



Non-Debt Tax Shield Optimization and Financial Distress of Listed Non-Finance Firms in Nigeria.

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Abstract

This study examined the effect of non debt tax optimization on the financial distress cost of listed non-finance firms in Nigeria. The specific objective was to ascertain the effect of non-tax rates, and used capital intensity as. The study, guided by these specific objectives, employed an ex-post facto research design on a population of forty listed non-finance firms, from which a sample size of thirty was purposively selected based on complete data from 2015 to 2024. Secondary data were obtained from annual reports and NGX publications, forming a ten-year balanced panel. The hypotheses were tested using panel regression techniques, and the fixed-effect model was chosen through the Hausman specification test after conducting the required diagnostic checks. The findings showed that: non-debt tax shield optimization has a positive and significant effect on financial distress cost ($\beta = 3.910153$; $p = 0.0003$); capital intensity optimization has a positive and significant effect on financial distress cost ($\beta = 0.009986$; $p = 0.0321$). In conclusion, the study concludes that both non-debt tax shield optimization and capital intensity optimization contribute significantly to the financial distress costs of listed non-financial firms in Nigeria. The positive direction of these relationships underscores the need for firms to carefully balance tax planning strategies with risk management considerations. While non-debt tax shields can provide tax advantages, their optimization should not compromise financial stability. Consequently, managers and policymakers should adopt prudent investment and tax planning decisions that minimize distress costs while enhancing firm value. The study recommended that Managers of listed non-financial firms in Nigeria should adopt a moderate and well-structured approach to the use of non-debt tax shields such as depreciation and amortization. Given the positive and significant effect on financial distress cost, firms should avoid excessive reliance on these tax-saving mechanisms.



Non-financial firms are advised to carefully manage their investment in fixed assets, since capital intensity has been found to significantly increase financial distress cost, management should avoid over-investment in capital assets that may lead to high fixed costs and reduced financial flexibility.

Keywords: Non debt tax optimization, Financial Distress Cost, Capital Intensity Optimization.

1.0 Introduction

Corporate financing decisions remain a central concern in financial management, particularly within emerging economies such as Nigeria where firms operate under volatile macroeconomic conditions, regulatory uncertainties, and constrained access to capital. Listed non-financial firms play a critical role in economic development through job creation, industrial growth, and value generation; however, their sustainability is often threatened by inefficient capital structure decisions and exposure to financial distress. Within this context, firms continually seek strategies to optimize their tax positions and improve financial performance while minimizing risk. One such strategy is the utilization of tax shields, which can significantly influence firms' financing behavior and overall financial health. While debt-related tax shields have been extensively studied, increasing attention is being directed toward non-debt tax shields as alternative mechanisms for reducing taxable income without increasing financial leverage.

Non-Debt Tax Shield (NDTS) optimization refers to the strategic use of tax-deductible expenses such as depreciation, amortization, investment tax credits, and other allowable deductions to minimize a firm's tax liability. Unlike interest tax shields derived from debt financing, NDTS does not expose firms to the risks associated with mandatory interest payments and potential default. Theoretically, NDTS is grounded in the trade-off theory of capital structure, which posits that firms balance the tax advantages of debt against the costs of financial distress. NDTS serves as a substitute for debt tax shields, thereby reducing the incentive for firms to rely heavily on external borrowing. In practice, firms with substantial non-debt tax shields may exhibit lower leverage levels, as they can



achieve tax efficiency without incurring additional financial obligations. However, the extent to which Nigerian listed non-financial firms effectively optimize NDTS remains an empirical question, especially given variations in tax regulations, asset structures, and managerial efficiency.

Financial distress, the dependent variable in this study, refers to a situation where a firm experiences difficulty in meeting its financial obligations as they fall due. It is often characterized by declining profitability, liquidity constraints, increasing leverage, and in severe cases, insolvency or bankruptcy. Financial distress has significant implications for stakeholders, including investors, creditors, employees, and regulators, as it can lead to loss of investment, reduced firm value, and broader economic instability. Measurement of financial distress typically involves the use of financial ratios and models such as Altman Z-score, interest coverage ratio, and cash flow indicators. In the Nigerian context, non-financial firms are particularly vulnerable to financial distress due to factors such as exchange rate volatility, inflationary pressures, inconsistent government policies, and infrastructural deficits. These challenges necessitate the exploration of internal financial strategies that can enhance firms' resilience and reduce the likelihood of distress.

The relationship between non-debt tax shield optimization and financial distress is theoretically and empirically significant. From a theoretical standpoint, effective utilization of NDTS can reduce taxable income and improve after-tax cash flows, thereby enhancing a firm's liquidity position and reducing the probability of financial distress. Additionally, by serving as a substitute for debt tax shields, NDTS may discourage excessive borrowing, thereby lowering financial risk and the likelihood of default. Conversely, inadequate optimization of NDTS may compel firms to rely more on debt financing to achieve tax benefits, increasing their exposure to financial distress. Empirical studies on this relationship have produced mixed results, with some findings suggesting that NDTS reduces financial distress risk, while others indicate insignificant or context-dependent effects. These inconsistencies highlight the need for further



investigation, particularly in developing economies where institutional and market conditions differ significantly from those in developed countries.

