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Economic Dilemma of Fuel Subsidy Removal in Nigeria: A Focus on the Headline Inflation

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Abstract

In this study, we provide valuable insights into how the removal of fuel subsidy contributed to headline inflation in Nigeria from 2023 to February 2025. This is based on the premise that high prices of premium motor spirit (PMS), associated with the subsidy removal, tend to increase the costs of transportation, food, and production. Thus, we employ exploratory analysis, a least squares estimation, and Granger causality tests to quantify the contributions of PMS, household kerosene, and automotive gas oil (AGO) prices to headline inflation using time series data from the National Bureau of Statistics (NBS). The exploratory analysis indicated that high PMS prices are positively and significantly correlated with headline inflationary pressures. The findings from the regression estimates revealed that prices of PMS, household kerosene, and automotive gas oil have positive and significant effects on headline inflation in both the short and long run. However, the magnitude of these impacts varies, with the price of PMS exerting a more pronounced positive effect on headline inflation during the study period. This underscores that changes in PMS prices exacerbate the inflation conundrum, complicating the Central Bank of Nigeria's (CBN) efforts to achieve price stability. Therefore, the government should prioritise fiscal discipline in managing the savings from subsidy removal, ensuring these funds are invested in revamping refineries to increase supply and reduce prices in the long run.

Keywords: *Subsidy Removal; Headline Inflation; PMS Prices; Household Kerosene; AGO and Nigeria*

1. Introduction

Subsidy describes financial support provided by the government to businesses or households through direct payments, tax breaks, or other incentives to promote consumption and production. It is touted as a means of stabilising prices and smoothening consumption by making goods and services

affordable. In particular, fuel subsidy is a government initiative designed to help consumers by lowering fuel costs to keep prices lower than the market rate. This involves compensating fuel suppliers or retailers by government units for the difference between the actual cost of production and the reduced price paid by consumers at the pump. One of the popular arguments for fuel subsidies is to address the issue of unstable fuel prices following the volatility of crude oil prices in the international market. According to Vandeninden, Grun & Fecher (2022), fuel subsidies are primarily intended to help people access essential services and utilities, like transportation, cooking appliances, heating, and home lighting, all while smoothing out price changes. It is also believed that fuel subsidies incentivise businesses across sectors and bolster overall economic activities, given that fuel constitutes a major input in the production process.

Notwithstanding the perceived benefits of fuel subsidies, they have been associated with unsustainable fiscal burdens and market distortions. Rentschler & Bazilian (2017) argue that there is a growing consensus that fossil fuel subsidies undermine economic, social, and environmental sustainability. This has intensified the interest of policymakers and organisations in reforming subsidies. For instance, the Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA) advocate for fuel subsidy reform to bolster global carbon capture and storage (CCS) efforts in line with the 2050 net-zero emissions goal. Additionally, various international policy platforms, including the United Nations (UN) Sustainable Development Goals (SDGs), have offered unique opportunities to reaffirm commitments to ineffective fuel subsidy reforms. This underscores the notion that subsidies for fossil fuels deter investments, hinder innovation, and diminish efficiency. They also heighten fiscal pressures, divert funds from essential services like health and education, promote corruption, exacerbate air pollution, and deepen poverty and income inequality. From a practical perspective, the impetus for pursuing subsidy reform has typically been more about fiscal concerns than environmental issues (Rentschler & Bazilian, 2017).

Before the second quarter of 2023, Nigeria has grappled with the issue of fuel subsidies since 1973 (McCulloch *et al*., 2021), with partial removal of the subsidies by successive national governments, including the administration of President Goodluck Jonathan. This aimed to ensure that certain economic and social goals, including the affordability of petroleum products, are achieved. It is also intended to enhance social safety nets and increase energy supply security while managing inflation (Akinola, Akinola & Kuye, 2024). Although subsidy regimes in Nigeria have been described as largely unsustainable and need to be terminated because of growing fiscal concerns, policy reform in terms of subsidy removal has remained a difficult task for successive national governments in Nigeria partly due to social welfare concerns, perceived adverse implications on the economy and continuous resistance by labour unions (see Kayode & Idera, 2025; Raifu & Afolabi, 2024; Agiri, Erude & Ohanyelu, 2023; Nnadozie, Emediegwu & Raifu 2022).

