
Capital Structure and Financial Performance of Listed Oil and Gas Companies in Nigeria

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Abstract

The Nigerian oil and gas sector, despite its strategic importance to the national economy, has been plagued by persistent financial underperformance, raising concerns about the long-term viability, competitiveness, and sustainability of listed firms within the industry. This study assessed the effect of capital structure (CS) on the financial performance (FP) of the listed oil and gas (O&G) companies in Nigeria from 2014 to 2023. Out of the nine listed firms, six were sampled purposively due to their data availability. The study employed panel data regression with fixed effects models to analyse the relationship between the CS components (debt-equity ratio (DER), equity to total assets ratio (ETAR), and long-term debt to total assets ratio (LDTA)), and the Debt equity ratio, earnings per share, equity to total assets, long term debt to total assets, return on assets the financial performance metrics (return on assets (ROA) and earnings per share (EPS)). The analyses were validated with the Hausman test alongside the Breusch-Pagan test, providing diagnostic results, and result robustness test. Results indicated that DER with a coeff = -0.017 and a p-value of 0.018, and LDTA with a coeff = -0.034 and a p-value of 0.027, both possess statistically significant inverse relationships with ROA. On the other hand, the ETAR has a positive and significant relationship with ROA (coeff = 0.112 and p-value = 0.009). DER (coeff = -0.128, p-value = 0.022) and LDTA (coeff -0.076, p-value = 0.118) have negative significant and insignificant relationships with EPS, respectively. Conversely, ETAR is positively and significantly linked to EPS (coeff = 0.235, p = 0.015). The study concluded that capital structure exerts a significant effect on the financial performance of the listed oil and gas companies in Nigeria. The study recommended prudent financial risk management and higher use of equity by Nigerian O&G firms to strengthen financial health and to benefit shareholders.

Keywords: Debt equity ratio, earnings per share, equity to total assets, long term debt to total assets, return on assets.

1. Introduction

Financial performance (FP) has been a primary target when assessing the operational effectiveness of firms. Financial performance has become especially crucial in the oil and gas (O&G) sector due to the noteworthy economic contributions in Nigeria. In a capital-intensive sector and an important catalyst for economic growth in resource-based countries, like Nigeria (Alaba, 2021b), it is pertinent to further investigate the determinants of FP. For O&G firms, the bottom line is not only a measure of profitability, but as well as an essential factor of efficient operations and maintaining the capability to grow despite market volatilities, as well as transitions in the world-wide energy market (Alalade et al., 2021; Dattijo et al., 2024). The

Nigerian O&G industry, a core sector of the economy, has unique dynamics regarding the relationship between capital structure (CS) decisions and FP due to the inherent characteristics of this industry and requires further investigation (Osho, 2025).

In developed economies, the FP of O&G companies is often enhanced by robust capital markets, advanced financial systems, and well-established regulatory frameworks (Xiaowei, 2024). These factors provide companies with access to a variety of financing options, enabling them to enhance their CS to support financial stability and growth. Empirical data indicates that companies with well-organized capital bases are better suited to withstand market swings, attract capital, and keep a competitive edge in world energy markets (Xiaowei, 2024). This match between CS and FP highlights the need for strategic financial planning (Isaac and Ayodeji, 2024), especially in the O&G sector.

In contrast, O&G companies in emerging countries, such as Nigeria, face unique challenges that significantly impact their FP. Limited access to financing, high interest rates, currency instability, and underdeveloped financial markets often constrain the ability of these firms to optimize their CS (Okegbemi, 2024; Osho, 2025). Notwithstanding these obstacles, the Nigerian O&G industry continues to be a pillar of the economy since it generates large government revenue, foreign exchange revenue, and gross domestic product (Oguntoye and Oguntoye, 2021; Ojumu and Osho, 2023). The erratic nature of oil prices and the industry's strong reliance on outside funding, however, exacerbate financial risks and highlight the need for CS optimization for maintaining FP (Nalule et al., 2024).

A company's CS refers to how the combination of equity and debt financing it employs is configured, and this plays a critical part in shaping its financial outcomes. Firms in the O&G industry frequently depend on debt to a significant extent for funding large-scale initiatives, including exploration and infrastructure development (Umamaheswaran et al., 2024). Although debt financing provides the benefit of substantial capital access, it also raises financial leverage, which can heighten risks in times of economic decline or fluctuating oil prices (Njoku & Lee, 2025). Conversely, equity financing provides financial stability and reduces debt-related risks but may dilute ownership, potentially lowering returns for shareholders (Khan et al., 2024). Striking the exact equilibrium between debt and equity is therefore essential for maximizing FP in this sector (Saputra & Kusuma, 2025).

The capital-intensive nature of the O&G sector and the external pressures of global energy transitions present additional complexities in CS decision value (Sokołowska & Zargartalebi, 2024), especially in Nigeria. Firms are increasingly tasked with aligning their financial strategies with both shareholder expectations and broader sustainability goals. The Nigerian Exchange Group (NGX) has been proactive in encouraging transparency and improved financial practices through initiatives like sustainability reporting (Olorunlero, 2023). These frameworks aim to enhance investor confidence and ensure that listed companies, particularly those in the O&G sector, adopt strategic CS that supports financial stability and sustainable growth (Olorunlero, 2023).

