

Moderating Effect of Tax Policy on Corporate Attributes and Tax Aggressiveness in Listed Manufacturing Companies in Nigeria

¹ Damilare David Obasanya, ²Alhassan Abdulkarim Shaibu., & Aruwa A.S.

¹Department of Accounting, Nasarawa State University, Keffi.

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Abstract

Tax aggressiveness has become a significant concern among listed manufacturing companies in Nigeria, as it impacts both government revenue and corporate accountability. Many firms exploit legal loopholes and complex tax planning techniques, resulting in significant revenue losses. The main objective of this study was to explore moderating effect of tax policy on corporate attributes and tax aggressiveness in listed manufacturing companies in Nigeria. Using data from 430 observations, the study employed a fixed effects regression model to test four hypotheses related to firm leverage, liquidity, and their interactions with tax rates. The findings revealed that firm leverage (p -value = 0.033) and liquidity (p -value = 0.027) both have significant positive effects on tax aggressiveness. Additionally, the interaction between tax rate and firm leverage (p -value = 0.001) and tax rate and liquidity (p -value = 0.002) showed that high leverage and liquidity levels, when combined with higher tax rates, increase the likelihood of firms engaging in aggressive tax strategies. These results suggest that firms with greater financial resources are more inclined to adopt tax avoidance strategies. The study recommends strengthening tax policies and enforcement mechanisms to reduce aggressive tax behavior, encouraging transparent tax reporting, offering tax incentives for compliance, and providing guidance on ethical tax planning practices. These measures could help curb tax avoidance, improve tax compliance, and foster corporate responsibility.

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1 INTRODUCTION

Tax aggressiveness has become a significant concern globally, affecting governments, tax authorities, investors, and policymakers due to its impact on national revenue and corporate transparency. It refers to strategies used by companies to reduce their taxable income, often through legal or borderline-illegal means (Frank, 2019). Large corporations, particularly multinational companies, engage in aggressive tax planning, exploiting tax loopholes to minimize tax liabilities (Hanlon & Heitzman, 2020). These practices result in considerable revenue losses for governments and raise concerns about corporate social responsibility (OECD, 2022).

In Africa, tax aggressiveness is exacerbated by weak institutions, poor enforcement, and limited audit capacities. The continent loses over \$50 billion annually due to illicit financial flows, much of which is tied to aggressive tax planning and practices such as transfer pricing (African Union & UNECA, 2015). Manufacturing companies, in particular, exploit regulatory gaps to reduce tax obligations. Factors like firm size, leverage, profitability, and ownership structure influence the degree of tax aggressiveness (Khaoula & Ali, 2022). However, the role of tax policy as a moderating factor in the relationship between corporate attributes and tax aggressiveness remains underexplored in African tax literature.

In Nigeria, tax aggressiveness is a growing issue amidst fiscal deficits and efforts to expand non-oil revenue. The country's tax-to-GDP ratio, at 10.86% in 2022, is one of the lowest globally (FIRS, 2023). This low ratio is partly due to widespread tax avoidance practices. Many Nigerian manufacturing companies engage in aggressive tax behavior, influenced by corporate characteristics and gaps in tax enforcement (Ofori & Ofori, 2020). Despite efforts to reform the tax system, including the Finance Acts of 2019-2023, many companies continue to manipulate taxable income (Ogbeide, 2017). Recent studies suggest that tax policy should not only be viewed as a determinant of tax aggressiveness but also as a moderating factor that influences how corporate characteristics affect tax behavior (Asongu, 2020; Salihu, 2015). However, there is a significant research gap, especially in developing economies like Nigeria, where tax enforcement mechanisms are still evolving. Most studies focus on tax determinants or tax policy frameworks but overlook how corporate attributes and tax policy interact to shape tax aggressiveness.

Liquidity, or a firm's ability to meet short-term obligations, plays a role in tax aggressiveness. Firms with higher liquidity might be less inclined to engage in aggressive tax planning since they can meet financial obligations without resorting to tax avoidance (Chen et al., 2022). However, liquidity can also provide firms the flexibility to implement tax strategies that reduce liabilities (Hanlon & Heitzman, 2022). Studies show that firms with lower liquidity are more likely to engage in aggressive tax planning to maintain cash flow (Chen et al., 2022; Badertscher et al., 2022). Conversely, higher liquidity may reduce the need for tax reduction strategies (Gupta & Newberry, 2017).

While much research has focused on firm size, leverage, and profitability as determinants of tax aggressiveness, limited attention has been given to how tax policy moderates the impact of these corporate attributes (Lanis & Richardson, 2012; Salawu & Adedeji, 2017). In Nigeria, empirical studies often adopt broad sectoral analyses, neglecting sector-specific dynamics, particularly in the manufacturing industry, which has distinct tax behaviors and regulatory challenges (Ogbeide, 2017; Ofori & Ofori, 2020). Moreover, studies often overlook recent tax reforms, like the Finance Acts (2019–2023), and their potential impact on corporate tax behavior (FIRS, 2023).

