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Assessing The Predictive Performance of Selected Models on Inflationary Data in Nigeria.

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Abstract

This study evaluates the effects of petroleum-product prices—Premium Motor Spirit (PMS or petrol), Automotive Gas Oil (AGO or diesel), and Dual-Purpose Kerosene (DPK or kerosene)—on inflationary dynamics and prevailing economic conditions in Nigeria from 2023 to 2026. Inflation was specified as the dependent variable, while PMS, AGO, and DPK prices constituted the explanatory variables. Selected econometric models and causality techniques were employed to analyse the relationships between petroleum-product pricing and inflation across states representing Nigeria's geopolitical zones. The study also examined price trends, interdependence, distributional characteristics, and future movements of petrol, diesel, and kerosene prices within the selected states. Stationarity tests and descriptive statistics were applied to evaluate the time-series properties and price distributions of the petroleum products. The empirical results indicate that increases in PMS prices intensify inflationary pressures across the geopolitical zones. Furthermore, strong positive relationships were identified between inflation and the prices of PMS, AGO, and DPK, demonstrating that variations in petroleum-product prices are closely associated with changes in Nigeria's general price level. In particular, increases in PMS and AGO prices exerted significant effects on inflation, largely through rising transportation and distribution costs. Based on these findings, petroleum-product price rates were forecast for petrol, diesel, and kerosene across the selected states in each geopolitical zone. The forecasts provide evidence regarding the likely future direction of petroleum-product prices and their possible inflationary consequences. The study concludes that sustained increases in petroleum-product prices, particularly PMS and AGO, constitute major drivers of inflation in Nigeria and may further increase production, transportation, distribution, and household costs throughout the economy.

Keywords
Order VAR,
PMS pricing,
Crude oil price,
Inflation,
Stationary & Econometrics Time Series.

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1.0 Introduction

Inflation is a fundamental economic indicator that reflects the rate at which the general price level of goods and services rises, which reduces purchasing power over time (Mankiw, 2016). In Nigeria, inflation has been a persistent challenge, driven by factors such as currency depreciation, fiscal deficits, supply chain disruptions, and external shocks like fluctuating oil prices (CBN, 2023). The removal of the petrol subsidy in 2023 significantly changed the Nigerian fuel-price structure and contributed to a sharp increase in petrol prices. This created strong inflationary pressures through transportation, food distribution and production costs. More recently, NBS-reported average petrol prices increased from about ₦1,034.76 per litre in January 2026 to ₦1,596.25 per litre in May 2026, illustrating the continuing volatility in fuel prices. High inflation destabilizes economies by distorting consumption patterns, discouraging investment, and increasing income inequality (Fischer, 1993).

Accurate inflation forecasting is therefore critical for policymakers to design effective monetary and fiscal interventions, ensuring price stability and sustainable economic growth. The roots of the rapidly developing inflationary regime in Nigeria is traceable to neglect of the real production sector as well as the preoccupation of the country with the distribution of oil revenue. The oil sector furnishes the Nigerian domestic economy essentially with financial infusions for fueling inflation and no real productive gains (Okongwu, 1986). It has been established in literature that rising inflation and higher interest rates have deleterious effect on investment.

The problems of excess liquidity, money growth and inflation persist due to inconsistent fiscal activities of the government. There is, therefore, need for the Nigerian government to ensure sustainable fiscal policy management, low inflation rate, minimal exchange rate premium, and avoidable systemic banking crisis for economic development and social wellbeing of the people to be achieved (Iyoha and Itsed, 2002). The Nigeria Consumer Price Index (CPI) a measure of Inflation rate shows the movement in the cost-of-living. The CPI stood at 2638.1 in 1996, while the inflation rate was 29.3%. By 2000, the CPI stood at 3,509, although the inflation rate had declined to 6.9% [Central Bank of Nigeria (CBN), 2000]. High inflation has implications for standards living of Nigerians. Nigeria is richly blessed with natural resources of which crude oil products play a key role.

At present, Nigeria is the ninth world producer and sixth world exporter of crude oil (Ehinomen and Adeleke, 2022). On the domestic economy, the petroleum sector generates over 90% of the country's foreign exchange earnings, and provides employment in various forms to Nigerians (Central Bank of Nigeria, 2010). In addition, the tremendous growth in oil earnings has influenced significantly Nigeria's international relations, and sometimes the politics of oil has taken Centre stage in the nation's history of international relations in the last few decades (NNPC, 1991).

2.0 Literature Review

To our knowledge, there is a dearth of studies on the relationship between petroleum product prices and inflation as most studies in similar area focused on oil price volatility and macroeconomic performance (Labays, 2016; Raymond, 2020; Orgunbodede et al, 2015; Arinze, 2011; Akinleye & Ekpo, 2023). This study will focus on the impact of crude oil prices on inflation in Nigeria leaning on the study of Bobai (2022) by adding other macroeconomic variables like money supply, fiscal deficit, and exchange rate into the model. In the same vein, existing studies (like Arinze, 2021; Bobai, 2022) use fuel price which is just an aspect of petroleum price. This work is at variance with existing works as it attempts to disaggregate petroleum price into PMS, AGO and DPK. This will be our contribution to knowledge.

