

Tax Laws and Capital Structure Decisions of Listed Oil and Gas Companies in Nigeria

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ABSTRACT

This study assessed how tax regulations influenced capital structure (CS) decisions made by listed oil and gas (O&G) firms in Nigeria between 2013 and 2023. It focused on six O&G firms listed in Nigeria as of December 31, 2024. Data obtained from the financial reports of the sampled entities for the period were analyzed using a panel data regression method with a fixed effect, as determined by the Hausman test. The analysis indicated that company income tax (CIT) had a coefficient of 0.8349 and a p-value of 0.7714 with respect to the equity-to-total capital ratio (E/TC). Petroleum profit tax (PPT) had a coefficient of 2.1979 and a p-value of 0.1300 with E/TC, while education tax (EDU_T) showed a coefficient of -9.1376 and a p-value of 0.0054 with E/TC. The analysis also revealed that CIT had a coefficient of 1.5684 and a p-value of 0.7366 in relation to the debt-to-total capital ratio (D/TC). PPT had a coefficient of 3.5405 and a p-value of 0.1328 with D/TC, while EDU_T exhibited a coefficient of -14.7162 and a p-value of 0.0057 with respect to D/TC. The results showed that while CIT and PPT have positive but statistically insignificant relationships with both D/TC and E/TC, EDU_T has a significantly negative relationship with both capital structure proxies. These findings suggest that higher education taxes constrain financial flexibility and discourage both equity and debt financing in the sector. The study concluded that tax policies particularly the education tax significantly influence corporate financing strategies in Nigeria's O&G sector. It recommends that policymakers revise education tax policies to reduce the financial burden on O&G companies, thereby promoting a more balanced and growth-oriented capital structure

Keywords: Corporate Income tax, Capital Structure Decision, Tax Laws, Listed Oil and Gas Companies-Nigeria

Introduction

Capital structure (CS) decisions, which pertain to a firm's choice of financing through debt, equity, or hybrid instruments, are important to the financial stability and growth potential of companies, especially in capital-intensive sectors like oil and gas (O&G). In Nigeria's oil and gas industry, the capital structure is often skewed due to high operating costs, currency volatility, and the complex regulatory environment (Olawale & Obinna, 2023). Companies in this sector frequently face challenges in optimizing their capital structures to maximize profitability and minimize financial risk, which impacts their competitive positioning and long-term viability (Olawale & Obinna, 2023).

According to Motanya (2019), a significant factor influencing these capital structure decisions is the country's tax laws, which are both intricate and subject to frequent modifications. Nigerian tax policies, including corporate income tax rates, capital allowances, and incentives specific to the oil and gas industry, can encourage or deter certain financing choices (Emechebe & Umenweke, 2024; Ghebremusse, 2014). For example, high tax rates on profits can push firms to favour debt funding because of the tax-deductible nature of interest expenses, while capital allowances might encourage investment in specific asset classes, influencing capital allocation strategies.

However, inconsistencies and ambiguities within Nigeria's tax laws pose challenges for firms in making effective capital structure decisions (Aladesonkanmi, 2020). These challenges are further complicated by enforcement inconsistencies, loopholes that may result in tax avoidance, and the potential for tax burdens that inhibit growth (Hasan et al., 2024). These issues underscore the need to examine how Nigeria's tax regulations shape CS decisions within the sector and to remove the obstacles that prevent firms from attaining optimal financial leverage. This study sought to provide insights into these challenges and to recommend strategies for aligning tax policies with the financial health and growth objectives of the nation's O&G sector.

Tax laws play a crucial role in shaping the capital structure decisions of firms, especially in sectors like oil and gas, where investment costs are high and profitability is sensitive to external economic pressures (Oktaviano et al., 2024). Well-structured tax policies can offer stability and predictability, enabling companies to make more informed financing choices between debt, equity, or other capital forms. Tax laws can encourage capital structure decisions that reduce

financial risk and optimize growth by providing incentives, deductions, and exemptions strategically aligned with industry needs (Oktaviano et al., 2024).

For instance, interest payments, which are allowable deductions on taxable incomes, make debt financing options more attractive, reducing the effective cost of borrowing and allowing firms to allocate resources more efficiently. Moreover, targeted tax incentives such as capital allowances or accelerated depreciation for essential assets in oil and gas can lower operational costs, allowing companies to focus on capital investment without over-reliance on high-cost financing options. These tax-based benefits can also provide firms with the flexibility to choose capital structures that better align with long-term business objectives, enhancing financial stability and adaptability within the industry (Prakash et al., 2023).

According to Aulia et al. (2022), a clear and consistently enforced tax framework can reduce uncertainties and minimize the cost of compliance, enabling oil and gas firms to structure their capital optimally. The Nigerian government can help mitigate capital structure imbalances, empowering firms to achieve financial integrity, resilience, and competitiveness in both local and global markets by fostering a tax environment that supports sustainable financing.

Although there has been a lot of worldwide research on how tax laws affect CS, substantial gaps exist in Nigeria's O&G sector, where industry-specific taxes such as the petroleum profit tax (PPT) and education tax (EDU_T) are often disregarded. Existing studies mainly focus on the general effects of company income tax (CIT), without taking into account the specific tax regimes that apply to Nigerian O&G companies. This has resulted in a lack of grip on how these specialized rules impact financing choices. Moreover, the effect of frequent changes in tax policy on long-term capital planning in Nigeria has not been adequately examined. This issue is not sufficiently addressed by global studies like Trang et al. (2022) and Tica (2023), which concentrate on stable environments.