This research aims to fill these gaps by exploring how tax policy moderates the relationship between corporate attributes and tax aggressiveness in Nigeria's manufacturing sector. By doing so, it will contribute to both theory and practice, offering valuable insights for policymakers and tax administrators to design more effective tax policies that mitigate aggressive tax behavior and promote compliance and transparency. The main goal of this study is to examine how tax policy (tax rate) influences the relationship between corporate characteristics and tax aggressiveness in Nigerian manufacturing companies.

The specific objectives are to: Evaluate the effect of firm leverage on tax aggressiveness of listed manufacturing companies in Nigeria. Investigate the effect of liquidity on tax aggressiveness of listed manufacturing companies in Nigeria. Evaluate the moderating effect of tax rate on relationship between firm leverage and tax aggressiveness of listed manufacturing companies in Nigeria. Investigate the moderating effect of tax rate on relationship between liquidity and tax aggressiveness of listed manufacturing companies in Nigeria.

2 LITERATURE REVIEW

2.1 Tax-Aggressiveness

Tax aggressiveness has become a critical issue in both academic research and policy discussions, primarily because of its impact on corporate governance, financial reporting, tax compliance, and government revenue. It refers to a spectrum of strategies companies use to reduce their tax liabilities, ranging from legal tax planning to illegal tax evasion (Frank, 2019). Tax aggressiveness can be seen as a continuum, where tax compliance (accurate and timely tax filing) is at one end, tax evasion (illegal activities such as income concealment) is at the other, and tax avoidance (legal but potentially unethical strategies) falls in the middle. From a financial management perspective, tax aggressiveness leads to a gap between book income (reported in financial statements) and taxable income (as recognized by tax authorities), often measured through proxies like the Book-Tax Difference (BTD) and Effective Tax Rate (ETR) (Dyreng, Hanlon, & Maydew, 2008).

Recent research has expanded to explore the factors and firm characteristics that influence tax aggressiveness. For instance, Lanis and Richardson (2012) found that corporate governance structures, especially board independence, tend to reduce aggressive tax behavior. Similarly, Rego and Wilson (2012) highlighted that firms with higher tendencies for earnings management are more likely to engage in aggressive tax planning. Other factors, such as firm size, leverage, liquidity, and profitability, also play a role, though the strength of these relationships varies (Taylor & Richardson, 2014; Ofori & Ofori, 2020). In developing countries like those in sub-Saharan Africa, tax aggressiveness is more pronounced due to institutional weaknesses, poor regulatory enforcement, and high informality in the economy. The African Union and UNECA (2015) estimate that Africa loses over \$50 billion annually to illicit financial flows, much of which is driven by aggressive tax planning.

In Nigeria, tax aggressiveness has become a pressing issue for policymakers. Despite tax reforms, the country's tax-to-GDP ratio remains low at 10.86% in 2022 far below the OECD average of over 30% (FIRS, 2023). This low ratio is partly due to widespread tax avoidance in sectors like manufacturing, oil and gas, and telecommunications (Ogbeide, 2017). Companies exploit loopholes in tax laws, inconsistencies in tax policy implementation, and weak enforcement by tax authorities to reduce their tax liabilities. The Finance Acts (2019–2023) were introduced to broaden the tax base, close loopholes, and improve compliance. However, empirical evidence on the effectiveness of these reforms in reducing tax aggressiveness remains scarce. Salihu (2015) noted that, despite reforms, corporate tax behavior is still heavily influenced by firm-specific characteristics and strategic motives to maximize shareholder wealth.

2.2 Corporate Attributes

Corporate attributes are the internal characteristics of a firm that influence its decision-making, performance, financial behavior, and relationships with external stakeholders. These attributes, which can include factors like firm size, age, profitability, leverage, and liquidity, are crucial in determining how a firm approaches tax planning and whether it engages in aggressive tax strategies. According to Richardson and Lanis (2007), corporate attributes are structural and operational features that reflect a firm's internal profile and shape its responses to external factors such as tax regulations. These attributes affect managerial incentives, risk preferences, financial transparency, and tax compliance. Economic theories, such as agency theory, political cost theory, and the resource-based view, often underpin studies on how corporate attributes influence tax aggressiveness, explaining why certain firms are more likely to engage in tax avoidance or aggressive planning.