Petroleum products are derived from crude oil and they include petrol, diesel, kerosene, natural gas, bitumen etc. Oil was discovered in Nigeria in 1956 at Oloibiri in the present Bayelsa State, after a century of searching (Dharam, 1991). Oil products are basically used in industries for production of goods and services and they are also used domestically for personal consumption in which the greater percentage of it comes from developed countries.

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have been under government control since 1973 when the government took it over from the private oil companies (Iwayemi, 1993). The prices of petroleum products in Nigeria should theoretically be derived from International Crude oil prices since the marginal supply (litres) comes from import, it should therefore reflect import price. In other words, when the marginal unit of consumption is imported, the economic price should be importing parity price. However, this has not always been the case for a number of reasons particularly socio-political ones (Iwayemi and Adenikinju, 2006).

Their study identified three factors that have influenced government position. First, is the desire to protect the interest of the poor who could be hurt from higher prices? The second is the need to reduce industrial cost as energy products are seen as critical inputs in production processes. The third factor relates to the potential inflationary impact of higher energy prices. Government of both oil producing and consuming countries invariably intervene in the market to influence product price. The extent of such intervention depends on the specific needs of the country and importance of the product in question. It has also been noted that crude oil cost is not the only cost incurred in the supply and distribution of petroleum products as other costs such as refining costs, transportation and distribution costs are involved.

Orgunbodede et al (2020) studied petroleum price crisis and the Nigerian public transportation system. The study claimed that incessant petroleum products price hike led to crisis and industrial actions in the country. They used perception scale on a 4-point Likert scale to elicit response from the operators of public passenger transport system using a 4-point Likert scale. The Mean Weight Value (MWV) was compared with the Group Arithmetic Mean (GAM) of each group and the results indicated that price increase significantly increased transport fare and fuel hoarding in Nigeria.

Arinze (2011) focused on the impact of oil price on the Nigerian economy. The study contends that upward adjustments of petroleum products prices have resulted in inflation, high cost of living, and inequitable income distribution in Nigeria between 1978 and 2007. It also found that the various Nigerian regimes increased fuel prices a total of 18 times within this period with most of the increase occurring between 1990 and 2007 where prices were adjusted, twice a year, sometimes. The study revealed that petroleum price increase spur inflation rate to increase also. It therefore recommended diversification of the Nigerian economy to curb macroeconomic instability which may arise from over dependence on crude oil.

Bobai (2012) analyzed the relationship between petroleum prices and inflation in Nigeria. It focused on the impact of petroleum product price increase on the Nigerian economy from 1990 to 2011. Employing the empirical econometric analysis approach and using variables like inflation rate and petroleum prices, the results shows that positive relationship exists between PMS, AGO and inflation. It however found PMS to exert higher effect on inflation than AGO, while negative relationship exists between inflation and DPK. The overall effect clearly indicates that increase in petroleum product price contributes significantly to the rate of inflation in Nigeria.

Ehinomeri and Adeleke (2022) shared their views that the distribution of petroleum products in the Nigerian economy is fraught with complex problems resulting sometimes in products outages, inflated price of products and contentions on the pump price of products. Their research examines the various issues regarding the distribution of products and recommends that the downstream activities of the industry be completely deregulated to allow private sector and entrepreneur's full participations in the distribution of the products. Their findings hypothesized that the participation of entrepreneurs will drive effectiveness into the sector. This effectiveness will bring down operations cost as well as the price level for the benefit of all the stake-holders in the country.

Akinleye and Ekpo (2013) examined the macroeconomic implications of oil price shocks on macroeconomic performance in Nigeria. The study employed the vector autoregressive estimation technique and observed that both positive and negative oil price shocks influence real government expenditure only in the long run rather than in the short run. It also found that positive rather than negative oil price shocks have stronger short and long run effects on real gross domestic product, thereby triggering inflationary pressure and domestic currency depreciation in the process as importation increases. The study posits that crude oil price shocks are capable of impeding economic growth only in the long run while raising

general price levels marginally in the short run leading to exchange rate depreciation and high importation.

3.0 Materials and Methods

In this Study, Time series is a standard technique of analysis whose aim is to describe the behavior of the inflation data and to explain, control and to forecast the future behavior of the data. A time series as a stochastic process is an ordered sequence of observations ordered by a time parameter which may be measured quarterly or yearly.

Types of Time Series: There are two types of time series: regular and irregular. A regular time series is one where the data is recorded in equal length time increments. An irregular time series occurs when the data is recorded in varying length time increments.

3.1.1 Graphical Presentation of Data

Graphical Representation is a way of analyzing numerical data. It exhibits the relation between data, ideas, information and concepts in a diagram. It is easy to understand and it is one of the most important learning strategies. It always depends on the type of information in a particular domain. There are different types of graphical representation. Some of them are as follows:

- **Line Graphs** – Line graph or the linear graph is used to display the continuous data and it is useful for predicting future events over time.
- **Bar Graphs** – Bar Graph is used to display the category of data and it compares the data using solid bars to represent the quantities (i.e. Cross-correlation function).
- **Line Plot** – It shows the frequency of data on a given number line. ' x ' is placed above a number line each time when that data occurs again.
- **Table** – The table shows the number of pieces of data that falls within the given interval.

