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Financial Leverage and Performance of Listed Information & Communication Technology Companies in Nigeria

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ABSTRACT

Purpose: *This paper examines how the leverage component of the capital structure determines the performance of Information & Communication Technology (ICT) Companies in Nigeria.*

Methodology: *Data from six listed ICT firms in Nigeria were used, covering the period 2011-2023. Descriptive statistics and robust Pooled Ordinary Least Squares regression were used for the analysis.*

Findings: *Results indicate that the short-term debt ratio does not determine performance, and the total-debt-to-equity ratio has a detrimental effect on financial performance, as measured by return on equity.*

Implications: *The study has provided value by adding to our understanding of how the performance of ICT firms is influenced by debt. The Pecking Order Theory's prediction was confirmed by the negative effect of debt on performance, with several implications. The Central Bank of Nigeria, through its monetary policy, is encouraged to cut down the cost of borrowing to enhance shareholders' wealth through increased earnings and investment.*

Originality: *This research is among the very few that enrich our understanding of how leverage impacts performance in a vibrant sector, such as ICT in Nigeria.*

Limitations and directions for future research: *Despite the valuable contributions, the focus on firms in the ICT sector, which limits generalizability to other contexts, and the selection of leverage and performance proxies constitute vital limitations. Future research should examine other sectors, employing additional leverage measures (debt-to-equity ratio and interest coverage ratio) and performance measures (Tobin's Q and earnings per share).*

Keywords: *Financial leverage; performance; information & communication technology; pooled ordinary least squares; return on equity.*

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INTRODUCTION

The relationship between financial leverage and firm performance remains one of the most debated subjects in corporate finance. Since the seminal works of Modigliani and Miller (1958, 1963), scholars and practitioners have continued to explore how debt financing shapes firm value, profitability, and risk. Although theoretical arguments, including tax shield benefits, agency costs, and information asymmetry, suggest plausible links between leverage and performance, empirical findings remain inconsistent, ranging from positive to negative or insignificant outcomes (Kenn-Ndubuisi & Nweke, 2019; Lawani et al., 2023; Matsoma, 2022). These divergent results demonstrate the continuing need for further empirical inquiry, particularly in understudied sectors such as Information and Communication Technology (ICT), where intangible assets, innovation cycles, and capital intensity differ significantly from traditional industries.

Several methodological gaps in prior literature heighten this need. First, several studies measure leverage using total liabilities (Abubakar, 2015; Afolabi et al., 2019), a method criticised by Rajan and Zingales (1995) for conflating interest-bearing debt with operational liabilities, thereby overstating leverage and distorting a firm's actual exposure to financial risk. Others rely on total assets in computing leverage (Abata et al., 2017), which may not accurately reflect obligations tied to debt financing. These measurement limitations call for more appropriate leverage indicators that isolate interest-bearing debt, such as short-term financing instruments, long-term borrowings, and total debt-to-equity ratios.

Against this backdrop, the present study pursues three key objectives:

i. To examine the effect of short-term debt ratio and total debt-equity ratio on the financial performance of listed ICT companies in Nigeria.
ii. To provide an empirically grounded justification for leverage measurement using interest-bearing debt rather than total liabilities, thereby addressing limitations identified in prior literature.
iii. To enrich sector-specific evidence by focusing on an emerging and strategically critical industry where empirical findings remain sparse.

The study's contributions are threefold. First, by refining how leverage is operationalized, it offers a more conceptually valid and theoretically consistent measurement framework. Second, it adds to the sparse evidence on the ICT sector in Nigeria, a sector characterised by high competition, technological disruption, and capital intensity. Third, the findings provide practical insights for policymakers, investors, and managers concerning the cost of borrowing, the optimal use of debt, and the conditions under which leverage enhances or undermines shareholder wealth.

Given Nigeria's macroeconomic challenges, including high interest rates, tightening monetary conditions, and underdeveloped credit markets, the study offers timely implications on how debt influences firm outcomes in such contexts.

