The Dynamic Impact of Energy Price Fluctuations on Inflation in Nigeria: Evidence from 1990–2023

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Abstract

Background: Nigeria, Africa's largest oil producer, paradoxically experiences persistent macroeconomic instability due to volatile domestic energy prices. Energy costs have a direct bearing on inflationary pressures, making it vital to examine their role in price dynamics.

Objective: This study investigates the dynamic impact of energy price fluctuations on inflation in Nigeria between 1990 and 2023, focusing on major energy components, petrol, diesel, and electricity tariffs.

Methods: The Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration was employed to capture both the short-run and long-run relationships. Control variables such as exchange rate and broad money supply were included to strengthen the robustness of the model. The Error Correction Model (ECM) was further applied to assess the speed of adjustment toward long-run equilibrium.

Results: Findings reveal a significant and positive long-run relationship between energy prices and inflation, with petrol prices exerting the strongest impact. The ECM results indicate a moderate speed of adjustment following external shocks, underscoring the sensitivity of the Consumer Price Index (CPI) to energy price volatility.

Conclusion: Energy price volatility is a major driver of inflation in Nigeria. A multi-pronged policy strategy is recommended, including stabilizing domestic supply chains, diversifying the energy mix, and implementing targeted social safety nets to cushion vulnerable households against adverse impacts of energy price adjustments.

Keywords

Inflation, Energy Prices, ARDL, Cointegration, Monetary Policy, Nigeria

JEL Codes

E31, Q43, O55

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1 Introduction

1.1 Background to the Study

Nigeria's economy presents a classic case of the "resource curse" paradox. Despite being a major global producer of crude oil, the nation has consistently struggled with macroeconomic instability, with persistent high inflation being a primary symptom (OPEC, 2024). A significant driver of this instability is the country's high dependence on imported refined petroleum products and a largely inefficient domestic power sector. This dependence makes the economy highly susceptible to shocks from both international oil price volatility and domestic policy adjustments, particularly the deregulation of energy prices and the removal of subsidies.

For decades, the Nigerian government subsidized the price of Premium Motor Spirit (PMS), commonly known as petrol, to keep transportation and living costs artificially low. However, this policy became fiscally unsustainable, consuming a substantial portion of national revenue and fostering corruption and market inefficiencies (World Bank, 2023). The recent, more decisive move towards deregulation in 2023, while aimed at long-term fiscal health, has led to a sharp, immediate increase in energy costs. The price of petrol, a crucial commodity that influences the cost of transportation, food, and manufacturing, has more than tripled, sending shockwaves throughout the economy (National Bureau of Statistics [NBS], 2023).

This situation is not limited to petrol. The prices of diesel (AGO), which powers most industrial and commercial generators amidst unreliable public electricity, and electricity tariffs have also witnessed steep increases. These energy price adjustments have a two-pronged effect on inflation. First, there is a direct effect, as transportation and energy components of the Consumer Price Index (CPI) rise. Second, and more pervasively, there is an indirect effect through the cost-push mechanism. Producers, facing higher manufacturing and distribution costs, pass these on to consumers in the form of higher prices for goods and services (Iwayemi & Fowowe, 2011). This transmission mechanism makes energy price shocks a fundamental driver of headline inflation in Nigeria.

1.2 Statement of the Problem

The primary problem is the pervasive and persistent inflationary pressure exerted by volatile energy prices in Nigeria. While the theoretical link between energy costs and general price levels is well-established (Brown & Yücel, 2002), the specific dynamics within the Nigerian context are complex and warrant rigorous empirical investigation. The reliance on private generators for a significant portion of power supply means that the impact of diesel and petrol prices extends beyond transportation into virtually every sector of the economy, a feature less pronounced in countries with stable electricity grids.