However, the second quarter of 2023 marked the complete removal of the fuel subsidy by President Bola Tinubu in his inaugural speech on 29th May 2023, leading to a surge in the pump prices of premium motor spirit (PMS) to over N537 (Central Bank of Nigeria, 2023). The reality is that the short- and long-term impact of this policy reform on the Nigerian economy is unavoidable. Therefore, it is crucial to explore the economic implications of this subsidy removal, focusing on the trajectory of inflation. This notion stems from the inflationary pressures and socioeconomic hardships often linked with subsidy removals. Following this introduction, the remainder of the research is structured as follows: Section II encompasses the relevant literature, while Section III addresses the methodology and data sources. Subsequently, in Section IV, we present and discuss the findings. Finally, Section V concludes the paper with a summary and insights on policy.

2. Related Literature

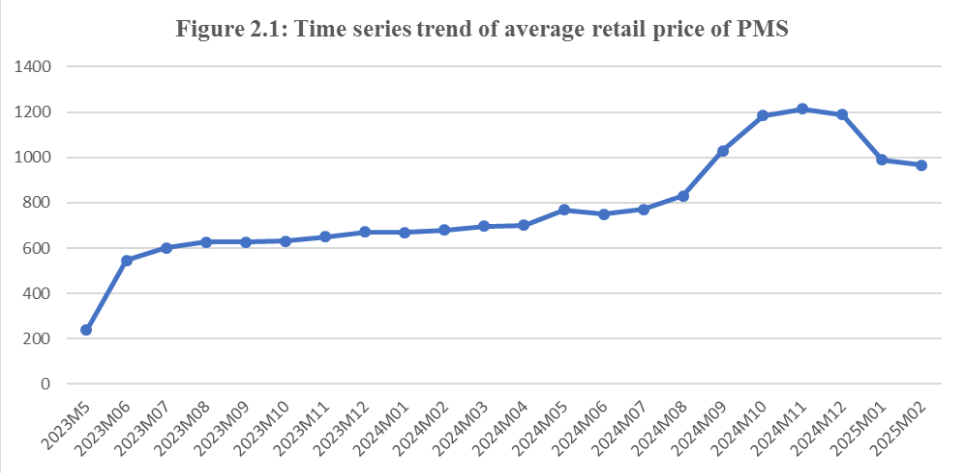
This study is anchored in the pass-through channel's theory, which assumes that changes in economic conditions—particularly variations in prices or costs—are transmitted throughout the economy and affect various economic agents, including consumers, businesses, and policymakers. This is closely linked to how policy reforms, such as subsidy removal and external shocks, influence domestic prices and overall output. According to economic theory, the removal of fossil fuel subsidies is likely to result in higher prices for petroleum products. This, in turn, would directly and indirectly impact inflation, ultimately affecting households' cost of living. Alexander (2024) posits that eliminating the subsidy may cause inflation to rise in the short term; however, it may also lead to greater economic stability and growth in the long term. According to Conflitti & Luciani (2017), when oil prices go up, it can lead to four potential inflationary effects: increased production costs, rising inflation expectations, workers pushing for higher wages to keep up with the energy price hike, and a negative supply shock if real wages don't decrease enough to adjust employment levels.

It is further argued that in situations where fuel prices are influenced by market dynamics, the resulting inflation from this adjustment tends to depend on how effectively consumers can respond to the new fuel price levels, either by reducing their consumption or by switching to alternative energy sources. Although there have been growing debates about the economic implications of higher fuel prices, it is widely acknowledged that an increase in fuel prices due to policy reforms, including the removal of subsidies, contributes to inflation. Živkov, Đurašković & Manić (2019) argue that oil price shocks significantly impact domestic inflation in various countries, operating through both direct and indirect channels. They further explain that the direct effect arises from rising prices of refined oil products, which then influence the Consumer Price Index (CPI), whereas the indirect effect occurs when price changes affect goods and services that rely on oil or its products as inputs in the production process.

As documented in the existing literature, numerous studies have investigated the implications of removing fuel subsidies on inflation and macroeconomic stability. The findings provide evidence of significant positive contributions of high fuel prices to subsidy removal to inflation (see Alexander, 2024; Balogun, 2025; Kayode & Idera, 2025; Kanu & Osuji, 2024). This underscores that removing fuel subsidies is a driving force behind headline inflation during the study period. Similarly, research by Meluda, Komolafe & Chilaka (2024); Noah, Jubril & Bello (2024); and Esekpa, Ekarika & Njama (2024) established that the removal of fuel subsidies exacerbated the issue of food inflation. In light of the literature reviewed, we improve on the previous studies by taking into consideration the prices of automotive gas oil (AGO) and household kerosene, which constitute integral aspects of energy use in Nigeria but tend to be neglected by previous studies. This provides an opportunity to gain a better insight into how subsidy removal affects the PMS price in addition to AGO and HHK and how they shape headline inflation in the study period.

