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Asset Management and Financial Performance of Listed Oil and Gas Firms in Nigeria

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Abstract
The study looked at how asset management affected the financial performance of Nigerian listed oil and gas corporations from 2013 to 2022. The study's particular aims are to determine the impact of asset management measures [current asset management (CAM), fixed asset management (FAM), inventory management (IM), and account receivable management (ARM)] on financial performance as a proxy for return on equity (ROE). The study used judgemental sampling approaches since the sample of eight (8) oil and gas firms were picked from the nine (9) oil and gas companies in a purposeful manner. A total of four research questions, objectives, and hypotheses were provided. The study used descriptive statistics, correlation, diagnostic tests, group unit root tests, and single equation cointegration tests, as well as panel least square regression with E-VIEW Software 9.0. This study used panel least squares via pooled, fixed, and random effects regression analysis, but random effects regression was chosen because it shows the level of relationship between the independent variables and the dependent variable, allowing us to determine whether or not there is a significant relationship. The data revealed that CAM, FAM, and ARM had a substantial effect on ROE; however IM has no significant effect on ROE of Nigeria's listed oil and gas enterprises. The study revealed that asset management affects the financial performance of Nigerian listed oil and gas companies. The following suggestions were given for the study: Managers of publicly traded oil and gas companies should keep the period between sales of goods and services and cash collection to a minimum, as increasing the frequency of debt collection can improve company performance. Listed oil and gas companies should aim to extend the payment period as long as feasible so that they can benefit from their suppliers financing their investments until payment is received.

Keywords: *Asset, Management, financial, performance and Inventory*

Background to the Study

Asset management and financial performance drive Nigerian listed oil and gas companies. Asset management optimises resource utilisation, while financial performance reflects oil and gas firm health and profitability. Due to better asset management and financial performance, listed Nigerian oil and gas companies can attract investors, sustain themselves, and stimulate the economy (Ghadiri, et al., 2021). Asset management affects oil and gas companies' profits (Swapnil &

Allayannis, 2021). Nigeria's oil companies must efficiently manage assets to survive and profit. Regulation, security, oil price volatility, and infrastructural challenges plague Nigeria's oil and gas industry. Oil and gas companies need good asset management to optimise operations, cut costs, and boost profits in a complex economy. Strategic planning, purchase, usage, maintenance, and disposal are asset management. Prioritising assets by their potential to support organisational goals and financial success is strategic planning (Al-Htaybat & Huong, 2020). Proper purchasing ensures the company invests in key assets that maximum earnings. Efficient equipment use maximises productivity and minimises downtime. Asset management requires maintenance. Inspections, preventive maintenance, and timely repairs prolong asset life, reduce breakdowns, and improve efficiency. Finally, proper asset disposal maximises value and minimises waste (Silva, et al., 2021).

Many studies have explored how asset management affects Nigerian oil and gas companies' finances. Research shows that asset management improves ROI, ROA, and profitability. Adegbite et al. (2020) found that Nigerian oil and gas companies with better asset management were more lucrative. Efficiency in asset management reduces expenses. Effective asset utilisation, downtime reduction, preventative maintenance, and procurement and disposal can reduce costs (Almadani, et al., 2021). Cost reductions can enhance these companies' profits. Thus, asset management impacts Nigerian oil and gas companies' profits. Managing assets well increases ROI, ROA, and cost savings. The Nigerian oil and gas industry has pricing instability and infrastructure challenges, therefore companies must use good asset management. Asset management strongly affects firm performance (Muhindo & Rwakihembo, 2021). Every firm relies on assets (Ngunya & Mwangi, 2018). Business assets are expected future economic advantages from past transactions or occurrences. Product-producing enterprises start and flourish with assets (Nnado & Ozouli, 2018). Nurlaela, et al. (2019) argue that most organisations have several assets that provide benefits for multiple accounting years, needing special handling. According to Oghenekohwo, Duru, and Moses (2019), oil and gas firms need current and non-current assets to operate properly. He said noncurrent assets drive every business and capital-intensive enterprises' asset utilisation decides profit and loss (Olaoye, et al., 2019). A company's worth and finances can suffer from idle or underperforming PPE. Olaoye et al. (2019) stated that companies cannot survive without corporate asset investment. Land, buildings, equipment, machinery, fixtures, fittings, and long-term prepayments boost firm productivity and profitability (Pallavi & Vishal, 2019). This category rarely varies because companies buy machinery and other productive noncurrent assets to improve sales (Prempeh, 2018). Cost-effectively developing, managing, maintaining, upgrading, and disposing of assets takes into account costs, risks, and performance (Adesina & Olatise, 2020). These definitions show assets management drives oil and gas company growth and profitability. All levels and periods of a business must prioritise asset management to survive (Ahmad, 2018). Current and non-current assets exist. Plant, machinery, land, and cars generate wealth for corporations. Current asset management manages short-term assets. Company assets may be dominated by current assets. Some companies' pre-recession financial performance depends on current assets management (Ahmed & Akeju, 2018).