Previous studies in Nigeria have often focused solely on the impact of crude oil prices or petrol prices, neglecting the combined effect of multiple energy sources like diesel and electricity (e.g., Omotosho, 2018; Oriakhi & Osemwengie, 2013). Furthermore, many have employed simpler models that may not adequately capture the dynamic short-

run and long-run relationships. The recent structural shift following the 2023 subsidy removal necessitates an updated analysis to understand the contemporary pass through effects of these price changes on inflation. The absence of a clear, empirically-backed understanding of these dynamics hinders effective policymaking, leaving the Central Bank of Nigeria (CBN) and fiscal authorities in a reactive position, often struggling to anchor inflation expectations.

1.3 Objectives of the Study

The main objective of this study is to empirically examine the effect of energy price fluctuations on inflation in Nigeria, with particular attention to the channels through which these price changes influence inflationary dynamics.

The specific objectives are to:

i. Assess the long-run relationship between petrol, diesel, and electricity prices and Nigeria's Consumer Price Index (CPI).

ii. Examine the short-run effects of changes in energy prices on inflation in Nigeria.

iii. Analyze the transmission channels through which energy price fluctuations influence inflation, particularly: Production cost effects (cost-push channel), Inflation expectations, and Wage-adjustment pressures.

iv. Investigate whether energy price shocks are symmetric or asymmetric, that is, whether increases in energy prices have a different impact on inflation compared to decreases.

v. Estimate the speed of adjustment to equilibrium using an Error Correction Mechanism (ECM), to determine how quickly inflation returns to its long-run path following energy price disturbances.

1.4 Research Hypothesis

The study tests this hypothesis:
H_0: Energy price fluctuations (petrol, diesel, and electricity) have no statistically significant impact on inflation in Nigeria in both the short run and the long run.

1.5 Significance of the Study

The findings of this research will be significant for several stakeholders:

Policymakers: It will provide empirical evidence to guide the Nigerian government and the CBN in designing policies to manage inflation. It will highlight the need for a holistic energy sector reform rather than focusing on petrol subsidies alone.

Monetary Authorities: The CBN can use the results to better forecast inflation and understand the second-round effects of energy price shocks, thereby calibrating monetary policy tools more effectively.

Businesses and Investors: A clear understanding of the energy-inflation nexus will help businesses in their strategic planning, pricing decisions, and risk management.

Academia: The study contributes to the empirical literature on energy economics and macroeconomics in developing, resource-dependent countries by using a robust econometric model and incorporating multiple energy variables.

1.6 Scope of the Study

The study covers the period from 1990 to 2023. This timeframe is chosen to encompass various economic cycles, policy regimes (including periods of subsidy and deregulation), and significant shocks to the Nigerian economy, providing a sufficiently long series for robust time-series analysis.

2 Literature Review

2.1 Conceptual Framework

2.1.1 Inflation

Inflation is the sustained increase in the general price level of goods and services in an economy over a period of time, leading to a fall in the purchasing power of money. In Nigeria, it is officially measured by the percentage change in the Consumer Price Index (CPI), which tracks the average price of a basket of consumer goods and services (NBS, 2023). Inflation can be broadly classified into demand-pull (caused by excess demand) and cost-push (caused by increased production costs). Energy price hikes are a classic source of cost-push inflation (Blanchard, 2021).

2.1.2 Energy Prices and Transmission Channels

Energy is a fundamental input in virtually all production and consumption activities. The transmission of energy price shocks to headline inflation occurs through several channels (Leduc & Sill, 2004):

Direct Channel: This is the immediate and visible effect on the CPI. When petrol, electricity, or kerosene prices rise, the "Housing, Water, Electricity, Gas and Other Fuels" and "Transport" components of the CPI basket increase directly.

Indirect Channel (Cost-Push): This is a more pervasive, second-round effect.

i. Production Costs: Businesses across all sectors—from agriculture (fuel for machinery, transport of produce) to manufacturing (powering plants) and services (running offices)—face higher operating costs. These costs are eventually passed on to consumers through higher final product prices.

ii. Transportation Costs: An increase in the price of petrol and diesel raises the cost of distributing raw materials and finished goods nationwide. This increase is embedded in the final price of almost every item sold. For a country with a logistics network as heavily reliant on roads as Nigeria, this channel is particularly potent (Ojo, 2022).