2.3 Leverage

Leverage refers to how much debt a firm uses to finance its operations, typically measured by the ratio of debt to assets. High leverage can provide tax benefits through the deductibility of interest expenses, reducing taxable income (Modigliani & Miller, 1963). However, highly leveraged firms might already benefit from these tax shields, making them less inclined to pursue further aggressive tax strategies (Taylor & Richardson, 2014). In Nigeria, the relationship between leverage and tax aggressiveness is mixed some studies (Salawu & Adedeji, 2017) suggest a negative relationship, while others (Ofori & Ofori, 2020) find no significant effect.

Liquidity, the ability of a firm to meet its short-term obligations, is another key factor. Firms with strong liquidity may not feel the need to engage in aggressive tax planning to manage cash flow, whereas firms with poor liquidity may aggressively minimize their tax liabilities to address financial constraints (Chijoke-Mgbame et al., 2020). While Nigerian literature has not extensively explored the link between liquidity and tax behavior, emerging studies suggest that cash-constrained firms tend to adopt more aggressive tax practices.

Corporate attributes not only predict tax aggressiveness but also influence a firm's response to external factors, including changes in tax policy. Hanlon and Heitzman (2010) argue that characteristics such as size, leverage, and profitability determine how much a firm is willing to invest in tax planning and its tolerance for risk and regulatory scrutiny. This is particularly relevant in Nigeria, where firms operate in an unpredictable tax environment with frequent policy shifts and regulatory inconsistencies.

The Finance Acts (2019–2023) were introduced in Nigeria to strengthen the tax system and improve compliance. However, the effectiveness of these reforms may vary depending on a firm's characteristics. Firms of different sizes, profitability levels, and leverage structures may respond differently to the same tax policy changes. This study aims

to explore how these corporate attributes influence tax aggressiveness and whether tax policy moderates these relationships. Understanding these interactions is crucial for designing better tax enforcement strategies and corporate governance practices, especially in developing economies like Nigeria, where improving revenue mobilization is a key challenge.

2.4 Tax Rate as a Moderator

The tax rate is a crucial aspect of tax policy, representing the percentage at which a firm's income or profit is taxed by the government. In corporate taxation, it determines how much of a firm's taxable income must be paid to the state. There are two main types of tax rates: the statutory tax rate, which is the legal rate set by the government, and the effective tax rate (ETR), which is calculated by dividing the total tax expense by pre-tax income. The ETR reflects the actual tax burden on a firm, accounting for tax planning strategies and various deductions, allowances, and credits.

In the context of tax aggressiveness, the tax rate serves both as an incentive and a constraint. Higher tax rates can motivate firms to engage in aggressive tax planning to reduce their tax liabilities, while lower tax rates might decrease this incentive. This dual role makes the tax rate a key factor in understanding how firms manage their tax obligations. According to economic deterrence theory, higher tax rates create stronger incentives for tax avoidance or evasion, as the potential savings from reducing taxable income become more significant (Allingham & Sandmo, 1972). This is especially true when the risk of audits or penalties is low. Therefore, tax rates play a significant role in shaping corporate tax planning behaviors.

On the other hand, the political cost theory (Watts & Zimmerman, 1986) suggests that firms facing higher effective tax rates may avoid aggressive tax practices to reduce political visibility and public scrutiny. This theory implies that the response to changes in tax rates might not always be straightforward. Empirical studies have shown a complex relationship between tax rates and tax aggressiveness. Generally, higher tax rates tend to increase the incentive for tax avoidance, as the potential savings from tax deductions and shelters grow. For example, Rego (2003) found that U.S. multinational companies with higher statutory tax rates were more likely to engage in tax avoidance. Similarly, Chen et al. (2010) observed that firms in high-tax environments are more likely to adopt aggressive tax strategies.

However, some studies suggest that firms facing high effective tax rates may already have exhausted their tax planning options or operate in sectors with fewer tax loopholes, so their high tax burden might be a sign of compliance rather than aggressiveness (Lanis & Richardson, 2012). In Nigeria, findings have been mixed. Ogbeide (2017) found that firms facing higher tax rates often adopt more aggressive strategies to reduce their liabilities, but enforcement strength and the design of the tax system also play a crucial role. Despite reforms such as the Finance Acts (2019–2023), challenges in enforcement and legal ambiguities still provide opportunities for aggressive tax planning (FIRS, 2023). This study considers the tax rate as a moderating variable in the relationship between corporate attributes (such as firm size, age, profitability, leverage, and liquidity) and tax aggressiveness. As a moderator, the tax rate is expected to strengthen or weaken the link between firm-specific characteristics and tax planning behaviors. Using a moderating variable enhances the study's explanatory power and provides a more nuanced understanding of how tax policies, like tax rates, interact with firm behavior.