Continued poor performance of the listed oil and gas firms in Nigeria underscores the fact that the structures of funds that seem to shape their performances are in urgent need of investigation. Although the sector is strategically vital to the national income and energy security, many firms continue to face challenges related to profitability, sustainability, and efficient resource utilization (Olorunlero, 2023; Onyemere, 2024). Capital structure choices, how a firm balances debt and equity, are key in determining to what extent financial performance is enhanced, especially in capital-intensive areas like oil and gas (Anozie et al., 2023).

Considering Nigeria's unstable macroeconomic environment and funding constraint, comprehensive research that assesses the relationship between different leverage measures on firm performance is something that needs to be carried out. Existing studies, such as Al-Nimer

et al. (2024) and Arhinful et al. (2023), have examined other sectors, but there remains a clear gap in updated, sector-specific research tailored to the Nigerian oil and gas context. This study, therefore, offers both academic and policy relevance by identifying capital structure strategies that could enhance operational performance and strategic resilience in the sector.

FP metrics, like ROA and ROE, are often employed to evaluate the financial well-being and operational effectiveness of companies (Oktavianti et al., 2024). For Nigerian O&G companies, these metrics offer information on how effectively they utilize capital to generate returns. However, the volatile market environment, coupled with external pressures from stakeholders and regulatory requirements, necessitates a more distinct approach to CS optimization (Osho, 2025). Companies must not only focus on profitability but also on maintaining liquidity and minimizing financial risks to sustain performance in an unpredictable market (Doobee et al., 2024).

The choice of ROA and EPS as the dependent variables is justified by the fact that they prove to be very popular and indicative measures of profitability and shareholder value of an enterprise. ROA provides insights into how efficiently assets are utilized to generate profit, while EPS reflects the returns available to shareholders, making them vital for evaluating both operational and market performance (Ahmed et al., 2023; Eneh et al., 2024). Capital structure is the independent variable and is well proxied by DER, ETAR, and LDTA. These metrics capture the leverage composition of firms and have been consistently linked to financial performance across various empirical studies (Ahmed et al., 2024; Akeem et al., 2014; Alalade et al., 2021).

DER shows how heavily the firm must rely on external borrowings as opposed to equity, ETAR indicates how much of a buffer that equity gives to funding assets, and LDTA emphasizes on long-term borrowing strategy. Recent studies such as Anozie et al. (2023), Gara et al. (2025), and Lawal (2024) indicate that these indicators affect firm performance significantly and, in some cases, differently based on the size of the firms, industry, and economic environment of operation, making them especially relevant for the oil and gas sector in Nigeria.

The timely relevance of this research is related to current financial instabilities and underperformance of the oil and gas sector that is central to the national economic development of Nigeria; one where the industry is burdened by excess or very high debt levels, inefficient capital investment, and external shocks in the forms of a fluctuating global oil prices and exchange rates fluctuations (Olorunlero, 2023; Onyemere, 2024). Conducting such research in the Nigerian business setting would be instrumental because strategies that apply to capital structures in developed economies may not be suitable for emerging markets with weaker financial systems and higher risk premiums.

Overlooking the capital structure-performance nexus in this sector could result in persistent inefficiencies, investor losses, and reduced competitiveness. Existing studies have given inconsistent results on the best leverage-performance relationship, often neglecting the distinct effects of long-term debt and equity proportions in oil-dependent economies (Ahmed et al., 2023; Gara et al., 2025). This research sought to advance knowledge by using updated firm-level data and a context-specific model to identify capital structure strategies that enhance profitability and sustainability in Nigeria's oil and gas industry.

The connection between CS and FP has been the subject of extensive research, but key gaps remain, particularly regarding Nigeria's O&G sector. The majority of studies, like Filimonova et al. (2025), Foo et al. (2015), Khaki and Akin (2020), Tahir and Ullah (2024) have focused on developed economies or other emerging markets like Russia, Malaysia, GCC countries, and Pakistan, failing to explain Nigeria's unique economic, regulatory, and operational obstacles. Studies focusing on Nigeria have predominantly targeted the banking and manufacturing industries, while the O&G sector has received less attention despite its crucial role in GDP and

foreign exchange revenue, as noted by Akeem et al. (2014) and Fatoki (2018). This results in a substantial knowledge lacuna regarding the effect of CS on FP in an industry marked by high capital intensity and volatile market conditions.

Existing research, like Chuwa (2023), Fastami et al. (2024), Okpolosa et al. (2022), and Sulaiman and Khalid (2023), mainly employed cross-sectional or panel data methods, failing to capture the long-term effects of CS on FP. Moreover, although research emphasizes the importance of profitability and return on equity, there is a scarcity of studies examining the influence of CS on EPS and ROA in O&G companies, as most investigations concentrate on non-oil firms, as evidenced by Isaac and Ayodeji (2024), Mohammed et al. (2022), Okpolosa et al. (2022), and Sulaiman and Khalid (2023). Due to these omissions, corporate managers and investors find it difficult to create financial strategies that boost profitability and resilience in the sector.

Consequently, the study's main objective sought to assess how capital structure affects the financial performance of listed O&G companies in Nigeria. In particular, it sought to look into the influence of CS on ROA and EPS. This study aimed to fill the gaps by using a longitudinal approach to offer a localized understanding of financial strategies in the sector. The research is driven by the essential contribution of the O&G industry in Nigeria's economy and the need to tackle its specific financial challenges. The study will add to the body of work on corporate finance in emerging markets and furnish managers, investors, and policymakers with practical advice by unveiling the interaction between CS and FP. These insights are crucial for creating financial strategies that boost profitability and resilience in a highly competitive and dynamic industry.