The study adopts an economic approach in analyzing the relationship between PMS Price and inflationary dynamics in Nigeria from 1980 to 2018. A descriptive analysis was conducted to reveal the relationship between the variables. An econometric approach of the Auto Regressive Distributed Lag modelling and Pairwise Causality techniques were adopted to test for the relationship between the variables. The study made use of time series annual data from 1980 to 2018 extracted from the Nigerian Oil and Gas Industry Annual Reports and CBN Statistical Bulletins. The data was analyzed using Python statistical package.

Where:
INF = Inflation Rat
the variables, while the influence of the international community on oil was neglected. Aminu and Olawore (2014) used primary data obtained from employees of gas stations in the capital city of Nigeria up to 2012, but this study used data covering the entire industry obtained from the regulator of the industry in Nigeria and the Central Bank of Nigeria and extended coverage to 2018. This study also included causality and exchange rate effects.

The study adopts an econometrics approach were used in analyzing the relationship between PMS Price and inflationary dynamics in Nigeria from 2023 to 2026. A descriptive analysis was conducted to reveal the relationship between the variables. An econometric approach of the Auto Regressive Distributed Lag modelling and Pairwise Causality techniques were adopted to test for the stationarity.

VAR model describes the gradual development of a set of k variables, which are called endogenous variables over the same sample period (t=1, 2, ---, T) as a linear function of only their past values. The variables are obtained in a k x 1 vector Y_t , which has the i^{th} element, $Y_{i,t}$, the observation at time "t" of the i^{th} variable.

p^{th} order VAR, denoted VAR (p), is given as

$$Y_t = C + A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_p Y_{t-p} + \varepsilon_t \quad (1)$$

where, the i^{th} periods back observation Y_{t-1} is called the i^{th} lag of Y, c is a k x 1 vector of constants, A_i is the time-invariant k x k matrix and ε_t is a k x 1 vector of non-autocorrelated disturbances (innovations or impulse or shocks) with;

(i) $E(\varepsilon_t) = 0$, every error term has mean zero
(ii) $E(\varepsilon_t \varepsilon_t') = \Omega$, the contemporaneous covariance matrix of error terms is Ω (a k x k positive).
(iii) $E(\varepsilon_t \varepsilon_{t-k}')= 0$ for any non-zero k; there is no serial correlation in individual error terms.

A p^{th} order VAR is also called a VAR with p lags and the process of selecting the maximum lag p in the model requires special attention in that inference making depends on the correctness of the choosing lag order.

3.1 Augmented Dickey-Fuller Test:

This study will test for a unit root in the time series by the test which was developed by Said and Dickey-Fuller (1984). The test is defined as:

$$\Delta Y_t = \alpha Y_{t-1} + \sum_{k=1}^{k} \theta_k \Delta Y_{t-k} + \mu_t \quad (1)$$

Where, k is the number of lags or Autoregressive terms and $\sum_{k=1}^{k} \theta_k \Delta Y_{t-k}$ is the additional Autoregressive terms

The test involves the following hypotheses:

H_0: the time series has unit roots.

H_a: the time series non-unit roots.

Decision Criteria:

Null hypothesis is rejected if P-value is less than the alpha value.

3.2. Kwiat-Kowski-Phillips-Schmidt-Shin Test:

This study will test for a unit root by the test which was proposed by Kwiat-Kowski Phillips-Smidth-Shin (1992). The test will serve as the second approach to check for the unit roots of the economic growth time series data. The test is defined as:

$$KPSS_T = \frac{\sum_{t=1}^{T} (\sum_{i=1}^{t} \hat{\mu}_i)}{T^2 \sum_{i=(-T^{\frac{2}{9}})} \frac{1}{T-i} \sum_{t=i+1} \hat{\mu}_t \hat{\mu}_{t-i}} \quad (2)$$

Where, the numerator is the cumulative residual function and the denominator is the long run variance of the error term.

3.3 VAR Model:

Vector Autoregressive model will be fit in this study to capture the mean and the linear interdependencies between the variables of the study, but the model has no ability to capture the variance of the time series, heteroscedasticity, leverage effects, to decompose the variance-covariance matrix into orthogonal sources of volatility and to standardize the uncorrelated factors to have a unit unconditional variance. The model is defined as:

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \ldots + A_P y_{t-P} + \varepsilon_t \quad (3)$$

Where, y_{t-i} is the ith lag of y_t, c is a k-vector of constants serving as the intercept of the model, A_i is the time-invariant ($k \times k$)-matrix and ε_t is a k-vector of error terms.

3.4 GO-GARCH Model:

The GO-GARCH model will be fit to capture the variance of the time series, heteroscedasticity, leverage effects, to decompose the variance-covariance matrix into orthogonal sources of volatility and to standardize the uncorrelated factors to have a unit unconditional variance, but the model is not capable to capture mean of the time series and is not capable to capture the interdependencies between the variables. The model is defined as:

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 + \sum_{k=1}^{r} \delta_k |\varepsilon_{t-k}| \quad (4)$$

Where, σ_t^2 is the conditional variance at time t, ω is the constant term, α_i are the ARCH parameters, β_j are the GARCH parameters, δ_k is the asymmetric term parameters, ε_t is the error term, p is the number of lag for ARCH term, q is the number of lag for GARCH term, and r is the number of lag for asymmetric term.