Oil and gas profit-making appears to be affected by Nigeria's harsh operating climate, especially managers' unscrupulous actions to enrich themselves at shareholders' expense. Ojo (2018) argued

that many Nigerian companies underperform and use creative accounting to display favourable results. Poor asset management by teams whose personal objectives typically trumped goal congruence produced oil and gas problems. Organisational asset management matters. This shows oil and gas companies need asset management. Corporations need asset management like blood (Ahmed, et al., 2018). Asset management is crucial for enterprises. Cash flow sustains business like blood does life. Weakness causes business failure (Amahalu & Ezechukwu, 2018). Asset management simplifies operations. Oil and gas firms must "balance" current assets and liabilities to avoid solvency and profitability issues (Kajola, et al., 2020). Operating profitability diminishes when firm liquidity increases (Olaoye, et al., 2019). A company picks its assets and duties in current assets management. Inventory, trade credit, accounts payable, and cash conversion cycle are current assets. Oil and gas business operating performance and working capital management's liquidity are balanced by current asset management. The firm's operations and liquidity suffer from asset investment changes. Disregarding profit or liquidity can bankrupt a company (Yameen, et al., 2019). Poor asset management may explain many Nigerian oil and gas companies' poor performance (Adesina & Olatise, 2020).

Asset management and structure make or break enterprises. Every shareholder wants maximum profits, while operations need optimal liquidity. Management of complex assets. To fix such issues, oil and gas companies should balance earnings and liquidity. One aim cannot be surrendered since firms value both. Oil and gas companies may fail without profits. Ignoring liquidity and overspending on non-current and current assets can lead to corporate insolvency. Profit maximisation in oil and gas requires asset management. Nigeria depends on oil and gas for money, foreign exchange, and jobs. Oil and gas firms must manage assets to maximise profitability and sustainability. There is scant research on how asset management affects Nigerian listed oil and gas companies' finances. This information gap prohibits these companies from improving financial and operational performance. Understanding how asset utilisation, investment decisions, maintenance plans, and lifecycle management affect oil and gas companies' finances is the issue. To understand how assets management affects financial success, business size, age, and industry-specific factors must be considered. Nigerian oil and gas companies also confront political instability, regulatory uncertainty, infrastructure restrictions, security challenges, and fluctuating oil prices. These challenges may impact oil and gas businesses' asset management and finances.

Industry participants also face weak infrastructure, growing inflation, trade and foreign exchange limitations, porous land borders, and logistical issues. Recession is likely because to COVID-19 demand and supply disruptions and lower oil prices. Oil and gas companies that import completed products suffered from foreign exchange illiquidity after global oil prices plummeted. Unsystematic and systematic risks may affect Nigerian listed oil and gas companies. The Nigerian oil and gas sector has massive inventories of unsold completed commodities, low earnings, and limited investment capital despite a vast market due to population growth. Poor performance was due to economic concerns. How much administrative failure caused this low performance is uncertain. This study examined how asset management affects Nigerian oil and gas finances. Few studies have examined asset management and financial performance in the Nigerian oil and gas industry. This study will bridge this information gap and advance asset management and financial performance studies. This research will add to the literature, provide practical consequences, and

increase understanding of Nigerian oil and gas assets management and financial performance through a comprehensive and context-specific examination.

Review of Related Literature

Conceptual Review

Asset Management

Asset management involves organised governance and value creation from lifecycle obligations. Current and non-current assets may suffer (Duru, et al., 2018). Asset management involves cost-effectively developing, managing, maintaining, upgrading, and disposing of assets while considering risks and performance (Famil & Ali, 2018). This shows that assets management is crucial to corporate growth and profitability, especially for manufacturers. Company asset management organises preservation, restoration, and maintenance using performance management (Idris & Yahaya, 2018). Business asset management is advanced performance management (Ikpefan & Owolabi, 2018). Asset management outperforms other departments in data, analytics, and performance. Asset management must be long-term because most facilities last a long time (Idris & Yahaya, 2018). Many asset management programs emphasise facility health. Physical assets that fulfil several performance goals must be included in a holistic asset management approach. Performance goals include operations, safety, and support facilities and equipment. Performance management impacts all corporate departments. Management of Fixed Assets Companies need property, plant, and equipment. Land, buildings, plant & machinery, fixtures, fittings, and vehicles boost corporate productivity. Buy such assets for long-term benefit. Buying assets to produce and sell is common. Selling should decide PPE efficiency. Adesina & Olatise (2020) claim non-current asset turnover ratio indicates PPE efficiency. Sale adequacy is compared to non-current asset investment. High PPE turnover ratios suggest efficient use of non-current assets to produce revenue, whereas low ratios imply inefficiency. Listed companies' financial success depends on asset management. To optimise shareholder profits, it includes strategic investment portfolio decisions, risk management, and asset valuation. A detailed asset management review of listed companies addresses important challenges and current trends. Asset allocation, valuation, performance evaluation, and technology development are covered (Hooda & Bhatia, 2020).