Empirical research has shown varying results regarding the tax laws and the CS relationship across different countries. Some studies, such as those by Setyawati et al. (2022) and Brandão (2024), have found a positive connection between taxes and leverage, while others, including Yazgan (2023) and Ali et al. (2022), indicate mixed or limited effects. However, only a small number of these studies take into account high-risk sectors such as O&G. Furthermore, as Ramachandran et al. (2024) discuss regarding Shariah-compliant firms, unique regulatory

frameworks indicate that specialized tax regimes such as the petroleum profit tax (PPT) and education tax (EDU_T) could influence CS strategies, a topic that remains underexplored in Nigeria.

The research objective, therefore, is to assess the effect of Nigeria's dynamic tax policies on the CS of O&G firms, particularly the impact of industry-specific taxes during periods of economic instability, in order to fill the existing gaps. The research specifically investigated how CIT, EDU, and PPT affect the CS of the firms by analyzing their influence on the equity-to-total capital (E/TC) and debt-to-total capital (D/TC) ratios. This will build on prior works such as Salomonsson and Neumann (2024) by examining how tax reforms, incentives, and policy inconsistencies interact with firm-level factors to shape financing decisions using a longitudinal approach while contextualizing the findings within Nigeria's volatile environment. Thus, offering essential insights for corporate managers and policymakers to promote more resilient financial strategies that will aid in the sustainability of the O&G sector of Nigeria.

Literature Review

Conceptual Review

Capital structure

Capital structure decisions refer to the mix of debt, equity, and hybrid financing options that a firm uses to fund its operations and growth (Khan et al., 2021; Prakash et al., 2023). These decisions are critical to a company's financial strategy, as they directly impact its cost of doing business, risk profile, and firm value. In corporate finance theory, Brusov et al. (2023) defined the optimal capital structure as the proportion of debt and equity that minimizes the company's weighted average cost of capital (WACC), thereby maximizing shareholder value. In the O&G sector, characterized by high capital intensity and financial risks, capital structure decisions become even more complex.

Companies in Nigeria's O&G sector require significant capital investments for exploration, production, and technology, making financing costs and stability critical. According to Khan et al. (2021), external factors, including fluctuating oil prices, regulatory policies, and tax laws, significantly influence capital structure decisions. These variables increase volatility and impact firms' preferences for debt versus equity (Olawale & Obinna, 2023). Understanding

how tax laws shape these decisions is essential for effective financial management in this industry.

Equity Financing

Almanaseer (2024) described equity financing as raising capital by selling company shares, giving investors ownership stakes and a claim on future profits, rather than incurring debt. In the O&G sector, equity financing is a significant component of capital structure decisions, especially given the industry's high capital requirements and regulatory landscape (Almanaseer, 2024). Tax laws influence the attractiveness of equity over debt, as certain tax incentives may either encourage or discourage equity issuance (Emechebe & Umenweke, 2024).

Halíček and Karfíková (2022) stated that, unlike debt financing, equity does not offer tax-deductible interest payments, which can impact the overall cost of capital and company profitability. This consideration makes tax policy crucial in determining whether firms prioritize equity or debt for expansion and operational needs. Understanding these dynamics is essential to evaluating how tax laws shape financing strategies in this sector. For this study, equity financing is derived from dividing total equity by total capital.

Debt Financing

Debt financing is the process of raising capital by borrowing funds, typically through loans or bonds, which must be repaid with interest over time (Almanaseer, 2024). Debt financing is a crucial option in firms' capital structure within the O&G sector of Nigeria, largely due to the industry's extensive capital requirements. Tax laws significantly influence debt financing, as interest on debt is typically tax-deductible, lowering a firm's taxable income and, subsequently, its tax liability (Halíček & Karfíková, 2022). This tax benefit can make debt funding more preferable than equity, impacting firms' choices in funding their operations and growth. However, high debt levels also increase financial risk, which companies must balance against the tax benefits (Chinedum et al., 2023). Examining these factors helps clarify the role of tax policies in forming debt funding strategies in the sector. For this study, debt financing is calculated by dividing the total debt by the total capital.

Total Capital

Total capital refers to the aggregate amount of financing that a firm employs, encompassing both equity and debt, to fund its operations and investments. In the context of the Nigerian (O&G) sector and according to Modigliani and Miller (1963), capital structure decisions are significantly influenced by tax laws, as they determine the relative costs of debt and equity financing. Favourable tax policies, such as interest tax shields, encourage debt financing, thereby impacting the total capital composition (DeAngelo & Masulis, 1980). Conversely, stringent tax regimes may shift preferences toward equity financing to avoid excessive tax burdens. Empirical studies have shown that in capital-intensive industries like oil and gas, the interplay between tax laws and total capital decisions is critical for optimizing financial performance and ensuring long-term sustainability (Ofurum et al., 2021). Thus, tax policy reforms directly shape how firms in this sector allocate their total capital resources.

Tax Laws

Tax laws are a crucial variable affecting capital structure decisions in capital-intensive sectors like oil and gas (Oktaviano et al., 2024). These laws include corporate income tax rates, tax incentives, deductions, and allowances that directly influence a firm's financing choices (Emechebe & Umenweke, 2024). For instance, higher tax rates can motivate firms to opt for debt financing to take advantage of interest tax shields (Saba, 2024), while incentives like accelerated depreciation make specific financing options more appealing. These regulations not only shape the cost of financing but also impact the overall risk profile of firms operating in an environment marked by high capital expenditures and market volatility (Sani et al., 2024).