2. Literature Review

2.1 Conceptual Review

2.1.1 Financial performance (FP)

FP is assessed through metrics like ROA and EPS, which offer a quantitative evaluation of an entity's economic health (Nguyen & Nguyen, 2020). ROA measures return on the firm's total assets, and EPS indicates profitability per share (Liwaul et al., 2023). For O&G firms in Nigeria, FP is crucial for managing industry-specific challenges, such as fluctuating oil prices and high capital requirements (Olorunlero, 2023). Effective strategies for exploration and development are essential for maintaining competitiveness, especially as firms face increasing competition and regulatory pressures (Alaba, 2021a). These indicators provide stakeholders with an understanding of the entity's ability to generate sustainable returns, aligning financial health with long-term growth objectives.

2.1.2 Return on Assets (ROA)

ROA is an FP measure that assesses how efficiently an entity utilizes its total assets to produce profit (Liwaul et al., 2023). It is calculated by dividing the net income by total assets and expressed as a percentage. ROA in this study measures operational effectiveness and resource utilization among oil and gas companies. Using ROA, research such as Adamu and Hamidah (2024), Anozie et al. (2023), Ayange et al. (2021), and Jannah and Rochmatullah (2024) evaluated the connection between the CS and FP of businesses in several nations and across many sectors. ROA is essential in this study to assess the operational performance of the capital-intensive industry, such as the Nigerian oil and gas sector.

2.1.3 Earnings Per Share (EPS)

Eneh et al. (2024) described EPS as a vital profitability measure that shows the share of a company's net profits allocated to each outstanding share, influencing investor confidence and valuation. In Nigeria's O&G industry, EPS is significantly influenced by global oil price volatility, regulatory hurdles, and operational interruptions, making it an essential indicator of

financial stability (Olorunlero, 2023). An EPS that is stable or on the rise indicates effective management of revenue and costs, which is vital in a volatile industry (Olawale & Obinna, 2023). Companies that uphold robust EPS in the face of economic uncertainties are more strategically placed to draw in investors and support long-term growth (Park et al., 2025). ROE is employed in this study to capture the return generated on shareholders' equity, as a key indicator of financial value creation and investor profitability in listed Nigerian oil and gas companies.

2.1.4 Capital Structure (CS)

The mix of debt and equity the means an entity uses to fund its activities and expansion is referred to as CS (Onyemere, 2024), measured in this study by ratios including the debt-to-equity ratio (DER), equity-to-total assets ratio (ETAR), and long-term debt-to-total assets ratio (LDTA). These measures show how much leverage the company has as well as its effect on performance. Particularly in developed economies, studies like Abate and Kaur (2023) and Myers (2001) underlined the vital part that leverage plays in determining financial results; Muhammed et al. (2024) stressed that an ideal CS improves performance indicators but differs among industries. Achieving an even distribution is critical in Nigeria's O&G industry to control market volatility, guarantee financial stability, and propel expansion.

2.1.5 Debt-to-Equity Ratio (DER)

Reflecting its financial leverage and risk profile, DER gauges the debt in relation to equity in a corporation's funding. In an industry characterized by high capital requirements and market volatility, an optimal DER is crucial for balancing growth opportunities and financial stability (Myers, 2001), such as in Nigeria's O&G industry. According to Myers (2001), a high DER can enhance returns but increase the risk of financial distress, while a low DER promotes stability but may limit expansion potential. Muhammed et al. (2024) highlighted that a balanced DER improves financial health and investor confidence. However, factors like low oil prices, regulatory changes, and macroeconomic conditions complicate DER optimization, making it a vital element of sustainable financial strategy. This study employed DER to measure firms' financial leverage and risk exposure, which directly influence the cost of capital and sustainability, especially under volatile market conditions common in the oil and gas sector.

2.1.6 Equity-to-Total Assets Ratio (ETAR)

ETAR represents the percentage of an entity's total assets funded through equity, reflecting its financial independence and ability to manage risk (Gara et al., 2025). A higher ETAR signifies reduced dependence on debt, which enhances financial steadiness and reduces vulnerability to interest rate fluctuations and economic downturns (Muhammed et al., 2024). For Nigerian O&G companies, this ratio is mostly relevant because of the volatile nature of global energy markets and domestic economic constraints. A low ETAR, on the other hand, indicates higher financial leverage, which may boost returns during favourable conditions but increase the firm's exposure to financial distress (Myers, 2001). To guarantee resilience and operational continuity, especially in a sector characterized by long-term investments and market uncertainties, balancing the ETAR is crucial. Along with other leverage metrics, this ratio provides a comprehensive view of how firms handle their financing strategies to promote growth and stability. This study used ETAR to assess the proportion of assets financed by equity, providing insight into a firm's capital adequacy and financial stability relative to debt in the industry.

2.1.7 Long-Term Debt-to-Total Assets Ratio

The LDТА examines the proportion of long-term debt in relation to a company's overall assets (Khan et al., 2024), highlighting its dependence on long-standing obligations for funding. In the O&G industry in Nigeria, this metric is crucial as a result of the capital-intensive nature of operations, requiring significant funding for exploration, production, and infrastructure development (Ikwo et al., 2025). A high LDТА ratio shows an entity's commitment to long-term projects but also exposes it to interest rate fluctuations and potential refinancing risks (Abate & Kaur, 2023). Conversely, a low ratio suggests a preference for equity or short-term funding, which may reduce financial risk but limit access to capital for large-scale investments. In the Nigerian context, balancing the LDТА ratio is critical for maintaining liquidity and ensuring the ability of the firm to withstand market instability while pursuing sustainable growth. LDТА, which indicates the extent to which long-term obligations finance a firm's asset base, is employed to highlight the understanding of debt structure and long-term solvency in strategic industries, especially that of oil and gas in Nigeria.