Despite the growing body of literature on capital structure and financial distress, several gaps remain, most prior studies have focused predominantly on debt tax shields, with limited attention given to non-debt tax shields as an alternative tax planning strategy, existing empirical evidence is largely drawn from developed economies, thereby limiting the generalizability of findings to emerging markets such as Nigeria, studies that examine NDTs often do not explicitly link it to financial distress, instead focusing on firm performance or leverage decisions. Furthermore, there is a paucity of recent and sector-specific studies that analyze listed non-financial firms in Nigeria, despite their economic significance and unique operational challenges. These gaps underscore the need for a comprehensive investigation into the effect of non-debt tax shield optimization on financial distress among listed non-financial firms in Nigeria. This study is therefore undertaken to fill these gaps by providing empirical evidence that will inform corporate financial decisions, enhance tax planning strategies, and contribute to the existing body of knowledge. The specific objective of this study is to:

Identify the effect of non-debt tax shield optimization approach on financial distress cost of listed non-finance firms in Nigeria.

2.0 Review of Related Literature

2.1 Conceptual Review

2.1.1 Non-Debt Tax Shield Optimization

Connection between non-debt tax shields and financial distress costs has been a subject of extensive theoretical debate, yielding divergent perspectives. non-debt tax shields, commonly measured as the ratio of depreciation and amortization to total assets, serve as proxies for tax benefits that firms can utilize without incurring debt. On the one hand, proponents of the substitution hypothesis argue that non-debt tax shields can replace debt-related tax shields, thereby reducing the firm's reliance on debt financing and,



consequently, its exposure to financial distress. This view aligns with the trade-off theory, which posits that firms balance the tax advantages of debt against the potential costs of financial distress (DeAngelo & Masulis, 1980). By leveraging non-debt tax shields, firms can achieve tax efficiency without increasing their debt burden, thus mitigating the risk of financial distress (Sritharan, 2015; Rosita, & Nuryaman, 2025).

On the other hand, Ali, Rangone, and Farooq, (2022) contend that non-debt tax shields may not effectively substitute for debt, especially in capital-intensive industries where substantial fixed assets lead to higher depreciation and amortization expenses. In such contexts, firms might simultaneously possess high non-debt tax shields and significant debt levels, potentially exacerbating financial distress risks. This perspective is supported by the pecking order theory, which suggests that firms prioritize internal financing but may resort to debt when internal funds are insufficient, regardless of existing non-debt tax shields (Myers & Majluf, 1984). In this regard, Bradley, Jarrell, & Kim, (1984) documented instances where firms with substantial non-debt tax shields also maintain high leverage, indicating that non-debt tax shields do not always deter debt accumulation and may, in some cases, coincide with increased financial distress costs.

A third perspective posits a neutral relationship between non-debt tax shields and financial distress costs, suggesting that the impact of non-debt tax shields on financial distress is contingent upon firm-specific factors such as asset structure, profitability, and industry characteristics (Koralun-Bereźnicka et al., 2024). For instance, firms with a high proportion of intangible assets may derive limited benefit from non-debt tax shields, as these assets often lack collateral value, (Titman & Wessels, 1988). Moreover, (Alam, & Kibria, 2019; De Vito, & Jacob, 2023), argue that the effectiveness of non-debt tax shields in mitigating financial distress may vary across different regulatory and economic environments, further complicating the relationship. Therefore, while non-debt tax shields can influence financial distress costs, their impact is neither uniformly positive nor negative but rather depends on a complex interplay of factors.



2.1.2 Capital Intensity

The term "Capital Intensity" refers to the amount of cash or its equivalent invested in a business entity's property, plant and equipment, and other non-current assets. The more capital is invested, the more capital intensive the firm is, and this will affect the firm either positively or negatively. Capital intensity is important in business because it shows the proportion of non-current assets to total assets. It has a significant impact not only on the company's financial situation, but also on the effectiveness and performance of the company's assets. Chukwu and Egbuhuzor (2017), posit that due to the sizeable investments that companies typically make in tangible non-current assets, it is reasonable and necessary to assess the returns on these investments on a regular basis (i.e., their capital intensity).

In the view of Shahean and Malik (2012), capital intensity is the value of an entity's total investment in noncurrent assets and is typically calculated by dividing the value of total non-current assets in the statement of financial position by the value of the firm's total assets. Further, capital intensity is the ratio of the company's investment activities in the form of fixed assets, and it represents how much of the company's fixed assets are out of its total assets (Lanis & Richardson, 2011; Husnaini et al, 2013). According to Rodriguez and Arias (2012); Ardyansah and Zulaikha (2014), a company's fixed assets allow it to reduce its taxes due to depreciation. Almost all fixed assets will depreciate and such depreciation will be reflected in the company's financial statements as the cost of depreciation, and these costs can be deducted from income in the calculation of corporate tax. However, the higher the depreciation fee, the lower the tax rate the company must pay.

