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Research Article

CAPITAL INTENSITY AND FINANCIAL STRUCTURE OF PUBLICLY TRADED INDUSTRIAL GOODS FIRMS IN NIGERIA

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Abstract

This study examines the relationship between financial structure and capital intensity of listed industrial goods firms in Nigeria using a multidimensional approach to financial structure. Financial structure is proxied by retained earnings, revaluation reserves, and lease financing, which collectively reflect the diverse financing strategies adopted by firms. Retained earnings represent internally generated funds that support reinvestment without external financing costs, while revaluation reserves capture unrealized gains on fixed assets that strengthen the equity base of firms. Lease financing, on the other hand, provides firms with access to productive assets without requiring substantial upfront capital outlay, thereby enhancing liquidity management and operational flexibility.

Capital intensity, the dependent variable, is measured as the ratio of capital assets to revenue and serves as an indicator of the extent of investment in fixed assets relative to operational output. The study posits that firms operating in capital-intensive industries rely heavily on long-term asset investment to enhance productivity, competitiveness, and efficiency. By investigating the linkage between financial structure and capital intensity, the study provides empirical evidence on how listed industrial goods firms in Nigeria utilize internal and external financing options to support asset acquisition and expand production capacity. The findings are expected to offer useful insights for corporate financial decision-making and strategic planning within a challenging macroeconomic environment.

Keywords: Financial structure, retained earnings, revaluation reserves, lease financing, capital intensity

1.1 Introduction

Financial structure has long been a central subject in corporate finance because it shapes a firm's funding capacity, cost of capital, and long-term sustainability (Frank & Goyal, 2009). It refers to the composition of all sources of financing both debt and equity used to fund a company's operations and investments (Myers & Majluf, 1984). In capital-intensive sectors such as the Nigerian industrial goods industry, financial structure decisions are especially critical due to significant initial capital requirements and recurrent operational costs. Within the Nigerian context, persistent macroeconomic volatility, inadequate infrastructure, and high borrowing costs have compelled firms to carefully design their financing mix to balance liquidity, profitability, and growth potential.

This study adopts a multidimensional approach to financial structure by focusing on retained earnings, revaluation reserves, and lease financing. Retained earnings represent internally generated funds that support reinvestment without incurring financing costs, while revaluation reserves capture unrealized gains on fixed assets that can enhance a firm's equity base. Lease financing, on the other hand, provides access to assets without substantial upfront capital outlay, offering flexibility in managing liquidity and tax obligations. Together, these components

highlight the varied financing strategies adopted by firms in navigating both market pressures and operational realities.

The dependent variable, capital intensity, measures the proportion of capital assets to revenue and serves as a proxy for the level of investment in fixed assets relative to operational output. In capital-intensive industries, higher capital intensity often reflects substantial investment in non-current assets, which can have implications for productivity, competitiveness, and tax efficiency. By examining the relationship between financial structure and capital intensity, this study aims to provide empirical insights into how listed industrial goods firms in Nigeria deploy different financing sources to sustain asset acquisition, enhance production capacity, and maintain strategic advantage in a challenging economic environment.

1.2 Statement of the problem

Firms in the Nigerian industrial goods sector had consistently faced the challenge of developing a financial structure that supported long-term investment needs while ensuring financial stability. Persistent macroeconomic instability, high borrowing costs, and restricted access to affordable credit had made the choice and mix of financing sources a critical strategic decision. While retained earnings provided a cost-free internal source of funds, their adequacy often depended on profitability levels, which fluctuated in volatile markets. Revaluation reserves strengthened the equity base and improved borrowing capacity, yet they represented unrealized gains that could not always be readily deployed for operations. Lease financing offered flexibility by enabling firms to acquire productive assets without heavy upfront capital expenditure, but it also increased fixed obligations over time.

Capital intensity, the proportion of fixed assets relative to operational output played a pivotal role in determining the productivity and competitive positioning of industrial goods firms. In capital-intensive industries, substantial investment in plant, equipment, and infrastructure was essential to maintain production capacity and market relevance. However, the way in which a firm structured its financing significantly influenced its ability to sustain such asset investment. A poorly aligned financial structure restricted capital acquisition, undermined operational efficiency, and weakened long-term growth prospects.

Despite the importance of these factors, there had been limited empirical evidence in Nigeria on how specific components of financial structure, such as retained earnings, revaluation reserves, and lease financing, affected capital intensity in industrial goods firms. This knowledge gap was critical, given that efficient capital investment was a determinant of both firm performance and industrial sector competitiveness. This study therefore examined the relationship between financial structure and capital intensity among listed industrial goods firms in Nigeria between 2014 and 2023, with the aim of providing insights that could guide corporate financial strategy and policy formulation.

1.3 Objectives of the study

The main objective of the study was to examine the effect of financial structure on capital intensity of listed industrial goods firms in Nigeria. However, the specific objectives were:

1. To assess the effect of retained earnings on capital intensity of listed industrial goods firms in Nigeria.
2. To analyze the effect of revaluation reserves on capital intensity of listed industrial goods firms in Nigeria.
3.To evaluate the effect of lease financing on capital intensity of listed industrial goods firms in Nigeria.
4. To determine the moderating effect of firm size on the relationship between financial structure and capital intensity of listed industrial goods firms in Nigeria.

2.0 Literature review and theoretical framework

Financial structure

In this study, financial structure was conceptualized as the composition of a firm's long-term financing sources, measured using retained earnings, revaluation reserves, and lease financing. This approach reflects the broader understanding of capital structure in the literature, which has been defined in various ways but generally refers to the mix of long-term sources of finance, such as equity, preference shares, debentures, long-term loans, and internally generated funds (Paramasivan & Subramanian, 2009; Gitman & Zutter, 2012). Gangeni (2006) stated that the study of capital structure seeks to explain the proportionate combination of securities and financing sources used by firms to support investment activities.

Firms require sustained investment to maintain operations and achieve growth, and these investments may be financed through internal sources such as retained earnings or external sources such as debt instruments and equity issuance (Ehrhardt & Brigham, 2011). The financial structure decision, therefore, involves determining the optimal mix of financing sources that minimizes the firm's cost of capital while maximizing its value (Frank & Goyal, 2009).

According to Nenu et al. (2018), financial structure represents a firm's permanent financing, composed primarily of long-term debt and equity, and is a critical determinant of corporate value. Most firms aim to maintain a target financial structure that aligns with their strategic objectives and risk tolerance (Gitman & Zutter, 2012). Asaf (2004) described the optimal financial structure as one that balances debt and equity in a way that minimizes the Weighted Average Cost of Capital (WACC) and thereby maximizes the firm's value. This balance requires management to consider trade-offs between cost, liquidity, maturity choices, and interest rate terms when selecting financing options.

Capital intensity

Capital intensity refers to the level of investment in physical assets such as machinery, equipment, buildings, and other non-current assets required to generate a unit of output or revenue. It reflects the extent to which a firm relies on tangible assets to sustain operations and produce income. In this study's context, capital intensity denotes the proportion of fixed assets to a firm's total output or sales volume, indicating how asset-heavy the operations are. Shahean and Malik (2022) described it as the extent of investment businesses make in non-current assets, while some literature refers to it as asset tangibility. Capital-intensive industries, such as those in the industrial goods sector, typically require significant fixed asset investments, which can influence cost structures, profitability, and long-term competitiveness.

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Capital intensity has both operational and fiscal implications. Firms with higher tangible asset investments may benefit from tax provisions such as depreciation, amortization, and capital allowances, which reduce taxable income and enhance after-tax returns (Ado et al., 2021; Oeta et al., 2019). Governments may also offer investment tax credits for activities like R&D, renewable energy projects, and equipment upgrades, thereby incentivizing capital-intensive investments. In the Nigerian industrial goods sector, strategic decisions regarding capital intensity can significantly affect financial structure and performance, as the level of fixed asset commitment impacts not only operational efficiency but also financing needs and overall value creation.