3.5 VAR-GO-GARCH:

VAR-GO-GARCH model is proposed to fit in this study in order to capture the mean of the variables, the variance, heteroscedasticity, leverage effects, linear interdependencies among the variables, to decompose the variance-covariance matrix into orthogonal sources of volatility, to standardize the uncorrelated factors to have a unit unconditional variance and to make forecast. The model is defined as:

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \alpha_i (\sigma_t z_t)_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 + \sum_{k=1}^{r} \delta_k |(\sigma_t z_t)_{t-k}| \quad (5)$$

Where, $(\sigma_t z_t)$ are the residuals of the model and the others parameters were defined in section 3.2.9.

3.6 Method to fit VAR-GO-GARCH Model:

This research work will use two phrase methods to fit the VAR-GO-GARCH model. In phase (I) the residuals of VAR model will be extracted. In phase (II) the extracted residuals from the VAR model will be used to fit GO-GARCH model.

Sources of Data

The time series data employed for the estimation of the empirical model specified to capture the impact of change in petroleum products prices on inflation Nigerian economy across the Selected Stated from each Geo Political zone. As shown in the table, inflation, price of petrol, price of diesel, price of kerosene are represented as (INF), (PMS), (DPK) and (AGO) respectively.

4.0 DISCUSSION OF RESULTS

Table 4.1: Summary Statistics

	INF	PMS	DPK	AGO
Mean	68.14053	89.36842	56.52632	77.00000
Median	22.46154	441.31050	39.37900	47.96500
Maximum	60.68130	60.32800	121.6600	125.8300
Minimum	42.264400	19.506000	4.17700	7.340000
Std. Dev.	27.45352	51.22171	42.55294	44.42993
Skewness	3.289660	0.6688347	0.954938	0.232478
Kurtosis	7.224228	1.563962	2.74448	1.232625
Jarque-Bera	222.9119	7.4992844	7.577221	9.543964
Probability	0.0400000	0.0087688	0.0885897	0.0432439
Sum	1378.680	1800.000	3227.000	421.000
Sum Sq. Dev.	21246.89	7769.63	143235.3	153022.4
Obs.	37	37	37	37

Source: Authors' Computation. Source: NBS Statistical Bulletin vol. 23, 2026; and Nigerian Oil & Gas Downstream Industry Report, 2026. Interpretation: Available 2026 reports indicate that higher fuel costs have been an important contributor to inflationary pressure. also, another report based on NBS data stated that Nigeria's inflation rate increased from 15.06% in February 2026 to 15.38% in March 2026, alongside rising petrol prices and higher transport and distribution cost.

Table 4.4 is the summary statistic on average prices of petroleum products and inflation. The result shows that the average prices of petroleum products i.e. price of petrol (PMS), price of diesel (DPK), and price of kerosene (AGO), stood at 89.37, 56.53 and 77 Naira respectively, and general inflation rate is 68.1%. This implies that the prices of petroleum products grow at an average price of 89.37, 56.53 and 77 Naira correspondingly while inflation rate revolves at 68.1% annually between June 2023 to June 2026.

Table 4.2: Descriptive statistics of the three Petroleum Products for Delta and Anambra States

State	Statistics	'Petrol Prices'	'Diesel Prices'	'Kerosene Prices'
Delta	Mean	272.97	518.34	599.19
	Median	172.00	375.00	450.00
	Minimum	140.00	185.00	250.00
	Maximum	1214.00	1170.98	1363.00
	Standard deviation	251.98	365.79	382.05
	C.V.	0.92	0.72	0.64
	Skewness	2.21	0.85	1.03
	Kurtosis	4.06	-0.88	-0.44
Anambra	Mean	277.14	489.08	589.79
	Median	165.30	400.00	450.00
	Minimum	99.76	184.00	250.00
	Maximum	1214.00	1130.69	2400.00
	Standard deviation	252.53	336.37	422.96
	C.V.	0.92	0.77	0.81
	Skewness	2.19	1.02	1.96
	Kurtosis	3.99	-0.36	4.52

4.1 interpretation. This section deals with the VAR model establishment, analysis and interpretations of results, which is the Vector Autoregressive (VAR) Model formation and forecasting of petroleum products price rate in two Nigeria states. This section is divided into three parts: the series plots and cross correlation, stationary of the series using unit root test and each variable was used as the dependent variable to construct suitable VAR model for forecasting of the series in future.

Where C.V. is Coefficient of Variation

Table 4.2 shows that the three pump prices (Petrol, Diesel and Kerosene per month) in the two states are similar basic of average pump prices and coefficient of variation in each petroleum products. Cross-correlation function between the three

Petroleum Products in both states were done in the Appendix.

Table 4.3: Cross-Correlation Coefficients between the three Petroleum Products, using the observations

Table 4.4: Summary Statistics

	INF	PMS	DPK	AGO
Mean	68.14053	89.36842	56.52632	77.00000
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Table 4.5: Cross-Correlation Coefficients between the three Petroleum Products, using the observations2023:06 - 2026:06

Bauchi State	Petro Prices	Diesel Prices	Kerosene Prices	Remark
1	9	0.8148	0.8626	Bauchi State Petrol Prices is moderate
2	0.8922	1.00	0.9708	Bauchi State Diesel Prices very moderate
3	0.564	0.9750	1.000	Bauchi State Kerosene Prices moderate
Kwara State	Petro Prices	Diesel Prices	Kerosene Prices	
1	0.6744	0.8643	0.9069	Kwara State Petrol Prices is moderate
2	1.000	0,897	0.9012	Kwara State Diesel Prices moderate
3	0.5667	1.000	1.000	Kwara State Kerosene Prices moderate

Footnote: Level of Reliability of the Cross Correlation Coefficient: 0.00 is not related, 0.01-

0.20 is slightly (very low), 0.23-0.40 is Fair (low), 0.51-0.60 is Moderate, 0.61-0.80 is Substantial (high) and 0.81-0.99 is almost Perfect (very high), 1.00 is Perfect.