Financial Performance (FP)

How well a corporation converts assets into earnings is FP. According to Nzewi (2018), organisations aim to maximise shareholders' wealth, including profit. All policies and efforts aim for this. However, companies have other goals. FP measures firm profit. Profit is the difference between revenue and manufacturing costs (Karim, et al., 2018). Revenue excess above net operational expenses (Nworie & Ofoje, 2022). Omari (2020) defines FP as a firm's ability to generate a reasonable return on invested capital, which pleases shareholders and recruits investors. Shareholders also care how the corporation maximises profits with limited assets. Unmet operational expenses do not generate profit (Kajola, et al., 2020). Earnings vs funding and sources determine return. FP assesses how well equipment, plant, and current assets generate profits (Nworie & Mba, 2022). Gross Profit Margin, ROA, ROE, NMP, and PAT indicate financial

success (Wuave, et al., 2020). FP is essential to any company. It shows a company's efficiency, profitability, and sustainability. This extensive review seeks to explain FP and its dimensions.

Theoretical Review

Agency Theory

Jensen and Meckling (1976) define a firm as a confluence of contractual ties between individuals in which managers (agent) and owners (principal) make daily corporate decisions to maximise the principal agent's investment. If managers' decisions and interests differ from shareholders', agencies may suffer. Jensen and Meckling (1976), cited in Nworie et al. (2023), characterised agency cost as principal monitoring expenses, agent bonding costs, and the unavoidable residual loss from ownership and control separation. Agency issues develop when ownership and control are separated. Managers control assets in this sector to ensure shareholder money is allocated wisely and yields targeted returns. Management must be pressured by shareholders to use internal funds. Strong human resource allocation to equity is linked to managers' decisions that boost profitability and sustainability. Conservative asset management reduces corporate risk by keeping huge inventories above process cycle demands, offering credit periods above product turnover, accepting low payment terms not used in the market, and other activities. These investments require more than working capital. The approach was criticised for bias because it sought asset management funding and corporate profits. Agency theory is fundamental to corporate finance and asset management. Principals (owners or shareholders) and agents (managers or executives) interact and may have conflicts of interest. Agency theory can be used to study how managers, who choose investments for investors, interact with both parties in asset management. Agency theory states that the agent, the asset manager, may not always treat the principal, the investor, well. The natural information imbalance between the parties gives management more investment decision-making experience. The agent can operate in their own self-interest instead of maximising principal returns.

Asset management can create conflicts of interest. Despite the investment's suitability, asset management may favour higher fees or commissions. The manager may take excessive risks against the principal's long-term investment goals to pursue short-term returns. Several strategies have been implemented to reduce these conflicts and align principals and agents' interests. Managers can be paid for reaching performance targets with performance-based incentives. Managers work in investors' best interests because their salary is directly associated with investment performance. Principals or third parties like boards of directors or regulatory bodies could potentially monitor and oversee the situation. Regular reporting, auditing, and investment transparency help ensure investor objectives are met and reduce information asymmetry. Technology and data analytics make asset manager monitoring more efficient. Machine learning and artificial intelligence have made massive data analysis easier, allowing the detection of potential conflicts of interest or performance irregularities. Many recent studies and scholarly articles have examined agency theory in asset management. Aggarwal, Kyung, et al. (2019) examined how investors and managers' interests align to show how fund manager ownership affects mutual fund performance. Pascual-Fuster et al. explored how governance structures affect closed-end fund performance in 2020, emphasising the importance of oversight and monitoring. Agency theory helps explain asset managers' relationships with agents. Technology, monitoring,

and performance-based incentives can prevent knowledge asymmetry conflicts of interest. Research is improving our understanding of agency theory and asset management relationship management.

Empirical Review

In 2023, Nworie et al. examined Nigerian listed consumer goods businesses' finances and asset management. A causal-comparative study explored how debtor turnover, cash ratio, and inventory turnover ratio affect Nigerian Exchange Group consumer goods firms' EPS. The study purposefully sampled 12 of 21 community consumer products firms. Secondary data from 2011–2020 annual reports and accounts of selected companies was collected. Normal Least Square tested 5% hypotheses. Debtor and inventory turnover ratios raised Nigerian Exchange Group consumer products companies' EPS, while cash ratio decreased it. 5% effects were negligible. Consumer products managers were instructed to collect debt more often to boost profits.

From 2012 to 2021, Nworie and Ofoje (2022) evaluated how inventory conversion length, account receivable period, and current ratio affected return on asset in six food and beverage enterprises. The random effect model shows that inventory conversion time lowers the return on asset of listed Nigerian food and beverage companies, whereas current ratio and account receivable period increase it.

Muhindo & Rwakihembo (2021) evaluated Pakistani non-financial enterprises' inventory, receivables, and payables management. Panel data from 2000 to 2016 was studied for 280 Pakistan Stock Exchange-listed nonfinancial firms. Asset and sales growth drove growth, but return on equity and assets determined profitability. Accounts payable and inventory management effect firm development and profitability. Receivable management alone impacts growth and profit.