Financial structure and capital intensity

Financial structure refers to the composition of a firm's long-term sources of finance, encompassing elements such as retained earnings, revaluation reserves, and lease financing. It reflects how an enterprise funds its assets and operations, balancing internally generated funds with external financing options (Abor, 2008; Saeedi & Mahmoodi, 2011). An optimal financial structure ensures that a firm can support its operational needs while minimizing the cost of capital and financial risk. In the industrial goods sector, where firms typically operate in assetheavy environments, the choice and mix of financing sources become critical for sustaining competitiveness and ensuring liquidity without overexposing the company to debt-related constraints.

Capital intensity, closely related to financial structure, denotes the proportion of tangible, noncurrent assets such as machinery, buildings, and equipment to a firm's total output or revenue. It illustrates the degree to which operations depend on significant fixed asset investments (Shahean & Malik, 2022). High capital intensity often demands substantial long-term financing, directly influencing a firm's financial structure. Moreover, capital-intensive investments can provide fiscal benefits through depreciation, amortization, and capital allowances, which reduce taxable income and enhance after-tax returns (Ado et al., 2021; Oeta et al., 2019). In this way, capital intensity not only shapes operational capacity but also determines the financing strategies a firm must adopt, linking asset investment decisions with broader capital structure considerations in the Nigerian industrial goods sector.

Retained earnings and capital intensity

From my understanding of past scholarly insights, retained earnings were recognized as a vital internal source of financing that influenced capital intensity by allowing firms to reinvest earnings into tangible assets without resorting to external debt or equity. Unlike interestbearing debt or dilution-prone equity issuance, retained earnings provided companies with cost-effective and flexible funding for acquiring machinery, buildings, equipment, and other fixed assets that define capital-intensive operations. Scholars such as Graham and Harvey (2001) noted that firms often preferred retained earnings due to the absence of interest obligations and transaction costs, which made them attractive for long-term investments. This internal reinvestment strategy helped firms maintain financial independence and operational autonomy. However, when not managed with strategic foresight or strong governance, retained earnings could also lead to inefficient allocation of resources, especially if

companies failed to identify high-return investment opportunities, thus negatively impacting capital intensity in the long run.

Previous empirical studies produced mixed results on the effect of retained earnings on capital intensity. Adeyemi et al. (2022) found that firms with high levels of retained earnings were more inclined to invest in non-current assets, leading to greater capital intensity and improved operational capacity. Sora et al. (2023) also emphasized the positive role of reinvested profits in enhancing productive capacity, especially in capital-intensive industries. On the contrary, Ogundajo and Adekunle (2020) highlighted that excess retained earnings, if not matched with prudent investment planning, could result in suboptimal asset acquisition and inefficient use of capital. Similarly, Wheeler et al. (2020) cautioned that firms might face agency problems when management controlled substantial internal funds without external monitoring, potentially leading to overinvestment or underperformance. Despite these differing views, the prevailing trend in literature suggested that retained earnings, when strategically managed, supported long-term capital investment.

The apriori expectation was that retained earnings would have a positive effect on capital intensity. This was based on the premise that internally generated funds enabled firms to finance fixed asset acquisition without incurring debt or diluting ownership, thereby promoting long-term investment and capital asset accumulation.

Revaluation reserves and capital intensity

From my understanding of past scholarly ideas, revaluation reserves can play a critical role in shaping a firm's capital intensity by influencing its access to capital and the value placed on its non-current assets. Revaluation reserves arise when a company reassesses the value of its tangible non-current assets such as land, buildings, and equipment and records an upward adjustment from their historical cost to fair market value. This increase in asset value is recorded under equity as a revaluation surplus, in line with the requirements of International Accounting Standard 16 (IASB, 2018). This reserve is non-distributable but strengthens the equity base of the firm, which in turn can enhance the company's borrowing capacity. When a firm's asset base is perceived to be higher due to revaluation, lenders and investors may view the company as more financially stable and creditworthy, thereby enabling the firm to secure additional funds for capital investments. Revaluation reserves thus provide an indirect mechanism for financing capital-intensive operations, particularly in asset-heavy sectors such as manufacturing and industrial goods. As noted by Penman (2013), the revaluation of fixed assets can signal to the market that the firm possesses valuable long-term resources, reinforcing confidence in its investment potential.

Empirical studies on the effect of revaluation reserves on capital intensity have produced supporting evidence for both positive and negative influences. Rosemary et al. (2021) found that firms with substantial revaluation reserves tended to exhibit higher levels of capital intensity, as the increased equity value from asset revaluations allowed for greater investment in fixed assets. These reserves improved financial leverage ratios and provided collateral for long-term borrowing, thus facilitating capital expenditure. Similarly, Alabdullah (2023) observed that revaluation surpluses helped firms attract external financing due to enhanced balance sheet strength, contributing to capital expansion in fixed infrastructure. However, some studies have highlighted the limitations

of relying heavily on revaluation reserves. For instance, Onyebuchi (2024) cautioned that the non-cash nature of revaluation gains could mislead stakeholders about the firm's real liquidity position, potentially resulting in overoptimistic investment decisions that may not align with operational cash flows. Furthermore, volatile economic conditions that cause asset values to fluctuate might reduce the sustainability of capital investments anchored on revaluation reserves. Nevertheless, the literature generally supports the notion that revaluation reserves, when conservatively managed, enable firms to boost capital intensity through enhanced access to capital markets.

The apriori expectation was that revaluation reserves would have a positive effect on capital intensity. This is because revaluation reserves increase the book value of a firm's fixed assets, thereby strengthening its equity base and enhancing its ability to secure additional financing for capital investments. The upward adjustment of asset values can improve a firm's debt-toequity ratio, boost investor confidence, and provide a stronger financial position for accessing external funds. Consequently, firms with substantial revaluation reserves are expected to invest more in tangible non-current assets, thereby increasing their capital intensity.

Lease financing and capital intensity

From my understanding of past scholarly insights, lease financing has a substantial impact on a firm's capital intensity, particularly in capital-intensive industries where firms require large investments in fixed assets. Lease financing provides firms with the opportunity to acquire and use non-current assets such as machinery, buildings, and equipment without the need for immediate full ownership. Instead of purchasing these assets outright, firms can enter lease agreements especially finance leases that allow them to gain long-term usage rights while spreading payments over time. This approach preserves working capital and enhances liquidity, enabling firms to invest in other operational areas while still expanding their asset base. According to Islam et al. (2014), lease financing plays a strategic role in firm operations by granting access to vital productive assets and reducing financial strain associated with large capital expenditures. In environments where raising capital through equity or debt is limited or costly, leasing offers a flexible and viable solution that increases capital intensity by facilitating asset acquisition without immediate balance sheet expansion. However, lease payments represent future obligations, and excessive reliance on leasing may pose financial risks if firms are unable to generate sufficient revenue to meet lease terms.

Empirical findings have supported both the advantages and constraints of lease financing in relation to capital intensity. Al-Qaisi (2018) and Atseye et al. (2020) observed that lease financing positively affects capital intensity by enabling firms to upgrade to modern technology and expand productive capacity without significant initial investment. They noted that leasing is particularly useful in developing economies where access to long-term credit facilities is often limited. Leasing allows businesses to avoid asset obsolescence by regularly updating equipment and infrastructure, which is crucial in fast-changing industrial sectors. On the contrary, some studies caution that excessive use of lease financing may lead to overleveraging, with firms facing increased liabilities from cumulative lease obligations. These liabilities, if poorly managed, can reduce firms' financial agility and

limit further investment in fixed assets. Additionally, restrictive lease terms may hinder operational flexibility and strategic decision-making. Despite these risks, the consensus in the literature indicates that, when properly managed, lease financing supports capital-intensive operations by lowering barriers to asset acquisition and boosting capacity utilization. Thus, this study anticipates that lease financing will exhibit a positive relationship with capital intensity among industrial goods firms in Nigeria.