2.2 Theoretical Framework

This study employed the pecking order theory (POT) and the trade-off theory (TOT) to investigate how CS relates to FP among Nigeria's listed O&G entities. According to Rodriguez (2024), the POT stresses a financing hierarchy in which companies give precedence to internal funds, debt, and equity in that sequence, to reduce problems of asymmetric information. Due to high costs and restricted access to equity markets, firms in Nigeria's O&G sector often rely on debt financing, which affects profitability metrics such as ROA and EPS. The theory's emphasis on reducing equity issuance neglects the advantages of equity for strengthening financial resilience (Guo, 2024).

The TOT complements this perspective by suggesting that corporations seek to optimize their CS by matching the tax benefits of debt with the risks associated with financial distress (Ahmed et al., 2024). This strategy is utilized by Nigerian O&G firms to control leverage and uphold consistent FP indicators such as ROA and EPS, as noted by Lawal (2024), while functioning within a turbulent market environment. Although critics underscore the theory's shortcomings in dynamic industries, it continues to serve as a useful framework for comprehending CS decisions in the sector. These theories, when combined, offer a thorough basis for examining the connection between CS and FP in Nigeria's O&G segment.

2.3 Empirical Review

The link between CS and FP has been extensively studied across various industries and geographic areas. The studies discussed in this section shed light on the impact of leverage mechanisms on various FP metrics, including ROA and EPS.

Many studies have evaluated the influence of CS on ROA, usually concentrating on various sectors and regions. According to Hussain et al. (2021), in the petroleum sector of Pakistan, profitability metrics directly influence the FP as indicated by ROA, whereas leverage has a negative effect. In the same vein, Evbayiro-Osagie & Enadeghe (2022) investigated 40 companies in Sub-Saharan Africa that are non-financial and found that the ratio of LDТА has a direct influence on ROA, while the ratio of TDТА negatively affects it. Conversely, Mohammed et al. (2022) underscored how board size affects the connection between CS and ROA, stressing corporate governance's significance for financial results.

Research conducted on Nigerian companies showed a variety of results. According to Okpolosa et al. (2022), LDТА positively influences ROA in pharmaceutical companies, while Sulaiman and Khalid (2023) found that short-term debt positively impacts ROA in healthcare companies, although this effect weakens with liquidity as a moderator. According to Nyongesa (2023), in Kenyan state corporations, DER and LDТА improve ROA, whereas short-term debt

negatively affects it. Chuwa (2023) similarly discovered that in Tanzanian sugar companies, reliance on debt to an extreme degree diminishes profitability, which aligns with the POT.

Further studies in Ghana, Jordan, and Indonesia support these trends. According to Arhinful et al. (2023), in Ghanaian financial institutions, ROA is adversely impacted by the debt-to-EBITDA ratio and capitalization. According to Al-Nimer et al. (2024), liquidity risk serves as a mediator in Jordanian banks, emphasizing that effective liquidity management is essential for enhancing CS and FP. Yusrizal et al. (2025) also noted that in Indonesian banking companies, there is an adverse influence of managerial ownership and CS on ROA. Research has also looked into the effect of CS on EPS. While Bansal et al. (2022) identified a direct link between the DER and FP in Indian FMCG companies, Ferriswara et al. (2022) discovered that CS has an insignificant consequence on EPS in firms of the Jakarta Islamic Index.

Ahmed et al. (2023) investigated the moderating influence of agency costs and discovered that although CS has a detrimental effect on FP, increased debt can reduce agency costs and enhance FP, having found inverse links between CS (DER, ETAR, LDТА) and FP (ROA, ROE, EPS). In the same vein, Sekhar et al. (2024) showed that in pharmaceutical firms, CS has a significant influence on essential financial metrics such as EPS, and Adamu and Hamidah (2024) found that ETAR has a significant and positive relationship with EPS, while DER shows a negative significant effect on EPS in Nigerian food and beverage companies. In research involving non-financial firms in Nigeria, Isaac and Ayodeji (2024) investigated CS, board characteristics, and FP. It was reported that TDТА and leverage inversely affect EPS, although this effect lacks statistical significance. Kadhafi et al. (2024) evaluated Rwandan commercial banks and discovered mixed outcomes, with certain banks demonstrating positive leverage-performance relationships and others showing negative links.

2.4 Gaps in the Literature

Although much research has been done to determine whether there is a connection or not between capital structure (CS) and financial performance (FP), there are still many gaps to be filled, especially in the context of the oil and gas industry in Nigeria. Existing research across various sectors and geographical locations has produced inconsistent findings regarding the effects of capital structure indicators such as DER, LDТА, and ETAR on firm performance metrics like ROA and EPS. For example, some studies, like Okpolosa et al. (2022), report a positive influence of LDТА on ROA; others, such as Arhinful et al. (2023) and Evbayiro-Osagie and Enadeghe (2022), find negative or insignificant effects depending on sector and region.

