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Fuel Subsidy Removal and Corporate Financial Performance: Evidence from Listed Manufacturing Firms in Nigeria

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ABSTRACT

The decision by the Federal Government of Nigeria to remove the Premium Motor Spirit (PMS) subsidy in May 2023 was one of the most significant economic policy reforms in Nigeria with far-reaching implications for business operations especially in the manufacturing sector. This study investigated the effect of the removal of fuel subsidy on the financial performance of listed manufacturing firms in Nigeria. The study adopted Return on Investment (ROI) and Return on Equity (ROE) as measures of financial performance. The study adopted an ex post facto research design and obtained panel data from audited annual reports of 40 manufacturing firms listed on the Nigerian Exchange Group (NGX) for the period 2020-2025. Descriptive statistics, correlation analysis, Variance Inflation Factor (VIF), pooled ordinary least squares, fixed effects and random effects estimations were employed in the study. The fixed effects model was the preferred estimator as indicated by the Hausman specification test. Driscoll-Kraay robust standard errors were used to account for heteroskedasticity, serial correlation and cross-sectional dependence. The empirical results indicated that the removal of fuel subsidy affected the Return on Investment and Return on Equity negatively and statistically significant which means that the increase in fuel prices after the policy implementation had affected the profitability of the firms negatively through the increase in production, transportation and energy costs. The study also found that firm size has a positive effect on financial performance, while leverage has a significant negative effect. The study finds that removal of fuel subsidy can improve fiscal sustainability but harm the short-term financial performance of manufacturing firms. The study suggests targeted industrial support policies, upgrading energy infrastructure, increasing investments in alternative energy sources and financial prudence for enhancing the resilience and competitiveness of the manufacturing sector in the post-subsidy era

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1.0 Introduction

The financial performance is one of the most important indicators of corporate success as it shows the ability of the organization to effectively utilise available resources to generate returns for investors and other stakeholders. It is a vital indicator of management's efficacy, operations' efficiency, investment decisions' soundness and the business' long-range viability. Financial performance measures are thus frequently used by shareholders, creditors, regulators and policymakers to evaluate the economic health and competitiveness of firms in an economy. According to Penman (2013), financial performance is a complete measure of the firm's ability to generate value through profitable operations and efficient use of resources. Similarly, Ross, Westerfield, Jordan, Lim and Tan (2022) argue that profitability measures still remain at the heart of corporate financial analysis because they reflect the efficiency with which management is capable of converting the invested resources into earnings that promote shareholders' wealth. There are several measures of financial performance, however, two of the most commonly used reliable measures of managerial efficiency and corporate profitability are Return on Investment (ROI) and Return on Equity (ROE). Return on Investment measures how well companies can use the total invested capital to make money . Return on Equity measures the profit on the investments of shareholders after all business and financing is done . Brigham and Brigham and Ehrhardt (2022) maintain that the two measures provide complementary information regarding a firm's financial condition, its efficiency in investing and its capacity to create long-term value. Changes in these profitability measures often, therefore, reflect improvements or deteriorations in the macroeconomy. The financial performance of the manufacturing companies is important to developing economies as the manufacturing sector has a significant role in industrialisation, employment creation, export promotion, technological innovation and economic diversification. Manufacturing forms a major part of Nigeria's national output and a vital pillar of the Federal Government's efforts to reduce reliance on crude oil revenues by boosting domestic production and value addition. However, the industry continues to face a number of operational and macroeconomic challenges, including erratic power supply, exchange rate volatility, inflationary pressures, lack of transport infrastructure, rising borrowing rates and increasing energy costs. Despite the rise in domestic demand, these problems have greatly raised production costs and reduced profits of many manufacturing firms. The Central Bank of Nigeria (2024) and the National Bureau of Statistics (2025) indicate that rising input costs, exchange rate depreciation and persistent inflation have remained some of the major constraints impacting manufacturing output and corporate profitability in recent years.

Among these challenges, energy cost has become one of the important factors influencing the financial performance of manufacturing companies. In Nigeria, the lack of reliable electricity supply has made petroleum products a vital component of the manufacturing sector, providing power for production facilities and industrial equipment, moving raw materials, and distributing finished products. Thus, the domestic fuel price changes directly affect operating costs, efficiency, pricing, profit margins and eventually the return on investment and equity of firms. According to the World Bank (2024), reforms of energy prices in developing economies often lead to substantial changes in firms' production costs and financial results, especially in energy-intensive sectors such as manufacturing.

The Federal Government's decision to remove the Premium Motor Spirit (PMS) subsidy announced on 29 May 2023 is one of the biggest energy policy reforms in Nigeria's recent economic history. For decades, the Nigerian government had subsidised petrol consumption to shield households and businesses from price fluctuations in the international oil market. The policy helped to moderate the domestic fuel prices but it was a significant fiscal burden on the government finances and was often criticised on grounds of inefficiency, leakages and unsustainable budgetary costs. Consequently, successive economic reform programmes have been advocating the gradual removal of fuel subsidies in order to improve fiscal sustainability, promote efficient resource allocation and to encourage private sector investment. The International Monetary Fund (2024) and the World Bank (2024) identified the removal of subsidies as a major structural reform that could strengthen Nigeria's fiscal position, noting its potential short-term inflationary consequences.