The apriori expectation is that lease financing will have a positive effect on capital intensity. This is because lease arrangements particularly finance leases enable firms to access and utilize capital assets such as machinery and equipment without requiring significant upfront capital outlay, thereby allowing them to expand their asset base and operational capacity. This financing approach is especially beneficial in capital-intensive industries where large investments in non-current assets are essential. By spreading the cost of assets over time and preserving liquidity, lease financing encourages higher levels of capital investment. Therefore, it is expected to positively influence capital intensity, provided lease obligations are wellmanaged and aligned with the firm's operational goals.

Firm size and capital intensity

Firm size plays a significant role in influencing a company's level of capital intensity, especially in the industrial goods sector where substantial investment in fixed assets is often required. Capital intensity refers to the extent to which a firm invests in capital assets such as machinery, equipment, and infrastructure relative to its overall operations. The relationship between firm size and capital intensity can be both positive and negative, depending on the firm's access to resources, operational structure, and strategic priorities.

Empirical studies have shown that larger firms are more likely to exhibit higher capital intensity due to their enhanced access to finance, economies of scale, and stronger asset base. For instance, Chen and Huang (2012) found a positive relationship between firm size and capital investment decisions, suggesting that larger firms can better absorb the high cost of capital-intensive projects. Similarly, Dang et al. (2018) argued that large firms are more capable of securing long-term financing and allocating funds efficiently to fixed asset acquisition, thereby increasing their capital intensity. Donaldson (2001) noted that large firms often have well-established management structures and long-term investment plans, which support sustained capital expenditures. Their ability to spread fixed costs over a large volume of output and secure favorable loan terms further enhances their investment capacity in fixed assets.

Conversely, other studies have pointed to a potential negative or insignificant relationship between firm size and capital intensity. For example, Dogan (2013) noted that some large firms may adopt capital-conserving strategies due to bureaucratic delays, diminishing returns on large-scale investments, or industry-specific technological constraints. In contrast, smaller firms, though financially constrained, may adopt innovative or lean asset strategies to remain competitive, which might reduce their capital intensity but increase efficiency. Bercovitz and Mitchell (2007) suggested that firm size might lead to strategic rigidity, where large firms resist change or delay capital investments due to internal complexities, resulting in suboptimal capital intensity levels.

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Theoretical framework Pecking order theory by Myers and Maljuf (1984)

The pecking order theory, originally introduced by Donaldson (1961) and later developed by Myers and Majluf (1984), explains the hierarchical preferences firms follow when financing their operations or new investments. According to the theory, firms prefer to fund projects first through internal resources such as retained earnings. If additional funding is required beyond internal sources, they opt for debt financing. Equity issuance is considered a last resort due to its associated costs and potential negative market perception. This financing preference is largely influenced by asymmetric information between firm managers and external investors. Managers typically have better insight into the true value and performance of the firm than external parties. As such, issuing new equity might be interpreted by investors as a signal that the firm is overvalued, potentially causing stock prices to decline. In contrast, debt issuance is considered a neutral signal and thus more favorable. Consequently, firms prioritize internal funds to avoid sending adverse signals to the market, followed by debt, and finally equity as the least desirable option due to ownership dilution and higher issuance costs.

The pecking order theory is relevant to this study as it offers critical insight into how listed industrial goods firms in Nigeria prioritize financing decisions that impact their capital structure and ultimately their capital intensity. These firms often operate in capital-intensive sectors that require significant investment in property, plant, and equipment. In managing such investments, the preference for internal financing, followed by debt and equity, directly affects how firms structure their capital in relation to their asset base. The theory also suggests that the tax-deductibility of interest on debt makes it more attractive than equity. However, as firms accumulate more debt, financial distress costs may arise, and the advantages of the debt tax shield may diminish, especially under restrictive tax regulations. Thus, while firms seek to minimize the cost of capital and avoid market misinterpretation, they also face constraints that shape their capital structure decisions.

Empirical review

Aliyu and Okoye (2025) conducted a comprehensive investigation into the relationship between capital structure and capital intensity in Nigeria's industrial sector and focused on a sample of twelve industrial goods firms listed on the Nigerian Exchange Group. Using stratified sampling, the study covered the period from 2014 to 2023. The independent variables included leverage, equity financing, and retained earnings, while the dependent variable was capital intensity, measured by the ratio of fixed capital to total assets. Panel data regression was employed to analyze the dataset. The results indicated that leverage had a significant negative effect on capital intensity, implying that firms with higher debt levels were less likely to invest in capital-intensive assets. In contrast, retained earnings and equity financing had a positive and significant influence on capital intensity. The authors concluded that a balanced and wellstructured capital mix promotes investment in productive fixed assets. They recommended that firms minimize excessive reliance on debt and instead focus on equity and internally generated funds to enhance long-term asset growth.

Okonkwo et al. (2025) assessed the effect of capital structure decisions and asset utilization efficiency in the Nigerian industrial sector. The study focused on twenty (20) industrial firms listed on the Nigerian Exchange Group, selected using stratified sampling to ensure representation across subsectors. The study period covered 2014 to 2023. The independent variables included leverage, common stock, and preferred stock, while the dependent variable was capital intensity, proxied by the ratio of total assets to revenue. The authors applied a random-effects panel regression model to estimate the effects of capital structure on asset utilization. The results revealed that leverage had a negative and significant effect on capital intensity, indicating that high levels of debt impaired firms' efficient use of physical capital. In contrast, common stock and preferred stock showed a positive and statistically significant relationship with capital intensity, suggesting that equity financing supported asset growth and utilization. Based on these findings, the authors advised that industrial firms in Nigeria should maintain a balanced capital mix that minimizes debt dependency and enhances equity-based financing. They also recommended regulatory reforms that encourage long-term equity investment to improve firms' productive capacity.

Nahri et al. (2024) explored the influence of capital structure, profitability, and institutional ownership on tax avoidance in manufacturing companies within the consumer industry sector listed on the Indonesia Stock Exchange (BEI) between 2020 and 2022. The researchers employed a purposive sampling method, selecting companies that consistently disclosed financial reports during the study period. Secondary data from these reports were then analyzed using Multiple Linear Regression Analysis with SPSS 25 software. The study's findings revealed that both capital structure and profitability, along with institutional ownership, had significant simultaneous and partial effects on tax avoidance in these manufacturing companies. Specifically, the results indicated that the companies' capital structure, measured by the debt-to-equity ratio, had a notable influence on their tax avoidance practices. Profitability, as expected, played a key role, with more profitable firms engaging in different tax avoidance strategies compared to less profitable ones. Additionally, institutional ownership was found to affect tax avoidance practices, likely due to the influence of institutional investors on firm behavior. The study concluded that capital structure, profitability, and institutional ownership are critical factors influencing tax avoidance in the manufacturing sector in Indonesia. It was recommended that companies in this sector carefully balance their debt levels and ensure strong institutional ownership to mitigate aggressive tax avoidance, which could ultimately lead to better financial performance and corporate reputation.