The cross-correlation coefficients result in Table 4.2 showed almost prefect relationship between the petroleum products, which lies between the coefficient of 81% to 97% relationship.

Table 4.3: KPSS Unit Root Test of the three Petroleum Products for the Selected State across the Geo-Political zone in Nigeria at different orders.

Data	**Variable**	**Bauchi State KPSS Unit Root Test**	**P-Value**	**Remark**	**Kwara State KPSS Unit Root Test**	**P-Value**	**Remark**
Actual Series	Petrol Prices	**0.604**	**0.029 ** **	Non-Stationary	**0.600**	**0.030****	Non-Stationary
	Diesel Prices	**0.822**	**0.001 ** **	Non-Stationary	**0.805**	**0.002****	Non-Stationary
	Kerosene Prices	**0.809**	**0.002 ** **	Non-Stationary	**0.810**	**0.002****	Non-Stationary

First Order Difference	**Variable**	**Oyo State KPSS Unit Root Test**	**P-Value**	**Remark**	**Kano State KPSS Unit Root Test**	**P-Value**	**Remark**
	Petrol Prices	0.72032	0.0032	Non-Stationary	0.62032	0.02232	Non-Stationary
	Diesel Prices	0.89100	0.03332	Stationary I(1)	0.9044	0.01132	Non-Stationary
	Kerosene Prices	0.55457	0.022132	Stationary I(1)	0.887	0.04432	Non-Stationary

Second Order Difference	**Variable**	**Delta State KPSS Unit Root Test**	**P-Value**	**Remark**	**Anambra State KPSS Unit Root Test**	**P-Value**	**Remark**
	Petrol Prices	0.72032	0.0032	Non-Stationary	0.62032	0.02232	Non-Stationary
	Diesel Prices	0.89100	0.03332	Stationary I(1)	0.9044	0.01132	Non-Stationary
	Kerosene Prices	0.55457	0.022132	Stationary I(1)	0.887	0.04432	Non-Stationary

Second Order Difference	**Variable**	**Delta State KPSS Unit Root Test**	**P-Value**	**Remark**	**Anambra State KPSS Unit Root Test**	**P-Value**	**Remark**
	Petrol Prices	0.862032	0.005432	Non-Stationary	0.62032	0.02232	Non-Stationary
	Diesel Prices	0.89100	0.077332	Stationary I(1)	0.9044	0.01132	Non-Stationary
	Kerosene Prices	0.83457	0.044132	Stationary I(1)	0.887	0.04432	Non-Stationary

Second Order Difference	**Variable**	**Oyo State KPSS Unit Root Test**	**P-Value**	**Remark**	**Kano State KPSS Unit Root Test**	**P-Value**	**Remark**
	Petrol Prices	0.72032	0.0032	Non-Stationary	0.62032	0.02232	Non-Stationary
	Diesel Prices	0.89100	0.03332	Stationary I(1)	0.9044	0.01132	Non-Stationary
	Kerosene Prices	0.55457	0.022132	Stationary I(1)	0.887	0.04432	Non-Stationary

Footnote: **= Sig. at 5% (or KPSS Unit root greater than 0.43226, implies Sig.)

Table 4.3 confirm that the three prices of petroleum products series are not stationary, it implies the series needed first/second order difference for stationary. Bayelsa State KPSS unit root test showed that the petrol pump prices per month was stationary after second order differencing, while diesel and kerosene pump prices were stationary after first order difference. Rivers State KPSS unit root test.