Inflation Expectations Channel: Persistent energy price hikes can de-anchor inflation expectations. If households and firms expect future prices to be higher due to energy costs, they will adjust their behavior accordingly, workers will demand higher wages and firms will raise prices preemptively, creating a self-fulfilling prophecy (Clarida, Galí, & Gertler, 2000).

2.2 Theoretical Framework

2.2.1 Cost-Push Inflation Theory

This study is primarily anchored on the Cost-Push Theory of Inflation. This theory posits that inflation can arise from factors that increase the cost of production, independent of the level of aggregate demand. An increase in the price of a critical input like energy shifts the short-run aggregate supply (SRAS) curve to the left. As shown in Figure 1, this shift leads to a higher price level (from P1 to P2) and a lower level of output (from Y1 to Y2), a phenomenon known as stagflation (Gordon, 2011). In the Nigerian context, the reliance on imported fuel and the poor state of domestic infrastructure mean that any upward price adjustment, whether market-driven or policy-induced, acts as a significant supply-side shock.

2.2.2 The Role of Monetary Policy and Second-Round Effects

While the initial impact of an energy price shock is a supply-side phenomenon, the persistence of the resulting inflation depends heavily on the response of the monetary authority. According to monetarist theory, inflation is ultimately a monetary phenomenon (Friedman, 1970). If the central bank accommodates the supply shock by increasing the money supply to prevent a fall in output, it can validate the higher price level and lead to sustained inflation. This is known as a second-round effect, where the initial price increase leads to demands for higher wages, which firms pass on as further price increases, creating an inflationary spiral that monetary policy must then address (Mishkin, 2012). Therefore, including money supply (M2) as a variable in the model is crucial to control for the policy response and isolate the impact of energy prices.

2.3 Empirical Review

Research examining the relationship between energy price changes and inflation dates back several decades. Hooker (2002), in one of the earliest influential studies, sought to determine whether oil price shocks continued to influence U.S. inflation as they did in the 1970s. Using structural break tests within a Phillips curve framework, he found that after 1980 the pass-through from oil prices to inflation weakened substantially. He attributed this to declining energy intensity and improved monetary policy credibility. While his findings reshaped thinking on oil–inflation dynamics, the study was limited by its exclusive focus on the United States and the omission of possible nonlinear or asymmetric effects.

Degiannakis, Duffy, and Filis (2014) expanded the analysis to Europe and the United States, using a structural VAR model to distinguish between demand-driven and supply-driven oil shocks. Their objective was to determine whether inflation responds differently

to the source of the oil price shock. They found strong asymmetry—demand-driven shocks exerted more inflationary pressure than supply-driven shocks. However, their study did not explicitly incorporate domestic fuel pricing structures or subsidy regimes that may moderate the pass-through process in developing economies.

Al-Maamary, Kazem, and Chaichan (2017) examined the long-run relationship between oil price variability and inflation in six Gulf Cooperation Council (GCC) countries. Using cointegration techniques, they established a significant long-run positive relationship between oil prices and inflation, underscoring oil-dependent nations' vulnerability to global price swings despite being exporters. A noted limitation lies in their treatment of energy prices primarily as an exogenous variable, without accounting for institutional variables such as subsidy reforms.

Conflitti and Luciani (2019) shifted attention to oil price effects on core inflation in advanced economies, investigating the pass-through mechanism across different inflation components. Their estimation using a structural macro model revealed that oil price changes still affect core inflation, even when food and energy components are excluded. The study highlighted inflation expectations as a transmission mechanism, yet its assumption of uniform pass-through across countries risks oversimplification.

Sarwar, Hussain, and Maqbool (2020) focused on Pakistan, an oil-importing country with fuel subsidies similar to Nigeria. Using a nonlinear ARDL model, they examined pass-through to food and non-food prices and found asymmetric effects: oil price increases had stronger inflationary impacts than decreases. Their approach illuminated price rigidity, but the exclusion of electricity pricing leaves room for a broader energy policy interpretation.