In 2021, Nangih and Emeka-Nwokeji explored how asset mix influences Nigerian consumer products businesses' finances. The study evaluated how returns affect assets, current and intangible asset structures, and tangible non-current assets. The companies' 2013–2019 annual reports were used in an ex post facto study. Data was analysed using multiple regression. Return on asset variability was 13.7% explained by independent variables. At 5%, current and intangible assets boost ROA. Noncurrent assets enhance ROA somewhat. Indeed, asset composition study is crucial to understanding a company's financial success, while accounting for 14% of its performance. To meet short-term contractual requirements, businesses were urged to develop their existing and intangible assets.

From 2011 to 2019, Temuhale and Ighoroje (2021) evaluated how capital and asset structures affected Nigerian listed industrial goods companies. Two models explained the research: asset structure employed PPE, OFA, and CAS; capital structure used LTDTEQ, LTDTAS, and lTDTLC. Each model assessed performance using ROA. Financial statements and annual profit-and-loss accounts gave data. We employed descriptive, correlational, and panel statistics. The ratio of long-term debt to total equity, total asset, and total long-term capital favourably and considerably affected Nigerian industrial products firms' return on assets, while all asset structure variables had a positive but minor effect. The study found that capital structure boosts industrial products firms'

performance while asset structure does not. The findings suggested firms support operations with less fixed assets and more long-term debt.

Research Methodology

Ex-Post Facto study was used. Ex-Post Facto research design resolves who, what, when, where, and how questions relevant to a study problem. Study population: 9 Nigeria exchange group oil and gas businesses. The study included data from the 2013–2022 annual reports and accounts of 8 oil and gas businesses, the majority of the sample. The study used judgemental sampling because the sample of 8 oil and gas companies was drawn purposively from the 9 oil and gas companies listed in the oil and gas sector of the Nigeria exchange group, representing a larger population of companies and making the study convenient.

Descriptive statistics and correlation analysis determined the independent-dependent relationship. Panel least square regression was used in the E-VIEW investigation. In this study, the panel least square via pooled, fixed, and random effects regression analysis was used, but the random effects regression analysis was chosen because it shows the relationship between the independent variables and the dependent variable to determine its significance. The model also graphically describes the relationship's positive or negative sign based on coefficient signs. Independent factors including Current Asset Management (CAM), Fixed Asset Management (FAM), Inventory Management (IM), and Account Receivable Management (ARM) greatly affect the financial performance model [proxy with Return on Equity (ROE)]. formulated as follows;

ROE = f (CAM, FAM, IM, ARM)

Thus,

$$\mathbf{ROE = \beta_0 + \beta_1 CAM + \beta_2 FAM + \beta_3 IM + \beta_4 ARM + E}$$

Where;

ROE = Return on Equity

B_0= Intercept

β_1= Coefficient of Current Asset Management

CAM = Current Asset Management

β_2 = Coefficient of Fixed Asset Management

FAM = Fixed Asset Management

B_3 = Coefficient of Inventory Management

IM = Inventory Management

B_4 = Coefficient of Account Receivable Management

ARM = Account Receivable Management

E = Error Term

Table 3.1: Measurement and Predicted Signs

Variables	Acronyms	Measure	Type of Variable	Expected Sign
Return on Equity	ROE	Net Profit / Total Equity	Dependent Variable	
Current Asset Management	CAM	Current Asset Management Ratio	Independent Variable	-

Fixed Asset Management	FAM	Fixed Asset Management Ratio	Independent Variable	+
Inventory Management	IM	Inventory Management Ratio	Independent Variable	+
Account Receivable Management	ARM	Account Receivable Management Ratio	Independent Variable	+

Source: The researcher from data gathered, 2024

Results and Discussion

The time series data from the annual reports and accounts of the eight oil and gas companies listed in the Nigeria Exchange Group are described in detail in table 4.2 below, which was obtained through the application of descriptive statistics in this study:

Table 4.2: Descriptive Statistics

	ROE	CAM	FAM	IM	ARM
Mean	0.070121	0.436650	0.178620	0.571851	1.847112
Median	0.064856	0.373160	0.144151	0.544260	1.167041
Maximum	0.297832	2.501740	1.882400	4.384140	47.92299
Minimum	-0.340632	-0.013399	0.006876	-0.504471	-2.982845
Std. Dev.	0.099860	0.411970	0.231369	0.554045	5.400895
Skewness	-0.891256	3.302802	5.423374	4.496715	7.933110
Kurtosis	5.950609	5.150937	8.366338	3.066589	7.695611
Jarque-Bera	39.61148	667.0615	4631.761	2820.944	14903.45
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	5.609688	34.93203	14.28963	45.74811	147.7690
Sum Sq. Dev.	0.787797	13.40781	4.228981	24.25028	2304.404
Observations	80	80	80	80	80

Source: E-VIEW Version 9.0 Output, 2024.