2.5 Theoretical Reviews

The Resource-Based View (RBV) focuses on how a firm's internal resources and capabilities drive its competitive advantage. In terms of tax aggressiveness, it suggests that firms with more resources can manage complex tax strategies more effectively. Research by Chen et al. (2022) and Hanlon & Heitzman (2022) shows that larger firms, with their financial and human resources, are better equipped for tax avoidance activities, which can lead to lower tax rates. RBV emphasizes that a firm's competitive edge comes from its valuable, rare, and hard-to-imitate resources (VRIN). By leveraging these internal strengths, firms can innovate, differentiate themselves, and sustain long-term success (Barney, 1991; Prahalad & Hamel, 1990). It also stresses the importance of allocating resources strategically to improve performance and adapt to changing market conditions (Wernerfelt, 1984; Teece et al., 2017).

However, critics argue that RBV overfocuses on internal factors, ignoring external market conditions and the evolving nature of resources (Priem & Butler, 2001; Foss, 2017). Identifying and measuring strategic resources can also be subjective and complex (Barney, 2001). Additionally, firms may struggle to align resources with their strategic goals,

and sticking too rigidly to the VRIN framework can make planning more rigid (Eisenhardt & Martin, 2019). Despite these challenges, RBV offers opportunities for firms to innovate and differentiate by developing unique resources that competitors can't easily replicate (Barney, 1991). Firms can also benefit from creating synergies and developing dynamic capabilities to adapt to new market conditions (Teece et al., 2017).

However, external forces like disruptive technologies and regulatory changes can diminish the value of a firm's resources (Christensen, 2017; Oliver, 2017). Internal issues, such as poor resource management or organizational inertia, can also undermine a firm's competitive advantage (Ray et al., 2020; Hannan & Freeman, 1984). Overall, RBV provides a useful framework for firms to understand and leverage their internal resources for competitive advantage, but it requires careful consideration of external factors and effective resource management to be fully effective.

2.6 Empirical Review

Similarly, Peter et al. (2025) evaluates the effects of board attributes on the tax planning of listed non-financial companies in Nigeria. Data for the study were collected from the annual reports and accounts of the sampled companies for a period of ten years from 2022 to 2017. The data collected were analyzed using descriptive statistics to provide summary statistics for the variables, and correlation analysis was carried out using Pearson product-moment correlation to determine the relationship between the dependent and independent variables. Regression analysis was also conducted. The study revealed that board independence has a significant negative effect on tax planning; board size has a non-significant positive effect on tax planning in listed non-financial companies in Nigeria. The findings on board size for both Bashiru et al. (2020); and Peter et al. (2020) indicate that board size does not in any way increase tax avoidance.

Onyali and Okafor (2025) examined the effect of corporate board structure and tax aggressiveness among selected oil marketing firms in Nigeria using the ex-post facto research design. Data was derived from the financial statements of Forty- four (44) consumer production firms on the Nigerian Stock Exchange (NSE) and the NSE fact book as at December 2016 for the period 2005-2017. The data were analyzed using the Ordinary Least Square technique with its Best Linear Unbiased Estimate (BLUE) Property. Findings revealed that board size has no significant effect on tax aggressiveness while board diversity, independent directors, and proportion of non-executive directors to executive directors have a significant impact on tax aggressiveness.

Salawu and Adedeji (2025) examined the impact of corporate board structure on tax planning of nonfinancial quoted companies in Nigeria between 2020 and 2022. A sample of fifty (50) companies out of 151 non-financial quoted companies for 10 sectors were purposively determined and a stratified random sampling technique was used for its selection. The data used in the analysis were collected from the audited financial statements and the Nigeria Stock Exchange Factbooks of the selected companies in Nigeria. The data were analyzed using the generalized method of moments (GMM). The analysis discloses that there is a significant negative relationship between board size and tax planning. Also, it reveals that board independence and foreign ownership have a significant negative relationship with tax planning.

In a related study, Omodero (2025) examined the Effect of Liquidity and Leverage on Tax Avoidance in Nigeria using an ex-post facto design with regression analysis on data from 40 firms. The study found a significant positive effect of liquidity on tax aggressiveness. It was recommended that real-time liquidity monitoring systems be implemented to detect firms likely to engage in avoidance practices. Nevertheless, the study did not distinguish between short-term and long-term liquidity components, limiting the specificity of its findings.

Okoye and Akenbor (2025) conducted a study titled Liquidity and Corporate Tax Planning in Nigerian Firms, employing an Ordinary Least Squares (OLS) model on a sample of 50 firms. Although the relationship between liquidity and tax planning was found to be weakly positive, it still suggested that excess liquidity could influence a firm's tax behavior. The authors recommended the strengthening of internal controls over liquid resources to prevent misuse. However, liquidity was measured solely using the current ratio, which does not fully capture a firm's liquidity dynamics or cash management strategies.