LITERATURE REVIEW

Financial leverage refers to the proportion of interest-bearing debt used in financing a firm's assets (Hillier et al., 2010). Unlike total liabilities, which include trade payables and other non-financial obligations, interest-bearing debt directly reflects a firm's borrowing decisions and associated financial risks (Rajan & Zingales, 1995). Short-term debt finances current operational needs, while long-term debt supports capital investments (Garba et al., 2018). Because leverage increases both potential returns and financial distress risk (Pandey, 2015), theory describes it as a double-edged sword.

Firm performance is multidimensional, but accounting-based indicators such as Return on Assets (ROA) and Return on Equity (ROE) remain widely used because they capture short-term operational effectiveness (Combs et al., 2005; Gentry & Shen, 2010). Market-based measures (e.g., Tobin's Q) are more future-oriented but may be less suitable for firms in markets characterised by inefficiency or low liquidity.

The Pecking Order Theory (POT) provides the primary theoretical lens for this study. POT suggests that firms prefer internal financing, followed by debt, and use equity only as a last resort (Myers, 1984). Information asymmetry makes external equity issuance costly, leading firms to rely on debt when internal cash flows fall short. In contexts like Nigeria, where interest rates are high and credit markets are imperfect, POT predicts limited reliance on debt and possible negative performance effects when debt is nonetheless used.

This theoretical perspective aligns with the present study, which examines how different forms of interest-bearing debt affect financial outcomes for ICT firms facing high innovation costs and uncertain revenue streams.

Review of Empirical Studies

Existing studies reveal mixed findings on the leverage–performance nexus. However, a critical synthesis reveals several patterns: A significant portion of empirical evidence indicates that excessive debt undermines profitability, especially in developing economies or volatile industries (Lawani et al., 2023; Matsoma, 2022). High borrowing costs, underdeveloped capital markets, and credit rationing intensify financial distress risk. For instance, Abubakar (2017), Ashraf et al. (2017), and Siddik et al. (2017) report that higher debt burdens reduce returns due to interest expenses and liquidity pressures. This body of evidence supports Pecking Order behaviour and aligns with Nigeria's macroeconomic realities.

Some studies, particularly in capital-intensive or regulated industries, find that moderate debt supports performance (Afolabi et al., 2019; Etale & Ekpulu, 2019). Leverage may discipline managerial behaviour (Agency theory) or optimize capital structure (Trade-off theory). However, such findings often emerge in sectors with stable cash flows (e.g., banking, utilities), suggesting that sectoral characteristics significantly moderate the leverage–performance relationship.

Studies such as Kenn-Ndubuisi and Nweke (2019) provide no strong evidence of a link between leverage and performance. This may reflect the use of inappropriate leverage measures, structural differences across firms, sample heterogeneity, or strong internal financing habits. These inconsistencies call for sector-specific, methodologically robust studies such as the present one.

A critical integration of the reviewed works indicates four significant gaps this study addresses: inappropriate leverage measures used in prior works; limited evidence from ICT firms, despite their economic importance; inconsistent empirical evidence suggesting contextual influences; and the scarcity of studies incorporating robust checks using alternative performance measures. These gaps form the basis for the objectives and hypotheses of the current study.

Based on the reviews, the following hypotheses are developed:

H1: Short-term debt ratio has an insignificant effect on the financial performance.

H2: The total debt equity ratio negatively impacts the financial performance.

METHODOLOGY

This study employs an ex post facto research design, which is appropriate for examining the historical relationship between financial leverage and firm performance using secondary data. The population consists of the 10 companies listed under the Information and Communication Technology (ICT) sector of the Nigerian Exchange Group (NGX) as of 31 December 2023. Due to incomplete financial data of four companies across the study period, six firms with complete and consistent annual reports from 2011 to 2023 constitute the final sample. This filtering approach aligns with best practices in capital structure research, which prefer balanced panel datasets to avoid estimation bias (Evgeny, 2015; Martis, 2013).