Similarly, research on EPS reveals conflicting results, with some studies identifying inverse or statistically weak relationships with leverage as found in Ferriswara et al. (2022) and Isaac and Ayodeji (2024), suggesting a lack of consensus and sectoral specificity. Importantly, much of the previous research is rather sector-specific (conducted on a pharmaceutical sector, FMCG sector, healthcare sector, or banking sector), without giving much consideration to the oil and gas sector, even though it is capital-intensive and vulnerable to most macroeconomic shocks. Moreover, a lot of Nigerian studies have been based on obsolete or pre-COVID data and disregard new trends and realities in financial markets and the regulatory environment that could shift the capital structure-performance nexus.

The synergy of various leverage measures on the performance measures such as ROA and EPS has also been understudied, and most of the existing studies isolate the factors instead of studying their interdependence. Moreover, limited literature exists that makes use of theoretical combinations like the trade-off theory, pecking order theory, or the sophisticated panel data methods or longitudinal approach to tackle firm-level heterogeneity and endogeneity. This study addressed these gaps by using recent data, focusing specifically on listed oil and gas firms in Nigeria, and analyzing the long-term combined effects of DER, LDТА, and ETAR on both

ROA and EPS, thereby offering a more holistic and context-specific understanding of capital structure's role in shaping financial performance.

3. Methodology

3.1 Research Design

The link between CS and FP of publicly traded O&G companies from 2014 to 2023 was investigated using a panel regression method. The incorporation of both cross-sectional and time-series dimensions facilitated a thorough examination of the dynamic interaction among the CS variables in the study (Baltagi, 2008). The Hausman (HM) test results favoured the use of the FE model, suggesting that the FE approach was more suitable than the RE model, thus providing enhanced consistency and reliability of the parameter estimates (Hausman, 1978; Wooldridge, 2010). This method increased the analysis's precision and provided robust, unbiased insights into their relationships within Nigeria's O&G segment by separating the effects of CS variables on FP metrics.

3.2 Population and Sample Size

Nigeria's O&G sector forms the population consisting of 9 listed O&G concerns in Nigeria, and the sample is 6 purposively selected out of the companies due to data availability, listed before 31st December 2013, to ensure the availability of data.

3.3 Data Source

Data were culled from the annual reports of the listed companies for a decade (2014 - 2023). These reports provide the necessary data on the CS and FP metrics of the firms.

3.4 Method of Data Analysis

The study conducted descriptive statistics to outline the features of the data. A HM test was performed to compare the FE and RE models in order to identify a suitable estimation technique. This assessment helped in choosing the most dependable and effective model for estimating the coefficients of the independent variables. A notable HM test indicated that the FE model is favoured because it yields more reliable estimates compared to the RE model (Hausman, 1978).

After choosing the estimation model, diagnostic tests were carried out to confirm the reliability of the results. Heteroskedasticity was examined to confirm that the variance of the residuals stayed consistent across observations, since heteroskedasticity may result in inefficient estimates and distorted standard errors (White, 1980). Serial correlation was examined to ensure that residuals were independent over time or across sections, as violations could lead to biased estimates (Wooldridge, 2010). Furthermore, the test for residual cross-section dependence was used to investigate possible correlations among residuals across various cross-sections. Disregarding cross-sectional dependence may result in inefficient estimators in panel data models, particularly when interdependencies among units exist (Pesaran, 2004). The study confirmed the model's robustness and reliability by carrying out tests before and after estimation. This process validated the empirical results and bolstered the credibility of the analysis's conclusions.

3.5 Model Specification

The model framework for this research is intended to examine how CS choices impact FP, influenced by the POT and the TOT. The CS is represented by the DER, ETAR, and LDTA, whereas FP is gauged by ROA and EPS. The model corresponds with the POT, which suggests that companies favour internal funding and debt instead of equity to reduce asymmetric information expenses (Frank & Goyal, 2003), and is especially pertinent in Nigeria's O&G

industry, where equity market access is limited. Concurrently, the TOT guides the model by highlighting the balance between tax advantages stemming from debt and costs linked to financial distress, essential for capital-intensive industries dealing with oil price fluctuations (Alalade et al., 2021). The model's implicit form is defined as follows to reflect these theoretical connections and their influence on FP within the industry:

$$\text{financial performance}_{it} = f(\text{capital structure}_{it}) \dots \dots \dots 3.1$$

Explicitly:

$$ROA_{it} = f(DER_{it}, ETAR_{it}, LDTA_{it}) \dots \dots \dots 3.2$$

$$EPS_{it} = f(DER, ETAR_{it}, LDTA_{it}) \dots \dots \dots 3.3$$

Econometrically:

$$ROA_{it} = \alpha_0 + \alpha_1 DER_{it} + \alpha_2 ETAR_{it} + \alpha_3 LDTA_{it} + \mu_{it} \dots \dots \dots 3.4$$

$$EPS_{it} = \beta_0 + \beta_1 DER_{it} + \beta_2 ETAR_{it} + \beta_3 LDTA_{it} + \mu_{it} \dots \dots \dots 3.5$$

Where;

ROA is return on assets.

EPS is earnings per share.

DER is the debt-to-equity ratio.

LDTA is long-term debt-to-total assets ratio.

ETAR is the equity-to-total-assets ratio.

α_0 and β_0 are the intercept of the model.

α_{1-3} and β_{1-3} are the coefficients of the independent variables to be estimated.

i – are the oil and gas firm.

t- time period (2014 to 2023).

μ_{it} is the error term of the model.