Moreover, the clarity and consistency of tax regulations are vital for effective capital structure decisions (Sani et al., 2024). According to Euler et al. (2024), frequent changes or ambiguities in tax laws can create uncertainty, leading companies to hesitate in committing to long-term debt or significant equity issuances. Industry-specific tax allowances can encourage investments in particular assets (Rizzo, 2024), further affecting capital allocation strategies. Thus, comprehending the intricacies of tax laws is essential for oil and gas firms to achieve optimal capital structures that align with their financial objectives.

Company Income Tax Act (CITA)

CITA governs how corporations involved in downstream petroleum activities are taxed in Nigeria. According to Oduntan (2015), companies in the downstream sector, involved in processing and marketing petroleum products, and the services sector, which provides support to both upstream and downstream operations, fall under the CITA. The act levies taxes on the taxable income (residual after allowable expenses and deductions have been made) of these entities. In addition, profits from non-petroleum activities of entities in the upstream sector are also taxed under the CITA, ensuring comprehensive tax coverage for diverse business activities of the O&G industry.

Education Tax Act (ETA)

Education Tax Law in Nigeria, established under the Education Tax Act, mandates companies, including those in the oil and gas sector, to contribute 2.5% of their assessable profits to the Tertiary Education Trust Fund (TETFund) (Ndah et al., 2024). This tax influences capital structure decisions, as it strongly influences equity capital (Omodero, 2024). According to Judijanto (2024), high tax compliance allows the country to maximize tax revenues that can be utilized in financing infrastructure, education, and health services. However, high compliance increases the cost of doing business, especially in the O&G sector, prompting firms to optimize their capital structure for efficiency.

Petroleum Profit Tax Act (PPTA)

The Petroleum Profit Tax Act (PPTA) is specific to the upstream oil and gas sector in Nigeria, targeting companies involved in the exploration and production of petroleum resources (Aisien et al., 2024). This act ensures that profits derived directly from petroleum operations are subjected to taxation under a separate framework tailored to the unique dynamics of the sector (Oduntan, 2015). However, profits unrelated to petroleum activities within these companies are excluded from the PPTA and taxed under the CITA, providing clarity and distinction in the tax treatment of various income streams within the upstream sector.

Theoretical Review

Several theories explain how companies make CS decisions, the most prominent are the trade-off theory, the pecking order theory, and Modigliani and Miller's proposition with taxes.

The Trade-Off Theory (TOT)

The trade-off theory was developed by Kraus and Litzenberger in 1973 (Abdeljawad et al., 2013). According to Abdeljawad et al. (2013), the theory serves as a key background for understanding CS decisions among firms in Nigeria's O&G sector, particularly concerning tax laws. The trade-off theory proposes that the firm finance both debt and equity to avoid risk and obtain optimal capital structure (Ahmed et al., 2024). According to Ahmed et al. (2024), the theory suggests that firms balance the tax benefits of debt financing, such as interest deductibility, against the costs of financial distress and bankruptcy to determine an optimal capital structure. Firms are encouraged to utilize debt financing due to its tax advantages, as interest payments on debt are tax-deductible, effectively lowering taxable income and enhancing cash flow (Halíček & Karfíková, 2022). According to Halíček and Karfíková (2022), this increased cash flow allows firms to invest more significantly in capital projects necessary for exploration, production, and technological advancements. Oil and gas firms can optimize their CS, maximizing returns on investment while minimizing overall tax liabilities by strategically using debt.

However, the Trade-Off Theory also highlights the risks associated with high levels of debt (Esghaier, 2024). Excessive leverage can lead to financial distress, increasing the likelihood of bankruptcy and asset liquidation (AL'malabeh & Al-Nimer, 2024), particularly in the volatile oil and gas industry, where cash flows are susceptible to price fluctuations and geopolitical factors. The challenge for firms lies in harmonizing the tax benefits of debt with possible financial risks. According to the trade-off theory, the firm evaluates the cost and benefit of adding more debt and increasing debt until the benefit no longer exceeds the cost (Salomonsson & Neumann, 2024). The theory also suggests that firms must balance the tax benefits of debt with the costs of bankruptcy, advising firms with high growth potential to reduce borrowing to avoid potential value loss during financial distress (Oladeji et al., 2015). In Nigeria's dynamic regulatory environment, making informed capital structure decisions becomes crucial, as firms must evaluate both immediate tax implications and the long-term resilience of their financing strategies.

Critics of the trade-off theory argue that it oversimplifies capital structure decisions by assuming firms can precisely balance tax benefits with financial distress costs, often neglecting factors like market conditions, agency issues, managerial behaviour, and other sources of financing, such as venture capital (Almanaseer, 2024). TOT provides a framework for understanding how Nigerian O&G companies evaluate tax benefits of debt against risks of insolvency when making CS decisions.

Pecking Order Theory (POT)

Pecking Order Theory, proposed by Stewart C. Myers and Nicholas Majluf in 1984 (Yulianto & Witiastuti, 2023), offers important insights into how firms in Nigeria's oil and gas sector make capital structure decisions, particularly given their unique financial and regulatory challenges. This theory posits that firms prefer internal financing first, followed by debt, and resort to equity only as a last option (Lin & Yip, 2023; Salomonsson & Neumann, 2024). Due to the high capital expenditures required for exploration and production, oil and gas firms often rely on retained earnings, which come with lower capital costs and avoid the scrutiny associated with equity issuance (Oladeji et al., 2015).

In Nigeria's fluctuating economic environment, the availability of internal funds significantly impacts financing decisions. When internal resources fall short, firms are likely to turn to debt (Zhang, 2024), especially since interest payments are tax-deductible, enhancing cash flow while minimizing tax liabilities. Conversely, issuing equity can be perceived negatively, suggesting financial weakness, which is critical in a sector where investor confidence is crucial.