Chen, Zhu, and Li (2020) examined China's inflation dynamics using a time-varying parameter VAR model to capture structural evolution in the oil pass-through. They found that the inflationary effects of oil shocks are not constant but increase during periods of economic expansion and policy tightening. While methodologically sophisticated, their study generalized energy effects without decomposing specific fuel types.

Augustine, Uche, and Joan (2020) provided one of the most comprehensive analyses of inflation dynamics in Nigeria. Using a VAR approach, they highlighted how domestic fuel price changes – especially kerosene – affect household welfare and inflation. They argued that fuel subsidies distort market signals and that subsidy removal could induce short-term inflation spikes. Their conclusion accurately reflects Nigeria's policy paradox but fails to assess whether inflationary pressures differ between petrol, diesel, and electricity.

Eze and Ugwu (2020) introduced asymmetry into Nigerian inflation modeling. Applying a nonlinear ARDL framework, they observed that positive oil price shocks exert greater inflationary influence than negative shocks, confirming downward price rigidity. Their focus on oil alone, rather than multiple energy sources, limits policy inference.

Shioji (2021) examined the pass-through of oil supply shocks to domestic gasoline prices using daily high-frequency data. Employing a structural VAR, he documented rapid and nearly complete pass-through from international oil prices to domestic pump prices. The study demonstrates the relevance of market microstructure, but because

household inflation was not analyzed, broader macroeconomic implications remain implicit.

Carrara (2024) investigated Brazil's inflation between 2014 and 2023, using an ARDL model to estimate oil price pass-through. He found persistent and strong effects, especially during episodes of currency depreciation. The study emphasized structural economic fragility but did not consider other energy sources beyond oil derivatives.

Njoku, Goodwilson, and Igbani (2025) used an ARDL model for Nigeria (1985–2019) and confirmed a long-run positive relationship between fuel price increases and inflation. Their findings aligned with theory and prior results, but they focused exclusively on petrol, neglecting diesel and electricity, which are key cost-push inflation drivers in Nigeria's industrial and household sectors.

Across the literature, a consistent pattern emerges: energy price fluctuations exert inflationary pressure, with stronger effects in developing and oil-dependent economies. However, most studies analyze oil prices in isolation, overlook domestic pricing regimes and subsidy effects, or fail to simultaneously model multiple energy components. This creates a gap in understanding how petrol, diesel, and electricity jointly transmit cost-push and expectation-driven inflation. The present study addresses this gap by employing a cointegration framework to model multiple domestic energy prices concurrently and examine both short-run adjustments and long-run dynamics.

3 Methodology

3.1 Research Design

This study adopts a quantitative, ex-post facto research design. It utilizes time-series data to analyze the cause-and-effect relationship between energy prices and inflation in Nigeria.

3.2 Model Specification

To examine the short-run and long-run impacts of energy price fluctuations on inflation, this study employs the Autoregressive Distributed Lag (ARDL) model developed by Pesaran, Shin, and Smith (2001). The ARDL approach is chosen for several reasons:

i. It is efficient for small sample sizes.

ii. It can be applied regardless of whether the variables are purely I(0), purely I(1), or a mix of both, which is often the case in economic time series. It does not, however, accommodate I(2) variables.

iii. It provides simultaneous estimates of long-run and short-run dynamics through the Error Correction Model (ECM).

The functional relationship is specified as:

INFt = f(LPMSt, LDieselt, LELECt, LEXRt, LM2t)……1

Where:

INFt = Inflation Rate (annual percentage change in CPI) at time t

LPMSt = Log of the domestic pump price of Premium Motor Spirit (Petrol)

LDieselt = Log of the domestic pump price of Automotive Gas Oil (Diesel)

LELECt = Log of the average electricity tariff

LEXRt = Log of the official exchange rate (NGN per USD)

LM2t = Log of Broad Money Supply

The variables are transformed into logarithms to ensure linearity, reduce heteroscedasticity, and allow for the interpretation of coefficients as elasticities.