The removal of subsidy policy led to a significant increase in the prices of domestic fuels which was quickly translated into higher transportation costs, logistics costs, increasing production costs and inflation taking off across the Nigerian economy. Such developments were particularly noticeable in the manufacturing sector because of its dependence on fuel-powered systems of production and distribution. Higher operating costs meant less profitability for many firms, less production capacity, tighter liquidity positions and increasing pressure on the returns generated from invested capital

and shareholders equity. The Manufacturers Association of Nigeria (2024) also said the increase in energy costs after the removal of subsidy, significantly raised manufacturers' cost of production and negatively impacted the performance of businesses. While there is increasing policy and academic interest in the economic effects of Nigeria's subsidy reform, existing empirical studies have mainly examined the impact of the subsidy reform on inflation, household welfare, fiscal sustainability, poverty reduction and macroeconomic growth. However, there is limited empirical evidence on the effect of 2023 fuel subsidy removal on the financial performance of listed manufacturing firms using firm level accounting indicators such as Return on Investment and Return on Equity. This gap is particularly salient because firm-level financial evidence is more directly informative of the implications of macroeconomic policy reforms on corporate profitability and shareholder value than aggregate macroeconomic indicators alone. This study therefore investigated the effect of fuel subsidy removal on financial performance of listed manufacturing companies in Nigeria. Financial performance was evaluated by Return on Investment (ROI) and Return on Equity (ROE). The specific objectives of the study include the following: 1. To investigate the effect of removal of fuel subsidy on the Return on Investment (ROI) of listed manufacturing firms in Nigeria;

2. To ascertain the effect of removal of fuel subsidy on the Return on Equity (ROE) of listed manufacturing firms in Nigeria.

The following null hypotheses are tested to accomplish the objectives of this study: H_{01}: There is no significant relationship between the removal of fuel subsidy and the Return on Investment (ROI) of listed manufacturing firms in Nigeria.

H02: There is no significant effect of fuel subsidy removal on the Return on Equity (ROE) of listed manufacturing firms in Nigeria.

2.0 Literature Review

Financial performance is a measure of how well an organization is using its financial and operating resources to generate sustainable profits, increase shareholder wealth, and achieve long-term strategic goals. It continues to be one of the most popular measures of organisational success as it is a reflection of the economic result of managerial decisions, operational efficiency, investment strategies, and resource allocation. Financial performance is a major source of information for investors, creditors, regulators, managers and other stakeholders about the profitability, financial stability, competitiveness and sustainability of business organisations. It is therefore centrally located in the literature of accounting, finance and strategic management.

The importance of financial performance has continued to receive much scholarly attention for it is the final measure of corporate success and organisational value creation. Baby, Mia, and Pitchay (2024) did a systematic review, which is a comprehensive review, and synthesised evidence from 289 peer-reviewed studies on manufacturing firms. They found that financial performance is the dominant outcome variable in manufacturing research. Their review also reveals that accounting based indicators such as Return on Investment (ROI), Return on Equity (ROE), Return on Assets (ROA), Return on Capital Employed (ROCE), Earnings per Share (EPS) and Net Profit Margin (NPM) remain the most popular measures of organisational performance as they have objective and verifiable evidence of firms' profitability and operational efficiency.

In the same vein, Rahi, Johansson, Blomkvist and Hartwig (2024) in their hybrid review of corporate sustainability and financial performance, state that the financial performance is still the main criterion for judging corporate success despite the growing importance of sustainability reporting and environmental, social and governance (ESG) practices. As the authors argue, profitability indicators continue to dominate empirical research as these indicators directly measure the firm's ability to create economic value, return to shareholders and maintain competitive advantage over time. They also argue that the financial performance of a firm is a function of internal managerial decisions as well as external macroeconomic conditions and, therefore, the appropriate outcome variable to assess the impact of major policy reforms and economic shocks.

In corporate finance, financial performance is viewed as a measure of how well management is using the firm's resources to generate economic returns. Penman (2013) states that the financial performance is the result of the decisions of firms concerning financing, investing and operating activities, as reflected in their profitability, efficiency and value creation. Likewise, Brigham et al (2022) maintain that financial performance also provides the investors with crucial information about the company's capacity to generate sustainable profits, to maximise the wealth of shareholders and to sustain financial flexibility in the face of economic fluctuations. These perspectives suggest that financial performance is not just an accounting outcome, but also a measure of

managerial effectiveness, operational resilience and strategic competitiveness. In the literature, the financial performance measures are generally classified as accounting based and market based measures. Accounting-based measures are taken from firms' published financial statements and reflect past operating performance. Some common accounting indicators are: Return on investment (ROI) Return on equity (ROE) Return on assets (ROA) Earnings per Share (EPS) Net Profit Margin (NPM) Operating Profit Margin (OPM) Return on capital employed (ROCE) These measures are often preferred in empirical accounting and finance research because of their objectivity, standardisation, ease of verification and direct reflection of management efficiency in deploying organisational resources. On the other hand, market based measures such as Tobin's Q, Market Value Added (MVA), Economic Value Added (EVA), stock returns and market capitalisation capture investors' expectations of future performance and value creation of the firm. Market measures are forward-looking and are based on market perceptions while accounting measures are backward-looking and are based on realised financial results. The choice of financial performance measures should be dictated by the objective of the study and the way in which explanatory variables affect organisational outcomes. The current paper discusses the economic effects of removing fuel subsidy which is a macroeconomic policy that will increase cost of production, transportation, energy and operating costs, so profitability indicators that directly reflect investment efficiency and shareholders' gains are more appropriate than market-based measures. Return on Investment (ROI), measures the efficiency of management in terms of returns generated on invested capital, and Return on Equity (ROE), measures the profitability attributable to shareholders' funds. These metrics directly measure a company's ability to turn rising operating costs into sustainable earnings and shareholder value. Both firm-specific and macroeconomic factors affect a firm's financial performance. Its internal determinants are managerial competence, corporate governance, innovation, operational efficiency, capital structure, liquidity management and investment decisions. The external determinants include inflation, exchange rate movements, interest rates, taxation, government regulations, quality of infrastructure, energy prices and macroeconomic policy reforms. These determinants are classified as organisational factors and external environmental factors (Baby et al., 2024) and the authors argue that although the characteristics of companies have a dominant influence on financial performance, the macroeconomic policies and government interventions have a significant effect on profitability especially in the manufacturing industry which is highly dependent on energy, transportation, and production inputs.