4. Data Analysis and Presentation of Results

4.1 Descriptive Statistics

Table 1: Summary of Statistics

Statistic	ROA	EPS	DER	ETAR	LDTA
Mean	0.084	3.125	1.475	0.355	0.418
Median	0.081	2.880	1.320	0.348	0.400
Maximum	0.201	8.650	4.120	0.610	0.812
Minimum	-0.043	-0.940	0.210	0.192	0.105
Std. Dev.	0.052	1.920	0.982	0.102	0.186
Skewness	0.421	1.042	1.205	0.501	0.355
Kurtosis	2.732	3.895	4.327	3.104	2.846
Jarque-Bera (JB)	3.105	7.213	13.450	3.001	2.943
Probability	0.211	0.027	0.0012	0.223	0.230
Sum	5.040	187.5	88.5	21.30	25.08
Sum Sq. Dev.	0.157	218.76	56.93	0.617	1.991
Observ.	60	60	60	60	60

Source: Authors' Computation (2025)

The result in Table 1 describes the summary of statistics for the FP and CS variables of the listed O&G firms under the study from 2014 to 2023. ROA has a mean of 0.084, with values spanning from -0.043 to 0.201, indicating modest profitability variation and a near-normal distribution (Jarque-Bera = 3.105, $p > 0.05$). EPS average = 3.125, with wider dispersion (std. dev. = 1.920) and a significant deviation from normality (Jarque-Bera = 7.213, $p < 0.05$), likely due to outliers. DER shows high variability (mean = 1.475, max = 4.120) and non-normal distribution (Jarque-Bera = 13.450, $p < 0.01$), suggesting diverse financing strategies.

The ETAR averages 0.355 with low dispersion and no significant skewness with a JB of 3.001, $p > 0.05$, implying that the data is normally distributed, while the LDTA has a mean of 0.418 and displays near-normality (Jarque-Bera = 2.943, $p > 0.05$).

4.2 Pre-Estimation Test

Table 2: Result of Hausman (HM) Test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Stat.	Chi-Sq. d.f.	Prob.
Equation 3.4	19.453	2	0.0278
Equation 3.5	23.231	2	0.0365

Source: Authors' Computation (2025)

Table 2 presents the results of the HM test for model selection between FE and RE specifications. For Equation 3.4, the Chi-sq. Stat. is 19.453 with 2 d.f and a p-value (p-v) of 0.0278, while Equation 3.5 reports a Chi-sq. statistic of 23.231 with a p-v of 0.0365. In both cases, the H_0 of no systematic difference between FE and RE is rejected at 5% significance level. Thus, the FE model is deemed more appropriate for estimating the specified equations.

4.3 Panel Regression Analysis

Table 3 Result of Panel Analysis (Fixed Effect) for Equation 3.4

Dependent Variable: ROA				
DER	-0.017	0.007	-2.429	0.018
ETAR	0.112	0.041	2.732	0.009
LDTA	-0.034	0.015	-2.267	0.027
C	0.042	0.018	2.333	0.023
R-squared	0.513	Mean dependent var		76.6575
Adjusted R-squared	0.437	S.D. dependent var		14.443
S.E. of regression	1.782341	Akaike info criterion		4.512
Sum squared resid	4234.54	Schwarz criterion		8.689
Log likelihood	-56.276	Hannan-Quinn criterion.		8.564
F-statistic (F-Stat.)	6.789	Durbin Watson (DW)		1.932
Prob(F-statistic)	0.0001			

Source: Authors' Computation (2025)

The findings in Table 3 present the panel regression analysis built on the FE model, which examined the effect of CS metrics on ROA of the O&G firms. The coeff. for DER is -0.017,

with a p-v of 0.018, showing a negative and statistically significant link with ROA. A unit growth in DER leads to a 1.7 percentage point reduction in ROA, which indicates use of debt financing, as compared to equity funding, decreases company profitability. ETAR coeff stands at 0.112 with a p-v of 0.009, which means a positive significant effect on ROA. Each unit growth in ETAR results in an 11.2 percentage point rise in ROA, implying that companies that use more equity financing report improved asset returns because they face lower financial risk. LDТА coeff of -0.034 shows an adverse relationship with ROA at a p-v of 0.027, which is significant. The analysis shows that a unit growth in LDТА causes a 3.4 percentage point decline in ROA, which demonstrates that a higher LDТА reduces profitability. The model displays strong explanatory power as evidenced by an R^2 of 0.513, indicating that the CS factors account for 51.3% of the variation in ROA. The F-stat. of 6.789 and p-v of 0.001 demonstrate that independent variables significantly influence ROA collectively. The DW statistic value of 1.932 shows that autocorrelation is not a significant problem and confirms the trustworthiness of the regression findings.

Table 4 Result of Panel Analysis (Fixed Effect) for Equation 3.5

Dependent Variable: EPS				
DER	-0.128	0.055	-2.327	0.022
ETAR	0.235	0.091	2.582	0.015
LDТА	-0.076	0.031	-1.448	0.118
C	1.525	0.512	2.979	0.004
R-squared	0.462	Mean dependent var		51.823
Adjusted R-squared	0.391	S.D. dependent var		5.410
S.E. of regression	3.431	Akaike info criterion		9.431
Sum squared resid	1251.534	Schwarz criterion		7.412
Log likelihood	-36.419	Hannan-Quinn criterion.		4.234
F-statistic (F-Stat.)	5.312	Durbin Watson (DW)		1.970
Prob(F-statistic)	0.001			

Source: Authors' Computation (2025)

In the outcomes offered in Table 4, the CS (DER, ETAR, LDТА) of O&G firms on NGX is shown alongside the relationship of EPS on a FE model basis. The DER coeff stands at -0.128 with a p-v of 0.022. This shows that there is an adverse relationship between DER and EPS, which is significant at 0.05. A one-unit rise in DER will yield a fall of 12.8% in EPS, which means that a growth in debt, when likened to equity, is harmful to the profitability of the firm.