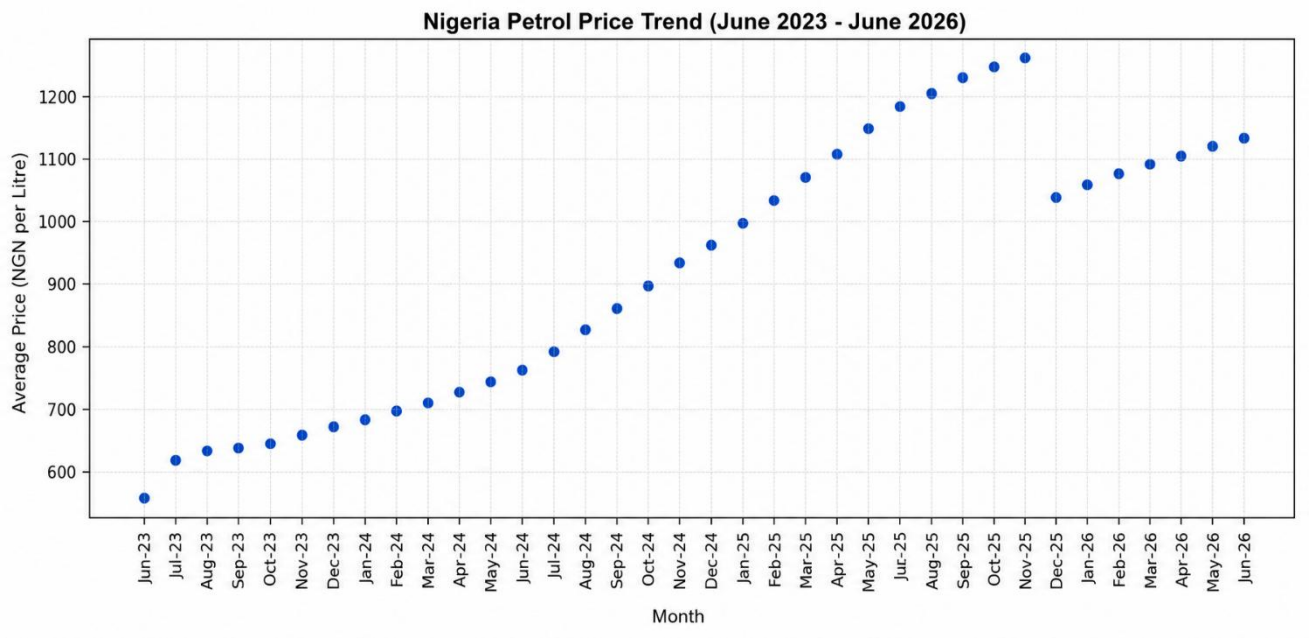

Figure 1: Nigerian Petrol Price Trend (June 2023 – June 2026)

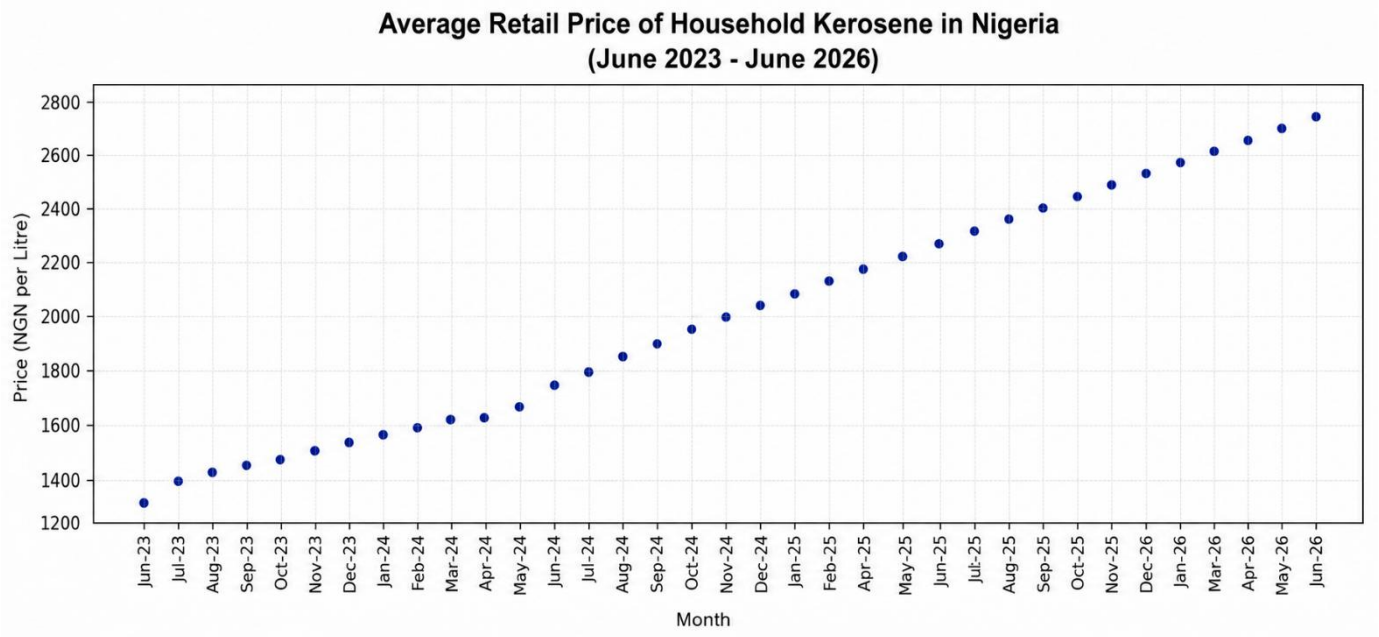

Figure 2: Average Retail Price of Household Kerosine (June 2023 – June 2026)