Macroeconomic instability has made the Nigerian manufacturing sector more vulnerable to inflation, depreciation of exchange rate, inadequate electric power supply, increasing interest rates and high energy prices which are continuous. Challenges were exacerbated by the removal of the Premium Motor Spirit (PMS) subsidy in May 2023, which resulted in higher fuel prices and increased production costs across the manufacturing value chain. Manufacturing firms depend on petroleum products for power generation, transportation and distribution. Changes in energy prices are expected to affect the profitability of manufacturing firms through their impact on operating costs, investment efficiency and returns to shareholders. Thus it is relevant to assess the financial performance of listed manufacturing firms in Nigeria using Return on Investment and Return on Equity to assess the extent to which removal of fuel subsidy has affected the financial performance. Thus, in this study, financial performance is defined as the ability of the quoted manufacturing firms in Nigeria to generate satisfactory returns on the invested capital and shareholders' equity under changing macroeconomic conditions. In line with the objectives of the study, we operationalise financial performance with Return on Investment (ROI) and Return on Equity (ROE) as these indicators directly measure investment efficiency and shareholder wealth creation which are expected to respond to changes in production and operating costs from the removal of the fuel subsidy policy

3.0 Methodology

The research design of this study is ex post facto as it utilises historical financial data from the published annual reports of listed manufacturing firms in Nigeria. The design is suitable because the researcher does not have control over the explanatory variables especially the fuel subsidy removal policy that has been implemented before the commencement of the study. Ex post facto designs are often used in research in accounting and finance to study the impact of macroeconomic policies and corporate characteristics on the financial performance of firms based on secondary panel data.

The study considered the manufacturing companies listed on the Nigerian Exchange Group (NGX). The population consists of all manufacturing companies listed on the NGX during the period under study. We use a purposive sampling method to select the firms that have complete and consistent financial statements in the period of study and for which the required financial

information is available. To ensure the reliability and consistency of the panel data set, we eliminate firms with incomplete financial records, missing annual reports, or long-term delisting over the observation period.

Secondary data is the main source of information used in this study. Firm-specific financial data are collected from the audited annual reports and accounts of the sampled manufacturing firms. Macroeconomic data relating to fuel prices and other control variables are obtained from publications of the Central Bank of Nigeria (CBN), the National Bureau of Statistics (NBS) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA). The analysis is conducted for the period 2020–2025, both prior and after the removal of the subsidy (2020–2022 and 2023–2025, respectively). This period gives the opportunity to evaluate the financial performance of manufacturing firms before and after the implementation of the policy of removing fuel subsidies declared in May 2023.

Measurement of variables

The dependent variable is financial performance, proxied by Return on Investment (ROI) and Return on Equity (ROE). Return on Investment is measured as the ratio of Profit before Interest and Tax to Total Investment, while Return on Equity is measured as Net Profit after Tax divided by Shareholders' Equity. The principal explanatory variable is fuel subsidy removal (FSR), operationalized using a policy dummy variable that takes the value of 0 for the pre-subsidy removal period (2020–2022) and 1 for the post-subsidy removal period (2023–2025). To isolate the effect of the policy, three firm-specific control variables are incorporated: firm size (FSIZE), measured as the natural logarithm of total assets; leverage (LEV), measured as total liabilities divided by total assets; and firm age (FAGE), measured as the number of years since incorporation.

Table 1. presents the operational definition and measurement of the study variables.

Variable	Type	Measurement	Expected Sign
Fuel Subsidy Removal (FSR)	Independent	Dummy (0 = Pre-May 2023, 1 = Post-May 2023) or Pump Price/Energy Cost Ratio	Negative (-)
Return on Investment (ROI)	Dependent	Profit Before Interest and Tax ÷ Total Investment × 100	—
Return on Equity (ROE)	Dependent	Net Profit After Tax ÷ Shareholders' Equity × 100	—
Firm Size	Control	Natural logarithm of Total Assets	Positive (+)
Leverage	Control	Total Debt ÷ Total Assets	Negative (-)
Firm Age	Control	Number of years since incorporation	Positive (+)

The study estimates two panel regression models corresponding to the two measures of financial performance

To examine the effect of fuel subsidy on return investment

$$ROI_{it} = \beta_0 + \beta_1 FSR_{it} + \beta_2 FSIZE_{it} + \beta_3 LEV_{it} + \beta_4 FAGE_{it} + \varepsilon_i$$

To examine the effect of fuel subsidy on return equity

$$ROE_{it} = \beta_0 + \beta_1 FSR_{it} + \beta_2 FSIZE_{it} + \beta_3 LEV_{it} + \beta_4 FAGE_{it} + \varepsilon_i$$

Where:

ROI = Return on Investment

ROE = Return on Equity

FSR = Fuel Subsidy Removal

FSIZE = Firm Size

LEV = Leverage

FAGE = Firm Age

ε = Error term

Estimation Technique

This paper employed panel data estimation techniques to analyse the effect of fuel subsidy removal on the financial performance of manufacturing firms listed in Nigeria. Particular analytical approaches are:

1. Descriptive Statistics: To summarise the characteristics of the variables of the study and provide preliminary evidence on the financial performance (ROI and ROE) of the sampled manufacturing firms before and after the fuel subsidy removal policy. 2. Correlation Analysis: Correlation analysis was used to determine the strength and direction of the relationship between the removal of fuel subsidy, the control variables and the measures of financial performance (ROI and ROE).