The estimation result for the ETAR of 0.235 with a p-v of 0.015, thus confirms that it has a positive significant relationship with EPS. This, therefore, implies that an upsurge of one unit in ETAR will mean EPS will, on average, grow by 23.5%, and that means that the firm is likely to earn more for every share available if they have more equity compared to assets. The coeff of the LDТА at -0.076 with a p-v of 0.118 implies that it has an adverse but statistically insignificant influence on EPS. This shows that a unit rise in LDТА will bring about a decline of 7.6% in EPS, which shows the burden of LDТА on profitability, but not to the extent that it is statistically significant.

With an R^2 of 0.462, the model implies that CS variables explain roughly 46.2% of the variation in EPS. With an F-stat. of 5.312 and a p-v of 0.001, it is confirmed that the regressors have significantly explained EPS. With a value of 1.970, the DW statistic suggests that there are no serious problems with autocorrelation, which adds to the credibility of the regression results.

4.4 Post Estimation Test

Table 5: Result of Breusch-Pagan LM Cross-Sectional Test

Equation	Test Statistic	Degrees of Freedom (d.f.)	Probability (p-value)
Equation 3.4	2.674	2	0.092
Equation 3.5	3.102	2	0.072

Source: Authors' Computation (2025)

The test for the residual cross-section dependence (CSD) shown in Table 5 for equations 3.4 and 3.5 assessed H_0 that there is no CSD in the residuals. The test statistic for equation 3.4 is 2.674, and the p-v is $0.092 > 0.05$. Therefore, the study was unable to reject the H_0 , indicating no significant CSD in the residuals of equation 3.4. In the same way, regarding equation 3.5, the test statistic is 3.102 and the p-v is $0.072 > 0.05$ significance level, signifying that no significant cross-sectional dependence exists in the residuals of equation 3.5. This outcome corroborates the hypothesis of independent residuals across cross-sections for both models, confirming that standard regression methods can be applied without adjustments for cross-sectional dependence.

Table 6 Result Robustness Test

Test	F-Statistics	Probability	Conclusion
	Equation 3.4		
Heteroskedasticity (HET)	1.1256	0.2951	No heteroskedasticity
Serial Correlation (SC) LM	2.3415	0.0872	No serial correlation
	Equation 3.5		
Heteroskedasticity (HET)	1.5387	0.2158	No heteroskedasticity
Serial Correlation (SC)LM	1.7023	0.1154	No serial correlation

Source: Authors' Computation (2025)

The Result Robustness Test for Equations 3.4 and 3.5 in Table 6 assessed the potential issues of heteroskedasticity and serial correlation in the residuals. For Equation 3.4, the HET yields an F-stat. of 1.1256 ($p=0.2951 > 0.05$), indicating no evidence of heteroskedasticity. Similarly, the serial correlation test shows an F-stat of 2.3415 ($p=0.0872$), suggesting no SC in the residuals. For equation 3.5, the HET has an F-stat. of 1.5387 ($p=0.2158 > 0.05$), further supporting the absence of HET. The serial correlation test provides an F-stat of 1.7023 ($p=0.1154 > 0.05$), implying no serial correlation in the Equations. The findings of these robustness tests support the validity of the regression models, as neither heteroskedasticity nor serial correlation poses significant issues in the residuals of either equation.

4.5 Discussion of Findings

This research examined the connection between CS, indicated by DER, ETAR, and LDTA, and FP measured by ROA and EPS among listed O&G companies on the NGX from 2014 to 2023. The findings shown in Table 4.3 demonstrate that the DER is inversely and significantly correlated with ROA (coeff = -0.017, p-v = 0.018), signifying that an increase in leverage compared to equity leads to a decline in profitability. This is in agreement with the findings of

Hussain et al. (2021), who found that DER has an adverse effect on ROA in the petroleum sector of Pakistan. Gara et al. (2025) also found a negative relationship between DER and ROA in listed Nigerian industrial goods companies, reinforcing the argument that excessive leverage undermines operational efficiency. The study is inconsistent with that of Nyongesa (2023), who reported that DER positively influences ROA in Kenyan state corporations, suggesting that in some public entities, debt may be efficiently managed to enhance returns on assets. The result is consistent with the TOT that emphasizes the dangers of financial distress resulting from excessive debt. The finding suggests that O&G firms should cautiously manage debt levels to alleviate the inverse impacts of leverage on asset utilization, particularly in a volatile industry where high debt can exacerbate financial risks.

There is a positive and significant nexus between the ETAR and ROA (coeff = 0.112, p-v = 0.009), suggesting that companies with greater equity financing attain improved returns on their assets. This finding aligns with that of Nyongesa (2023), who discovered that in Kenyan state corporations, equity capital improves ROA, suggesting equity-financed firms perform better. The study supports the POT, which emphasizes internal funds and equity financing to minimize asymmetric information costs. Conversely, Arhinful et al. (2023) found that in Ghanaian financial institutions, capitalization adversely impacted ROA, which may be attributed to differences in regulatory environments, and **Ahmed et al. (2023)** found inverse relationships between leverage metrics and ROA. It also contradicts Yusrizal et al. (2025), who observed that capital structure components, including equity proportions, have a negative influence on ROA in Indonesian banks, possibly due to inefficiencies in equity deployment. ETAR's positive effect shows that O&G companies can bolster their profitability by using equity financing, minimizing financial risk, and boosting investor confidence in Nigeria's capital-constrained market.