Capital intensity is also seen as a critical determinant of a firm's tax planning behavior and financial structure. Firms with high capital intensity often have greater opportunities to leverage depreciation-related tax shields, which can reduce their effective tax burdens over time (Chen, Chen, Cheng, & Shevlin, 2010). This strategic depreciation not only lowers taxable income but also enhances cash flow availability for reinvestment and



operational activities. Furthermore, research by Aliani and Zarai (2012) confirms that capital-intensive firms may engage in more aggressive tax planning to maximize these tax-related benefits, particularly in jurisdictions where tax depreciation allowances are generous. The implication is that capital intensity not only reflects a firm's asset composition but also acts as a lever through which tax liabilities are managed, supporting long-term investment and financial efficiency.

2.1.3 Financial Distress Cost

Financial health status of a firm is very critical to stakeholders because of its importance for informed decision making. Financial health status gives a comprehensive assessment of the combined indicators, capable of providing an overview of the company's success or failure from time to time and compared with other companies (Israel, et al., 2023). Also, financial health status shows the level of firm financial performance which is a combination of financial indicators such as profitability indicators, liquidity indicators, leverage indicators and activity indicators (Sayidah et al., 2019). Further, Sayidah et al., (2019) stated that corporate annual financial report presented by the company management described the condition of financial health status of the company to find the company's financial condition, whether it is strong, medium (grey) or weak (financial distress likelihood), wherefor, financial distress refers to a state in which a company undergoes a period of deteriorating financial conditions prior to reaching a state of bankruptcy. Financial distress represents the decline of a company's earning power, which increases the probability that it may not settle its obligatory payments of interest and debt capital, consequently affecting its credit risk profile (Gordon, 1971). Financial distress can be temporary, whereby recovery depends on early distress detection and the success of turnaround strategies, the failure of which pushes the company into a severely decline state, in which it becomes insolvent and not viable, leading to a corporate failure (Sewpersadh, 2017). Cybinski, (2001) proposed the *financial distress continuum theory* during which companies experience various stages of distress before failure or a recovery (Sewpersadh, 2017).



Financial distress entails multiple costs, including both direct and indirect cost related to bankruptcy, as well as costs associated with the process of liquidation. Often overlooked in distressed companies are the indirect distress costs, such as the loss of creditors and stakeholders, and the costs of the company's value reduction due to managers' actions to protect their own self-interests, to include asset substitution (Altman, 1984). Other indirect bankruptcy costs are the intra-group conflicts of interest, holdout problems, foregone sales and competitive positions, higher operating costs (Senbet & Wang, 2012), and the foregone investment opportunities (Nigam & Boughanmi, 2017). Therefore, following Altman (1984), who highlights indirect distress costs as consequences of reduced stakeholder confidence and value-destructive managerial actions, this study employs the *sales-growth-gap* metric as employed in prior related study of (Pindado & Rodrigues, 2005) obtained as the difference between sector and firm sales growth rates as a proxy for indirect financial distress costs. Specifically, this metric captures the extent to which a firm's revenue performance lags behind industry trends, potentially signaling weakened competitive standing due to underlying distress factors.

2. 2 Theoretical Framework

2.2.1 Pecking Order Theory

The pecking order theory, initially introduced by Gordon Donaldson in 1961 and later refined by Stewart C. Myers and Nicolas Majluf in 1984, offers a pivotal framework for understanding corporate financing behaviors, particularly in relation to tax optimization and financial distress costs. At its core, pecking order theory posits that firms prioritize their sources of financing based on the principle of least effort or resistance, primarily due to asymmetric information between corporate insiders and external investors. This hierarchy begins with internal financing through retained earnings, followed by debt issuance, and finally, equity issuance as a last resort (Vanacker & Manigart, 2010; Guizani, 2020). The rationale is that internal funds incur no flotation costs and do not dilute ownership, while debt is less susceptible to information asymmetry than equity,



which can signal potential overvaluation to the market and thus is costlier due to adverse selection concerns (Myers & Majluf, 1984).

The assumptions underpinning pecking order theory are critical to its explanatory power. First, it assumes that managers possess more information about the firm's value and prospects than external investors, leading to information asymmetry. Second, it presumes that firms aim to minimize the costs associated with this asymmetry, which includes the potential undervaluation of new equity issues. Third, the theory suggests that there is no well-defined target capital structure; instead, firms adapt their financing choices based on the path of least resistance, influenced by the availability of internal funds and the costs of external financing options (Frank & Goyal, 2003). These assumptions collectively explain why firms might prefer debt over equity, as the potential costs of financial distress and the signals sent to the market by issuing new equity can outweigh the benefits (Gatchev et al., 2009; Franks et al., 2006)

Applying pecking order theory to the nexus between corporate tax optimization and financial distress costs provides a critical understanding of firms' financing decisions. Michalkova et al., (2021), document that while debt financing offers tax shields through interest deductibility, thereby optimizing tax liabilities, it simultaneously increases the firm's financial leverage and the associated risk of financial distress. Firms must balance the tax benefits of additional debt against the rising marginal costs of potential financial distress, such as bankruptcy costs and agency conflicts between debt holders and equity holders (Kraus & Litzenberger, 1973). Pecking order theory explains why firms might limit debt usage despite its tax advantages; the preference for internal financing and cautious use of debt reflects a strategy to mitigate the costs of financial distress. Thus, pecking order theory serves as a robust theoretical framework for analyzing how firms navigate the trade-offs between tax optimization and the cost associated with financial distress.