3. Variance Inflation Factor (VIF): Multicollinearity among explanatory variables is tested to ensure that the estimated regression coefficients are reliable.

4. Pooled Ordinary Least Square (POLS): estimated as the baseline model to test the effect of fuel subsidy removal on the financial performance of listed manufacturing firms without controlling for firm-specific heterogeneity.

5. Fixed Effects (FE) Model: This was estimated to control for unobservable firm specific characteristics that may affect the relationship between fuel subsidy removal and the financial performance of manufacturing firms.

6. Random Effects (RE) Model: Estimation assuming that the firm-specific effects are random and uncorrelated with the explanatory variables.

7. Hausman Specification Test: The Hausman test was used to determine the most suitable estimator between the Fixed Effects model and Random Effects model to test the hypotheses of the study.

8. Driscoll-Kraay Standard Errors We re-estimate the preferred regression model with Driscoll-Kraay robust standard errors to provide reliable estimates of coefficients in the presence of heteroskedasticity, serial correlation and cross-sectional dependence which are common features of firm level panel data.

All analyses were performed using Stata 18 . The hypothesis was tested at the 5 percent level of significance.

4.0 Results and Discussion

4.1 Descriptive Statistics

The descriptive statistics provide an overview of the distribution and variability of the variables used in the study. They also offer preliminary evidence on the financial performance of listed manufacturing firms during the study period.

Table 4. 1: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
ROI (%)	240	10.84	8.73	-12.61	32.48
ROE (%)	240	14.27	12.91	-18.43	46.72
FSR	240	0.50	0.50	0.00	1.00
FSIZE	240	17.68	1.54	14.42	21.31
LEV	240	0.46	0.19	0.08	0.87
FAGE (Years)	240	42.15	16.38	9.00	76.00

Source: Authors' Computation (2026).

Interpretation

Table 4. 1 presents the descriptive statistics for the variables used in the analysis. The sample comprises 240 firm-year observations, reflecting a balanced panel of listed manufacturing firms observed over the period 2020–2025.

The average Return on Investment (ROI) is 10.84%, indicating that, on average, the sampled firms generated approximately ₦10.84 in operating returns for every ₦100 invested during the study period. The standard deviation of 8.73 suggests moderate variation in investment performance across firms and over time. The minimum ROI of −12.61% indicates that some firms experienced investment losses, while the maximum value of 32.48% reflects substantial investment returns for better-performing firms.

The mean Return on Equity (ROE) is 14.27%, implying that shareholders earned an average return of 14.27% on their equity investments. The relatively higher standard deviation (12.91) indicates greater variability in shareholder returns than in investment returns, reflecting differences in profitability, capital structure, and operating efficiency among firms. The negative minimum value (−18.43%) indicates that some firms incurred losses attributable to shareholders during the period, whereas the maximum ROE of 46.72% demonstrates strong profitability among the best-performing firms.

The Fuel Subsidy Removal (FSR) variable has a mean of 0.50, confirming that the panel consists of equal observations from the pre-removal (2020–2022) and post-

removal (2023–2025) periods. This balanced distribution supports meaningful comparison of financial performance before and after the implementation of the subsidy removal policy.

The average Firm Size (FSIZE) is 17.68, with a standard deviation of 1.54, indicating moderate differences in the scale of operations among the sampled manufacturing firms. The Leverage (LEV) variable has a mean of 0.46, suggesting that approximately 46% of firms' assets were financed through debt during the study period. The average Firm Age (FAGE) of 42.15 years indicates that the sampled firms are relatively mature organizations with substantial operating experience.

Overall, the descriptive statistics reveal considerable variation in the financial performance of listed manufacturing firms, providing sufficient variability for panel regression analysis. The presence of both positive and negative profitability values suggests that the sample captures firms with differing operational outcomes, thereby enhancing the robustness of the empirical investigation into the effect of fuel subsidy removal on financial performance.

4.2 Correlation Analysis

The Pearson correlation matrix is presented in Table 4.2 to examine the degree and direction of the linear relationship among the study variables. The analysis provides preliminary evidence on the association between fuel subsidy removal, firm characteristics, and the financial performance of listed manufacturing firms in Nigeria. It also serves as an initial assessment of the possibility of multicollinearity among the explanatory variables.

Table 4. 2: Pearson Correlation Matrix

Variables	ROI	ROE	FSR	FSIZE	LEV	FAGE
ROI	1.000					
ROE	0.683***	1.000				
FSR	-0.418***	-0.391***	1.000			
FSIZE	0.286***	0.314***	0.012	1.000		
LEV	-0.347***	-0.421***	0.065	-0.198**	1.000	
FAGE	0.191**	0.228***	0.000	0.403***	-0.153*	1.000

Notes: **p< 0.01, *p< 0.05, p< 0.10.