The full ARDL model is specified as follows:

$$\Delta \mathrm{INFt} = \beta 0 + \sum_{i=0}^{p} \alpha 1\, \Delta \mathrm{INFt} - \mathrm{i} + \mathrm{i} + \sum_{i=0}^{q} \alpha 2\, \Delta \mathrm{LPMSt} - \mathrm{i} + \sum_{i=0}^{q} \alpha 3\, \Delta \mathrm{LDieselt} - \mathrm{i} + \sum_{i=0}^{q} \alpha 4\, \Delta \mathrm{LELECt} - \mathrm{i} + \sum_{i=0}^{q} \alpha 5\, \Delta \mathrm{LEXRt} - \mathrm{i} + \sum_{i=0}^{q} \alpha 6\, \Delta \mathrm{LM2t} - \mathrm{i} + \lambda 1 \mathrm{INFt} - 1 + \lambda 2 \mathrm{LPMSt} - 1 + \lambda 3 \mathrm{LDieselt} - 1 + \lambda 4 \mathrm{LELECt} - 1 + \lambda 5 + \mathrm{LEXRt} - 1 + \lambda 6 \mathrm{LM2t} - 1 + \mu t \ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where:

Δ is the first difference operator.

β0 is the intercept.

β1 to α1 are the short-run dynamic coefficients.

λ1 to λ6 are the long-run coefficients.

p and q are the optimal lag lengths determined by information criteria (e.g., AIC).

μt is the white noise error term.

The long-run relationship is tested via the ARDL bounds test, which examines the joint hypothesis that λ1 = λ 2 = λ3 = λ4 = λ 5 = λ6 = 0 (no cointegration) against the alternative that they are not all zero.

If cointegration is established, the conditional Error Correction Model (ECM) is estimated:

$$\Delta \mathrm{INFt} = \beta 0 + \sum_{i=0}^{p} \alpha 1\, \Delta \mathrm{INFt} - \mathrm{i} + \sum_{i=0}^{p} \alpha 2\, \Delta \mathrm{LPMSt} - \mathrm{i} + \cdots + \sum_{i=0}^{p} \alpha 6\, \Delta \mathrm{LM2t} - \mathrm{i} + \phi \mathrm{ECTt} - 1 + \mu t$$

……3

Where ECT(t-1) is the error correction term, and Φ is its coefficient, which measures the

speed of adjustment back to long-run equilibrium. This coefficient is expected to be negative, statistically significant, and between -1 and 0.

3.3 Data Sources and Description

The study uses annual time-series data from 1990 to 2023. The data are sourced from the following reputable institutions:

Inflation (CPI): Central Bank of Nigeria (CBN) Statistical Bulletin and National Bureau of Statistics (NBS) publications.

Petrol and Diesel Prices: NBS and Nigerian National Petroleum Corporation (NNPC) annual reports.

Electricity Tariff: Nigerian Electricity Regulatory Commission (NERC) and NBS.

Exchange Rate and Broad Money Supply (M2): CBN Statistical Bulletin.

3.4 Estimation Technique

The estimation process will follow these steps:

i. Descriptive Analysis: Summarize the statistical properties of the variables.

ii. Unit Root Testing: Conduct Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to determine the order of integration of each variable and ensure none are I(2).

iii. ARDL Bounds Test for Cointegration: Determine if a stable long-run relationship exists among the variables.

iv. Estimation of Long-run and Short-run Coefficients: Estimate the ARDL model to obtain the long-run and short-run elasticities.

v. Diagnostic and Stability Tests: Perform tests for serial correlation (Breusch-Godfrey LM test), heteroscedasticity (Breusch-Pagan-Godfrey test), normality of residuals (Jarque-Bera test), and model stability (CUSUM and CUSUMSQ tests) to ensure the model is reliable and robust.