Offor (2024) investigated the impact of retained earnings on the profitability of deposit money banks in Nigeria. The study utilized an ex-post-facto research design, focusing on a 13-year period spanning from 2010 to 2022. The population consisted of the 13 listed deposit money banks in Nigeria, out of which 12 were purposively selected as the sample for analysis. Secondary data were sourced from the audited annual reports and financial statements of the selected banks. To analyze the data and test the hypotheses, the study employed Spearman Covariance analysis, a non-parametric statistical method suitable for assessing the strength and direction of association between variables. The dependent variables considered were return on assets (ROA) and net profit

margin (NPM), while the independent variable was retained earnings. The empirical findings revealed that retained earnings had a statistically significant and positive effect on return on assets. Furthermore, the analysis indicated a strong and positive relationship between retained earnings and net profit margin among the sampled deposit money banks. These results underscore the importance of internally generated funds in enhancing financial performance within the banking sector. Based on the findings, the study recommended that deposit money banks in Nigeria should continue to leverage retained earnings as a key component of their capital structure. This strategy not only boosts profitability but also enhances financial stability and reduces over-reliance on external borrowing.

Musa and Eze (2024) conducted a study on the effect of capital mix and productive capacity utilization in the Nigerian industrial sector. The population consisted of all industrial goods firms listed on the Nigerian Exchange as of 2023, from which nine were selected using purposive sampling. The study focused on the 2013–2022 period. Independent variables included leverage, common equity, and other components of shareholders' funds, while the dependent variable was capital intensity assessed via the ratio of net fixed assets to total sales. The researchers used panel data estimation techniques with fixed effects, alongside a robustness check using generalized least squares (GLS) regression. The study found that leverage had a negative significant effect on capital intensity, implying that firms with higher debt obligations struggled to maintain productive capital investments. Conversely, common equity and other equity components, such as share premium and revaluation reserves, showed positive and significant impacts on capital intensity. The analysis also revealed that firm size significantly moderated the relationship between equity financing and capital intensity, further emphasizing the importance of scale in optimizing asset utilization. It was concluded that effective capital structure management, especially reduced reliance on debt and a stronger focus on equity sources, is essential for sustaining capital productivity. They urged financial managers to strike a balance between financial flexibility and operational asset growth.

Dahmash (2023) examined the impact of capital structure on profitability by analyzing the relationship between a firm’s market value and two key financial indicators retention per share and dividend per share within the context of Jordanian firms. The study utilized an unbalanced panel data set comprising 2,281 firm-year observations, spanning the period from 2010 to 2021. This extensive dataset included both financial and non-financial firms, providing a comprehensive view of the corporate environment in Jordan over more than a decade. To analyze the data, the study employed panel regression analysis. The primary objective was to determine how internal financing decisions (proxied by retention per share) and shareholder payout policies (proxied by dividend per share) influenced the market valuation of firms. The findings from the pooled sample revealed that dividends per share had a strong and statistically significant positive effect on firm market value, suggesting that higher dividend payouts boost investor confidence and market valuation. In contrast, retention per share exhibited a statistically significant negative effect on market value, implying that retained earnings, when not effectively reinvested, may not yield immediate value in the eyes of investors. Robustness checks were conducted by dividing the sample into financial and non-financial firms, and the results remained consistent across these sub-samples.

The study concluded that while dividend payments enhance firm valuation, reliance on retained earnings may signal lower investor confidence unless supported by productive reinvestment strategies. It was recommended that Jordanian firms carefully balance dividend policies and retained earnings to optimize market value and shareholder wealth.

Bei and Hui (2022) determined effect of founder control on equity financing and corporate performance based on moderation of radical strategy of listed companies in China. The study employed descriptive statistical analysis, correlation statistical analysis, and empirical model testing of sample data. The study disclosed that there is a negative correlation between founder control and equity financing, there is a negative correlation between equity financing and corporate performance, a corporate radical strategy has a negative moderating effect on the relevance between founder control and corporate performance.

Aloys et al. (2022) studied the analysis of retained earnings financing on financial performance of listed manufacturing and allied firms: A dynamic panel approach. The study applied Dynamic Unbalanced Panel analysis techniques using Secondary data for 10-year period (2010 - 2019) with the study population comprising of 9 listed firms. Quantitative secondary data was collected from the firms' financial statements by use of a document analysis guide. Focus was on retained earnings financing moderated by economic growth rate and earnings volatility on performance which was proxied by Tobin's Q. Longitudinal research design was used as it is appropriate when dealing with panel data. Pearson correlation was used to show the strength and direction of association among the study variables. Retention ratio (RR) had a moderate positive correlation with Tobin Q and a strong positive correlation. The regression coefficient was also positive and significant.

Miko and Para (2021) studied the result of capital structure and profitability of listed manufacturing organizations in Nigeria. The multiple regression method was used for measuring of the data and the data were gathered utilizing the secondary source for data collection from 2008-2017. The outcome from the study revealed that equity finance had a positive significant influence on profitability of manufacturing companies listed on the Nigerian Stock Exchange Market.

Ado et al. (2021) studied the impact of corporate tax planning on the financial performance of listed companies on the Nigeria Stock Exchange (NSE). Secondary data was collected from Thompson Reuters DataStream and annual reports of listed companies. Multiple regression analysis was used to analyze data from 84 companies listed on the NSE for a period of nine years from 2010 to 2018, resulting in 756 observations. The findings indicated that inventory intensity has no significant relationship with Return on Assets (ROA), suggesting that an increase in inventory intensity may not improve financial performance. On the other hand, capital intensity is negatively and significantly related to ROA, indicating that a substantial increase in capital intensity can lower financial performance. However, leverage is positively and significantly related to ROA, implying that highly leveraged companies tend to achieve higher ROA. The study drew support from agency and tax planning theories.

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3.0 Methodology

3.1 Research design

Ex-post facto research design was used in this study. Ex-post facto research, also known as after-the-fact research, is a type of study in which the examination begins after the event has occurred without the intervention of the researcher. This design was suitable for this study because the study made use of historical data that were extracted from the studied firm's annual reports. Also, this design was used because of the peculiarity of the information needed which is historical data and this design is cost effective and less time-consuming

3.2 Population of the study

The population for this study comprised all industrial goods firms listed on the Nigerian Exchange Group (NGX) between 2014 and 2023. This sector was specifically chosen because it includes capital-intensive manufacturing companies whose capital structure and tax planning strategies are critical to their financial performance. According to the Nigerian Exchange Group Fact Book, as of December 31, 2023, there were 13 industrial goods firms listed on the Nigerian Exchange Group (NGX) and the firms were Austin Laz & Company Plc, Berger Paints Plc, Beta Glass Plc, BUA Cement Plc, Cap Plc, Cutix Plc, Dangote Cement Plc, Grief Nigeria Plc, Lafarge Africa Plc, Meyer Plc, Notore Chemical Industries Plc, Premier Paints Plc, and Triple GEE and Company Plc. These firms formed the population of the study, as they provide a relevant and focused sample for examining the effect of capital structure on tax planning of listed industrial goods firms in Nigeria.

3.3 Sample size and sample size determination

The sample size comprised 11 listed industrial goods firms. This was because industrial goods firms that had been listed after 2014 or delisted before 2023 were not included in the study. These excluded firms included BUA Cement Plc, which was listed on January 9, 2020, and Notore Chemical Industries Plc, which was listed on August 2, 2018. They were excluded because, for the years in which they were not listed, regulatory scrutiny had not applied to them. As a result, if they had been included, those years could have contained poor-quality annual reports, missing values, or even entirely missing annual reports for certain periods.