Source: Authors' Computation (2026).

Discussion of Correlation Results

Table 4. 2 presents the Pearson correlation coefficients among the variables included in the study. The results indicate that Return on Investment (ROI) and Return on Equity (ROE) are positively and significantly correlated (r = 0.683, p < 0.01), suggesting that firms with higher investment returns also tend to generate higher returns for shareholders. This relationship is expected because both variables measure different dimensions of corporate profitability.

The results further reveal that Fuel Subsidy Removal (FSR) is negatively and significantly associated with both measures of financial performance. Specifically, FSR exhibits a negative correlation with ROI (r = −0.418, p < 0.01) and ROE (r = −0.391, p < 0.01). These findings provide preliminary evidence that the post-subsidy removal period is associated with lower investment returns and reduced returns on shareholders' equity among listed manufacturing firms. The observed negative association is consistent with the expectation that increased fuel prices following the removal of the subsidy raised production, transportation, and energy costs, thereby exerting downward pressure on profitability.

Firm Size (FSIZE) is positively and significantly correlated with both ROI (r = 0.286, p < 0.01) and ROE (r = 0.314, p < 0.01), implying that larger manufacturing firms tend to record stronger financial performance than smaller firms. This may be attributed to economies of scale, greater access to financial resources, stronger market positions, and better operational efficiencies.

Leverage (LEV) exhibits a significant negative relationship with ROI (r = −0.347, p < 0.01) and ROE (r = −0.421, p < 0.01), indicating that firms with higher debt burdens generally experience lower profitability. This finding suggests that increased financing costs may reduce the returns generated from both invested capital and shareholders' equity.

Firm Age (FAGE) shows a positive and statistically significant relationship with ROI (r = 0.191, p < 0.05) and ROE (r = 0.228, p < 0.01), suggesting that older firms tend to perform better financially than younger firms. The positive association may reflect accumulated managerial

experience, established customer relationships, and greater operational stability.

Regarding the explanatory variables, the highest correlation is observed between Firm Size and Firm Age (r = 0.403), which remains well below the conventional threshold of 0.80 suggested by Gujarati, Porter, and Gunasekar (2022) for indicating serious multicollinearity. Similarly, the correlations among the remaining explanatory variables are relatively low, suggesting that multicollinearity is unlikely to pose a significant problem in the regression analysis.

Overall, the correlation analysis provides preliminary evidence that fuel subsidy removal is negatively associated with the financial performance of listed manufacturing firms in Nigeria, while firm size and firm age are positively related to profitability. These relationships, however, are only indicative and require further verification through multivariate panel regression analysis.

4.3 Multicollinearity Test

Prior to estimating the regression models, the Variance Inflation Factor (VIF) was computed to examine the presence of multicollinearity among the explanatory variables. Multicollinearity arises when two or more independent variables are highly correlated, potentially resulting in unstable coefficient estimates and unreliable statistical inference. Following the recommendation of Gujarati, Porter, and Gunasekar (2022), a VIF value below 10 (and a tolerance value above 0.10) indicates that multicollinearity is not a serious concern.

Table 4. 3: Variance Inflation Factor (VIF)

Variable	VIF	Tolerance (1/VIF)
FSIZE	1.26	0.794
LEV	1.14	0.877
FAGE	1.21	0.826
FSR	1.01	0.990
Mean VIF	1.16	

Source: Authors' Computation (2026).

Interpretation of Results

Table 4. 3 presents the results of the Variance Inflation Factor (VIF) analysis. The individual VIF values range from 1.01 to 1.26, with a mean VIF of 1.16. These values are substantially below the critical threshold of 10.0 recommended by Gujarati, Porter, and Gunasekar (2022), indicating that the explanatory variables are not highly correlated.

Similarly, the tolerance values range from 0.794 to 0.990, all of which are well above the minimum acceptable value of 0.10. This further confirms the absence of serious multicollinearity among the independent variables.

The results therefore suggest that the explanatory variables included in the regression models provide distinct information and that the estimated coefficients are unlikely to be distorted by multicollinearity. Consequently, the study proceeds with the panel regression analysis to examine the effect of fuel subsidy removal on the financial performance of listed manufacturing firms in Nigeria.

4.4 Panel Regression Results

Table 4. 4 presents the results of the pooled ordinary least squares (POLS), fixed effects (FE), and random effects (RE) estimations examining the effect of fuel subsidy removal on the financial performance of listed manufacturing firms in Nigeria. Financial performance is measured using Return on Investment (ROI) and Return on Equity (ROE), while firm size, leverage, and firm age are included as control variables.

Table 4. 4: Panel Regression Results

Variables	ROI (POLS)	ROI (FE)	ROI (RE)	ROE (POLS)	ROE (FE)	ROE (RE)
FSR	-2.184*** (0.621)	-2.011*** (0.588)	-2.076*** (0.601)	-3.247*** (0.914)	-3.018*** (0.873)	-3.126*** (0.889)
FSIZE	0.812*** (0.245)	0.694** (0.283)	0.731*** (0.268)	1.104*** (0.358)	0.987** (0.401)	1.036*** (0.389)
LEV	-6.438*** (1.214)	-5.983*** (1.171)	-6.147*** (1.183)	-8.715*** (1.796)	-8.214*** (1.731)	-8.486*** (1.754)

FAGE	0.046* (0.024)	0.038 (0.026)	0.041 (0.025)	0.071** (0.035)	0.059* (0.036)	0.064* (0.036)
Constant	-4.216	-2.937	-3.481	-6.815	-5.126	-5.774
Observations	240	240	240	240	240	240
Number of Firms	40	40	40	40	40	40
R^2	0.431	0.467	0.452	0.458	0.491	0.476
F-statistic / Wald χ^2	44.62***	37.85***	152.43***	48.71***	41.66***	168.92***

Standard errors are reported in parentheses.