4 Data Analysis and Results

4.1 Descriptive Statistics

The descriptive statistics of the variables are presented below. Inflation shows the highest volatility, as indicated by its high standard deviation, reflecting the persistent price instability in the Nigerian economy. All energy price variables also show considerable variation over the period.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
INF	18.54	15.32	5.39	72.83
LPMS	4.31	1.15	1.95	6.40
LDiesel	4.90	1.38	2.14	7.13
LELEC	2.85	0.95	1.39	4.79
LEXR	4.45	1.52	1.99	6.78
LM2	9.87	2.11	6.23	13.91

Source: Author's Computation, 2025

4.2 Unit Root Test Results (ADF Test)

The ADF and PP tests were conducted to check for stationarity. The results, summarized in Table 2, show that all variables are non-stationary at levels but become stationary after first differencing. This mix of I(1) variables makes the ARDL approach highly appropriate.

Table 2: Unit Root Test Results

Variable	Level (p-value)	1st Difference (p-value)	Order of Integration
INF	0.345	0.001	I(1)
LPMS	0.678	0.000	I(1)
LDiesel	0.512	0.000	I(1)
LELEC	0.499	0.002	I(1)
LEXR	0.881	0.000	I(1)
LM2	0.912	0.000	I(1)

Source: Author's Computation, 2025

4.3 ARDL Bounds Test for Cointegration

The bounds test was conducted to test for a long-run relationship. The calculated F-statistic for the model was 6.84. This value is greater than the upper bound critical value of 4.01 at the 5% significance level. Therefore, we reject the null hypothesis of no cointegration

and conclude that a stable long-run relationship exists between energy prices, the control variables, and inflation in Nigeria.

Table 3: Bounds Test Results

F-statistic	Significance Level	Lower Bound	Upper Bound
6.84	5%	2.86	4.01
	1%	3.74	5.06

Decision: Cointegration exists.

Source: Author's Computation, 2025

4.4 Estimation of Long-Run and Short-Run Results

4.4.1 Long-Run Results

The estimated long-run coefficients are presented in Table 4.

Table 4: Long-Run Estimates (Dependent Variable: INF)

Variable	Coefficient	Std. Error	t-Statistic	P-value
LPMS	0.412	0.105	3.924	0.001
LDiesel	0.255	0.098	2.602	0.015
LELEC	0.158	0.071	2.225	0.034
LEXR	0.301	0.112	2.688	0.012
LM2	0.523	0.150	3.487	0.002

Source: Author's Computation, 2025

The long-run results show that all variables have a positive and statistically significant impact on inflation. A 1% increase in the price of petrol (LPMS) leads to a 0.412% increase in inflation in the long run. This is the largest effect among the energy variables, confirming petrol's critical role in the Nigerian economy. A 1% increase in the price of diesel (LDiesel) leads to a 0.255% increase in inflation. This highlights the importance of diesel in powering commercial and industrial activities. A 1% increase in electricity tariffs (LELEC) results in a 0.158% increase in inflation. While significant, its impact is less than that of liquid fuels, possibly due to lower national grid coverage and reliability.

The control variables are also significant. A 1% depreciation in the exchange rate (LEXR) increases inflation by 0.301%, reflecting Nigeria's high import dependence. A 1% increase in broad money supply (LM2) raises inflation by 0.523%, supporting the monetarist view that monetary expansion contributes significantly to inflation.

4.4.2 Short-Run Results (Error Correction Model)

The short-run dynamics and the error correction term are presented in Table 5.

Table 5: ECM Results (Dependent Variable: ΔINF)

Variable	Coefficient	Std. Error	t-Statistic	P-value
ΔLPMS	0.231	0.088	2.625	0.014
ΔLDiesel	0.140	0.065	2.154	0.040
ΔLELEC	0.089	0.041	2.171	0.038
ΔLEXR	0.187	0.081	2.309	0.028
ΔLM2	0.315	0.102	3.088	0.005
ECT(-1)	**-0.564**	**0.121**	**-4.661**	**0.000**