S/N	Company	Ticker	Sector	Date Listed	Date Incorporated
1	Austin Laz & Company Plc [Rst]	AUSTINLAZ	INDUSTRIAL GOODS	-	13-Jul-82
2	Berger Paints Plc [Cg+]	BERGER	INDUSTRIAL GOODS	-	1-Sep-59
3	Beta Glass Plc.	BETAGLAS	INDUSTRIAL GOODS	2-Jul-86	2-Jun-74
4	Cap Plc	CAP	INDUSTRIAL GOODS	24-May-78	21-Sep-65
5	Cutix Plc.	CUTIX	INDUSTRIAL	12-Aug-87	4-Nov-82

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6	Dangote Cement Plc [Cg+]	DANGCEM	INDUSTRIAL GOODS	26-Oct-10	4-Nov-92
7	Greif Nigeria Plc [Dip]	VANLEER	INDUSTRIAL	-	20-Jan-40 GOODS
8	Lafarge Africa Plc. [Cg+]	WAPCO	INDUSTRIAL	17-Feb-79	24-Feb-59 GOODS
9	Meyer Plc.	MEYER	INDUSTRIAL	-	20-May-60 GOODS
10	Premier Paints Plc. [Mrf]	PREMPAINTS	INDUSTRIAL	7-Mar-95	24-Aug-82 GOODS
11	Tripple Gee And Company Plc.	TRIPPLEG	INDUSTRIAL	-	14-Apr-80 GOODS

Source: Researcher's compilation (2025)

3.4 Sampling techniques

This study employed a purposive sampling technique to select relevant firms from the industrial goods firms listed on the Nigerian Exchange Group (NGX) between 2014 and 2023. This nonprobability sampling method was chosen to ensure that only firms with consistent and reliable financial data relevant to capital structure and tax planning were included. Specifically, two (2) industrial goods firms that joined the NGX after 2014 were excluded, as they did not cover the entire study period. Consequently, the final sample consisted of eleven (11) listed industrial goods firms with complete and consistent annual reports from 2014 to 2023.

3.5 Source of data and method of data collection

Secondary data was used for this study. These data were sourced from the Nigerian Exchange Group and the published annual reports of the sampled firms for the study period (2014-2023). The reason for using the secondary data was based on the fact that secondary data was assumed to be reliable, suitable and adequate for the nature, scope and objectives of the study.

3.6 Method of data analysis

In assessing the capital structure and tax planning of listed industrial goods firms in Nigeria, panel least squares regression analysis was used to analyze the data, and STATA 17 was employed as the statistical package. This method was adopted because panel least squares regression is well-suited for examining both cross-sectional and time-series variations, thereby providing more robust and reliable parameter estimates. It also allowed the study to control for unobserved heterogeneity across firms while efficiently utilizing the longitudinal data collected over the study period.

3.7 Model specification

In line with the previous researches, the researcher adopted and modified the model of Usman (2025) in determining the effect of financial structure on capital intensity of listed consumer goods firms in Nigeria. This is given below:

Capital intensity = *f* (Retained earnings, revaluation reserves, lease financing) (i)

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Regression models without moderation

$CAI_{it} = \beta_0 + \beta_1 RET_{it} + \beta_2 RSV_{it} + \beta_3 LFN_{it} + £_{it}$ (ii)

Regression models with moderation

$CAI_{it} = \beta_0 + \beta_1 RET*FSZ_{it} + \beta_2 RSV*FSZ_{it} + \beta_3 LFN*FSZ_{it} + £_{it}$ (iii)

Where;

CAI = Capital intensity
RET = Retained earnings
RSV = Revaluation reserves
LFN = Lease financing
FSZ = Firm size
β_0 = Model intercept
β_1-β_3 = Coefficient to be estimated it = Cross section of listed industrial goods firms with time variant
$£_{it}$ = Stochastic error term

3.7 Operationalization of variables

Table 3.1 Operationalization of variables

Variables	Measurement	Source	Apriori
Capital intensity (Dependent variable)	Non-current assets/total asset of the sampled industrial goods firms.	Muhammed (2022)	
Retained earnings (Independent variable)	Retained earnings as reported in the annual reports of the sampled industrial goods firms.	Usman (2025)	+ve
Revaluation reserves (Independent variable)	Revaluation reserves as reported in the annual reports of the sampled industrial goods firms.	Deias and Alessandro (2023)	+ve
Lease financing (Independent variable)	Value of lease contract (right of use asset) as reported in the annual reports of the sampled industrial goods firms.	Celestine and Chibuike (2022)	+ve

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Firm size (moderating variable)	Natural logarithm of total assets of the sampled industrial goods firms.	Atseye et al. (2020)	+ve

Source: Researcher's operationalization (2025)

3.8 Decision rule

The decision rule that was used in this study is stated thus; Reject the null hypotheses if the probability value (p-value) is less than 0.05 ($p<0.05$). Alternatively, accept the null hypotheses if the probability value (p-value) is greater than 0.05 ($p>0.05$). This can be stated symbolically as: Accept Ho if Pc < Pt

Reject Ho if Pc > Pt

All analyses were conducted at 95 per cent level of confidence; that is 0.05 level of significance

4.0 Data presentation, analysis and discussion of findings

Table 4.1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
cai	110	.548	.279	.072	.99
ret	110	88607517	2.306e+08	-574796	1.099e+09
rsv	110	11291506	61319396	0	6.252e+08
lfn	110	6767254.1	28189951	10377	2.189e+08
fsz	110	15.821	2.694	12.008	22.094
totalassets	110	2.331e+08	6.224e+08	163990	3.939e+09

Source: Researcher's computation (2025)

Table 4.1 presents the descriptive statistics for the key variables in the study. For the purpose of this analysis, most variables were left unlogged to retain their actual values and provide a more intuitive understanding of their distribution. Beginning with capital intensity (cai), the results show that from 2014 to 2023, the average capital intensity ratio was 0.548 or 54.8 per cent. This suggests that, on average, non-current assets made up just over half of the total assets of industrial goods firms during the study period. This relatively high ratio reflects a capitalintensive sector and potentially indicates heightened tax planning activities, given that greater investment in non-current assets is often associated with depreciation-based tax strategies. The standard deviation for capital intensity was 0.279 or 27.9 per cent, indicating a moderate level of variability across the firms. While this suggests that there were some differences in the capital intensity ratios among the firms, the level of dispersion was not extreme, pointing to some consistency in tax planning practices within the sector. The minimum value observed was 0.072 (7.2 per cent), meaning the firm with the lowest ratio had very little investment in non-current assets

relative to total assets. The maximum value reached as high as 0.99 (99 per cent), suggesting that nearly all the assets of some firms were non-current. This is highly unusual and may point to anomalies in financial reporting. As observed, such extreme values were often associated with firms that had financial distress or relied on non-Big Four audit firms, potentially leading to lapses in the accuracy or standardization of their annual reports.

The first independent variable, retained earnings (ret) showed a mean value of ₦88,607,517,000, indicating that, on average, industrial goods firms in Nigeria retained approximately ₦88.6 billion in accumulated profits over the study period. This suggests a moderately strong capacity for internal financing across the sector. However, the standard deviation was ₦230,600,000,000; more than twice the mean, signifying an exceptionally high level of variability in retained earnings among the firms. Such dispersion reflects significant differences in profitability, dividend policies, and reinvestment strategies within the sector. The minimum value of retained earnings was -₦574,796,000, indicating that at least one firm had accumulated losses rather than profits, which may point to prolonged financial distress or aggressive dividend payouts in spite of weak earnings. On the other hand, the maximum value reached ₦1,099,000,000,000, over ₦1 trillion; suggesting that some firms had consistently strong earnings and chose to reinvest a substantial portion rather than distribute profits to shareholders. The wide range between the minimum and maximum values illustrates the diversity in financial performance and earnings retention practices among industrial goods firms during the 2014–2023 period.

For revaluation reserves (rev), the minimum value was ₦0, indicating that one or more firms had no recorded revaluation reserves during the study period. This likely suggests that such firms did not undertake asset revaluations, which is acceptable depending on their accounting policies, asset types, or strategic choices. The maximum observed value was ₦625,200,000,000, reflecting that at least one firm accumulated a significant revaluation surplus of approximately ₦625 billion, most likely as a result of upward revaluation of noncurrent assets such as property, plant, or equipment. The mean value of revaluation reserves stood at ₦11,291,506,000, while the standard deviation was ₦61,319,396,000, indicating a very high level of variability across firms. This substantial dispersion suggests that while a few firms recognized large revaluation gains, the majority either recorded minimal amounts or none at all, with numerous reasons outside this study's scope.