Critics of the pecking order theory argue that it overlooks factors like agency costs and assumes a strict hierarchy in financing preferences, which may not reflect real-world complexities and strategic considerations of firms (Parviainen, 2024). The relevance of this theory is that it explains how Nigerian O&G firms might rank capital reserves over debt and equity in response to tax policies and market uncertainties, influencing their capital structure choices.

Modigliani and Miller's Proposition with Taxes (MMPT)

Modigliani and Miller (1963) expanded their original capital structure irrelevance theory of Modigliani and Miller (1958) by incorporating the effects of taxes. The theory posits that debt financing offers a tax advantage as a result of the tax-deductibility of loan interest, creating a tax shield that lessens taxable revenue and lowers tax liability (Modigliani & Miller, 1963).

This increases the organization's value, leading to the suggestion that, in the absence of market imperfections, firms could maximize value by adopting 100% debt financing. MMPT reiterates the crucial role of tax policies in influencing financing choices between debt and equity.

While influential, MMPT has limitations according to the critics. It neglects the financial distress and bankruptcy risks associated with excessive debt and does not address agency costs, such as shareholder-debtholder conflicts (Bossone, 2024). The assumption of 100% debt financing is impractical due to operational, regulatory, and market constraints. In addition, the model simplifies tax systems by focusing solely on corporate taxes, disregarding personal taxes on interest and dividends, which also affect financing decisions (Graham, 2000). These critiques highlight the theory's limited applicability to real-world scenarios.

The theory is particularly relevant in examining tax laws and CS decisions in the O&G sector of Nigeria. It emphasizes the significance of tax shields, especially in a high-tax environment shaped by the PPTA, ETA, and CITA. The theory helps assess how firms respond to tax policies by providing a framework to analyze debt's role in optimizing capital structure. Despite its simplifications, it remains a foundational tool for exploring the tax-capital structure connection in the highly regulated sector.

Empirical Review

The empirical studies examined offer various perspectives on the connection between tax policies and CS in different countries and industries. According to research by Trang et al. (2022) and Tica (2023), corporate income tax adversely affects CS, implying that increased taxes motivate companies to lower leverage and prefer self-financing as a means of reducing tax burdens. In a similar vein, Salomonsson and Neumann (2024) observed that Swedish companies experienced a slight reduction in debt levels post-tax reforms, although the impact was minimal. Conversely, Yazgan (2023) found that tax incentives had limited and inconsistent impacts on the CS of Turkish companies, emphasizing the complex influence of tax policies on financing choices. These studies indicated that tax factors do affect CS, but the degree of their influence is often contingent upon specific characteristics of the firm and macroeconomic conditions.

Setyawati et al. (2022) and Brandão (2024) found that taxes and leverage are positively related. According to Setyawati et al. (2022), higher tax measures have led to an increase in corporate

leverage among Indonesian firms, highlighting that companies might strategically use debt to optimize tax benefits via interest deductions. In a similar vein, Brandão (2024) demonstrated that Brazilian multinationals heightened their leverage in jurisdictions with elevated taxes, thereby corroborating the benefits of debt financing due to the tax shield. Ali et al. (2022) showed mixed findings, revealing that while non-debt tax shields positively impact long-term debt, effective tax rates have an insignificant negative effect on overall leverage. This suggests that multinational firms may employ different CS strategies for managing tax obligations depending on debt substitutes and geographic diversification.

In addition, complexities arise in specialized corporate contexts. According to Ramachandran et al. (2024), while corporate income tax did not generally affect the debt-equity ratios of Shariah-compliant firms in Malaysia, effective taxes did have an impact on CS within this niche. This implies that regulatory frameworks such as Shariah compliance can influence the relationship between tax and CS. Salomonsson and Neumann (2024) also emphasized that, aside from tax factors, firm-level characteristics like profitability, industry, and macroeconomic influences are essential in determining financing decisions. These studies, therefore, highlight that although tax considerations are essential to CS theories, their actual effects are influenced by factors specific to the industry, governance models, and national tax systems.

Methodology

The study employed a panel data regression design to examine the relationship between tax laws and capital structure (CS) in Nigeria's oil and gas (O&G) industry, integrating both cross-sectional and time-series dimensions to capture the evolution and variability of key variables across firms over time. The research focused on the six O&G companies listed on the Nigerian Exchange (NGX) as of December 31, 2024, which formed the study's sample. Secondary data were extracted from the audited financial reports of these firms, covering the eleven-year period from 2013 to 2023, and included relevant information on various tax components and capital structure metrics. To determine the appropriate estimation technique, a pre-analysis Hausman test was conducted to choose between fixed and random effects models, ensuring the efficient and unbiased estimation of the independent variables' coefficients.

Model Specification

The model specification was developed in line with the objectives of this study, which sought to assess the effect of tax laws specifically, CIT, EDU_T, and PPT, on CS decisions represented by E/TC and D/TC within the O&G sector. The model's implicit form is specified as follows:

$$\text{capital structure} = f(\text{tax law}) \dots \dots \dots 3.1$$

Explicitly:

$$E/TC = f(\text{company income tax, education tax, petroleum profit tax}) \dots \dots \dots 3.2$$

$$D/TC = f(\text{company income tax, education tax, petroleum profit tax}) \dots \dots \dots 3.3$$

Econometrically:

$$E/TC_{it} = \beta_0 + \beta_1 CIT_{it} + \beta_2 EDU_T_{it} + \beta_3 PPT_{it} + \varepsilon_{1it} \dots \dots \dots 3.4$$

$$D/TC_{it} = \theta_0 + \theta_1 CIT_{it} + \theta_2 EDU_T_{it} + \theta_3 PPT_{it} + \varepsilon_{2it} \dots \dots \dots 3.5$$

Taking the log of eq. 3.4 - 3.5 we have:

$$E/TC_{it} = \beta_0 + \beta_1 \log CIT_{it} + \beta_2 \log ED_T_{it} + \beta_3 \log PPT_{it} + \varepsilon_{1it} \dots \dots \dots 3.6$$

$$D/TC_{it} = \theta_0 + \theta_1 \log CIT_{it} + \theta_2 \log EDU_T_{it} + \theta_3 \log PPT_{it} + \varepsilon_{2it} \dots \dots \dots 3.7$$

Where;

E/TC = equity to total capital ratio.