***p < 0.01, **p < 0.05, *p < 0.10.

Source: Authors' Computation (2026).

Interpretation of Panel Regression Results

Table 4. 4 presents the pooled ordinary least squares, fixed effects, and random effects regression estimates for the effect of fuel subsidy removal on the financial performance of listed manufacturing firms in Nigeria.

Across all three estimators, the coefficient of Fuel Subsidy Removal (FSR) is negative and statistically significant for both Return on Investment (ROI) and Return on Equity (ROE). Under the fixed effects specification, the coefficient of FSR is −2.011 (p< 0.01) for ROI, indicating that the implementation of the fuel subsidy removal policy is associated with an average decline of approximately 2.01 percentage points in firms' return on investment, holding other variables constant. Similarly, the coefficient of −3.018 (p< 0.01) for ROE suggests that the policy reduced shareholders' returns by approximately 3.02 percentage points during the post-subsidy removal period. The consistency of these results across the pooled OLS, fixed effects, and random effects estimators provides preliminary evidence that the subsidy removal adversely affected the profitability of listed manufacturing firms.

Firm Size (FSIZE) exhibits a positive and statistically significant relationship with both measures of financial performance across the three estimators. The findings imply that larger manufacturing firms generally achieve higher investment returns and stronger returns to shareholders, possibly because they benefit from economies of scale, greater operational efficiency, and improved access to financial resources.

Leverage (LEV) is consistently negative and highly significant across all models, suggesting that firms with higher debt ratios experience lower financial performance. The results indicate that increased reliance on debt financing imposes additional financing costs, thereby reducing profitability and shareholder returns.

Firm Age (FAGE) displays a positive but relatively weak relationship with financial performance. Although the coefficient is positive across all models, its statistical significance varies, suggesting that while older firms may benefit from accumulated experience and market reputation, these advantages are less pronounced after controlling for firm-specific effects.

The explanatory power of the estimated models is satisfactory. The fixed effects models explain approximately 46.7% and 49.1% of the variations in ROI and ROE, respectively, while the overall F-statistics indicate that the regression models are jointly significant at the 1% level. These results suggest that fuel subsidy removal and the selected firm-specific characteristics collectively explain a substantial proportion of the variations in the financial performance of listed manufacturing firms in Nigeria.

4.5 Hausman Specification Test

The Hausman Specification Test was conducted to determine the most appropriate estimator between the Fixed Effects (FE) and Random Effects (RE) models. The test examines whether the individual firm-specific effects are correlated with the explanatory variables. The null hypothesis states that the Random Effects estimator is appropriate and efficient, while the alternative hypothesis supports the Fixed Effects estimator.

Table 4. 5: Hausman Specification Test Results

Test Statistic	Chi-square (χ^2)	Degrees of Freedom	Probability
Hausman Test	13.84	4	0.0078**

Decision Rule: Reject the null hypothesis if p< 0.05.

Source: Authors' Computation (2026).

Interpretation

The Hausman test produced a Chi-square statistic of 13.84 with a corresponding probability value of 0.0078, which is less than the 5% level of significance. Consequently, the null hypothesis that the Random Effects model is the appropriate estimator is rejected in favour of the Fixed Effects model.

The result indicates that the unobserved firm-specific characteristics are correlated with the explanatory variables. Therefore, the Fixed Effects model provides more reliable and consistent estimates for examining the effect of fuel subsidy removal on the financial performance of listed manufacturing firms in Nigeria. Accordingly, the Fixed Effects model is adopted as the preferred estimator. To further improve the reliability of statistical inference, the model is re-estimated using Driscoll–Kraay robust standard errors, which correct for heteroskedasticity, serial correlation, and cross-sectional dependence.

4.6 Driscoll–Kraay Robust Fixed Effects Regression Results

Following the outcome of the Hausman Specification Test, the preferred Fixed Effects model was re-estimated using Driscoll–Kraay robust standard errors. The results are presented in Table 4.6.

Table 4. 6: Driscoll–Kraay Robust Fixed Effects Regression Results

Variables	ROI	ROE
FSR	-2.143* (0.541)	-3.184* (0.816)
FSIZE	0.731 (0.304)	1.052 (0.432)
LEV	-5.846* (1.093)	-8.067* (1.642)
FAGE	0.036 (0.024)	0.061* (0.034)
Constant	-3.218	-5.601
Observations	240	240
Number of Firms	40	40
Within R^2	0.472	0.496
F-statistic	41.58***	45.36***
Prob> F	0.0000	0.0000

Robust standard errors are reported in parentheses.

**p< 0.01, *p< 0.05, p< 0.10.

Source: Authors' Computation (2026).

4.7 Test of Hypotheses

Hypothesis One

H_{01}:Fuel subsidy removal has no significant effect on the Return on Investment (ROI) of listed manufacturing firms in Nigeria.

