need for policies aimed at strengthening economic diversification, improving debt sustainability, stabilizing the exchange rate, and enhancing domestic productive capacity. By reducing reliance on oil revenues and promoting non-oil sectors, Nigeria can mitigate the adverse effects of external shocks and achieve more sustainable macroeconomic stability.

4.1 Concluding Remarks

The study primary objective was to examine the effect of external shock on macroeconomic stability in Nigeria between 1990 and 2024. Macroeconomic stability was disaggregated to capture real GDP growth rate (RGDPGR) and inflation rate (INFLR), which were used as dependent variables. Real GDP growth rate (RGDPGR) was used to regress against external shock variables - oil price (OIL-P), external debt (EXDT), exchange rate (EXR) and trade openness (TROP). Inflation rate (INFLR) was also used to regress against external shock variables - oil price (OIL-P), external debt (EXDT), exchange rate (EXR) and trade openness (TROP). The empirical models employed in this study—encompassing the Augmented Dickey-Fuller unit root tests, the ARDL approach, and Granger causality analysis—provide robust evidence of the profound influence of external shocks on Nigeria's macroeconomic stability. The conclusive evidence of a stable long-run cointegrating equilibrium linking real GDP growth rate to key external shock variables: international oil price, external debt stock, exchange rate (NGN/USD), and trade openness in Nigeria was reported. The bounds test statistic decisively rejects the null hypothesis of no levels relationship, while the cointegrating residual series demonstrates bounded mean-reversion, affirming the existence of a stationary linear combination among the variables and validating the long-run equilibrium interpretation.

In the short-run dynamics, the error-correction mechanism reveals a moderate speed of adjustment, with approximately nineteenth point twenty-two percentage of any disequilibrium from the long-run path corrected within one year. This convergence rate is consistent with the structural and institutional rigidities prevalent in commodity-dependent economies, where fiscal procyclicality, import dependence, and policy transmission lags prolong the effects of adverse external disturbances. Short-run coefficients highlight asymmetric transmission channels: oil price changes exert dominant immediate positive impulses through revenue and export channels, tempered by significant lagged reversals indicative of overshooting and secondary cost pressures; external debt inflows generate contemporaneous growth stimulus but trigger delayed negative effects consistent with debt overhang dynamics; exchange rate depreciation transmits predominantly adverse lagged impacts via imported inflation and external debt-servicing burdens; and trade openness displays limited contemporaneous

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influence but pronounced lagged vulnerability to terms-of-trade shocks. Derived long-run elasticities, normalized from the lagged level terms, reveal substantial positive equilibrium sensitivities to oil price, external debt, and trade openness, underscoring their role as structural anchors of growth in the long horizon, while persistent exchange rate depreciation imposes a negative long-run constraint. These patterns collectively illustrate that external shocks induce pronounced short-run macroeconomic volatility in Nigeria, yet coexist with a resilient equilibrium path sustained by commodity revenues, debt-financed investment, and integration benefits, albeit tempered by currency misalignment costs. As of early 2026, Nigeria's macroeconomic performance exhibits clear signs of convergence toward this long-run equilibrium following intensive post-2023 reforms. Growth acceleration, moderated inflation, strengthened external reserves, and naira stabilization reflect adjustment mechanisms at work, supported by non-oil sector momentum and prudent policy calibration. Nonetheless, the moderate adjustment speed and historical persistence of disequilibria underscore the imperative for deeper structural transformation. The absence of significant Granger causality from these external variables to inflation (INFLR), or vice versa, in the pairwise tests implies that while shocks transmit powerfully to output growth, their inflationary effects are less predictable or dominant in the sample period. This may stem from offsetting monetary interventions, subsidy mechanisms, or domestic supply-side factors muting direct price channels, though it does not negate broader instability risks from volatility. In the current Nigerian context as of early 2026, these findings resonate strongly amid ongoing stabilization efforts. Headline inflation has moderated significantly from peaks above 34% in 2024 to around 14-15% by late 2025, driven by tighter monetary policy, exchange rate unification gains, and base effects. The naira has achieved relative stability, trading around ₦1,400–1,450 per US dollar officially with narrowed parallel market gaps, bolstered by external reserves climbing to approximately $45 billion.

In conclusion, the study establishes that external shocks remain a fundamental source of short-run instability in Nigeria's macroeconomic framework, yet the presence of a robust long-run cointegrating relationship signals underlying resilience and policy space for mitigation. Sustained progress toward macroeconomic stability and higher growth trajectories requires accelerated diversification of the export base, strengthened fiscal and debt sustainability frameworks, credible exchange rate management supported by reserve accumulation, and strategic deepening of trade integration. By addressing these channels, Nigeria can shorten disequilibrium periods, enhance shock absorption capacity, and more fully realize the growth potential embedded in its long-run equilibrium relationships, thereby advancing toward a more resilient and diversified development path in an uncertain global environment. Ultimately, the results reinforce the need for Nigeria to prioritize robust domestic macroeconomic management and diversification strategies to bolster stability. While external factors warrant vigilant monitoring, the absence of strong Granger causality toward inflation suggests that targeted internal reforms—enhancing fiscal discipline, monetary credibility, and non-oil sector growth—offer the most direct path to mitigating instability risks in both the short and structural contexts.

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