In Table 4.2, CAM's mean is 0.4367, its SD is 0.4120, and its minimum is -0.0134, as shown in Table 4.2. Maximum value is 2.5017. Therefore, listed oil and gas companies need 0.4367 time to convert CAM to ROE. FAM readings range from 0.0069 to 1.8824, with an average of 0.1786 and a Std. Dev. of 0.2314. Since the mean value is lower than the Std. Dev., the firm's fixed-to-cash conversion rate is slower at 0.1786. IM ranges from -0.5045 to 4.3841, averaging 0.5719 and reaching 0.5540 at the Std. Dev. The company's inventory-to-cash conversion time is likely lower (0.5719 days). The ARM variable ranges from -2.9828 to 47.9230, averages 1.8471, and has a Std. Dev. of 5.4009. The organisation averages 2.0896 days to turn a receivable into an asset, indicating a slower process. Range of ROE values: -0.3406, 0.2978, 0.0701, and 0.0999 are the minimum,

maximum, average, and Std. Dev. As seen by the mean value being lower than the Std. Dev. value, the enterprises' ROE has likely fallen significantly during this study.

Variance Inflation Factor (VIF)

VIF measures regression multicollinearity. Multicollinearity between independent variables can increase standard errors and alter coefficient estimations in panel data analysis, making results less accurate. Panel data analysis requires VIF values for each independent variable to interpret VIF test results. A VIF score above 10 shows significant multicollinearity between a variable and other independent variables in the model. Remove the variable or use other modelling methods to resolve multicollinearity. Panel data analysis may benefit from the VIF test for multicollinearity and regression. Panel data researchers can enhance regression models by assessing VIF levels and acting. Information in Table 4.3:

Table 4.3: Variance Inflation Factors Multicollinearity Test

Date: 05/13/24 Time: 01:53
Sample: 1 80
Included observations: 80

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000283	3.553362	NA
CAM	0.001049	4.723308	2.209604
FAM	0.005948	6.335972	3.951205
IM	0.001177	9.324449	4.485503
ARM	1.28E-05	5.176611	4.628399

Source: EVIEW, 9.0 Outputs, 2024.

Table 4.4 shows the results of a multicollinearity test on the study's panel series data. Multicollinear data sets have two or more independent variables in multiple regression models with high correlation. Table 4.3 shows the variance inflation factor (VIF) that ensured the study's validity. For each independent variable—CAM, FAM, IM, and ARM—the Centred Variance Inflation Factor (CVIF) statistics are 2.2096, 3.9512, 4.4855, and 4.6284. The VIF cut-off value of 10 indicates no multicollinearity in the variables being analysed. Multicollinearity is usually indicated by VIF values over 10.

The Breusch-Godfrey serial correlation LM test

The Breusch-Godfrey serial correlation LM test detects autocorrelation in regression model residuals. This test is often used in panel data analysis to see if error terms correlate across time periods for each individual or business. Regressing the residuals from the initial panel data regression model on lagged values and independent variables is the test. Based on lagged residual coefficient estimates, the test statistic is generated. As seen in Table 4.4a:

Table 4.4a: **Breusch-Godfrey Serial Correlation LM Test**:

F-statistic	11.98290	Prob. F(2,73)	0. 3930
Obs*R-squared	19.77257	Prob. Chi-Square(2)	0. 8793

Source: E-VIEW, 9.0 Outputs, 2024.

Variable residuals were calculated before model estimation to confirm serial correlation. We tested serial correlation LM. Since the f-statistics' p-values are not significant at 5%, the serial correlation LM test in Table 4.4a finds no serial correlation element in the models. To evaluate test findings, check for statistical significance. The residuals may indicate serial correlation if the test is significant, indicating a model specification problem. Diagnostics and model changes may explain serial correlation and enhance model dependability. A non-significant test strengthens the regression model, showing no serial link.Variable residuals were calculated before model estimation to confirm serial correlation. We tested serial correlation LM. Since the f-statistics' p-values are not significant at 5%, the serial correlation LM test in Table 4.4a finds no serial correlation element in the models. To evaluate test findings, check for statistical significance. The residuals may indicate serial correlation if the test is significant, indicating a model specification problem. Diagnostics and model changes may explain serial correlation and enhance model dependability. A non-significant test strengthens the regression model, showing no serial link.

Heteroskedasticity Test

Regression models with heteroskedasticity have error term variances that vary across independent variable values. Classical linear regression assumes constant variance homoskedastic error terms. The assumption is broken by heteroskedasticity. The Breusch-Godfrey test finds regression model heteroskedasticity. Breusch-Godfrey tests panel regression residuals for heteroskedasticity. Panel analysis analyses cross-sectional and time-series data. Panel data analysis' Breusch-Godfrey test interpretation determines regression model validity. Heteroskedasticity breaks the continuous error term variance assumption. Biassed coefficient estimates, inefficient parameter estimation, and incorrect model inferences can result. The Breusch-Godfrey test may demonstrate heteroskedasticity in a panel regression model, requiring robust standard errors or additional estimation methods like feasible generalised least squares (FGLS) or clustered standard errors. Panel data analysis reliability and validity need addressing heteroskedasticity. See Table 4.4b:

Table 4.4b: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	8.630628	Prob. F(14,75)	0.4578
Obs*R-squared	25.21674	Prob. Chi-Square(8)	0.3529
Scaled explained SS	29.64194	Prob. Chi-Square(8)	0.5577

Source: E-VIEW, 9.0 Outputs, 2024.