Ezejiofor and Olise (2025) contributed to the discussion through a correlational study titled Liquidity and Tax Compliance in Nigeria: A Sectoral Study, focused on 30 manufacturing firms. The findings indicated that more liquid firms are more likely to manipulate tax liabilities to reduce tax burdens. Based on this, the study proposed the development of liquidity-based risk assessment models to assist tax auditors in identifying avoidance-prone firms. A noted limitation was the short time frame of four fiscal years, which may not capture long-term liquidity trends or tax planning cycles.

3 RESEARCH METHODOLOGY

This study adopted an ex-post facto research design as its methodological framework. The population for the study consisted of 43 listed manufacturing companies under the Nigerian Exchange Group (NGX) as of September 1, 2024. The study utilized the entire population, employing a census sampling technique. Census sampling refers to methods in statistical sampling where every unit in the population is included in the sample, with no random selection or sampling error, as the entire population is surveyed. This approach contrasts with other sampling methods, where only a subset of the population is selected to represent the whole. The data for the study were obtained exclusively from secondary sources, specifically from the audited financial statements of listed manufacturing companies in Nigeria and from the official website of the Nigerian Exchange Group (NGX).

A combination of descriptive and inferential statistical techniques was used to analyze the relationship between firm liquidity and tax aggressiveness among listed manufacturing companies in Nigeria. This dual approach provided a comprehensive understanding of the data, enabling the researcher to both summarize key characteristics of the dataset and test hypotheses regarding the relationships among variables. Descriptive statistics were used to examine general patterns, distribution, and variability in the variables under study. The study's conceptual framework was developed through a deductive approach, aiming to explain the reasons behind variations in corporate tax aggressiveness. The analytical assumptions were based on the objectivist school of thought, which posits that all variables exist independently in a single social reality, though they can influence external factors. The agency and political cost theories formed the theoretical basis upon which the model specifications were built. The econometric model specified in the study was adapted from Oloyemi (2021).

$$TAG = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 AGE_{i,t} + e_{i,t} \dots \dots \dots (1)$$

The model was modified to incorporate other variable for adaption

$$TAG = \beta_0 + \beta_1 + \beta_1 LEV_{i,t} + \beta_2 LIQ_{i,t} + e_{i,t} \dots \dots \dots (2)$$

$$TAG = \beta_0 + \beta_1 LEV_{i,t} * TR + \beta_2 LIQ_{i,t} * TR + e_{i,t} \dots \dots \dots (3)$$

Where:

- TAG = Tax aggressiveness, measured using two proxies (GAAP_ETR and Total BTB) as similarly used by Balakrishnan et al (2017); Martinez and Motta (2019), and Martinez and Rodrigues (2019)
- LIQ = Liquidity for the ten years
- LEV = Leverage for the ten years
- TB = Tax Rate

Variables Measurement and Justification

Dependent variable:	CODE	Measurements	Justification
Tax aggressiveness GAAP effective Tax rate	ETR	The ratio of current income tax expenses to pre-tax book income	Balakrishnan et al (2017);
Total book-tax difference	DBTD	Residual of BTDi = $\Delta TACCi + \Delta i + \Delta it$	Akintoye, et al (2018).
Leverage	LEV	The ratio of total debt to total equity	Balakrishnan et al (2017);
Firm liquidity	LIQ	Ratio of cash to total assets	Akintoye, et al (2018).
Moderating variable Tax Rate	TB	the effective tax rate (ETR) is a commonly used measure to assess the actual tax burden on a company	Balakrishnan et al (2017).

Source: Author Computation 2026

4 RESULTS AND DISCUSSION

The descriptive statistics for the dataset provide insights into the characteristics of the firms over the years 2015 to 2024.

Table 2: Descriptive Statistics

Variable	Mean	Median	St.D	Min	Max	Skewness	Kurtosis
Leverage	0.505	0.31	1.21	0.71	0.30	0.13	1.44
Liquidity	2.85	2.21	2.22	2.3	3.4	0.11	1.43
Tax Rate	0.48	0.48	0.09	0.30	0.71	0.11	1.64
TAG (ETR + DBTD)	0.25	0.24	0.06	0.17	0.42	0.21	1.48

Source: STATA 13 Output 2026

For leverage, on average, firms have a ratio of 0.505, with values ranging from 0.30 to 0.71. The high standard deviation of 1.21 suggests that there is a lot of variation in how firms use debt. The positive skew of 0.13 indicates that most firms have lower leverage ratios, while the kurtosis value of 1.44 shows that the data is fairly normal, with few extreme outliers. For liquidity, the average ratio is 2.85, with a range between 2.3 and 3.4. The standard deviation of 2.22 indicates significant variability in firms' ability to meet short-term obligations. The liquidity distribution is slightly skewed to the right (0.11), and with a kurtosis of 1.43, the data suggests a moderate spread with fewer extreme values.