For lease financing, the mean value stood at approximately ₦6,767,254,000, indicating that, on average, the firms reported a value of about ₦6.77 billion under this metric during the study period. This suggests a relatively moderate position across the firms in terms of lease financing, which may reflect a key component of capital structure or financial capacity depending on the variable's operational definition. The standard deviation was approximately ₦28,200,000,000 (₦28.2 billion), which is notably higher than the mean. This signifies a substantial level of variability in lease financing across the sampled firms. Such dispersion points to the existence of extreme values or a high degree of disparity in the firms' financial structure. The minimum value was ₦10,377,000 (₦10.38 million), while the maximum reached as high as ₦219,000,000,000 (₦219 billion). The wide range between the minimum and maximum further confirms the significant heterogeneity in the sample. Some firms appear to have operated on a relatively small scale, while others reported exceptionally large values

for lease financing, suggesting the presence of highly capitalized firms or firms with substantial financial leverage or asset bases.

The descriptive statistics for total assets revealed a mean value of ₦233,000,000,000 (that is, ₦233 billion), indicating that, on average, industrial goods firms in Nigeria maintained a substantial asset base during the 2014–2023 period. The standard deviation stood at approximately ₦622,000,000,000 (₦622 billion), reflecting a high level of variability in total asset size across the sampled firms. This wide dispersion suggested significant differences in firm sizeu and asset utilization capacity. The smallest firm recorded total assets of just ₦163,990,000 (₦163.99 million), while the largest held assets amounting to ₦3,940,000,000,000 (₦3.94 trillion), indicating a substantial gap between the least and most capitalized firms in the sector. This pattern is expected in a heterogeneous sector such as industrial goods, where firms differ widely in age, scope, and financial capability.

To support regression modelling and address skewness in the total asset data, firm size (fsz) was computed as the natural logarithm of total assets. The logged values ranged from 12.01 to 22.09, with a mean of 15.82 and a standard deviation of 2.69. Although the log transformation compresses the scale, the variation in values still reflects the differences in firm scale across the sample. This transformation ensured more stable coefficient estimates and minimizes the influence of outliers in subsequent regression analysis, while the unlogged interpretation provides intuitive understanding of the firms' capital structure.

Table 4.2 Shapiroâ€"Wilk W test for normal data

Variable	Obs	W	V	Z	Prob>z
cai ret rsv	110	0.929	6.354	4.123	0.000
	110	0.898	9.147	4.936	0.000
	110	0.977	1.845	1.357	0.000
lfn	110	0.251	66.980	9.375	0.000
fsiz	110	0.889	9.958	5.125	0.000

Source: Researcher's computation (2025)

Table 4.2 presents the output of the normality test for the study variables, each with an expected 110 observations. Starting with capital intensity (cai), the Shapiro-Wilk test returned a zstatistic of 4.123 and a corresponding p-value of 0.000, which is less than the 5 per cent significance threshold. This result indicates that cai does not follow a normal distribution. Retained earnings (ret) recorded a z-statistic of 4.936 and a p-value of 0.000, while firm size (fsz) had a z-statistic of 5.125 and a p-value of 0.000, both indicating significant deviations from normality and which same was the case for lease financing (lfn) with z statistic of 9.375. Interestingly, only revaluation reserves (rsv) approximated normality, with a z-statistic of 1.357 and a p-value of 0.087, which exceeds the 0.05 threshold. This suggests that rsv can be reasonably considered normally distributed within the context of the study.

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In summary, the majority of the study variables did not conform to a normal distribution. However, this is not uncommon in financial datasets and was well expected due right from the descriptive statistics, looking at the dispersions. As Olkin (1994) noted, deviations from normality may arise due to outliers, skewed distributions, or multimodal patterns. Such issues can be addressed using non-parametric techniques or robust estimation methods, ensuring that the validity of statistical inferences is not compromised.

Table 4.3 Spearman's rank correlation coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) cai	1.000						
(2) ret	-0.171	0.586	0.678	0.487	1.000		
(3) rsv	0.136	0.629	0.585	0.630	0.532	1.000	
(4) lfn	0.336	0.437	0.620	0.670	0.439	0.409	1.000
(5) fsiz	-0.312	0.663	0.615	0.656	0.884	0.578	0.552	1.000

Spearman rho = 0.578

Source: Researcher's computation (2025)

Table 4.3 presents the Spearman rank correlation coefficients among the study variables. As expected, all variables exhibited perfect correlation with themselves, with coefficients of 1.000 along the diagonal of the matrix. Focusing on the relationships with capital intensity (cai), retained earnings (ret) showed a weak negative correlation with capital intensity, with a coefficient of -0.171. This implies that firms with lower levels of retained earnings tended, to some extent, to exhibit higher capital intensity. Nevertheless, the association remains weak and does not establish any cause-and-effect relationship. For revaluation reserves (rsv), a weak positive correlation of 0.136 was observed, indicating a marginal tendency for firms with higher revaluation reserves to also exhibit slightly higher capital intensity. Lease financing (lfn) presented a coefficient of 0.336, indicating that increase in lease financing coincidentally comes with increased capital intensity in the studied firms. Lastly, firm size (fsz) exhibited a moderate negative correlation with capital intensity, with a coefficient of -0.312. This suggests that as firm size increases, capital intensity tends to decrease to a moderate extent. In other words, larger industrial goods firms were more likely to operate with lower capital intensity compared to their smaller counterparts. In summary, the Spearman correlation results reveal mostly weak associations between capital intensity and the capital structure components under study. As commonly emphasized in empirical research, correlation does not imply causation, and these observed relationships may result from shared influences or coincidental comovements in the data.

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Table 4.4 Regression Results before moderation and after moderation

	Before moderation		After moderation	
	(1) Pooled-OLS	(2) Random Effects Model	(1) Pooled-OLS	(2) Random Effects Model
	cai	cai	cai	cai
Constant	0.490**	0.490**	0.108	0.108
	(0.043)	(0.040)	(0.816)	(0.816)
ret	-0.188***	-0.188***		
	(0.000)	(0.000)		
rsv	0.074**	0.074**		
	(0.014)	(0.012)		
lfn	0.178***	0.178***		
	(0.000)	(0.000)		
ret_fsz			-0.105***	-0.105***
			(0.000)	(0.000)
rsv_fsz			0.026*	0.026*
			(0.091)	(0.088)
lfn_fsz			0.067***	0.067***
	(0.000)	(0.000)		

r^2 0.434 0.434 0.432 0.432 N 110.000 110.000 110.000 110.000 F/W 10.619 63.713 10.511 63.069 p 0.000 0.000 0.000 0.000 hettest 0.621(0.431) 0.124(0.726) vif 2.932 4.230

lagrange	0.000(1.000)	0.000(1.000)

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source: Researcher's computation (2025)

Table 4.4 presents the regression output examining the effect of capital structure on tax planning, both before and after incorporating the moderating variable (firm size). In the unmoderated model, the F-statistic of 10.619 with a corresponding p-value of 0.000 indicates that the pooled OLS regression is statistically significant and appropriate for inference. The model reports an R-squared value of 0.434, suggesting that approximately 43.4 per cent of the systematic variations in tax planning of listed industrial goods firms in Nigeria are explained by the proxies of capital structure included in the model. The remaining 56.6 per cent of the variation is accounted for by other factors captured in the error term. On another hand, the moderated model, which incorporates the moderating effect of firm size with the capital structure proxies, yielded an R-squared value of 0.432. This implies that 43.2 per cent of the systematic variations in tax planning are explained by the combined influence of capital structure and the moderating role of firm size. The residual 56.8 per cent remains unexplained and is absorbed by the model's error term. The F-statistic of 10.551 with a p-value of 0.000 confirms that the moderated pooled OLS model is also statistically significant and suitable for inference.