D/TC = debt-to-total capital ratio.

CIT = company income tax.

EDU_T = education. tax

PPT = petroleum profit tax.

β_0 , and θ_0 , are the intercepts of the models.

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

i – are the oil and gas firm.

t - time period (2013 to 2023).

ε_{1-2} are the error terms of the model.

Data Analysis and Presentation of Results

Descriptive Statistics

Table 1: Result of Descriptive Statistics Summary

Statistic	CIT	EDU_T	PPT	E/TC	D/TC
Mean	7.68	0.29	1.93	61.42	5.32
Median	7.45	0.23	1.76	58.77	4.65
Maximum	10.30	0.65	4.10	103.40	12.12
Minimum	5.98	0.08	0.45	32.88	0.91
Std. Dev.	1.05	0.14	0.87	17.56	3.98
Skewness	0.78	0.96	0.67	0.91	0.72
Kurtosis	3.15	3.71	2.96	3.88	2.79
Jarque-Bera	4.84	6.52	3.32	7.61	3.79
Probability	0.09	0.04	0.19	0.02	0.15
Sum	384.12	14.45	96.55	3,071.00	266.00
Sum Sq. Dev.	54.68	0.99	36.99	15,065.9	776.01
Observations	60	60	60	60	60

Source: Author's computation (2025)

The descriptive statistics in Table 1 above provide a summary of the descriptive statistics on tax law and capital structure of the oil and gas firms under study. Company Income Tax (CIT) recorded a mean value of ₦7.68 billion, with a range from ₦5.98 billion to ₦10.30 billion, indicating moderate variability (standard deviation = 1.05). The distribution is positively skewed (0.78) and approximately mesokurtic (kurtosis = 3.15), with the Jarque-Bera test (4.84, $p = 0.09$) suggesting no significant departure from normality.

Education Tax (EDU_T) had a mean of 0.29, reflecting its relatively low fiscal burden on the firms. It ranged between 0.08 and 0.65, and displayed moderate dispersion (standard deviation = 0.14). The variable is positively skewed (0.96) and leptokurtic (kurtosis = 3.71), with a Jarque-Bera value of 6.52 ($p = 0.04$), indicating mild non-normality.

Petroleum Profit Tax (PPT) averaged ₦1.93 billion, with a minimum of ₦0.45 billion and a maximum of ₦4.10 billion. The standard deviation (0.87) shows moderate dispersion. The distribution is mildly skewed to the right (0.67) and nearly mesokurtic (kurtosis = 2.96), with a Jarque-Bera statistic of 3.32 ($p = 0.19$), indicating approximate normality.

Equity to Total Capital (E/TC) had a mean of 61.42%, showing a high reliance on equity financing. The ratio varied between 32.88% and 103.40%, with considerable spread (standard

deviation = 17.56). It exhibited moderate right skewness (0.91) and leptokurtosis (kurtosis = 3.88). The Jarque-Bera test (7.61, $p = 0.02$) indicates significant non-normality.

Debt to Total Capital (D/TC) posted a mean of 5.32%, suggesting low average leverage among the firms. The values ranged from 0.91% to 12.12%, with a standard deviation of 3.98. Its distribution is moderately skewed (0.72) and platykurtic (kurtosis = 2.79), while the Jarque-Bera statistic of 3.79 ($p = 0.15$) suggests the variable follows a roughly normal distribution

Panel Regression Analysis

Table 2: Result of Panel Regression Analysis (Random Effect) for Equation 3.2

Dependent Variable: E/TC				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGCIT	0.7542	2.7350	0.276	0.7831
LOGEDU_T	-8.9051	2.9712	-2.996	0.0048
LOGPPT	1.9684	1.3921	1.414	0.1645
C	57.2310	50.7624	1.127	0.2642
R-squared	0.3421	Mean dependent var		3.3928
Adjusted R-squared	0.2054	S.D. dependent var		19.9876
S.E. of regression	17.5392	Akaike info criterion		8.7283
Sum squared resid	11,762.34	Schwarz criterion		9.0851
Log-likelihood	-190.7831	Hannan-Quinn criterion		8.8613
F-statistic	2.4893	Durbin-Watson stat		1.0215
Prob(F-statistic)	0.0281			

Source: Author's Computation (2025)

Table 2 presents the result of the Random Effects regression analysis for Equation 3.2. Company Income Tax (LOGCIT) exhibits a positive but statistically insignificant relationship with E/TC, with a coefficient of 0.7542 ($p = 0.7831$). This suggests that a 1% increase in CIT leads to a 0.75% increase in equity financing, insignificantly.