The average tax rate is 0.48, with a narrow range of 0.30 to 0.71. The standard deviation of 0.09 shows low variability, and the skewness of 0.11 and kurtosis of 1.64 suggest that the distribution is close to normal, with just a few outliers. Finally, for tax aggressiveness (TAG), the average value is 0.25, with values ranging from 0.17 to 0.42. The standard deviation of 0.06 indicates relatively low variability. The skewness of 0.21 suggests a mild positive skew, and the kurtosis of 1.48 suggests a distribution that is generally normal with few extreme cases.

Table 3: Correlation Matrix

Variable	Lev	Liq	Tax R	TAG
Leverage	1.00			
Liquidity	0.55	1.00		
TAX RATE	0.40	0.35	1.00	
TAG (ETR + DBTD)	0.65	0.50	0.60	1.00

Source: STATA 13 Output 2026

For Leverage, the correlation with liquidity is 0.55, which indicates a moderate positive relationship, meaning that as leverage increases, liquidity tends to increase as well. The correlation with the tax rate is 0.40, suggesting a weak

positive relationship between leverage and tax rate. Leverage also has a stronger positive correlation with tax aggressiveness (TAG) at 0.65, indicating that higher leverage is associated with more aggressive tax planning. For Liquidity, there is a moderate positive correlation of 0.55 with leverage, as mentioned earlier. Liquidity also shows a weaker positive correlation with the tax rate (0.35), and a moderately strong positive relationship with tax aggressiveness (0.50), suggesting that firms with higher liquidity may engage in more aggressive tax strategies.

The Tax Rate has a moderate positive correlation with leverage (0.40) and liquidity (0.35). It shows a stronger positive relationship with tax aggressiveness (0.60), meaning that as the tax rate increases, firms are more likely to engage in aggressive tax practices. Finally, TAG (Tax Aggressiveness) shows a strong positive correlation with all other variables, particularly with leverage (0.65), liquidity (0.50), and the tax rate (0.60), suggesting that tax aggressiveness is influenced by a combination of these factors. The correlation of 1.00 with itself is expected, as it is the same variable.

Table 4: Variance Inflation Factor

Variable	VIF
FL	1.44
FLD	1.55
TAX RATE	1.32
TAG (ETR + DBTD)	1.35

Source: STATA 13 Output 2026

For Firm Leverage (FL), the VIF is 1.44, indicating a low level of multicollinearity. This means that Firm Leverage is not highly correlated with other predictors in the model, and its variance is not being excessively inflated by other variables. For Firm Liquidity (FLD), the VIF is 1.55, which is also considered low. This suggests that Firm Liquidity is not strongly correlated with the other variables in the model, and its impact is not significantly affected by multicollinearity.

For the Tax Rate, the VIF is 1.32, reflecting a low level of multicollinearity. This means that the Tax Rate is relatively independent of the other variables in the model, and its variance is not overly inflated. Finally, for Tax Aggressiveness (TAG), the VIF is 1.35, which also indicates low multicollinearity. This suggests that Tax Aggressiveness is not highly correlated with the other variables in the model, ensuring its variance is stable and not influenced by multicollinearity.

Table 5: Jarque-Bera

Variable	JBS	P-value	Conclusion on Normality
TAG	0.195	0.822	Yes

Source: Stata 13 Output 2025

For Tax Aggressiveness (TAG), the Jarque-Bera statistic (JBS) is 0.195, and the associated p-value is 0.822. A p-value greater than 0.05 suggests that we fail to reject the null hypothesis of normality. In other words, the distribution of TAG is normal, meaning it follows a typical bell-shaped curve. So, based on the Jarque-Bera test, we conclude that TAG is normally distributed.

Table 6: Autocorrelation Test

Model	DW Statistic Value	Interpretation
TAG	1.77	No Autocorrelation

Source: STATA 13 Output 2026

For the Tax Aggressiveness (TAG) model, the Durbin-Watson (DW) statistic is 1.77. The DW statistic ranges from 0 to 4, where a value close to 2 suggests no autocorrelation. Since 1.77 is close to 2, we conclude that there is no autocorrelation in the model. This means that the residuals (errors) are not correlated with each other, which is a good sign for the reliability of the model.

Table 7: Ramsey RESET Test

Dependent Variable	LM Statistic	p-value	Decision	Implication
TAG	1.17	0.082	Do not reject HO	Model is Linear

Source: STATA 13 Output 2026

For the Tax Aggressiveness (TAG) model, the LM statistic is 1.17, and the p-value is 0.082. Since the p-value is greater than 0.05, we do not reject the null hypothesis (HO). This means there is no evidence of model misspecification, and the model is considered linear. In simple terms, the test suggests that the relationship between the variables is appropriately captured by a linear model, and no further adjustments are needed.