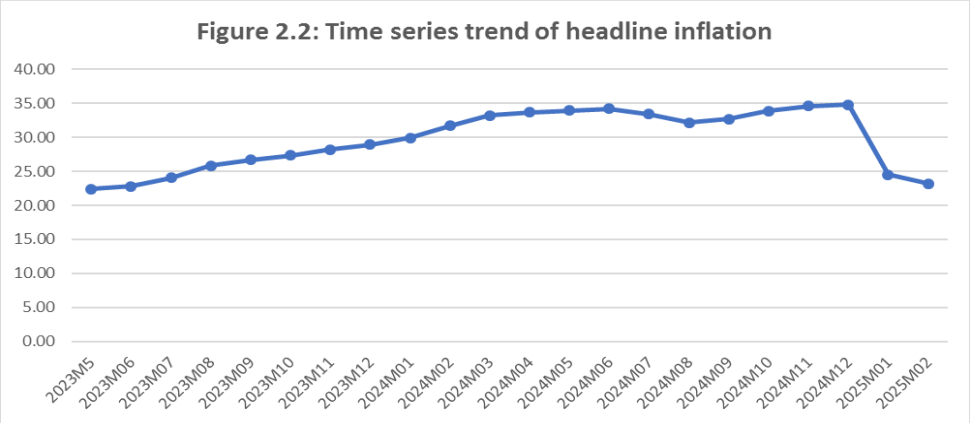
2.1 Stylized Facts on the Trajectory of Headline Inflation and Average PMS Prices

Following the fuel subsidy removal by President Bola Tinubu in his inaugural speech on 29th May 2023, the pump prices of PMS reacted accordingly by increasing significantly, which triggered an increase in the headline inflation. The trends of these variables between May 2023 and February 2025 are presented in Figures 2.1 and 2.2.



Source: Authors' (2025) illustration based on data from the National Bureau of Statistics (NBS)

Figure 2.1 shows that the average retail price paid by consumers for PMS increased from 238.11 naira in May 2023 per litre to 545.83 naira per litre in June 2023. This indicates that pump price of PMS increased by 129.23% in a month following the subsidy removal. The prices increased further to 626.7 naira and 769.62 naira per litre in August 2023 and May 2024 and reached a record high of 1,214.17 naira per litre in November 2024. The continuous increase in the price of PMS explains the short-term adverse implications of policy reform on average retail price and large dependence on PMS for transportation and household needs, which increases the cost of crises in Nigeria. However, the retail price paid by consumers for PMS decreased from 1,189.12 naira per litre in December 2024 to 990 and 965 naira per litre in January and February 2025, respectively. This gradual decline in the price of PMS could be attributed to the naira-for-crude deal between the Federal Government and domestic crude oil refiners, especially Dangote refinery and the associated price war between the Nigerian National Petroleum Company Limited (NNPCL) and Dangote refinery. There is growing concerns about the sustainability of this price fall given the plan of NNPLC to terminate the naira-for-crude arrangement and the activities of Independent Petroleum Marketers Association of ***Nigeria*** (***IPMAN***) in storing the product to ensure they have enough to sell at a higher rate, having anticipated that the price of PMS will soon rise.



Source: Authors' (2025) illustration based on data from NBS

As observed in Figure 2.2, headline inflation rose from 22.41% in May 2023 to 22.79% in June 2023. This indicates that headline inflation increased by 0.38% compared to May 2023's rate, which is associated with the rise in PMS prices following the elimination of the petrol subsidy. The time series trend revealed that headline inflation reached 31.70% and 34.19% in February and June 2024,

respectively. It hit a record high of 34.80% in December 2024 but decreased to 24.48% and 23.18% in January and December 2025, respectively. The reduction in headline inflation rates during these two months may be linked to the drop in the retail price of PMS, as reported by the NBS. Additionally, the annual average comparison of the changes in retail PMS prices and the headline inflation rate before and after the subsidy removal is summarised in Table 2.1.