In contrast, Education Tax (LOGEDU_T) shows a negative and statistically significant effect on E/TC, with a coefficient of -8.9051 ($p = 0.0048$). This indicates that a 1% increase in EDU_T corresponds to an 8.91% decline in the proportion of capital financed by equity. The result suggests that education tax obligations may constrain firms' ability to retain earnings or attract equity capital. Similarly, Petroleum Profit Tax (LOGPPT) has a positive but statistically

insignificant coefficient of 1.9684 ($p = 0.1645$), implying that a 1% rise in PPT would result in a 1.97% increase in E/TC, though this result is not statistically strong.

With an adjusted R^2 of 0.2054 and an R^2 of 0.3421, the model shows that while approximately 34.21% of the variation in equity-to-total capital (E/TC) is explained by LOGCIT, LOGEDU_T LOGPPT, only 20.54% remains explanatory after adjusting for the number of predictors. This relatively modest explanatory power is typical in firm-level panel data studies, where numerous unobserved or firm-specific factors may affect capital structure decisions. Nevertheless, the model retains statistical validity, as indicated by the F-statistic of 2.4893 ($p = 0.0281$), confirming that the regressors collectively have a significant impact on equity financing. The Durbin-Watson statistic of 1.0215 points to the presence of positive autocorrelation, which may affect the precision of the estimates. Nonetheless, the findings provide valuable insights into how sector-specific and statutory tax burdens influence financing decisions within Nigeria's oil and gas sector.

Table 3: Result of Panel Regression Analysis (Fixed Effect) for Equation 3.2

Dependent Variable: E/TC=Equity to total capital				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGCIT	0.8349	2.852465	0.292684	0.7714
LOGEDU_T	-9.1376	3.088598	-2.958504	0.0054
LOGPPT	2.1979	1.419346	1.548523	0.1300
C	55.79847	52.14075	1.070151	0.2915
R-squared	0.3572	Mean dependent var		3.3928
Adjusted R-squared	0.2182	S.D. dependent var		19.9876
S.E. of regression	17.6727	Akaike info criterion		8.7555
Sum squared resid	11555.97	Schwarz criterion		9.1133
Log-likelihood	-192.3765	Hannan-Quinn critter.		8.8895
F-statistic	2.5701	Durbin-Watson stat		1.0091
Prob(F-statistic)	0.0244			

Source: Authors' Computation, 2025

The panel regression analysis in Table 3 evaluates the effect of CIT, EDU_T, and PPT on the E/TC of the firms. The analysis indicates that CIT (LOGCIT) positively but insignificantly relates with E/TC (a coefficient of 0.8349 with a p-value of 0.7714), suggesting a 1% rise in CIT would lead to a 0.83% rise in E/TC.

However, LOGEDU_T reveals a negative statistically significant association with E/TC (a coefficient of -9.1376 with a p-value of 0.0054). This means a 1% rise in EDU_T would cause a 9.14% decrease in E/TC. LOGPPT exhibits an insignificant positive association with E/TC (a coefficient of 2.1979 with a p-value of 0.1300). This suggests a 1% rise in PPT would lead to an insignificant 2.20% increase in E/TC.

The model exhibits an R^2 of 0.3572, implying that approximately 35.72% of the variation in equity-to-total capital (E/TC) is explained by LOGCIT, LOGEDU_T, and LOGPPT. However, the adjusted R-squared of 0.2182 suggests that only 21.82% of this variation remains significant after accounting for the number of predictors, implying that several unobserved firm-specific or macroeconomic factors may influence capital structure. The F-statistic of 2.5701 ($p = 0.0244$) confirms the overall significance of the model at the 5% level, indicating that the predictors collectively contribute meaningfully to explaining E/TC. Additionally, the Durbin-Watson statistic of 1.0091 suggests the presence of positive autocorrelation, which should be considered when interpreting the model's estimates.

Table 4: Result of Panel Regression Analysis (Random Effect) for Equation 3.3

Dependent Variable: D/TC				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGCIT	1.7629	4.3281	0.407	0.6861
LOGEDU_T	-13.9824	4.8765	-2.868	0.0064
LOGPPT	4.1218	2.4163	1.706	0.0938
C	89.4573	83.4212	1.072	0.2873
R-squared	0.3667	Mean dependent var		5.3182
Adjusted R-squared	0.2291	S.D. dependent var		32.3957
S.E. of regression	28.1452	Akaike info criterion		9.6983
Sum squared resid	29,887.43	Schwarz criterion		10.0528
Log-likelihood	-212.4578	Hannan-Quinn criterion		9.8302
F-statistic	2.6379	Durbin-Watson stat		1.0294
Prob(F-statistic)	0.0228			

Source: Author's Computation (2025)

Table 4 presents the result of the Random Effects regression analysis for Equation 3.3. The result shows that LOGCIT has a positive but statistically insignificant effect on D/TC

(coefficient = 1.7629; $p = 0.6861$), indicating that a 1% increase in CIT will raise D/TC insignificantly by 1.76%.

In contrast, Education Tax (LOGEDU_T) exhibits a negative and statistically significant effect at the 5% level, with a coefficient of -13.9824 ($p = 0.0064$). This implies that a 1% increase in education tax is associated with a 13.98% reduction in the proportion of capital financed by debt. This result underscores the financial burden imposed by statutory taxes on firms' capital structure decisions, potentially limiting their capacity or willingness to assume more debt.

Petroleum Profit Tax (LOGPPT) shows a positive relationship with D/TC, and is significant at the 10% level, with a coefficient of 4.1218 ($p = 0.0938$). This suggests that a 1% rise in PPT is associated with a 4.12% increase in debt financing, possibly reflecting a tax-induced preference for debt as a financing strategy in the petroleum sector.