Homoscedasticity

This holds that error terms of the regression model should have a constant variance across all levels of the independent variables (Muller & Stadtmuller, 1987). The homoscedasticity assumption of the pooled ordinary least squares (OLS) model is tested using the Breusch-Pagan module in Stata 17. The assumption of homoscedasticity specifically indicates that if the errors exhibit heteroscedasticity, it becomes challenging to rely on the standard errors of the least square estimates. Therefore, the confidence intervals will either be very narrow or excessively large. The results presented in table 4.4 above however, indicated that the assumption of homoscedasticity in the OLS regression model was not violated for both the unmoderated and the moderated models, as evidenced by the p-value from the heteroscedasticity test (Hettest =
0.621, p-value = 0.431>0.05) for the unmoderated model and Hettest = 0.124(p-value = 0.726>0.05) for the moderated model. It is evident that the dataset employed did not have so much variability and was homoscedastic. As such, the pooled OLS was consistent with no further ado.

Multicollinearity

The regression model assumes the absence of multicollinearity between the independent variables. It is a situation where one or more independent variable can be expressed as a combination of other independent variables. This can be detected by observing the Variance Inflation Factor (VIF). The VIF should be less than 10 for this assumption to hold (Gujurati, 2004). From table 4.4 above, the mean VIF for both unmoderated and moderated cai models were 2.93 and 4.23 respectively. These indicate that the assumption of multicollinearity was not

violated meaning absence of multicollinearity. Since multicollinearity assumption was not violated for all models, the researcher proceeded to depend on other diagnostics on the correct model to employ.

Lagrange Multiplier LM test

This test was applied to determine whether the random-effect GLS or pooled OLS model is more suitable for the data (Breusch & Pagan, 1980). The null hypothesis states that there are no random effects, implying that the variation across entities is zero, and thus, OLS is sufficient. The decision to accept or reject the null hypothesis depends on the probability value: if the p-value is greater than 0.05, the null hypothesis is accepted; otherwise, it is rejected. The results presented in table 4.4 across all models (unmoderated and moderated) showed test statistics of 0.000 with a corresponding p-value of 1.000 respectively, indicating the acceptance of the null hypothesis. This outcome suggests that the pooled OLS model was appropriate and sufficient for the analysis in all angles.

Test of hypotheses

Hypothesis one

H_{01}: Retained earnings has no significant effect on capital intensity of listed industrial goods firms in Nigeria.

H_{11}: Retained earnings has a significant effect on capital intensity of listed industrial goods firms in Nigeria.

Regression output from table 4.4 presented a coefficient of -0.188 with a p-value of 0.000 for the effect of retained earnings on capital intensity of listed industrial goods firms in Nigeria. Alongside the negative coefficient, the probability value was statistically significant at 95 per cent confidence interval ($p>0.05$). These imply that retained earnings has a significant negative effect on capital intensity of listed industrial goods firms in Nigeria. On this note, the null hypothesis that retained earnings does not have a significant effect on capital intensity of listed industrial goods firms in Nigeria was rejected and the alternate hypothesis was accepted.

Hypothesis two

H_{02}: Revaluation reserves have no significant effect on capital intensity of listed industrial goods firms in Nigeria.

H_{12}: Revaluation reserves has a significant effect on capital intensity of listed industrial goods firms in Nigeria.

Estimates from the regression results in table 4.4 presented 0.074 and 0.014 as coefficient and p-value respectively for the effect of revaluation reserves on capital intensity of listed industrial goods firms in Nigeria. These imply that revaluation reserves have a significant positive effect on capital intensity of listed industrial goods firms in Nigeria. On this note, the null hypothesis that revaluation reserves have no significant effect on capital intensity of listed industrial goods firms in Nigeria was rejected and the alternate hypothesis was accepted.

Hypothesis three

H_{03}: Lease financing has no significant effect on capital intensity of listed industrial goods firms in Nigeria.

H_{13}: Lease financing has a significant effect on capital intensity of listed industrial goods firms in Nigeria.

Figures from the regression output in table 4.4 presented 0.178 and 0.000 as coefficient and pvalue respectively for the effect of lease financing on capital intensity of listed industrial goods firms in Nigeria. These imply that lease financing has a significant positive effect on capital intensity of listed industrial goods firms in Nigeria. On

this note, the null hypothesis that lease financing has no significant effect on capital intensity of listed industrial goods firms in Nigeria was rejected and the alternate hypothesis was accepted.

Hypothesis four

H_{04}: Firm size does not significantly moderate the relationship between capital structure and capital intensity of listed industrial goods firms in Nigeria.

H_{14}: Firm size significantly moderate the relationship between capital structure and capital intensity of listed industrial goods firms in Nigeria.

Output from table 4.4 presented values for the moderating effect of firm size on the relationship between financial structure and capital intensity of listed industrial goods firms in Nigeria. Specifically, it was observed that firm size has a significant positive effect on the relationship between lease financing and capital intensity {0.067(0.000)} of listed industrial goods firms in Nigeria. It was also observed that firm size has a significant negative moderation on the relationship between retained earnings and capital intensity of the studied firms {0.105(0.000)}. Firm size also failed to significantly moderate the relationship between revaluation reserves {0.026(0.091)}. All in all, the null hypothesis was rejected and the alternate accepted since half of the independent variables were successfully moderated. Therefore, firm size significantly moderates the relationship between financial structure and capital intensity of listed industrial goods firms in Nigeria.

Discussion of findings

Retained earnings and capital intensity

Regression output from table 4.4 presented a coefficient of -0.188 with a p-value of 0.000 for the effect of retained earnings on capital intensity of listed industrial goods firms in Nigeria. Alongside the negative coefficient, the probability value was statistically significant at 95 per cent confidence interval ($p>0.05$). These imply that retained earnings has a significant negative effect on capital intensity of listed industrial goods firms in Nigeria. This means that the higher the retained earnings the lower the capital intensity of listed industrial goods firms in Nigeria. In other words, increase in retained earnings of listed industrial goods firms in Nigeria causes decrease in their capital intensity. In simpler terms, the higher the retained earnings, the lower the capital intensity of listed industrial goods firms in Nigeria. This means that an increase in retained earnings tends to reduce the firm's investment in capital-intensive assets.

This is not in line with the apriori expectation because normally, retained funds are supposed to be used in investments instead of dividend payments. A possible explanation for this unexpected inverse relationship could be that retained earnings are being channeled toward less capital-intensive uses. For instance, firms might be using retained profits to fund working capital, settle current obligations, diversify into less asset-heavy activities and things, or even return value to shareholders through dividends or share buybacks rather than reinvest in longterm physical assets (Perri, 2022). Another angle is that firms with higher retained earnings may not feel pressured to invest in large-scale fixed assets because they already maintain sufficient production capacity or are adopting leaner, more flexible business models that don't require massive physical infrastructure; taking big

companies like Dangote Cement Plc or Lafarge Plc for case studies in this particular scenario. These firms are already large in size and have large asset base already and may not feel the need to invest in more non-current assets. Interestingly, this finding runs counter to traditional finance theory, which assumes that internal financing (like retained earnings) should support capital formation and growth. This is yet another case to remind that theories are different from real life activities sometimes.