The study relies solely on secondary data extracted from audited annual reports of the selected firms, published accounts available on corporate websites, and reports submitted to the NGX. All variables were computed from these publicly available financial statements to ensure reliability and replicability.

The study measures leverage using only interest-bearing debt, in line with best practice (Rajan & Zingales, 1995). Total liabilities were avoided because they include non-debt obligations (e.g., payables, accrued expenses) that do not represent financing decisions and may distort leverage. Accordingly, STDR was measured as short-term interest-bearing debt divided by total capital, and TDER as total interest-bearing debt divided by equity. This operationalization directly corresponds to the concerns raised earlier in the introduction and positions the study within a more rigorous methodological tradition. Consistent with Rajan and Zingales (1995) and Hillier et al. (2010), this study adopts more theoretically coherent leverage indicators, as shown in Table 1.

Table 1: Variables and Measurements

Variable	Acronym	Type	Measure	Source
Return on equity	ROE	Dependent variable	Earnings before interest & taxes (EBIT) divided by equity	Abubakar (2016); Garba et al. (2018)
Short- term debt ratio	STDR	Independent variable	Short-term interest-bearing debt divided by total capital (total debt plus equity)	Abubakar and Garba (2017); Garba et al. (2018)
Total debt equity ratio	TDER	Independent variable	Total debt (short-term interest-bearing debt plus long-term interest-bearing debt) divided by equity	InunJariya (2015); Kenn-Ndubuisi and Nweke (2019)
Age	AGE	Control variable	Natural logarithm of the number of years a firm since incorporation	Abubakar (2020); Mohammed (2010);
Size	SIZE	Control variable	Natural logarithm of sales revenue	Evgeny (2015); Rajan and Zingales (1995)

Source: Compiled by authors based on the literature.

The study chose the above variables because ROE directly measures profitability attributable to shareholders, making it ideal for assessing how leverage affects returns under POT. STDR and TDER isolate financial liabilities from operating liabilities, ensuring conceptual accuracy. Age and size are included because they are consistently shown to influence firm performance and may confound the leverage performance relationship (Chinaemerem & Anthony, 2012; Frank & Goyal, 2003).

To examine the effect of leverage on firm performance, the following panel regression model is estimated:

$$ROE_{it} = \beta_0 + \beta_1 STDR_{it} + \beta_2 TDER_{it} + \beta_3 AGE_{it} + \beta_4 SIZE_{it} + C_{it} + \mu_{it} \quad - \quad - \quad (1)$$

Where: ROE = Return on equity, β_0 = Intercept, β_1 and β_2 = Coefficients of the independent variables, β_3 and β_4 = Coefficients of the control variables, subscript i and t refer to each firm i in year t, C = unit-specific error component, μ = Remaining error component.

This model aligns with previous capital structure studies (Evgeny, 2015; Kenn-Ndubuisi & Nweke, 2019) and is suitable for small-sample panel data.

The study employs descriptive and static panel regression techniques (Pooled Ordinary Least Squares [POLS], Fixed Effects Model [FEM], and Random Effects Model [REM]) for estimation. The restricted F-test and the Breusch-Pagan test are used to determine the optimal panel estimator.

RESULTS AND DISCUSSION

Descriptive Analysis

Table 2 summarizes the descriptive characteristics of all variables employed in the study.

The short-term debt ratio (STDR) has a mean value of 0.05, indicating that only 5% of the capital employed by ICT firms is financed by short-term interest-bearing debt. This low reliance on short-term borrowing is unsurprising, given the capital-intensive nature of ICT operations and the need to match long-term investments with long-term financing instruments. The long-term debt ratio (LTDR) averages 0.08, slightly higher than STDR, suggesting a modest preference for longer-term financing.