2.3 Empirical Review

Jamiu, Lawal, Emmanuel, and Joseph (2024) investigated the influence of financial distress on corporate tax planning strategies among listed manufacturing firms in Nigeria. Data was collected exclusively from the Nigerian Stock Exchange, specifically from manufacturing firms producing consumer and industrial goods. The dataset spans eight years, from 2013 to 2020. The study focused on 29 firms, producing 232 firm-year observations. The research adopted an ex-post facto design, utilized purposive sampling to select companies with complete data, and performed ordinary least square regression analysis. Findings revealed that financial distress had a statistically insignificant and negative relationship with corporate tax planning strategies.

Ismanto and Abdurachman (2024) examined the influence of institutional ownership, leverage, and financial distress on corporate tax aggressiveness. The data for the study was obtained from the Indonesia Stock Exchange, covering firms in the Real Estate and Property Services sector. The dataset spans a four-year period from 2019 to 2022. Employing a causal research design, the authors utilized purposive sampling to select 15 companies, yielding 60 firm-year observations. The analysis was performed using fixed effect model based on the results of both the Chow and Hausman tests. The study found that financial distress had a significant negative effect, suggesting that companies facing financial pressure tend to refrain from aggressive tax behavior, possibly to prioritize liquidity and maintain financial credibility.

Firmansyah and Pratiwi (2024) investigated the influence of executive character and financial distress on tax avoidance behavior of state-owned enterprises listed on the Indonesia Stock Exchange, focusing on how manager overconfidence might moderate the relationship. The selected timeframe for analysis covered the years 2017 to 2021. The authors applied a purposive sampling technique to select 10 companies from a population of 38, resulting in a total of 50 firm-year observations over five years. Panel data analysis was conducted using the fixed effect model regression technique via EViews 9 software.



The findings revealed that executive character negatively affects tax avoidance, while financial distress was not statistically significant in influencing tax avoidance. Further, manager overconfidence did not exhibit any moderating effect on the relationship between either executive character or financial distress and tax avoidance.

Chatterjee, Yerramilli, and Nguyen (2024) conducted an empirical study to investigate how chief executive officer busyness and chief financial officer power jointly influence firm risk-taking behavior. The study utilized data obtained from firms listed on the United States Stock Exchange. The data covered a ten-year period from 2006 to 2015. It focused broadly on firms across various sectors, excluding financial and utility companies. The research adopted a quantitative research design with panel data methodology and applied a matched sampling technique, analyzing a final sample of 3,711 firm-year observations. The authors used Panel Data Regression, particularly employing Fixed Effect Regression and Two-Stage Least Squares Regression to address endogeneity concerns. The findings revealed that chief executive officer busyness negatively affected firm risk-taking, while chief financial officer power had a positive influence, and the interaction between them significantly moderated the relationship, such that powerful chief financial officers could offset the risk-averse tendencies of busy chief executive officers.

Cahyaningrum and Puspitosari (2024) investigated the influence of business strategy and financial distress on tax avoidance. The study utilized data exclusively from the Indonesia Stock Exchange, specifically analyzing firms within the consumer non-cyclicals sector. The research covered the period from 2018 to 2022. quantitative research design was adopted, using purposive sampling to select 27 companies, later narrowed to 66 observations after removing outliers. Multiple linear regression specifically the ordinary least squares technique—was used for hypothesis testing. The results revealed that financial distress had a statistically significant positive effect on tax avoidance.



Aryasa and Pramatha (2024) examined the influence of financial distress, good corporate governance, and profitability on tax avoidance. The data were drawn exclusively from companies listed on the Indonesia Stock Exchange, focusing specifically on the healthcare sector. The temporal scope of the research spanned from 2020 to 2022. Utilizing a quantitative research design, the authors adopted a purposive sampling technique, with the final sample comprising 51 observations. To test their hypotheses, they applied multiple linear regression using the ordinary least square technique. The analysis revealed that good corporate governance negatively influenced tax avoidance. In contrast, financial distress and profitability exhibited no significant relationship with tax avoidance.

Saputri and Radianto (2023) evaluated the effect of financial distress and selected corporate governance mechanisms on tax aggressiveness among property and real estate firms. The research utilized secondary data sourced exclusively from the Indonesia Stock Exchange, focusing on companies within the property and real estate sector. The scope of the study spanned seven years, from 2014 to 2020. Employing a quantitative research design, the authors applied purposive sampling to select 29 companies, resulting in a total of 203 firm-year observations. Multiple regression analysis with robust standard error correction was used to analyze the data and test the proposed hypotheses. The findings revealed that financial distress, audit quality, and independent commissioners exhibited no significant effect on tax aggressiveness.