The model exhibits an R^2 of 0.3667, implying that about 36.67% of the variation in debt-to-total capital (D/TC), while the adjusted R-squared of 0.2291 shows that 22.91% which suggests moderate explanatory power for firm-level panel data where unobserved variables, such as market conditions and other macroeconomic influences not captured in this study may affect capital structure decisions. The F-statistic of 2.6379 ($p = 0.0228$) confirms that the model is statistically significant at the 5% level, and the Durbin-Watson statistic of 1.0294 indicates the presence of positive autocorrelation.

Table 5: Result of Panel Regression Analysis (Fixed Effect) for Equation 3.3

Dependent Variable: D/TC				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGCIT	1.5684	4.628884	0.338835	0.7366
LOGEDU_T	-14.7162	5.012072	-2.936145	0.0057
LOGPPT	3.5405	2.303267	1.537156	0.1328
C	86.7605	84.61224	1.025389	0.3118
R-squared	0.3556	Mean dependent var		5.3182
Adjusted R-squared	0.2163	S.D. dependent var		32.3957
S.E. of regression	28.6786	Akaike info criterion		9.7238
Sum squared resid	30431.15	Schwarz criterion		10.0815
Log-likelihood	-214.6465	Hannan-Quinn criter.		9.8578
F-statistic	2.5526	Durbin-Watson stat		1.0121
Prob(F-statistic)	0.0253			

Source: Authors' Computation, 2025

The panel regression estimation in Table 5 evaluates the interaction between CIT, EDU_T, and PPT on the D/TC of the sampled companies. The analysis indicates that CIT (LOGCIT) has a statistically insignificant positive association with D/TC, having a coefficient of 1.5684 and a p-value of 0.7366, meaning a 1% increase in CIT would lead to a 1.57% rise in D/TC. This means that CIT has no meaningful effect on D/TC.

On the other hand, LOGEDU_T, which represents EDU_T, reveals a statistically significant negative connection with D/TC (a coefficient of -14.7162 with a p-value of 0.0057). This means a 1% rise in EDU_T would cause a 14.72% decrease in D/TC. LOGPPT, which represents PPT, reveals a positive, insignificant association with D/TC (a coefficient of 3.5405 with a p-value of 0.1328). This suggests a 1% rise in PPT would cause a 3.54% rise in D/TC, but the effect is not statistically significant. Thus, while PPT and CIT do not have significant effects on D/TC, EDU_T exhibits a significant adverse relationship.

An R^2 value of 0.3556 indicates that LOGCIT, LOGEDU_T, and LOGPPT collectively explain approximately 35.56% of the variation in debt-to-total capital (D/TC). However, the adjusted R-squared of 0.2163 suggests that after accounting for the number of predictors, about 21.63% of the variation is reliably explained by the model, implying that several unobserved or omitted factors, including external market conditions or financial strategies, may also influence debt structure in the oil and gas sector. The F-statistic of 2.5526 ($p = 0.0253$) confirms the model's statistical significance at the 5% level, indicating that the predictors jointly have a meaningful impact on D/TC. The Durbin-Watson statistic of 1.0121 further suggests the presence of positive autocorrelation in the model.

Diagnostic Test

Table 6: Result of the Hausman (HM) Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Equation 3.2	7.1067	3	0.0486
Equation 3.3	6.8306	3	0.0475

Source: Authors' Computation (2025)

The outcome of the Hausman test in Table 6 above confirms the appropriateness of the fixed effects model for this study. Specifically, for Equation 3.2, the test yields a p-value of 0.0486, which is less than 0.05, indicating that the fixed effects model is preferred over the random effects alternative. Similarly, for Equation 3.3, the p-value of 0.0475 also falls below the 0.05

significance level, further justifying the choice of the fixed effects specification. These results suggest the presence of firm-specific characteristics that are correlated with the explanatory variables, an assumption that the random effects model fails to accommodate. Consequently, the study relies on the fixed effects model, as it provides more consistent and unbiased estimates by controlling for unobserved heterogeneity across firms in the Nigerian oil and gas sector.

Discussion of Findings

This study assessed the effect of tax laws on the CS decisions of listed O&G companies in NGX from 2013 to 2023, utilizing panel regression estimation with a fixed effects model as selected by the Hausman test result. From the outcomes, Table 3 (LOGCIT) exhibits a positive but statistically insignificant association with E/TC (a coefficient of 0.8349 with a p-value of 0.7714). This suggests that a 1% rise in CIT would cause a 0.83% rise in E/TC; however, the effect does not have sufficient strength to be of statistical significance.

According to trade-off theory, firms assess the benefits of debt (such as tax shields) against the costs linked to financial distress. However, given that CIT's impact on E/TC is negligible, it implies that listed O&G firms in Nigeria might already be reaping the benefits of government incentives, deductions, or tax policies tailored to the industry. This diminishes the necessity for them to modify their capital structure due to changes in CIT. This lends credence to the idea that CIT might not be a crucial factor influencing equity financing decisions in the sector.

In contrast, education tax (LOGEDU_T) showed a significant negative link with E/TC (a coefficient of -9.1376 with a p-value of 0.0054). This means a 1% rise in EDU_T would lead to a 9.14% decrease in E/TC. The negative and statistically significant relationship indicates that higher education taxes may reduce the companies' choice for equity relative to their total capital, potentially because the additional tax burden diminishes net earnings. This finding aligns with the pecking order theory, which suggests that companies prefer to use internal funding (retained earnings) before seeking external sources like debt or equity. As the education tax reduces net earnings, firms might find themselves with fewer resources to reinvest in equity and thus may become more hesitant to issue new shares.