Table 2.1: Summary of 12-month average of PMS price and headline inflation rate before and after subsidy removal

Variable	Before subsidy removal (June 2022 to May 2023)	After subsidy removal (June 2023 to May 2024)
PMS price	219.03	655.48
Headline inflation rate	21.15	28.86

Source: Authors' (2025) compilation based on data from NBS

As shown in Table 2.1, a year before the removal of the fuel subsidy, the average retail price of PMS per litre was 219.03 naira. However, a year after the fuel subsidy removal, the average retail price of PMS more than doubled as it increased to 655.48 naira per litre, indicating an increase of 199.26% in 12 months. This is a source of worry following the expected negative spill-over effect of high PMS prices on economic activities in Nigeria. Similarly, before the removal of the petrol subsidy, the average retail price of PMS stood at 21.15% between June 2022 and May 2023, but it rose to an average of 28.86% a year (June 2023 to May 2024) after the removal of the subsidy. The increase in headline inflation in the post-subsidy regime tends to exacerbate the cost-of-living crisis in Nigeria.

3. Data and Methodology

3.1 Data Description and Measurement

The monthly data on headline inflation rate measured in percentage was used to capture inflation trajectory. The data was obtained from the NBS which spanned from 2022 to February 2025. Again, available monthly data on the average monthly retail price measured by the amount in local currency (naira) paid by consumers per litre of PMS was obtained from the NBS for the same period. Additionally, the average monthly retail price per litre of household kerosene and automotive gas oil (diesel) measured by the amount in local currency (naira) paid by consumers as reported by the NBS was also used for this study.

3.2 Model Specification

We set out the specify the model following the works of Kayode & Idera (2025), Noah, Jubril & Bello (2024); and Esekpa, Ekarika & Njama (2024). We improved on these previous models by taking into consideration the prices of household and AGO, which are not subsidised and theoretically linked to inflation in Nigeria. The formal specification of the model is provided as:

$$HINF = f(PMS, HHK, AGO) \quad (1)$$

Where: HINF = Headline inflation, PMS = average retail price of PMS, HHK = average retail price of household kerosene and AGO = average retail price of automotive gas oil.

The autoregressive distributed lag (ARDL) model specification is also specified as follows:

$$\Delta HINF_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta HINF_{t-1} + \sum_{i=1}^{q} \alpha_2 \Delta PMS_{t-1} + \sum_{i=1}^{q} \alpha_3 \Delta HHK_{t-1} + \sum_{i=1}^{q} \alpha_4 \Delta PMS_{t-1} + \beta_1 HINF_{t-1} + \beta_2 PMS_{t-1} + \beta_3 HHK_{t-1} + \beta_4 AGO_{t-1} + \varepsilon_t \quad (2)$$

Where: α_0 = constant parameter to be estimated, α_1 - α_4 = short-run parameters, β_1 - β_4 = long-run multipliers, p = optimal lag operator for each of the dependent variables, q = optimal lag operator of the independent variables, Δ = first difference operator, ε_t = error terms

3.3 Method of Data Analysis

In this study, we utilized the least squares method to estimate the ARDL models. According to Hassler and Wolters (2006), the ARDL has gained traction in econometrics literature largely because it allows for the cointegration of nonstationary variables, which is akin to an error correction process. For the ARDL to be effectively estimated, the variables need to exhibit a structure of mixed integration [(0) and I(1)], and we utilized it following its high statistical power and low size distortion, even in a small sample. This means that one of the first steps in working with the ARDL model is to determine the order of integration for each series through a unit root test. Consequently, we conducted a unit root test for each of the variables using the Kwiatkowski, Phillips, Schmidt & Shin (KPSS. 1992) method. Essentially, the KPSS provides the basis for testing the null hypothesis that a time series is trend stationary. Our choice of the KPSS test method followed its sensitivity as it is widely adjudged to have a higher power in detecting departures from stationarity (see Afriyie *et al.*, 2020; Sjösten, 2022; Kębłowski & Welfe, 2004). In addition, we applied Granger (1969) test to ascertain the causal relations between the variables and basic inferential statistics, including exploratory data analysis and correlation analysis, to gain insights into the mean, standard deviation and overall data distribution over the study period.