Revaluation reserves and capital intensity

Estimates from the regression results in table 4.4 presented 0.074 and 0.014 as coefficient and p-value respectively for the effect of revaluation reserves on capital intensity of listed industrial goods firms in Nigeria. These imply that revaluation reserves have a significant positive effect on capital intensity of listed industrial goods firms in Nigeria. This effect implies that increase in revaluation reserves of listed industrial goods firms in Nigeria causes increase in their capital intensity. In other words, the higher the revaluation reserves, the higher the capital intensity of the studied firms. Looking at this, possible explanation is that revaluation reserves often reflect upward adjustments in the value of long-term assets, particularly property, plant, and equipment. Generally, when firms revalue their fixed assets, it typically indicates not just accounting changes but also that the assets are still relevant, active, and possibly being upgraded. Therefore, this revaluation can be tied to planned capital-intensive operations, meaning that the firms are deepening their investment in physical infrastructure or non-current assets so to say.

This finding was in line with the apriori expectation. It is generally and logically believed that revaluation reserves should have a positive effect on capital intensity. A healthy revaluation reserve strengthens a firm's financial position and may enhance the firm's borrowing capacity, making it easier to access external funding for further capital investments. It could also be that firms with stronger asset bases are more confident in maintaining or increasing their scale of operations, which naturally translates into higher capital intensity. So, while revaluation reserves are non-cash items, their presence can be a strong signal of capital strength and strategic intent, which aligns with greater capital investment activity.

Lease financing and capital intensity

Figures from the regression output in table 4.4 presented 0.178 and 0.000 as coefficient and pvalue respectively for the effect of lease financing on capital intensity of listed industrial goods firms in Nigeria. These imply that lease financing has a significant positive effect on capital intensity of listed industrial goods firms in Nigeria. In essence, increase in lease financing causes increase in capital intensity of listed industrial goods firms in Nigeria. Put another way, the higher the lease financing, the higher the capital intensity of the studied firms. A possible explanation for this result here lies in the nature of lease financing itself. Lease arrangements allow firms to access capital-intensive assets; such as machinery, equipment, and vehicles without the heavy upfront cost that comes with outright purchases. This makes it easier for firms to expand or upgrade their production capacity without weighing their liquidity or exhausting internal funds. In that case, lease financing provides a flexible and cost-effective way to scale up operations, which directly contributes to increased capital intensity.

This finding is in line with the apriori expectation. It was expected that lease financing should have a positive significant effect on capital intensity of listed industrial goods firms in Nigeria. Undoubtedly, industrial goods firms typically require significant investments in physical infrastructure to maintain output efficiency and meet demand and leasing offers a convenient alternative to traditional asset acquisition. This view as well as this study's finding is in line with Islam et al. (2014) which stated that through finance leases, firms can commit to longterm use of productive assets, thereby expanding their capacity without immediately reflecting the full asset value on their statement of financial position. In addition to that, empirical studies like those of Al-Qaisi (2018) as well as Atseye et al. (2020) affirmed that leasing contributes positively to capital intensity by enabling firms to access advanced equipment and fixed assets that would otherwise be unaffordable.

Financial structure, firm size, and capital intensity

Table 4.4 presents the results on the moderating effect of firm size on the relationship between components of financial structure; retained earnings, revaluation reserves, and lease financing and capital intensity among listed industrial goods firms in Nigeria. The findings reveal notable patterns. Specifically, firm size exhibited a significant positive moderating effect on the relationship between lease financing and capital intensity {0.067 (0.000)}. This indicates that as firms expand in size, their ability to leverage lease financing for the acquisition of noncurrent assets and the enhancement of production capacity increases. In other words, larger firms tend to convert lease-based financing more effectively into capital-intensive investments compared to smaller firms.

Firm size also showed a significant positive moderation on the direct relationship with capital intensity {0.025 (0.003)}, suggesting that scale itself supports higher levels of asset investment. However, a significant negative moderating effect was observed on the relationship between retained earnings and capital intensity {-0.105 (0.000)}. This suggests that as firms grow larger, the negative influence of retained earnings on capital intensity becomes more pronounced. Larger firms may allocate retained earnings towards strategic diversification, debt repayment, or liquidity preservation rather than investing in additional capital-intensive assets. In contrast, the moderating effect of firm size on the relationship between revaluation reserves and capital intensity was statistically insignificant {0.026 (0.091)}, implying that the effectiveness of revaluation reserves in driving capital intensity is relatively stable regardless of firm size.

Overall, these results highlight that firm size plays a decisive role in shaping how elements of financial structure influence capital intensity. The generally positive significant moderation effects suggest that larger firms possess advantages such as better access to financial markets, economies of scale, and greater operational stability factors that enhance the capacity of financing components to drive investment in tax-deductible, long-term assets. Consequently, financial structure decisions within the industrial goods sector should not be considered in isolation but evaluated alongside firm size to maximize their impact on capital intensity.

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5.0 Summary, conclusion, and recommendations

Summary of findings

The study examined the moderating effect of firm size on the relationship between financial structure and capital intensity of listed industrial goods firms in Nigeria between 2014 to 2023. To achieve the study's objectives, the pooled least square regression estimation was initially conducted, followed by diagnostics tests for multicollinearity and heteroscedasticity. Preliminary analyses such as descriptive statistics, correlation matrix, and normality tests were performed before employing robust regression techniques. The empirical findings revealed that: Retained earnings (coeff. = -0.188[0.000]) have a significant negative effect on capital intensity of listed industrial goods firms in Nigeria. This means that increase in retained earnings causes decrease in capital intensity of listed industrial goods in Nigeria. Revaluation reserves (coeff. = 0.074[0.014]) have a significant positive effect on capital intensity of listed industrial goods firms in Nigeria. It means that the higher the revaluation reserves, the higher the capital intensity of listed industrial goods in Nigeria. Lease financing (coeff. = 0.178[0.000]) has a significant positive effect on capital intensity of listed industrial goods firms in Nigeria. It means that increase in lease financing in these firms causes increase in their capital intensity as well. Firm size significantly moderated the relationship between some capital structure components and capital intensity of listed industrial goods firms in Nigeria. Specifically, firm size positively moderated the effect of lease financing (coeff. = 0.067[0.000]) on capital intensity, suggesting that as firms grow larger, these financing components more strongly influence capital intensity. Conversely, firm size negatively moderated the relationship between retained earnings and capital intensity (coeff. = -0.105[0.000]), implying that the negative impact of retained earnings on capital intensity becomes more pronounced in larger firms. However, firm size did not significantly moderate the effect of revaluation reserves (coeff. = 0.026[0.091]) on capital intensity, indicating that the influence of these components does not vary with firm size.

Conclusion

This study examined the effect of financial structure measured by retained earnings, revaluation reserves, and lease financing on capital intensity of listed industrial goods firms in Nigeria, while also assessing the moderating role of firm size. The findings revealed a mixed pattern of significance across the financial structure components. Revaluation reserves and lease financing had significant positive effects on capital intensity, indicating that these elements of financial structure can effectively drive long-term asset investment among industrial firms. Retained earnings, however, showed a significant negative effect, suggesting that internally generated funds may be channeled toward less capital-intensive activities.

Furthermore, the moderating analysis demonstrated that firm size strengthens the positive effect of lease financing on capital intensity, while amplifying the negative influence of retained earnings. Firm size did not significantly moderate the relationship between revaluation reserves and capital intensity. Overall, the study concluded that firm size plays a significant role in shaping the impact of financial structure on capital intensity in listed industrial

goods firms in Nigeria, reinforcing the importance of considering organizational scale in financial decision-making.

Recommendations

1. Management of firms should be aware that retained earnings are better used for other purposes, not capital investments for tax avoidance purposes, especially in large firms.
2. Revaluation reserves are reportedly very useful in tax planning, and firms should consider maintaining them as part of their asset base.
3. Lease financing should be encouraged since it was observed to strongly enhance capital investment as well as tax avoidance and works even better in large firms.
4. Firms' stewards should also noel that financial structure decisions should not be made in isolation especially when those decisions are used for the purpose of capital intensity; firm attributes like firm size must be factored in for more effective investment outcomes.

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