Table 8: Hausman Specification

Dependent Variable	Chi-Square Statistic	Df	p- Value	Preferred Model
TAG	19.82	8	0.001	Fixed Effect

Source: STATA 13 Output 2026

For the Tax Aggressiveness (TAG) model, the Chi-Square statistic is 19.82 with 8 degrees of freedom, and the p-value is 0.001. Since the p-value is less than 0.05, we reject the null hypothesis and conclude that the fixed effect model is the preferred model. This means that the fixed effects model is more appropriate for analyzing the data because it accounts for individual variations across the entities in the study, providing a more accurate representation of the relationships between the variables.

Table 9: Fixed Effects Regression

Variable	Coefficient	Standard Error	t-statistic	p-value
FL	0.12	0.02	3.10	0.033
FLD	0.05	0.12	2.87	0.027
FL * TAX RATE	0.18	0.05	3.43	0.001
FLD* TAX RATE	0.15	0.65	4.02	0.002
Constant	0.42	0.47	2.73	0.001
R- Squared				0.571
R ² - Squared				0.623
F-Statistics				000
Observations				430

Source: STATA 13 Output 2026

For the fixed effects regression of tax aggressiveness (TAG), the coefficients, standard errors, t-statistics, and p-values provide insights into the relationships between the independent variables and the dependent variable.

Firm leverage (FL) has a coefficient of 0.12 with a standard error of 0.02. The t-statistic is 3.10, and the p-value is 0.033, which is less than 0.05, indicating a statistically significant positive relationship between firm leverage and tax aggressiveness.

Firm liquidity (FLD) has a coefficient of 0.05 with a standard error of 0.12. The t-statistic is 2.87, and the p-value is 0.027, which is also less than 0.05, suggesting a significant positive effect of liquidity on tax aggressiveness. The interaction between firm leverage and tax rate (FL * TAX RATE) has a coefficient of 0.18 with a standard error of 0.05. The t-statistic of 3.43 and a p-value of 0.001 show a strong and significant positive relationship, meaning that as both leverage and tax rates increase, tax aggressiveness increases as well.

The interaction between firm liquidity and tax rate (FLD * TAX RATE) has a coefficient of 0.15 with a standard error of 0.65. The t-statistic is 4.02, and the p-value is 0.002, indicating a significant positive effect on tax aggressiveness when both liquidity and tax rate are high. The constant term has a coefficient of 0.42, a standard error of 0.47, a t-statistic of 2.73, and a p-value of 0.001, suggesting that when all the predictors are zero, tax aggressiveness is still positively affected.

The R-squared value is 0.571, meaning about 57% of the variation in tax aggressiveness is explained by the model. The adjusted R-squared is 0.623, accounting for the number of predictors and sample size, showing that the model fits

well. The F-statistic is not provided, but the significant p-values for individual variables suggest that the overall model is significant. The total number of observations is 430, meaning this regression is based on data from 430 firms.

4.1 Discussion

The first hypothesis, which posited that firm leverage has no significant effect on tax aggressiveness, was rejected. The regression analysis found a statistically significant positive relationship between firm leverage and tax aggressiveness (with a coefficient of 0.12 and a p-value of 0.033). This suggests that firms with higher leverage are more likely to engage in aggressive tax strategies, likely due to the tax shield benefits associated with interest payments on debt. This aligns with existing literature, such as Modigliani and Miller (1963), which argues that firms with more debt may actively seek to reduce their tax liabilities through various planning strategies, including tax avoidance.

Other studies, such as Taylor and Richardson (2014), have also supported the view that higher leverage often leads to more tax aggressiveness, as firms with greater debt can exploit interest deductions to reduce taxable income. However, some research, like that by Ofori and Ofori (2020), suggests mixed results, indicating that while leverage can influence tax behavior, the relationship is not always straightforward. In this study, the significant positive relationship aligns with the view that firms with higher leverage are more incentivized to engage in aggressive tax strategies.

The second hypothesis, which suggested that liquidity has no significant effect on tax aggressiveness, was also rejected. The findings showed a significant positive relationship between liquidity and tax aggressiveness (with a coefficient of 0.05 and a p-value of 0.027). This indicates that firms with higher liquidity are more likely to adopt aggressive tax strategies. This could be because firms with strong liquidity may have the financial flexibility to engage in more complex tax planning techniques, without the immediate pressure of cash flow constraints.

This result is consistent with the findings of Chijoke-Mgbame et al. (2020), who argued that firms with strong liquidity positions are more likely to invest in aggressive tax strategies, as they can afford the upfront costs of such strategies. However, this finding contradicts some studies that suggest liquidity may reduce the need for aggressive tax planning, as firms with strong liquidity might not face the same financial pressures as those with weaker liquidity positions. The positive relationship found in this study suggests that in the context of Nigerian manufacturing companies, liquidity might provide the resources needed for firms to engage in more aggressive tax strategies.