4. Findings and Discussion

Table 4.1: Summary of descriptive statistics

Statistics	PMS	HINF	HHK	AGO
Mean	799.5510	29.98381	1571.771	1218.436
Median	701.2400	31.70000	1439.640	1341.160
Maximum	1214.170	34.80000	2056.380	1462.980
Minimum	545.8300	22.79000	1236.100	794.8400
Std. Dev.	209.4768	4.162830	309.8206	236.6761
Jarque-Bera	3.069878	2.170829	2.736223	2.411950
Probability	0.215469	0.337762	0.254587	0.299400

Source: E-views output (2025)

The findings indicated that the headline inflation rate averaged 29.98% during the study period, with minimum and maximum values of 22.79% and 34.80%, respectively. This suggests that Nigerians continue to grapple with rising prices since the removal of the petrol subsidy, which exacerbates the cost-of-living crisis in the country. The results further revealed that the PMS price averaged 799.55 naira per litre, fluctuating between minimum and maximum prices of 545.83 and 1214.17 naira per litre, respectively, over the study period. This indicates that the pump price of PMS has substantially increased since the subsidy removal. A similar finding was noted for the prices of HHK and AGO, which averaged 1571.77 and 1218.44 naira per litre, respectively. The high prices of these energy resources highlight the effects of subsidy removal on the retail prices of HHK and AGO paid by consumers. Additionally, the results revealed significant outliers in the PMS observations, as the associated standard deviation is greater than the mean value. However, the observations of the headline inflation rate, HHK, and AGO tend to cluster around their respective mean values, given their low standard deviations compared to their corresponding means. The probability values of the Jarque-Bera statistics indicated that all the variables are normally distributed at the 5% level.

Table 4.2: Summary of correlation analysis

		HINF	PMS	HHK	AGO
HINF	Pearson Correlation	1	.438**	.389	.820***
	Sig. (2-tailed)		.047	.082	.000
	N	21	21	21	21

Note: *** and ** denote significant at 1% and 5% levels respectively
Source: E-views output (2025)

The findings showed that the high PMS prices are positively and significantly associated with headline inflationary pressures. This indicates that an increase in PMS price driven by subsidy removal is associated with an increase in the headline inflation rate. A similar pattern was observed for the relationship between AGO price and headline inflation rate as they are found to be positively and significantly correlated. This finding indicates that the high prices of AGO are directly related to the increase in the price level. However, no evidence of a significant association was established between headline inflation and the price of HHK at the 5% level.

Table 4.3: Summary of KPSS unit root test results

Null hypothesis: The variable is stationary					
Variable	Levels test results		First difference test results		Order of Integration
	LM statistic	5 Percent Critical value	LM statistic	5 Percent Critical value	
HINF	0.349	0.463	-	0.463	I(0)
PMS	0.526	0.463	0.095	0.463	I(1)
HHK	0.561	0.463	0.127	0.463	I(1)
AGO	0.138	0.463	-	0.463	I(0)

Source: Researcher's computation from E-views 12

The KPSS unit root test results showed that all the headline inflation and average price of automotive gas oil are stationary at levels. Consequently, we reject the null hypothesis of the unit root and conclude that they are integrated of order zero, I(0). On the other hand, prices of PMS and household kerosene are stationary at first difference, indicating that they are integrated of order one, I(1). Overall, the findings indicate that the variables are mixed integrated, thus necessitating conducting a cointegration test using the bounds method.

Table 4.4 Bounds cointegration test results

Test Statistic	Value	Signif.	I(0)	I(1)
HINF PMS HHK AGO				
F-statistic	7.859	10%	2.72	3.77
K	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61

Note: K denotes the number of regressors in the model
Source: Researcher's computation from E-views 12

We observed from the bounds counteraction test results that headline inflation has a long-run relationship with the independent variables in the model. This indicates that changes in the prices of PMS,

household kerosene and automotive gas oil can be relied upon in predicting changes in headline inflation. The evidence of a long-run relationship among the variables is in tandem with the findings of Hassan & Meyer (2020), Isah (2024) and Wale-Awe & Sulaiman (2020), who reported that petrol prices and inflation are cointegrated.