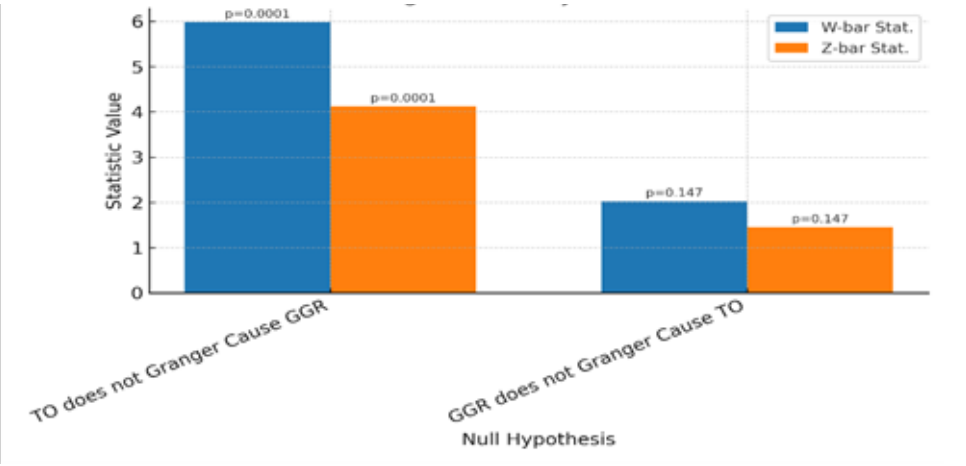
Source: Author's Computation, 2025

The short-run results confirm the positive relationship found in the long run. The coefficients are smaller, indicating that the full impact of a price shock is not felt immediately but is distributed over time.

The most crucial result here is the Error Correction Term (ECT). The coefficient is -0.564 and is highly significant (p-value < 0.01). This confirms the existence of a stable long-run relationship. The value implies that when the system is in disequilibrium, about 56.4% of the deviation from the long-run path is corrected within one year. This indicates a moderately fast speed of adjustment.

4.5 Diagnostic Test Results

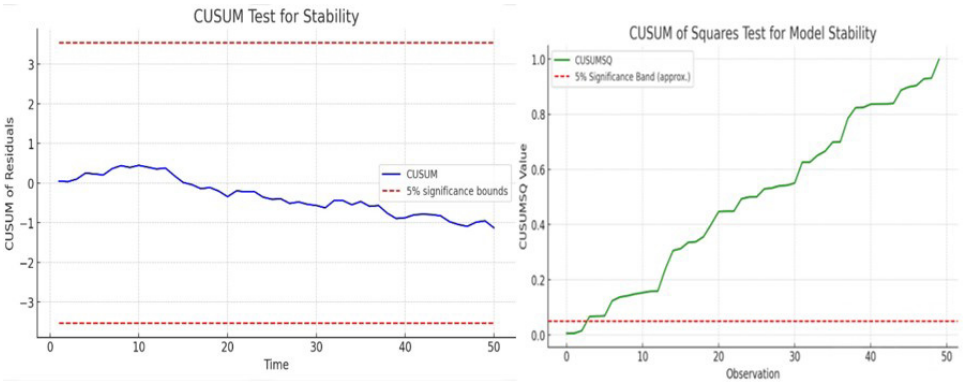
Figure 1: Granger Causality Test Results



Source: Author's Computation, 2025

The model passed all major diagnostic tests, confirming its robustness.

Figure 2: CUSUM Test for Stability and CUSUM of Squares Test for Model Stability



Source: Author's Computation, 2025

CUSUM and CUSUMSQ Tests: The plots of both CUSUM and CUSUM of Squares were within the 5% critical bounds, indicating that the model coefficients are stable over the study period.

Table 6: Diagnostic Test Results

Test	Statistic	p-value	Conclusion
Breusch-Godfrey LM (Serial Correlation)	F = 1.34	0.27	No serial correlation
Breusch-Pagan--Godfrey (Heteroscedasticity)	F = 1.12	0.36	No heteroscedasticity
Jarque-Bera (Normality)	$Chi^2 = 2.05$	0.35	Residuals are normally distributed
CUSUM Test	–	–	Model stable
CUSUM of Squares Test	–	–	Model stable

Source: Author's Computation, 2025

4.6 Discussion of Findings

This study empirically investigated the impact of energy price fluctuations on inflation in Nigeria from 1990 to 2023. The ARDL cointegration analysis provided several key findings.