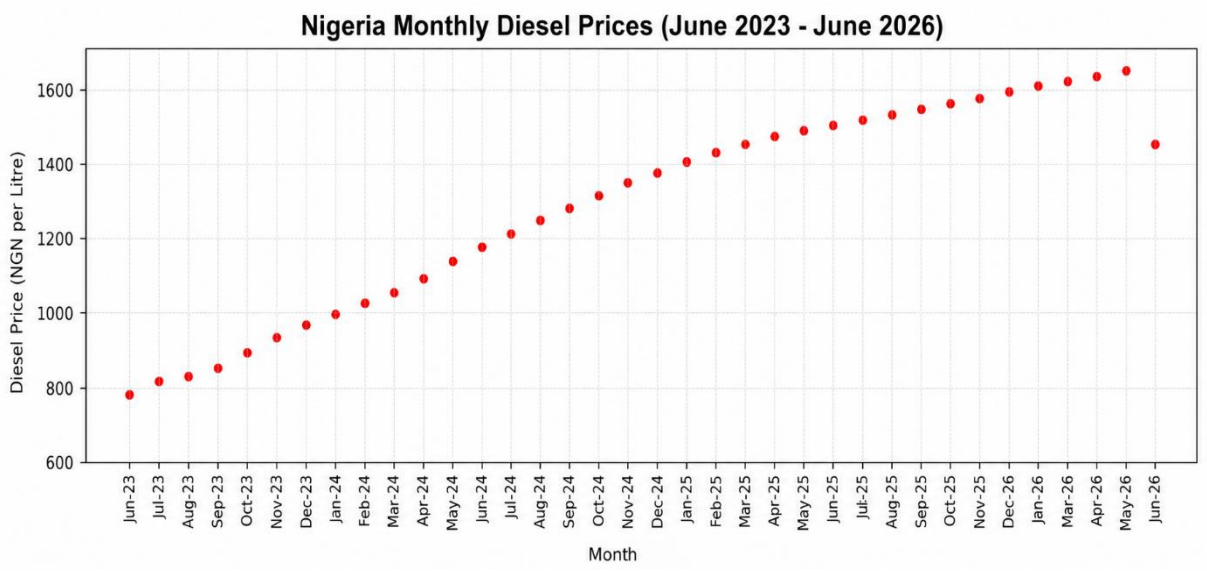

Figure 3: Nigerian Monthly Diesel Prices (June 2023 – June 2026)

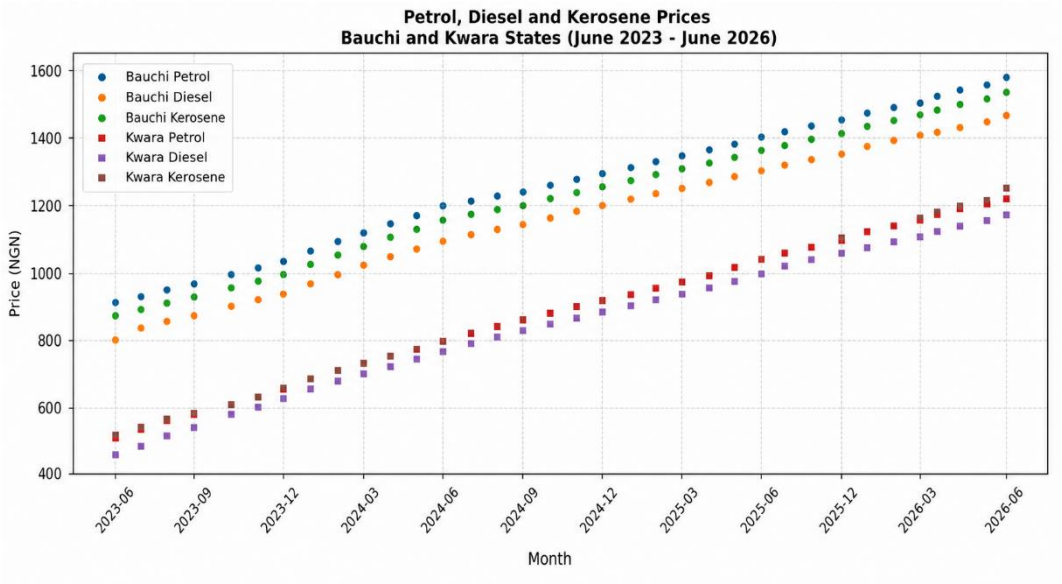

Figure 4: Petrol, Diesel and Kerosine Prices. Bauchi and Kwara States (June 2023 – June 2026)

showed that the petrol and kerosene pump prices per month was stationary after second order differencing, while diesel pump prices were stationary after first difference. These results confirm that the three prices of petroleum products series in both states pump prices per month needed first or second order difference(s).

Table 4.6: The VAR (2) Model Forecast values for the three Petroleum Products for Bayelsa State

Year	Month	Petro Prices (Y_t)	Diesel Prices (Y_t)	Kerosene Price (Y_t)
2027	Jan	1336.81	1219.81	1409.74
	Feb	1203.19	1119.49	1345.49
	Mar	1259.74	1066.24	1250.56
	Apr	1214.33	1067.28	1325.59
	May	1280.05	1006.96	1184.70
	Jun	1222.01	1013.83	1303.63
	Jul	1297.31	942.29	1112.20
	Aug	1226.34	958.71	1279.85
	Sep	1311.12	872.56	1033.40
	Oct	1227.54	901.66	1254.15
	Nov	1321.02	798.11	948.94
	Dec	1925.92	1842.50	2226.04
2028	Jan	1726.49	1719.34	859.79
	Feb	1221.86	781.04	1294.68
	Mar	1326.92	636.74	767.30
	Apr	1215.84	717.08	1158.87
	May	1321.65	550.89	673.22
	Jun	1208.44	650.33	1116.95
	Jul	1309.92	462.50	579.73
	Aug	1200.33	580.42	1066.87
	Sep	1290.95	872.56	489.50
	Oct	1192.23	901.66	1006.12
	Nov	1263.89	798.11	405.64
	Dec	1184.95	842.50	931.75
2029	Jan	1227.90	719.34	331.72
	Feb	1179.28	781.04	840.42
	Apr	1176.02	717.08	728.46
	May	1125.88	550.89	521.32
	Jun	1175.88	650.33	490.77
	Jul	1058.50	665.98	460.23
	Aug	1179.43	661.11	429.69
	Sep	979.58	656.24	399.15
	Oct	1187.02	651.37	368.61
	Nov	889.00	646.50	338.06
	Dec	2198.71	2641.63	2107.52