Sabil and Waluyo (2023) investigated the influence of governance and financial indicators on corporate tax avoidance, aiming to analyze how managerial ownership, independent commissioners, audit committees, and financial distress affect tax avoidance, while further assessing whether company size moderates the relationships. The data were sourced from companies listed on the Indonesian Stock Exchange. The dataset spans the period from 2016 to 2020. Utilizing a purposive sampling technique, the researchers selected 54 manufacturing firms, producing a total of 270 firm-year observations. The



study employed the fixed effects model of panel data regression, selected based on Chow and Hausman tests, and also incorporated moderated regression analysis. The findings indicated that independent commissioners and audit committees exerted a significant positive influence on tax avoidance, whereas managerial ownership and financial distress showed no significant effect. Moreover, company size did not significantly moderate the effect of financial distress.

Pratiwi and Abbas (2023) conducted a study with the primary objective of examining the impact of corporate governance, corporate social responsibility, and tax aggressiveness on financial distress, considering leverage as a moderating factor. The dataset used in the research was drawn from companies listed on the Indonesia stock exchange, specifically within the property and real estate sector. The temporal scope of the data spans five years, from 2017 to 2021. Employing a purposive sampling technique, the research included a population of property and real estate firms on the IDX, resulting in 60 firm-year observations. The methodological framework utilized a quantitative design and applied the common effect model from panel data regression techniques to test the hypotheses. In terms of findings, the study reported that tax aggressiveness had no significant effect. Furthermore, leverage was found to strengthen the relationship between corporate social responsibility and financial distress but had no moderating impact on the relationships between tax aggressiveness and financial distress.

Prastiwi and Mariana (2023) conducted a study with the principal objective of examining how financial distress and the presence of a risk management committee influence corporate tax aggressiveness. The research focused on manufacturing firms listed on the Indonesia Stock Exchange, with data covering a seven-year period from 2013 to 2019. The study utilized a quantitative research design, employing purposive sampling to select 151 firm-year observations from a defined population that met specific criteria. Data were analyzed using multiple linear regression, with the Ordinary Least Squares method serving as the main technique for hypothesis testing. Findings revealed that financial



distress had a statistically significant negative effect on tax aggressiveness, indicating that companies under financial strain tend to reduce rather than increase tax avoidance activities. In contrast, the presence of a risk management committee showed no significant effect on tax aggressiveness.

Orji & John-Akamelu (2023) investigated the effect of book tax differences on financial distress among public listed consumer goods firms in Nigeria. Data were collected from firms listed on the Nigerian Exchange Group. The study covers a 10-year period from 2012 to 2021. It focuses specifically on the consumer goods sector in Nigeria. The independent variables are temporary book tax differences, permanent book tax differences, total book tax differences, and discretionary book tax differences, while the dependent variable is the Altman's Z-Score. Control variables include firm size and leverage. *ex-post facto* research design was adopted with a purposive sampling technique. The sample comprises 16 consumer goods firms selected from a population of 21 firms. Feasible Generalized Least Squares estimator was applied to test the hypotheses, revealing that temporary and permanent book tax differences have significant positive effects on the Altman's Z-Score, whereas total and discretionary differences do not exert significant effects.

3.0 Methodology

This study employed *ex-post facto* research design to examine the effect of non-debt tax optimization on financial distress cost of listed non-finance firms in Nigeria. *Ex-post facto* research design is a non-experimental method in which researchers examine existing data or conditions to investigate potential cause-and-effect relationships after the events have already occurred, without manipulating variables. *Ex-post facto* research design is appropriate for this study as it allows the investigation of the causal relationship between non debt tax optimization and financial distress costs using historical data from listed non-finance firms. The area of study of this research is in Nigeria. The population of this study covered non-financial firms listed on the Nigerian Exchange Group (NGX)



with representation from the following sectors: consumer goods firms, industrial goods firms and oil and gas firms. As of December 31st 2024, forty (40) listed firms. A purposive sampling approach was used to choose the firms for the study. This method was appropriate because it allowed the researcher to focus on companies that met the specific conditions required for the analysis. To be included, a firm had to be listed on the Nigerian Exchange Group as at the 2015 financial year and must have submitted complete annual reports for every year from 2015 to 2024. Using this period made it possible to build a ten-year panel dataset with consistent observations across the selected firms. The data for this study were secondary in nature and they were sourced from Nigerian Exchange Group (NGX) Fact books, related companies' annual financial reports, over the period of interest. The data analysis technique that was used for this study was panel data analysis technique. Panel data regression analysis technique was employed in this study to test the hypotheses and was complimented with fixed and random effect regression techniques. The most suitable of both techniques was determined by Hausman Specification test.