The heteroskedasticity problem occurs when one variable's variability is not equal across the range of a second variable that defines it. The Breusch-Pagan-Godfrey heteroskedasticity test validated

model estimate homoscedasticity. At 5% significance, the f-statistics p-values are minimal, showing no heteroskedasticity issues with the models.

The Ramsey RESET (Regression Equation Specification Error Test)

The Ramsey RESET (Regression Equation Specification Error Test) is an econometric diagnostic test for regression model misspecification. It is crucial in panel data analysis, which involves cross-sectional and time-series observations. The Ramsey RESET Test checks the regression model's functional form to ensure accurate specification. The test looks for omitted variables or nonlinearity in the model that could bias results. It helps panel regression models capture the true relationship between variables in panel data analysis. As seen in Table 4.4c:

Table 4.4c: Ramsey RESET Test

Equation: UNTITLED
Specification: ROE C CAM FAM IM ARM
Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	1.341567	74	0.1838
F-statistic	1.799801	(1, 74)	0.1838
Likelihood ratio	1.922446	1	0.1656

Source: E-VIEW, 9.0 Outputs, 2024

Table 4.4c implies the model is homoskendastic because three parameters have probability values over 0.05. Ramsey test results show our model is stable for regression analysis. To understand the Ramsey RESET Test, the F-statistic and critical values from the F-distribution are compared. The F-statistic is statistically significant at a certain level if it reflects model specification errors. To improve model accuracy, researchers may need to add variables, change variables, or use a new functional form. The Ramsey RESET Test helps panel data analysts find specification issues and verify regression results.

Group Panel Unit Root Test

A group unit root test in panel data analysis determines if time series data from a group of individuals or entities has a unit root. A unit root denotes a non-stationary time series variable with no steady mean or variance. Panel data analysis requires group unit root test interpretation to understand stationarity. If the test results show a unit root, the group's time series variables are non-stationary and have long-term dependencies. The reliability of data-based statistical analysis and forecasting models may be affected. However, the group unit root test showing no unit root shows that the time series variables are stationary and have no long-term dependence. Statistical modelling and analysis may be better for this data since it provides meaningful interpretation of correlations and trends over time. Panel data analysis requires group unit root test interpretation to determine data stationarity and the best modelling methods for accurate and trustworthy results. As seen in Table 4.5:

Table 4.5: Augmented Dickey-Fuller Unit root Test

Group unit root test: Summary
Series: ROE, CAM, FAM, IM, ARM
Date: 05/13/24 Time: 01:58
Sample: 1 80
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-15.1434	0.0000	5	395
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-12.7740	0.0000	5	395
ADF - Fisher Chi-square	128.420	0.0000	5	395
PP - Fisher Chi-square	125.925	0.0000	5	395

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Source: E-VIEW, 9.0 Outputs, 2024.

The ADF unit root test results in Table 4.5 reveal that ROE, CAM, FAM, IM, and ARM have unit root tests at their initial difference (1) but are not stationary at level. The fact that their group ADF statistics value exceeds 5% proves this. The p-value for each variable is less than the 5% threshold of significance and higher than the 95% confidence level, further proving stationary series. Data can be utilised in a regression since they all hit stationarity at the first difference, or order one.

Single Equation Co-integration Test

In panel data analysis, the Single Equation Co-integration Test evaluates the long-term connection between two or more non-stationary variables. It uses co-integration, which shows that a stationary linear combination of non-stationary variables exists. The Single Equation Co-integration Test helps panel data analysts evaluate if the variables of interest have a stable long-run connection across units or entities. Table 4.6 shows this.

Table 4.6: Single Equation Co-integration Test

Date: 05/13/24 Time: 01:57
Series: ROE CAM FAM IM ARM

Sample: 1 80
Included observations: 80
Null hypothesis: Series are not cointegrated
Cointegrating equation deterministics: C
Automatic lags specification based on Schwarz criterion (maxlag=11)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
ROE	-5.310310	0.0083	-41.81511	0.0068
CAM	-5.167189	0.0122	-40.38014	0.0097
FAM	-7.315579	0.0000	-64.49868	0.0000
IM	-7.429093	0.0000	-65.47268	0.0000
ARM	-8.134664	0.0000	-72.53435	0.0000

Source: E-VIEW, 9.0 Outputs, 2024.