The Driscoll–Kraay robust regression results indicate that the coefficient of Fuel Subsidy Removal (FSR) is −2.143 with a probability value less than 0.01. The coefficient is negative and statistically significant, indicating that the implementation of the fuel subsidy removal policy reduced the Return on Investment of listed manufacturing firms by approximately 2.14 percentage points, holding other factors constant.

Since the probability value is less than the 5 percent level of significance, the null hypothesis is rejected. The study therefore concludes that fuel subsidy removal has a significant negative effect on the Return on Investment of listed manufacturing firms in Nigeria.

Hypothesis Two

H_{02}:Fuel subsidy removal has no significant effect on the Return on Equity (ROE) of listed manufacturing firms in Nigeria.

The regression results further reveal that Fuel Subsidy Removal (FSR) has a coefficient of −3.184 with a probability value less than 0.01. This indicates that the policy significantly reduced the Return on Equity of listed manufacturing firms by approximately 3.18 percentage points after controlling for firm-specific characteristics.

Accordingly, the null hypothesis is rejected, and the study concludes that fuel subsidy removal has a significant

negative effect on the Return on Equity of listed manufacturing firms in Nigeria.

Overall, the findings demonstrate that the removal of the fuel subsidy adversely affected the financial performance of listed manufacturing firms in Nigeria. The increase in fuel prices following the policy implementation appears to have raised production, transportation, and energy costs, thereby reducing firms' investment efficiency and returns to shareholders. The robustness of the results across the preferred estimation technique provides strong empirical evidence that the fuel subsidy removal policy exerted a significant downward effect on the profitability of the sampled firms.

4.8 Discussion of Findings

The primary objective of this study was to examine the effect of fuel subsidy removal on the financial performance of listed manufacturing firms in Nigeria using Return on Investment (ROI) and Return on Equity (ROE) as proxies for financial performance. The empirical findings reveal that fuel subsidy removal exerts a negative and statistically significant effect on both ROI and ROE, suggesting that the policy adversely affected the profitability of listed manufacturing firms during the post-subsidy removal period.

The first hypothesis examined whether fuel subsidy removal significantly affects the Return on Investment (ROI) of listed manufacturing firms in Nigeria. The Driscoll–Kraay robust fixed-effects regression indicates that fuel subsidy removal significantly reduced ROI. This finding suggests that the substantial increase in petrol prices following the removal of the subsidy increased production, transportation, logistics, and energy costs, thereby reducing the efficiency with which manufacturing firms generated returns from invested capital. Given the heavy dependence of Nigerian manufacturers on fuel-powered electricity generation and road transportation, higher fuel prices inevitably translated into increased operating costs, compressed operating margins, and lower investment returns. These findings support the Cost-Push Inflation Theory, which posits that increases in the prices of key production inputs raise production costs and reduce firms' profitability unless such costs can be fully transferred to consumers.

The finding is consistent with emerging empirical evidence on the consequences of Nigeria's 2023 fuel subsidy reform. Aniemeke (2024) observed that the removal of fuel subsidy generated substantial inflationary pressures, increased transportation and production costs, and adversely affected macroeconomic performance, although the reform also strengthened government revenue and fiscal sustainability. Similarly, Akan and Edheku (2025) found that rising energy costs following the subsidy removal weakened manufacturing performance and argued that firms adopting renewable energy alternatives were better able to mitigate the adverse effects of higher fuel prices on operational performance. The present study extends these findings by providing firm-level evidence that the policy reduced the returns generated from invested capital among listed manufacturing companies.

The second hypothesis investigated the effect of fuel subsidy removal on Return on Equity (ROE). The results indicate that fuel subsidy removal has a negative and statistically significant effect on ROE, implying that the policy reduced returns available to ordinary shareholders. This finding suggests that higher operating and distribution costs reduced net earnings after tax, thereby lowering the returns generated on shareholders' funds. The decline in ROE further indicates that many manufacturing firms were unable to fully pass the increased cost of production to consumers because of weakened consumer purchasing power, competitive market conditions, and persistent inflationary pressures. Consequently, shareholders bore part of the burden of the policy through reduced profitability and lower returns on equity investment.

This finding corroborates recent evidence from studies examining the business consequences of subsidy removal. Osue and Omoluabi (2025) reported that increased production, transportation, and financing costs following fuel subsidy removal significantly reduced business profitability and operational efficiency among Nigerian enterprises. Likewise, Omodara, Bamidele, and Adeyemi (2026), in a firm-level analysis of listed oil and gas companies, found that the 2023 fuel subsidy reform significantly affected corporate profitability, demonstrating that major energy policy reforms have direct implications for firms' financial outcomes. Although these studies focused on different sectors, their conclusions reinforce the present finding that abrupt increases in energy costs weaken firms' financial performance.

The significant negative coefficients obtained for fuel subsidy removal also demonstrate that macroeconomic policy reforms can have heterogeneous effects across sectors. While the removal of fuel subsidy has been widely acknowledged as a necessary fiscal reform capable of improving public finance and reducing fiscal leakages, its immediate effect on manufacturing firms appears to have been adverse because of the sector's high

dependence on energy and transportation. International evidence similarly suggests that energy price shocks disproportionately affect energy-intensive industries by increasing production costs, reducing profit margins, and weakening firms' competitive positions where cost increases cannot be fully transferred to consumers. Recent reports by international observers also note that the post-reform period in Nigeria was characterized by rapidly rising fuel prices, higher transport costs, and increased cost-of-living pressures, all of which intensified the operating environment for businesses.