Model Specification

This study adapted the model of Farooq., et., al (2023), is presented below as:

$$\phi_{it} = \alpha_1 \ln FDL_{it} + \alpha_2 TFA_{it} + \alpha_3 LTLev_{it} + \alpha_4 STCred_{it} + \epsilon_{it}$$

Where:

- Φ_{it} = proportion of the forgone sale of a firm relative to the industry
- FDL_{it} = Financial distress likelihood for firm i for time t
- TFA_{it} = Total fixed assets for firm i for time t
- $LTLev_{it}$ = Long-term leverage for firm i for time t
- $STCred_{it}$ = Short-term credit for firm i for time

In line with the specific objectives of this study, the economic model has been specified and presented below as:

$$FDCOST_{it} = \partial_0 + \partial_1 NDTAX_{it} + \partial_2 CITAX_{it} + \mu_{it} \quad (1)$$

Where:

- $FDCOST$ = Financial Distress Cost
- $NDTAX$ = Non-Debt Tax
- $CITAX$ = Capital Intensity (control variable)



∂_0	=	Model Constant
$\partial_1 - \partial_4$	=	Slope Coefficient
μ	=	Stochastic disturbance
i	=	i th firm
t	=	period

3.9 Measurement of Variables

This study intends to employ cash effective tax rate, tax efficiency rate, non-debt tax shield, debt tax shield and capital intensity as independent variables(X), while financial distress cost will be employed as dependent variable(Y). Operationalization of the proposed variables has been described in Table 3.3

Table 3.3 Operationalization of Study Variables

Variables	Measurement	Source
FINANCIAL DISTRSS COST (Dependent Variable)	Computed as the difference between the growth rate of the sales of the sector and the growth rate of firm sales	Pindado and Rodrigues, (2005)
NON-DEBT TAX SHIELD (Independent Variable)	Non-Debt tax shield is computed as Depreciation and amortisation divided by total asset	Shittu and Alagbe, (2023).
CAPITAL INTENSITY (Control Variable)	Capital intensive tax saving strategy is computed as the ratio of total assets to total sales revenue	Dyreng, Hanlon, Maydew and Thornock, (2017).

Source: Authors' Computation, (2026)

3.10 Decision Rule

The degree to which the independent variables determine the dependent variable will be tested at 5% (0.05) level of statistical significance. A probability value less than 5% statistical significance indicates a rejection of the null hypothesis (Ho).



4.0 Data Presentation and Analysis

4.1 Data Presentation

This study examined the effect of non-debt tax optimization on the financial distress cost of listed non-financing firms in Nigeria. The specific objective was to ascertain the effect of non debt tax, on financial distress cost while capital intensity strategies was used as the control variable. The study, employed an ex-post facto research design on a population of forty listed non-finance firms, from which a sample size of thirty was purposively selected based on complete data from 2015 to 2024. Secondary data were obtained from firms' annual reports, forming a ten-year balanced panel (see Appednix A).

4.2 Descriptive Analysis of Data

Table 4.1 Descriptive Analysis

	FDCOST	NDTAX	CITAX
Mean	0.030397	0.033255	4.469681
Median	0.105350	0.028085	1.107353
Maximum	1.210308	0.125380	313.7582
Minimum	-4.030291	4.76E-05	0.000000
Std. Dev.	0.455850	0.024206	22.15398
Skewness	-2.882525	1.014549	10.68340
Kurtosis	25.57947	3.891727	136.1375
Jarque-Bera	6788.355	61.40521	227276.7
Probability	0.000000	0.000000	0.000000
Sum	9.119158	9.976453	1340.904
Sum Sq. Dev.	62.13205	0.175189	146748.8
Observations	300	300	300

Source: Authors' Computation, (2026)

Table 4.1 shows that the financial distress cost had a mean of 0.030397, indicating that, on average, the difference between sector sales growth and firm sales growth was slightly positive, meaning most firms were only mildly exposed to distress pressures. The minimum value of -4.030291 and maximum of 1.210308 reveal a wide spread, suggesting that while some firms significantly underperformed their sectors, others performed much closer to sector trends. The standard deviation of 0.455850 confirms meaningful variability in distress outcomes across the sample of 300 observations. The



skewness value of -2.882525 indicates a strong leftward tail, meaning extreme negative distress values occurred more frequently than extreme positive ones, while the kurtosis of 25.57947 reflects heavy tails, showing the presence of many outliers. The Jarque-Bera probability of 0.000000 confirms that the distribution was not normally distributed; however, with 300 observations, the Central Limit Theorem supports the reliability of regression estimates even when the raw variable is not normal.

Table 4.1 shows that non-debt tax shield had a mean of 0.033255 , implying that depreciation and amortization averaged about 3% of total assets. Values ranged from virtually zero ($4.76E-05$) to 0.125380 , reflecting modest but meaningful variation in firms' reliance on depreciation-based tax shelters. The standard deviation of 0.024206 suggests relatively low dispersion, showing that firms generally clustered close to the mean. With a skewness of 1.014549 , the distribution was moderately right-skewed, meaning a small number of firms reported relatively high depreciation relative to assets. The kurtosis of 3.891727 , slightly above 3, indicates modestly heavier tails than a normal distribution. Although the Jarque-Bera p-value of 0.000000 rejects normality, the large sample size permits dependable regression inference under the Central Limit Theorem.