Table 4.6 shows that the variables are co-integrated and suitable for multiple regression because the single equation co-integration test yields probability values below 0.05 (5%). The Single Equation Co-integration Test in panel data analysis evaluates the co-integrating connection between variables. Test findings that show co-integration imply a consistent long-term link between the variables of interest, which may be analysed and interpreted to understand the panel data's economic or social dynamics. A lack of co-integration shows that the variables do not have a long-term relationship, hence alternative methods may be needed for analysis.

The Hausman test

In panel data analysis, the Hausman test checks the consistency and reproducibility of computed coefficients. Panel data allows researchers to control for individual heterogeneity, time effects, and panel-specific characteristics by combining cross-sectional and time-series data. The Hausman test contrasts fixed and random effects estimators' efficiency. Researchers use the test to choose an estimator for panel data analysis. This happens below:

Table 4.7: Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	40.934688	6	0.0000

** WARNING: estimated cross-section random effects variance is zero.

Source: E-VIEW, 9.0 Outputs, 2024.

Comparing the test statistic's p-value to 0.05 is how you interpret the Hausman test. The consistent and efficient random effects estimator is better if the p-value is less than the significance level. If the p-value is greater than the significance level, the fixed effects estimator is preferable since it is consistent and efficient under the null hypothesis of no connection between individual-specific effects and regressors. In conclusion, the Hausman test helps panel data analysts choose the best estimator and verify regression results.

Redundant Fixed Test

In panel data analysis, a redundant fixed test is used to validate regression model fixed effects with numerous fixed effects. Fixed effects capture data heterogeneity that is constant across time or across panel entities. A redundant fixed test determines if adding specific fixed effects significantly increases the model's explanatory power.

Table 4.8: Redundant Fixed Effects Tests

Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.353869	(9,86)	0.0001
Cross-section Chi-square	37.544390	9	0.0000

Source: E-VIEW, 9.0 Outputs, 2024.

Interpreting a redundant fixed test entails determining if the additional fixed effects offer relevant information to the model. If the additional fixed effects are not statistically significant, they may not provide explanatory power and may be removed from the model. However, if the test demonstrates that the additional fixed effects are substantial, they should be kept in the model to explain data variation. By detecting fixed effects that considerably increase the panel data model's explanatory power, the redundant fixed test helps specify the model.

Random Effects vs Fixed Effects Regression

Random effects models use both within-group and between-group panel data variations, allowing for more efficient parameter estimates than fixed effects models. This produces more accurate regression coefficient estimations and boosts statistical power. Random effects models work well when individual-specific effects are random and time-invariant because they presume they are uncorrelated with the independent variables. Fixed effects models presume that individual-specific effects are associated with independent variables, which might skew estimates if violated. Individual-specific random effects uncorrelated with the dependant variables make random effects models more flexible for unobserved variability across individuals. This is beneficial when unseen factors affect the dependent variable but are not in the model. However, fixed effects models exclude all time-invariant individual-specific effects, which may result in information loss and omitted variable bias. For this investigation, random effects regression was used.

Random effects regressions

In panel data analysis, random effects regression accounts for unobserved variability among persons or entities. Panel data—also called longitudinal data—observes several entities or individuals across time. Random effects regression allows unobserved individual-specific effects to be dispersed randomly across the sample. Unobservable elements that affect the result variable yet are constant for each entity can be captured by these random effects. Researchers can adjust for individual differences and get more accurate variable connections estimates by integrating random effects in the regression model. Random effects regression can reveal the evolution of individual behaviour and relationships in panel data. As shown below:

Table 4.9: Random Effects Regression Result

Dependent Variable: ROE
Method: Panel EGLS (Cross-section random effects)
Date: 07/09/24 Time: 04:13
Sample: 2013 2022
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 80
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.090542	0.017990	5.032812	0.0000
CAM	-0.042826	0.028542	-1.500447	0.1368
FAM	0.175006	0.077122	2.269216	0.0261
IM	0.205975	0.063932	3.221757	0.0017
ARM	0.011920	0.003074	3.878220	0.0002

Effects Specification		
	S.D.	Rho
Cross-section random	0.034761	0.2067
Idiosyncratic random	0.068106	0.7933

Weighted Statistics

R-squared	0.544567	Mean dependent var	0.039046
Adjusted R-squared	0.516970	S.D. dependent var	0.083368
S.E. of regression	0.068900	Sum squared resid	0.450990
F-statistic	12.48558	Durbin-Watson stat	1.697505
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.352627	Mean dependent var	0.074136

Sum squared resid	0.584859	Durbin-Watson stat	0.923406

Source: E-VIEW Version 9.0 Output, 2024.

Table 4.9 shows the CAM coefficient is -0.0428 with a t-value of -1.5004 and p-value of 0.1368. This suggests CAM hurts ROE. This implies that the effect is not significant because the p-value of 0.1368 exceeds 0.05. The CAM p-value, 0.1368, is greater than 0.05, indicating its importance to ROE. Since CAM's coefficient is -0.0428, CAM and ROE are decreasing. A 1% increase in CAM lowers ROE by 4.28%. CAM little affects oil and gas firms' ROE. The Pecking Order Theory study found that management of profitable and unprofitable organisations would drive suppliers for more financing and lower current assets to raise money internally and avoid debt and equity. This result contradicts Nworie, Moedu, and Onyali (2023) and Nangih and Emeka-Nwokeji (2021) but supports Nworie and Ofoje (2022) and Wuave, Yua, and Mkuma (2020).