The control variables further provide useful insights into the determinants of financial performance. Firm size exhibits a positive and significant relationship with both ROI and ROE, indicating that larger firms possess greater capacity to absorb macroeconomic shocks through economies of scale, stronger financing capacity, and more diversified operations. Conversely, leverage maintains a significant negative relationship with financial performance, suggesting that highly leveraged firms experienced greater financial pressure during the post-subsidy removal period because of rising borrowing and operating costs. Firm age displays a positive but relatively weak association with profitability, implying that while accumulated experience may enhance resilience, it does not fully offset the adverse effects of major macroeconomic policy shocks.

Overall, the findings demonstrate that although fuel subsidy removal may contribute to fiscal sustainability at the national level, it imposes substantial short-term adjustment costs on manufacturing firms through increased production and operating expenses. The study therefore contributes to the literature by providing robust firm-level evidence that the 2023 fuel subsidy removal significantly reduced both investment efficiency and shareholder returns among listed manufacturing firms in Nigeria. These findings underscore the importance of complementing major economic reforms with targeted industrial support measures capable of cushioning productive sectors during periods of macroeconomic adjustment.

5.0 Conclusion

This study examined the effect of fuel subsidy removal on the financial performance of listed manufacturing firms in Nigeria using Return on Investment (ROI) and Return on Equity (ROE) as indicators of financial performance. The study was motivated by the implementation of the fuel subsidy removal policy in May 2023, which significantly altered the operating environment of Nigerian businesses through increased energy, transportation, and production costs. Using panel data obtained from the annual reports of sampled manufacturing firms for the period 2020–2025 and employing panel regression techniques with Driscoll–Kraay robust estimation, the study provides empirical evidence on the implications of the policy for corporate profitability.

The findings reveal that fuel subsidy removal has a statistically significant negative effect on both Return on Investment and Return on Equity. Specifically, the policy reduced firms' ability to generate returns from invested capital and shareholders' equity, indicating that the sharp increase in fuel prices following the subsidy removal substantially increased operating costs and compressed profit margins. The results further demonstrate that firm size positively influences financial performance, suggesting that larger firms possess greater resilience to macroeconomic shocks, while leverage exerts a significant negative effect, implying that highly indebted firms are more vulnerable to rising operating and financing costs. Although firm age exhibits a positive relationship with financial performance, its influence is comparatively weak.

Overall, the study concludes that while fuel subsidy removal may contribute to improved fiscal sustainability and reduced government expenditure, its immediate consequence has been a deterioration in the financial performance of listed manufacturing firms in Nigeria. The findings therefore underscore the importance of balancing macroeconomic reforms with complementary industrial policies capable of mitigating the adverse effects of rising production costs on the manufacturing sector. Such policy coordination is essential for sustaining industrial productivity, protecting corporate profitability, and promoting long-term economic growth.

5.1 Recommendations

Based on the findings of the study, the following recommendations are made:

Government should introduce targeted support measures for the manufacturing sector through temporary tax incentives, energy support programmes, or production-related subsidies to cushion the short-term impact of fuel subsidy removal on manufacturing firms.

Manufacturing firms should strengthen energy efficiency and diversify their energy sources by investing in renewable energy technologies, gas-powered systems, and energy-efficient production processes to reduce dependence on petrol and diesel.

Managers should intensify cost management and operational efficiency strategies by improving supply

chain management, reducing production waste, adopting modern manufacturing technologies, and enhancing resource utilization to offset rising operating costs.

Manufacturing firms should maintain prudent financing policies by reducing excessive reliance on debt financing and strengthening internal capital generation, thereby minimizing the adverse effect of increasing financing costs on profitability.

Government should improve critical infrastructure, particularly electricity supply, transportation networks, and logistics systems, to reduce the overall cost of doing business and enhance the competitiveness of the Nigerian manufacturing sector under the post-subsidy regime.

Future economic reforms with significant implications for production costs should be implemented gradually and accompanied by stakeholder consultation and transitional support mechanisms, thereby enabling firms to adjust their operations and investment strategies without experiencing severe disruptions to financial performance.

5.2 Contribution to Knowledge

This study contributes to the literature on energy policy and corporate financial performance in several important ways. First, unlike many previous studies that examined fuel subsidy removal from a macroeconomic perspective, this study provides firm-level empirical evidence on how the policy affects the financial performance of listed manufacturing firms in Nigeria. By focusing on corporate profitability rather than aggregate economic indicators, the study offers a more direct understanding of the implications of energy policy reforms for business performance.

Second, the study expands the existing literature by employing Return on Investment (ROI) and Return on Equity (ROE) as complementary measures of financial performance, thereby providing a broader assessment of the effect of fuel subsidy removal on both investment efficiency and shareholders' returns. This dual-dimensional approach enhances understanding of the channels through which macroeconomic policy reforms influence corporate profitability.

Third, the study contributes methodologically by applying panel data estimation techniques complemented with Driscoll–Kraay robust standard errors, thereby addressing potential econometric problems associated with heteroskedasticity, serial correlation, and cross-sectional dependence. This enhances the reliability and robustness of the empirical findings.

Finally, the findings provide evidence-based insights for policymakers, regulators, investors, and corporate managers by demonstrating that while fuel subsidy removal may strengthen public finances, it also imposes significant short-term adjustment costs on manufacturing firms. The study therefore highlights the need for complementary industrial and energy policies that preserve the intended fiscal benefits of subsidy reform while safeguarding the competitiveness and financial sustainability of the manufacturing sector.

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