As shown in Table 4.1, capital intensity had a mean of 4.469681 , showing that total assets were, on average, about four to five times greater than total sales revenue across firms. The minimum value of 0.000000 and the maximum of 313.7582 demonstrate extremely high variability, consistent with highly asset-intensive firms coexisting with firms with faster turnover relative to asset base. The standard deviation of 22.15398 reflects very large dispersion, confirming dramatic differences in capital structure among firms. The skewness of 10.68340 shows a very strong right-skew, meaning many firms had low or moderate capital intensity levels while a few had extremely high values, and the kurtosis of 136.1375 reveals enormous tail thickness consistent with severe outliers. Although the Jarque-Bera p-value of 0.000000 confirms non-normality, the 300



observations allow regression analysis to remain statistically valid under the Central Limit Theorem.

4.2.1 Correlational Analysis

Table 4.2 Spearman Rank-Order Correlational Analysis

Sample: 2015 2024

Correlation Probability	FDCOST	NDTAX	CITAX
NON=DIRECT TAX	0.018728 0.7467	1.000000 -----	
CAPITAL INTENSITY TAX	0.085479 0.1397	0.175720 0.0023	1.000000 -----

Source: Authors' Computation, (2026)

Table 4.2 presents the Spearman rank-order correlations and shows that the relationship between financial distress cost and the

The results for non-debt tax shields and capital intensity showed weak and statistically insignificant positive correlations with financial distress cost, with coefficients of 0.018728 and 0.085479 and p-values of 0.7467 and 0.1397, respectively. These findings imply that neither depreciation-based tax savings nor the scale of firms' asset intensity had a meaningful monotonic association with distress outcomes across the sample. Given the near-zero coefficients and non-significant probabilities, this tax optimization attributes did not demonstrate consistent directional relationships with financial distress cost.



Test of Hausman Specification

The purpose of the Hausman test is to determine whether the fixed-effects or random-effects estimator is more appropriate by examining whether the regressors are correlated with firm-specific effects.

Table 4.9 Test of Hausman Specification

Correlated Random Effects - Hausman Test (Comparing Random Effect and Fixed Effect Model)
 Equation: Untitled
 Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	24.794292	2	0.0002

Source: Authors' Computation, (2026)

Table 4.9 shows a probability value of 0.0002, leading to rejection of the null hypothesis that random effects are consistent. This indicates that firm-specific effects were correlated with the regressors, making the random-effects estimator biased. Therefore, the fixed-effects model was confirmed as the appropriate technique for the study's analysis.

4.3 Test of Hypotheses

The estimates used in the test of hypotheses are shown below in Table 4.10.

Table 4.10 Test of Hypotheses

Dependent Variable: FDCOST
 Method: Fixed Effect Model (Cross-section weights)
 Date: 04/30/26 Time: 13:13
 Sample: 2015 2024
 Periods included: 10
 Cross-sections included: 30
 Total panel (balanced) observations: 300
 Linear estimation after one-step weighting matrix
 White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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NDTAX	3.910153	1.054168	3.709233	0.0003
CITAX	0.009986	0.004636	2.153926	0.0321
C	-0.120367	0.059145	-2.035111	0.0428
Effects Specification				
Cross-section fixed (dummy variables)				
Weighted Statistics				
R-squared	0.282054	Mean dependent var	0.095696	
Adjusted R-squared	0.189940	S.D. dependent var	0.505419	
S.E. of regression	0.435515	Sum squared resid	50.26332	
F-statistic	3.062013	Durbin-Watson stat	1.863572	
Prob(F-statistic)	0.000000			

Source: Authors' Computation, (2026)

The model validity indicators in Table 4.10 showed that the fixed-effect regression model was statistically meaningful and suitable for explaining variations in financial distress cost among the firms. The probability of the F-statistic was 0.0000, indicating that the combined effect of the explanatory variables significantly explained changes in financial distress cost at the 5% level. The adjusted R-squared value of 0.189940 implied that the non debt tax optimization variables jointly explained about 18.99% of the systematic variation in financial distress cost after accounting for firm-level fixed effects. The Durbin–Watson statistic of 1.863572 suggested that the model did not suffer from serious autocorrelation problems, meaning the residuals behaved well statistically. Overall, these statistics confirmed that the fitted model was valid for making inferences about the effects of non debt tax optimization approaches on financial distress cost.

The constant term in Table 4.10 had a coefficient of -0.120367 with a probability value of 0.0428, indicating that it was statistically significant at the 5% level. This negative constant suggested that, when all tax optimization strategies were held at zero, the baseline financial distress cost of the firms was negative, implying a low distress-cost environment in the absence of these tax variables. Because it was significant, the constant



captured important underlying firm-specific characteristics (such as managerial quality or operational structure) that systematically reduced distress cost beyond the influence of the variables included in the model.

4.3.1 Test of Hypothesis I

H₀₄: Non-debt tax shield optimization approach has no significant effect on financial distress cost of listed non-finance firms in Nigeria.

The coefficient for non-debt tax shield (NDTAX) was 3.910153, showing that a one-unit increase in NDTAX raised financial distress cost by about 3.91 units. This indicated a strong cost-increasing effect, suggesting that higher depreciation and allowance-related tax shields were linked with financial pressure rather than relief. The probability value of 0.0003 was far below the 5% significance level, meaning the effect was statistically significant. In line with this, the null hypothesis (H₀₁) was rejected while the alternate hypothesis was accepted. This shows that non-debt tax shield optimization significantly and positively affected financial distress cost.