Additionally, Table 4.8 Multiple Regression shows that the FAM coefficient is 0.1750, with a t-value of 2.2692 and a p-value of 0.0261. This implies FAM boosts ROE. It appears that the effect is substantial because the p-value of 0.0261 is below 0.05. The t-ratio of 2.2692 demonstrates how significantly FAM affects ROE, while the p-value of 0.0261 is below 0.05. With 0.1750, FAM looks to be rising with ROE. Every 1% FAM change boosts ROE by 17.50%. FAM severely affects listed oil and gas firms' ROE. Pecking Order Theory has helped us understand how firms manage assets and fund projects. The hypothesis suggests that internal funding is superior, but its effects on financial performance depend on the business, its growth potential, and other factors. This finding matches Nangih and Emeka-Nwokeji (2021) but differs from Wuave, Yua, and Mkuma (2020) and Nworie and Ofoje (2022).

In Table 4.4.1, the p-value (sig. value) is 0.0017 and the IM coefficient is 0.2060 with a t-value of 3.2218. IM appears to enhance ROE. That the p-value of 0.0017 is below 0.05 (5%) shows that the effect is significant. The t-ratio is 3.2218 and the IM p-value is 0.0017, both below 0.05. The relevance of IM's p-value on ROE is shown by these values. Since IM's coefficient is 0.2060, its p-value looks to be favourably correlated with ROE. A 1% increase in IM would boost ROE by 20.6%. The perking order theory states that managers of both prosperous and failed organisations will aggressively encourage suppliers to give more finance and fewer current assets to raise money internally and avoid debt and stock. IM has little effect on listed oil and gas firms' ROE. This conclusion contradicts Nworie and Ofoje (2022), Miswanto and Oematan (2020), and Wuave, Yua, and Mkuma (2020), but it supports Nworie, Moedu, and Onyali (2023).

In conclusion, the ARM coefficient is 0.0119, with a t-value of 3.8782 and a p-value of 0.0002. This suggests ARM boosts ROE. That the p-value is 0.0029 is below the 0.05 (5%) threshold shows a substantial effect. The t-ratio of 3.8782 and p-value of 0.0002 illustrate how significant ARM is to ROE. At 0.0119, ARM looks to be increasing ROE. A 1% ARM p-value modification would increase ROE by 1.19%. Industrial sector listed companies' ARM is heavily affected by ARM. Good inventory management should balance profitability and liquidity with an order amount of inventory, according to the trade-off model hypothesis. This hurts financial performance since working capital items like transportation, storage, insurance, and damage cost more. Nworie, Moedu, and Onyali (2023) cite Deloof (2003) as claiming that low inventory could lead to stock-

outs and missed revenues for Nigerian manufacturers. This result contradicts Nworie and Ofoje (2022) but matches Wuave, Yua, and Mkuma (2020).

Model Summary: The independent factors [CAM, FAM, IM, and ARM] explain 54% of ROE variance (R2). The model cannot explain 46%. The substantial positive relationship was confirmed by a 59% R2 score. The adjusted R2 assesses model fit. The model fits well and explains the dependent variable's relationship to the independent variables 52ways. The error term and other factors outside the model make up 48%. Since the Durbin Watson computed value of 1.697505 is less than "2", serial or autocorrelation is proven. CAM, FAM, IM, and ARM positively and significantly affect firm profitability proxy by return on equity, except CAM. Also, the F-Statistics with a value of 12.48558 and P-value of 0.0000 revealed that all independent variables [CAM, FAM, IM, and ARM] collectively affected the ROE of Nigeria exchange group-listed oil and gas enterprises.

Conclusion and Recommendations

The study analysed how asset management affected listed Nigerian corporations' financial performance from 2013 to 2022. The hypotheses were tested using descriptive statistics, correlation, and E-VIEW 9.0 random effects regression analysis at 0.05 (95% confidential interval). The results showed that FAM, IM, and ARM affect ROE whereas CAM did not. The study found that asset management affects Nigerian listed oil and gas enterprises' financial performance. Our study recommendations are:

1. Publicly traded oil and gas company managers should reduce the interval between sales and cash collection to increase business performance by collecting debt more often.

2. Listed oil and gas companies should stretch the payment time as much as feasible to take advantage of suppliers financing their investments till payment is received. Consumer goods financial managers should always have the right inventory level, taking into account product demand, manufacturing needs, and resource constraints.

3. To reduce financial effect, listed Nigerian oil and gas businesses should handle account receivables. They should control client credit and short-term debt collection and payment timeliness.

4. These oil and gas enterprises should always keep enough inventories. This will help organisations overcome the cost impact of inventory turnover. They should always aim to increase revenue per unit of property, plant, and equipment.

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