Table 4.7: The VAR (2) Model Forecast values Statistics Summarized between 2027 to 2031 for Bauchi State

Statistics	*Petrol Prices*	*Diesel Prices*	*Kerosene Prices*
Average	2212.45	983.36	855.01
Minimum	3212.12	1462.50	1271.70
Maximum	3826.92	1619.81	2345.49

Table 4.7 showed that the prices of Petrol will be sold at the average price of 2212.45 Naira and it will lie between 3212.12 Naira to 3826.92 Naira, Diesel price will be sold at the average price of 983.36 Naira and it will lie between 462.50 naira to 1119.81 naira, while Kerosene will be sold at the average price of 855.01 naira and it will lie between 2345.49 naira to 1271.70 naira from January 2027 to December 2029.

Conclusions

In this research, petrol prices are a major driver of inflation in Nigeria because fuel is an essential input into almost every sector of the economy. The removal of the petrol subsidy in 2023 significantly changed the Nigerian fuel-price structure and contributed to a sharp increase in petrol prices an increase in petrol prices raises transportation and production costs, which then pushes up the prices of food and other commodities. The resulting inflation reduces purchasing power and increases the cost of living. Therefore, controlling inflation in Nigeria requires not only appropriate monetary policy but also improvements in energy supply, transportation, domestic refining, agriculture and the overall productive capacity of the economy.

Inflation and petrol prices are closely connected in the Nigerian economy, whereby the Inflation refers to a sustained increase in the general price level of goods and services, which reduces the purchasing power of money. Petrol, on the other hand, is a major input into transportation, agriculture, manufacturing, electricity generation and the distribution of goods. Consequently, changes in petrol prices can have a significant effect on the cost of living and the overall inflation rate.

The price of petroleum products has been discovered to affect the prices of other commodities for the selected state across the Geo-Political Zone in Nigeria. More specifically, an increase in the price of PMS also plays a major role in increasing the price level in Nigeria. This is because the Nigerian economy still thrives on petrol in terms of fuel for power through generators due to poor electricity supply as well as fuel for vehicles for transportation of humans, goods and services.

Furthermore, there exists an economic incongruity as regards the increase in demand for PMS which should stimulate the economy and drive down inflation; rather, it led to a persistent increase in inflationary tendencies. Moreover, there is an absence of alignment between the Nigerian PMS price and global standards despite its status as an oil-producing country. It is on this basis that this study investigated the impact of PMS pricing on inflationary dynamics in Nigeria.

The study used the inflation rate as the dependent variable and the prices of PMS, DPK

and AGO as well as the exchange rate as the independent variables while making use of selected models and causality techniques. The study revealed that PMS pricing exerts a significant and positive effect on inflation, implying that PMS pricing increases inflation in Nigeria. Nevertheless, the causality test revealed that PMS pricing has no causal relationship with inflationary dynamics in Nigeria. Therefore, the study recommends that the Nigerian government should try as much as possible to stabilize the price of PMS within the selected state to protect the country from vagaries in price and instability in micro and macro-economic planning.

In summary, this study contributes to the extant literature by providing causal evidence on the effect of PMS pricing on inflationary dynamics in Nigeria. The study revealed the absence of causality between PMS pricing and inflationary dynamics; this implies that changes in the behaviour of PMS pricing will not determine changes in the behaviour of inflation. However, the study was limited to the Nigerian economy using the ARDL and causality techniques only. Therefore, as a possible direction for future research, the Sub-Saharan region as well as other oil-

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ACKNOWLEDGEMENT LETTER FOR TETFund SPONSORSHIP OF INSTITUTIONAL-BASED RESEARCH (IBR)

Department of Mathematics,

Faculty of Natural and Applied Sciences,

Nigerian Army University Biu

10 August 2026

The Executive Secretary,
Tertiary Education Trust Fund (TETFund),
6 Zambezi Crescent,
Maitama, Abuja.

Dear Sir,

ACKNOWLEDGEMENT OF TETFund SPONSORSHIP FOR INSTITUTIONAL-BASED RESEARCH (IBR)

On behalf of the Governing Council, Management, Staff and Mathematics Department of **Nigerian Army University**, I wish to express our sincere appreciation to the Tertiary Education Trust Fund (TETFund) for the sponsorship and financial support provided for the implementation of our **Institutional-Based Research (IBR)** project.

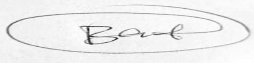
We acknowledge with profound gratitude the invaluable contribution of TETFund towards strengthening research capacity and promoting academic excellence in our institution. The support will greatly enhance the ability of our researchers to undertake meaningful research that addresses institutional, national and developmental challenges.

We assure TETFund that the funds provided will be utilized strictly for the approved research activities and in accordance with the relevant TETFund guidelines and regulations. The institution remains committed to ensuring transparency, accountability and the successful completion of the sponsored research project.

We sincerely appreciate the Executive Secretary, Management and Staff of TETFund for this laudable intervention and continued support to tertiary institutions in Nigeria.

Please accept the assurances of our highest regards and appreciation.

Yours faithfully,



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