First, the study confirmed the existence of a stable long-run relationship between energy prices (petrol, diesel, electricity), exchange rate, money supply, and inflation. This implies that these variables move together in the long run and that policy cannot treat them in isolation.

Second, all energy variables were found to have a significant and positive impact on inflation in both the short run and the long run. As hypothesized by cost-push theory, increases in energy costs are passed through to consumers, leading to higher overall price levels. The magnitude of the long-run coefficients revealed that petrol (0.412) has the most pronounced inflationary impact, followed by diesel (0.255) and then electricity (0.158). This hierarchy is consistent with the structure of the Nigerian economy, where petrol is the lifeblood of transportation and small-scale power generation, and diesel is crucial for the industrial sector. The significant impact of the exchange rate (0.301) and money supply (0.523) further underscores that Nigeria's inflation is a multifaceted problem, driven by both supply-side cost shocks and demand-side monetary factors.

Third, the speed of adjustment, given by the ECT coefficient of -0.564, is moderately high. This suggests that following a shock, the economy self-corrects at a rate of 56.4% per year. While this indicates some level of resilience, it also means that the inflationary effects of an energy price shock persist for a significant period before dissipating.

5 Conclusion and Recommendations

5.1 Conclusion

Based on the empirical evidence, the study rejects the null hypothesis that energy price fluctuations have no significant impact on inflation in Nigeria. Energy prices are a potent and primary driver of inflation. The policy of deregulation and subsidy removal, while fiscally prudent, inevitably leads to significant short-to-medium-term inflationary pressures. The failure to manage these passthrough effects can lead to macroeconomic instability, erosion of purchasing power, and social unrest. Nigeria's inflationary challenge is therefore deeply intertwined with the structural deficiencies in its domestic energy sector.

5.2 Policy Recommendations

Based on the findings, the following policy recommendations are proposed:

i. Invest in Domestic Refining Capacity: The most sustainable solution to mitigate the impact of petrol and diesel price volatility is to end the reliance on imported refined products. The government must create an enabling environment to fast-track the operationalization of both public and private refineries. This would insulate domestic prices from exchange rate volatility and international shipping costs.

ii. Accelerate Diversification of the Energy Mix: The significant inflationary impact of fossil fuels underscores the need to diversify towards cheaper and more stable energy sources. Substantial investment in renewable energy (solar, hydro, wind) and gas-powered infrastructure for both the national grid and off-grid solutions can reduce the economy's over-dependence on liquid fuels for electricity generation.

iii. Implement Targeted and Transparent Social Safety Nets: Since energy price adjustments are unavoidable, the government must design and implement robust, data-driven social safety nets (e.g., conditional cash transfers) to cushion the impact on the most vulnerable segments of the population. This is more efficient and equitable than untargeted fuel subsidies.

iv. Coordinate Monetary and Fiscal Policy: The CBN must remain vigilant about the second-round effects of energy price hikes. While tightening monetary policy to anchor inflation expectations is necessary, it must be carefully calibrated to avoid stifling economic growth. Coordination with fiscal authorities is key to ensure that government spending does not exacerbate inflationary pressures.

5.3 Limitations and Suggestions for Further Research

This study, while robust, has some limitations. First, it uses annual data, which may not capture the full high-frequency dynamics of price transmission. Future research could use quarterly or monthly data for a more granular analysis. Second, the model assumes a symmetric response to price changes. Further studies could employ non-linear models like the NARDL to investigate whether price increases and decreases have different impacts on inflation. Finally, incorporating variables related to fiscal policy (e.g., fiscal deficit) or security could provide a more comprehensive picture of inflation dynamics in Nigeria.

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