4.3.2 Test of Hypothesis II

H₀₅: Capital intensity optimization approach has no significant effect on financial distress cost of listed non-finance firms in Nigeria.

The coefficient for capital intensity tax optimization (CITAX) was 0.009986, indicating that a one-unit increase in CITAX increased financial distress cost by about 0.01 units. This positive direction implied that greater investment in capital-intensive assets tended to raise distress cost, possibly due to heavier capital-maintenance burdens. The probability value of 0.0321 was below the 5% threshold, showing that the effect was statistically significant. Therefore, the null hypothesis (H₀₂) was rejected while the alternate hypothesis was accepted. This confirms that capital intensity optimization had a significant effect on financial distress cost.



4.4 Discussion of Findings

Non-debt tax shield optimization showed a positive and significant effect on financial distress cost ($\beta = 3.910153$; $p = 0.0003$), indicating that asset-based deductions like depreciation may increase distress due to high capital intensity or reduced liquidity. Jackson and Maccarthy (2023) found that capital-intensive firms could face higher financial burden, while Ainun (2024) reported a similar positive link between capital intensity and tax aggressiveness. Mahmudi and Lasulita (2025) also suggested that thin capitalization and financial distress amplify tax avoidance risks, and Abiemanyu and Prasetyo (2023) noted that capital intensity may not directly reduce distress. This shows that non-debt shields can sometimes worsen financial strain despite providing tax benefits.

The result that capital intensity optimization positively and significantly affects financial distress cost ($\beta = 0.009986$; $p = 0.0321$) suggests that investments in fixed assets increase financial obligations and liquidity pressures, raising distress risk. Jackson and Maccarthy (2023) found that capital intensity had little effect on profits but may influence financial vulnerability. Ainun (2024) reported that asset-heavy strategies can elevate tax aggressiveness, indirectly stressing finances, while Balakrishnan, Watts, and Zuo (2016) observed that accounting conservatism linked to investment can influence corporate risk-taking. Abiemanyu and Prasetyo (2023) similarly indicated that capital intensity can create pressure on firm resources, reinforcing why highly capital-intensive strategies may increase distress costs.



5.0 Summary of Findings, Conclusion and Recommendations

5.1 Summary of Findings

This study examined the effect of non debt tax optimization on the financial distress cost of listed non-finance firms in Nigeria. The findings showed that:

1. Non-debt tax shield optimization has a positive and significant effect on financial distress cost ($\beta = 3.910153$; $p = 0.0003$).
2. Capital intensity optimization has a positive and significant effect on financial distress cost ($\beta = 0.009986$; $p = 0.0321$).

5.2 Conclusion

This study investigated the effect of non-debt tax shield optimization on the financial distress cost of listed non-financial firms in Nigeria. Drawing on panel data analysis, the empirical findings provide robust evidence on the relationship between tax-based financing strategies and firms' financial vulnerability. The results revealed that non-debt tax shield optimization exerts a positive and statistically significant effect on financial distress cost. This finding implies that increased reliance on non-debt tax shields such as depreciation, amortization, and investment tax credits may be associated with higher financial distress costs among the sampled firms. Rather than serving purely as substitutes for debt tax shields, excessive optimization of non-debt tax shields may reflect underlying operational or investment structures that heighten firms' exposure to financial strain.

Furthermore, the study found that capital intensity optimization has a positive and significant effect on financial distress cost. This suggests that firms with higher levels of investment in fixed assets relative to total assets are more likely to experience increased



financial distress costs. High capital intensity may limit financial flexibility, increase fixed obligations, and expose firms to higher operating and financial risks, especially in volatile economic environments such as Nigeria.

The study concludes that both non-debt tax shield optimization and capital intensity optimization contribute significantly to the financial distress costs of listed non-financial firms in Nigeria. The positive direction of these relationships underscores the need for firms to carefully balance tax planning strategies with risk management considerations. While non-debt tax shields can provide tax advantages, their optimization should not compromise financial stability. Consequently, managers and policymakers should adopt prudent investment and tax planning decisions that minimize distress costs while enhancing firm value.

5.3 Recommendations

Based on the specific variables examined in this study, the following recommendations are advanced:

Managers of listed non-financial firms in Nigeria should adopt a moderate and well-structured approach to the use of non-debt tax shields such as depreciation and amortization. Given the positive and significant effect on financial distress cost, firms should avoid excessive reliance on these tax-saving mechanisms. Instead, tax optimization strategies should be aligned with firms' cash flow capacity and overall financial health. Management should ensure that non-debt tax shields are utilized in a way that supports operational efficiency without increasing the likelihood of financial strain.

Non-financial firms are advised to carefully manage their investment in fixed assets, since capital intensity has been found to significantly increase financial distress cost, management should avoid over-investment in capital assets that may lead to high fixed costs and reduced financial flexibility. Instead, firms should pursue optimal capital



allocation strategies that balance fixed and current assets while ensuring efficient utilization of existing assets.

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