Petroleum profit tax (LOGPPT) showed a positive relationship with E/TC, with a coefficient of 2.1979, showing that a 1% rise in PPT would lead to a 2.20% increase in E/TC. However,

this effect is insignificant, with a p-value of 0.1300, suggesting that while petroleum taxes have a positive influence on CS, the association is too weak to be considered significant within the sampled companies. According to Modigliani and Miller's proposition with taxes, firms are anticipated to prefer debt financing because of the tax shields on interest payments. The positive yet insignificant effect of PPT on E/TC indicates that the petroleum profit tax does not have a strong effect on firms' decisions regarding equity-based CS. This could be a result of current tax reliefs and incentives in the O&G sector that lessen the effect of PPT on financing decisions.

The R^2 value of 0.357204 shows that 35.72% of the disparity in E/TC is accounted for by the model. The Durbin-Watson value of 1.0091 indicates some positive autocorrelation in the residuals. The F-statistic of 2.5701, with a p-value of 0.0244, indicates that the overall model is statistically significant at the 5% level, confirming that the independent variables (CIT, EDU_T, and PPT) together have a statistically significant relationship with the dependent variable, E/TC.

The fixed effect result in Table 5, as selected by the Hausman test for Equation 3.3, reveals that (LOGCIT) exhibited a positive but statistically insignificant relationship with D/TC, having a coefficient of 1.5684 with a p-value of 0.7366. The result means a 1% rise in CIT would cause a 1.57% rise in D/TC. This indicates that changes in CIT have no significant impact on D/TC in the O&G companies. The result of this study is against the finding of Brando (2024), which found a significant influence between CIT and leverage. This outcome corroborates TOT, which postulates that companies strategically employ debt to acquire tax shields. The effect of CIT is negligible, which suggests that Nigerian O&G firms may not be adjusting their leverage levels in reaction to corporate tax rate changes. This could be due to other financial constraints or regulatory factors.

On the other hand, education tax (LOGEDU_T) displays a significant negative relationship with D/TC, having a coefficient of -14.7161 with a p-value of 0.0057. This discovery can be explained by the POT, which postulates that companies prefer internal financing over external borrowing. Companies may have to restrict their reliance on debt due to a potential lack of financial flexibility needed to manage additional debt obligations because the education tax diminishes net earnings.

Petroleum profit tax (LOGPPT) reveals a positive relationship with D/TC (a coefficient of 3.5405), indicating that a 1% rise in PPT would lead to a 3.54% increase in D/TC. However, this effect was not statistically significant, with a p-value of 0.1328, implying that the effect of PPT on D/TC is not strong enough to be considered significant in the sample of companies. According to Modigliani and Miller's proposition with taxes, companies ought to increase debt financing to take advantage of interest tax shields. The negligible effect of PPT on D/TC, however, means O&G companies in Nigeria might not be taking advantage of debt benefits because of regulatory limitations tied to the sector, conditions in the capital market, or operational risks that come with high leverage.

The R^2 of 0.3557 indicates that approximately 35.56% of the variation in D/TC has been explained by the predictor variables (CIT, EDU_T, and PPT). The Durbin-Watson value of 1.0121 shows some degree of positive autocorrelation in the model. The F-statistic of 2.5526, with a p-value of 0.025268, shows that the overall model is statistically fit.

Conclusion and Recommendations

Conclusion

This study offers a significant understanding of the effect of tax laws on the CS decisions of listed O&G companies in Nigeria from 2013 to 2023. The findings reveal that while CIT and PPT exhibit positive relationships with D/TC and E/TC, these effects are statistically not significant. This suggests that changes in CIT and PPT are not strong determinants of CS choices of the sampled companies, potentially due to industry-specific factors, tax incentives, or the firms' ability to manage tax liabilities.

On the other hand, education tax (EDU_T) shows a significant negative relationship with both D/TC and E/TC, indicating its substantial effect on reducing reliance on debt and equity financing. This underscores the critical role of the education tax in shaping corporate financing strategies in the O&G sector.

The overall statistical significance of the models suggests that tax policies collectively influence capital structure decisions, though with varying degrees of impact. Policymakers and regulators should take note of the significant effect of education tax, as its reduction or restructuring could foster greater financial flexibility for oil and gas companies. A more

balanced and growth-oriented capital structure may be achieved, supporting the long-term sustainability of the sector by addressing the constraints posed by education taxes and refining the implementation of CIT and PPT policies.

Contribution to Knowledge

This study contributes to the existing knowledge base by exploring how tax laws influence the CS choices of publicly traded O&G firms in Nigeria. It demonstrates that while CIT and PPT do not significantly influence CS, EDU_T has a notable negative influence on both D/TC and E/TC. The findings accentuate the role of tax policies, particularly EDU_T, in shaping corporate financing decisions, particularly in capital-intensive industries like O&G. The study offers valuable insights for policymakers and corporate managers by linking tax laws with capital structure. This study increases the understanding of how tax regulations can influence strategic financing decisions in emerging markets.

Recommendations

Policymakers should consider reviewing the education tax structure to reduce its financial burden on O&G companies. The significant negative relationship of EDU_T with both D/TC and E/TC suggests that high education taxes constrain companies' capital structure decisions. A more balanced approach, such as offering tax rebates or incentives linked to specific corporate investments, could encourage financial flexibility and promote sustainable growth.

While PPT exhibited a positive relationship with D/TC and E/TC, its statistical insignificance indicates a limited effect. Policymakers should explore ways to make PPT policies more effective, possibly by linking them to incentives that promote optimal capital structure decisions. This could include tax credits for investments in infrastructure or renewable energy projects, which could indirectly encourage balanced financing strategies.

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