4.5: ARDL model estimation results

Dependent Variable: HINF				
Short-term estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PMS)	0.028932***	0.007200	4.018499	0.0030
D(HHK)	0.010471**	0.004163	2.515487	0.0330
D(AGO)	0.020384**	0.008383	2.431703	0.0379
CointEq(-1)	-0.0285***	0.004031	-7.093800	0.0000
Long-term estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PMS	0.034503***	0.012220	2.823507	0.0199
HHK	0.024039***	0.008435	2.849902	0.0191
AGO	0.012484***	0.001854	6.731920	0.0001
C	23.57222***	4.709149	5.005622	0.0007
Summary of post-estimation test results				
Test type	Statistic	Probability value	Inference	
Breusch-Pagan serial correlation test	5.521	0.0632	No serial correlation	
Breusch-Pagan-Godfrey Heteroscedasticity test	3.684	0.9209	Homoscedastic	
Normality test	1.111	0.5737	Normally distributed	

Note: *** and ** denote significant at 1% and 5% levels respectively
Source: E-views output (2025)

The findings indicated that PMS, household kerosene, and automotive gas oil prices have positive and significant effects on headline inflation in both the short and long run. However, the magnitude of these impacts varies, with the price of PMS exerting a more pronounced positive effect on headline inflation during the study period. This observation aligns with the results of Alexander (2024) and Kayode & Idera (2025), who established that the high petrol price associated with subsidy removal is inflationary. This finding further illustrates that high PMS price, triggered by the subsidy removal, exacerbated the economic hardships faced by Nigeria amid the ongoing reforms of the current administration. Similarly, the significant positive contribution of the retail price of automotive gas oil supports the findings of Adams & Jauro (2024) and Balogun (2025), who reported that the subsidy increased transportation and food costs, thus contributing to overall inflation. The error correction coefficient (-0.0285) indicates that the model can adjust to the long-run equilibrium position at a speed of 2.85%. This finding further substantiates the evidence of a long-run relationship among the variables. The post-estimation test results, particularly the residual diagnostics test, indicated that the residuals are serially independent, homoscedastic, and normally distributed at the 5% level, which provides a strong basis for the reliability of the ARDL results.

4.6: Pairwise Granger causality test results

Null Hypothesis	F-Statistic	Prob.
PMS does not Granger Cause HINF	4.56**	0.0299
HINF does not Granger Cause PMS	8.01***	0.0048
HHK does not Granger Cause HINF	0.82	0.4618
HINF does not Granger Cause HHK	3.03*	0.0808
AGO does not Granger Cause HINF	1.52	0.2514
HINF does not Granger Cause AGO	27.47	1.E-05
HHK does not Granger Cause PMS	12.71***	0.0007
PMS does not Granger Cause HHK	1.84	0.1943
AGO does not Granger Cause PMS	2.02	0.1691
PMS does not Granger Cause AGO	6.33***	0.0110
AGO does not Granger Cause HHK	3.83**	0.0471
HHK does not Granger Cause AGO	4.05**	0.0409

Note: ***, ** and * denote significant at 1%, 5% and 10% levels respectively
Source: E-views output (2025)

The findings indicate that bidirectional causality exists between PMS prices and headline inflation in the long run. This suggests that high PMS prices contribute to inflationary pressures in Nigeria and vice versa. This observation aligns with the conclusions of Wale-Awe & Sulaiman (2020) and Isaac (2017), who identified a unidirectional causality flowing from petroleum pump prices to inflation in Nigeria. Additionally, there is a unidirectional causality from PMS and household kerosene prices to the automotive gas oil price. Similarly, a unidirectional causality flows from household kerosene to PMS prices in the long run. The findings elucidate the interactions among energy prices.

5. Conclusion and Policy Implications

The continuous increases in pump prices of PMS since the subsidy removal have raised concerns about the macroeconomic implications in Nigeria. Thus, we explore how changes in the PMS prices affected headline inflation in Nigeria. The findings showed that headline inflation pressure is largely driven by changes in the retail prices of PMS paid by consumers during the study period. This highlights that changes in PMS prices worsen the issue of inflation conundrum, which makes it difficult for the Central Bank of Nigeria (CBN) to achieve the goal of price stability. Hence, the government should prioritise fiscal discipline in the management of the savings from subsidy removal by ensuring they are invested in revamping refineries to increase supply and reduce prices in the long run. The findings further revealed that the prices of household kerosene and automotive gas oil significantly contributed to the headline inflationary pressures in Nigeria. This is not surprising following the close link of these fuel prices with rising transportation, cooking and manufacturing costs. in the short and long run. This highlights the need for the government to create an enabling environment for the establishment of more modular refineries to bolster supply and maintain stability in the price level.

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