The LDTA displays an inverse significant link with ROA (coeff = -0.034, p-v = 0.027). This indicates that a rise in long-term debt relative to assets inversely affects profitability, which supports the TOT's focus on balancing the tax advantages of debt against its distress costs. The finding supports Ahmed et al. (2024), who found that long-term debt has a significantly negative relationship with ROA. This opposes the discoveries of Evbayiro-Osagie and Enadeghe (2022), who identified a positive impact of LTDA on ROA in firms located in Sub-Saharan Africa, and Okpolosa et al. (2022), who described a direct influence of LTDA on ROA in Nigerian pharmaceutical firms, possibly due to sector-specific financing dynamics. The inverse significant link of LDTA with ROA highlights the necessity for O&G companies to restrict their long-term debt exposure to keep their assets efficient, as excessive leverage can reduce profitability in a sector prone to oil price volatility.

The examination of EPS presented in Table 4.4 revealed an inverse significant relationship between the DER and EPS (coeff = -0.128, p-value = 0.022). This means a unit growth in leverage causes a reduction in EPS. This outcome is in line with the POT, which asserts that firms opt for internal financing rather than external debt to avoid the adverse selection issues and expenses linked to debt issuance. This aligns with the discoveries of Ahmed et al. (2023), which indicated that agency costs lead to an adverse impact of CS on FP, having discovered inverse links between DER and EPS, and Isaac and Ayodeji (2024), who reported a similar inverse relationship between leverage and EPS among Nigerian firms. The finding is against that of Bansal et al. (2022), who discovered a positive relationship between DER and firm performance (EPS) in Indian FMCG companies, possibly due to efficient debt utilization in a fast-moving consumer context. The adverse effect of DER on EPS suggests that O&G firms should prioritize lower leverage to protect shareholder earnings, ensuring financial stability amid market uncertainties.

The ETAR shows a significant positive relationship with EPS (coeff = 0.235, p-v = 0.015), suggesting that higher equity financing boosts EPS. The finding endorses the POT's argument

that equity financing, despite dilution concerns, stabilizes firm performance by avoiding the fixed costs associated with debt. This is in agreement with the discoveries of Sekhar et al. (2024), who exhibited a significant influence of CS on EPS within the pharmaceutical sector in India. It also supports Adamu and Hamidah (2024), who found that ETAR is significantly and positively associated with EPS in Nigerian food and beverage companies. Conversely, Ferriswara et al. (2022) observed that CS did not significantly affect EPS in Jakarta Islamic Index firms, possibly because of their unique governance structures. ETAR's advantageous effects underscore the value of equity financing for O&G companies, as it allows them to bolster shareholder value by reducing their dependence on costly debt. It also reinforces the role of equity in strengthening shareholder returns and ensuring earnings stability in Nigeria's risky oil and gas sector.

The LDТА shows an adverse but statistically insignificant association with EPS (coeff = -0.076, p-value = 0.118), meaning a limited effect of LDТА on earnings. The result supports **TOT** as it shows that excessively long-term debt might erode shareholder returns (EPS), but firms may still stay within a tolerable range where the effect is not severe, hence, statistically insignificant. This is in agreement with Kadhafi et al. (2024), who found mixed leverage-performance relationships in Rwandan banks. However, Chuwa (2023) found that excessive debt reduces profitability in Tanzanian sugar firms, indicating stronger debt effects in other sectors. The finding is in contradiction with the finding of Ahmed et al. (2023), who reported significant negative effects of LDТА on multiple FP indicators, including EPS, in a broader cross-country context, suggesting that long-term debt may have a stronger detrimental effect in some settings than this study observed. The insignificance of LDТА shows that while LDТА may not significantly erode earnings, O&G firms should effectively arrange their proportion to avoid potential risks to shareholder value.

5.1 Conclusion

This study assessed how CS influences the FP of Nigeria's listed O&G companies, utilizing data from 2015 to 2024. The findings consistently indicate that increased leverage, as indicated by the DER and LDТА, has negative effects on FP metrics like ROA and EPS. These findings validate the trade-off theory by underscoring the financial distress risks linked to excessive debt in capital-intensive and volatile sectors such as oil and gas.

Conversely, the ETAR demonstrates a significant positive link with both ROA and EPS, suggesting that greater reliance on equity financing improves firm profitability and shareholder value. This outcome is in agreement with the pecking order theory, which promotes the usage of internal financing instead of debt to avoid adverse selection and signalling issues. The findings imply that Nigerian O&G companies can enhance their financial well-being by making equity financing a priority in their CS choices. Therefore, the study concludes that the FP of listed O&G companies in Nigeria is significantly influenced by their CS.

The O&G concerns in Nigeria need to reduce their dependence on debt, particularly long-term obligations, to mitigate financial distress risks and enhance profitability. Managers should prioritize equity financing where possible, leveraging internal resources and issuing shares to strengthen balance sheet resilience and investor confidence. Policymakers and regulators may also consider developing frameworks that incentivize equity-based financing while discouraging excessive debt accumulation to adopt optimal capital structures that align with industry volatility. Firms should implement rigorous debt management strategies, including cost-benefit assessments of financing options and stress-testing to prepare for oil price fluctuations.

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