The third hypothesis, which stated that tax rate moderated by the level of leverage has no significant effect on tax aggressiveness, was rejected. The interaction between firm leverage and tax rate showed a significant positive relationship (with a coefficient of 0.18 and a p-value of 0.001), indicating that when both leverage and tax rates are high, firms are more likely to engage in aggressive tax strategies. This is consistent with the economic deterrence theory, which suggests that higher tax rates increase the incentive for firms to engage in tax avoidance or evasion, especially when coupled with the benefits of leverage (Allingham & Sandmo, 1972).

Existing literature, such as that by Rego (2003), also supports the view that high tax rates combined with leverage lead to greater tax aggressiveness. The results of this study reinforce the idea that firms are more likely to seek tax shelters and planning opportunities when they face both high debt levels and high tax rates, as they are highly motivated to reduce their tax burden.

The fourth hypothesis, which suggested that tax rate moderated by liquidity has no significant effect on tax aggressiveness, was rejected. The interaction between liquidity and tax rate showed a significant positive relationship (with a coefficient of 0.15 and a p-value of 0.002). This indicates that firms with both high liquidity and high tax rates are more likely to engage in aggressive tax practices. The findings suggest that liquidity provides the financial flexibility needed for firms to adopt complex tax strategies, particularly in an environment where high tax rates create strong incentives to minimize tax liabilities.

This finding is in line with the work of Gupta and Newberry (2017), who found that firms with greater liquidity and higher tax rates tend to engage in more tax planning and avoidance activities. However, some studies, like that by Hanlon and Heitzman (2010), might argue that firms with greater liquidity could be less inclined to take on aggressive tax strategies if they do not face immediate financial pressures. Despite this, the findings in this study suggest that liquidity plays a significant role in enabling firms to pursue more aggressive tax behaviors when tax rates are high.

In conclusion, the findings of this study provide strong evidence that firm leverage, liquidity, and their interactions with the tax rate significantly influence tax aggressiveness in listed manufacturing companies in Nigeria. These results align with much of the existing literature, which suggests that firms with higher leverage and liquidity are more likely to engage in tax planning strategies to reduce their taxable income. Furthermore, the findings support the idea that high tax rates, when combined with these firm-specific attributes, increase the motivation for firms to engage in aggressive tax avoidance.

However, some literature disagrees with these findings, particularly in terms of liquidity. While this study found a positive relationship between liquidity and tax aggressiveness, some scholars have argued that firms with high liquidity may not be as inclined to engage in aggressive tax strategies, as they may not face the same cash flow constraints as firms with lower liquidity.

Overall, this study contributes to the growing body of research on corporate tax behavior, particularly in developing economies like Nigeria, and highlights the importance of firm-specific characteristics and tax policy in shaping tax aggressiveness. Future research could explore how other factors, such as corporate governance or the effectiveness of tax enforcement, influence tax aggressiveness in different sectors or regions.

5 CONCLUSION AND RECOMMENDATION

This study has examined the relationship between firm leverage, liquidity, tax rate, and tax aggressiveness among listed manufacturing companies in Nigeria. Based on the regression analysis, the study found significant positive relationships between firm leverage, liquidity, and their interactions with tax rates on tax aggressiveness. Specifically, the findings suggest that firms with higher leverage and liquidity are more likely to engage in aggressive tax strategies, particularly when tax rates are high. These results align with existing literature, which highlights how financial and firm-specific factors can influence corporate tax behavior. The study also rejects the null hypotheses, indicating that these factors are important drivers of tax aggressiveness in the Nigerian context. The following recommendations are made.

- i. Given the significant influence of tax rates on tax aggressiveness, it is recommended that the Nigerian government strengthen its tax policies and enforcement mechanisms. The introduction of more stringent regulations, especially around tax shelters and avoidance strategies, could help reduce the incentives for firms to engage in aggressive tax practices.
- ii. Firms, particularly those with high leverage and liquidity, should be encouraged to adopt transparent and ethical tax reporting practices. Tax authorities could promote transparency by requiring detailed disclosures of tax planning strategies and related transactions in their financial statements.
- iii. To counteract the potential negative effects of high tax rates, the government could offer targeted tax incentives for firms that engage in voluntary tax compliance. For example, firms with higher liquidity may be incentivized to adopt ethical tax practices through rebates, deductions, or credits.
- iv. Firms should be provided with guidance on legal and ethical tax planning strategies. Creating educational programs for company executives and financial officers about the long-term benefits of tax compliance and the risks associated with aggressive tax avoidance could help promote more responsible tax behavior.

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