The total debt-equity ratio (TDER) has a mean of 0.22, indicating that ICT companies rely more on equity than on debt. This may be attributed to the high cost of borrowing in Nigeria, coupled with information asymmetry concerns that make ICT firms less inclined to issue additional debt. Consistent with Pecking Order Theory (POT), the results imply that firms prefer internally generated funds and equity rather than external debt.

Return on equity (ROE) shows a mean of –0.38, indicating that, on average, ICT firms experienced losses relative to shareholder equity during the study period. The negative average suggests challenges in profitability, which may be exacerbated by macroeconomic conditions, foreign exchange pressures, and increased competition within the ICT industry.

The dispersion and skewness measures indicate wide variability in ROE, TDER, and size, reflecting heterogeneity in firm performance, capital structure, and operational scale among ICT firms.

Table 2: Descriptive Results

	STDR	LTDR	TDR	TDER	AGE	L_AGE	SIZE	L_SIZE	ROE
Mean	0.05	0.08	0.14	0.22	27	3.02	5082780	14.82	-0.38
Median	0.01	0.00	0.06	0.06	21	3.01	2729800	14.82	0.08
Minimum	0.00	0.00	0.00	0.00	6	1.79	469066	13.06	-21.62
Maximum	0.57	0.53	0.68	0.68	70	4.25	25193400	17.04	4.25
Std. Dev.	0.10	0.14	0.18	0.34	20	0.77	5734390	1.17	3.31
C.V	1.92	1.73	1.29	1.57	0.74	0.25	1.12	0.08	8.79
Skewness	3.39	1.81	1.45	1.91	0.93	0.13	1.68	0.17	-5.21
Kurtosis	12.70	2.28	1.16	2.59	-0.37	-1.29	2.41	-1.31	30.33

Note: Size is in thousands of Naira

Source: Authors' computation

Multicollinearity Test

Variance Inflation Factor (VIF) values reported in Table 3 indicate that all variables possess VIF scores below the critical threshold of 10 (Hair et al., 2014), with tolerance values above 0.10 (Menard, 2011). This confirms the absence of multicollinearity. The regression coefficients can therefore be interpreted without concern for inflation arising from highly correlated predictors.

Table 3: Variance Inflation Factor

Variable	Variance Inflation Factor	Tolerance
STDR	1.730	0.5780
TDER	1.615	0.6192
L_AGE	1.135	0.8811
L_SIZE	1.031	0.9699

Source: Authors' computation

Regression Analysis

The POLS, FEM, and REM results are presented in Table 4. All models exhibit statistically significant F-statistics, indicating that the explanatory variables collectively predict firm performance.

	POLS	FEM	REM (GLS)
CONSTANT	8.89 (1.49)	17.61 (1.55)	9.16 (1.48)
STDR	10.65 (1.95)*	11.74 (1.60)	10.62 (1.91)*
TDER	-4.83 (-3.07)***	-5.83 (-3.11)***	-4.92 (-3.09)***
L_AGE	0.12 (0.20)	-3.18 (-1.34)	0.08 (0.13)
L_SIZE	-0.62 (-1.67)	-0.52 (-0.67)	-0.63 (-1.63)
R^2	0.19	0.29	0.19
F	2.96 (0.03)**	1.96 (0.07)*	2.96 (0.03)**
STD ERROR	3.09	3.07	3.09
DW	1.54	1.60	1.54

Notes: ***, **, and * indicate significance at 1%, 5% and 10%, respectively.
The values in parentheses are t-values for constant and variable, and p-values for those in the F-statistics.

Source: Authors' computation

Model Selection

The two standard specification tests conducted in this research are as follows:

Restricted F-test (POLS vs FEM): The F-test result (p = 0.36) supports the null hypothesis that POLS is preferred over FEM.

Breusch–Pagan Lagrangian Multiplier (LM) test (POLS vs REM): The LM statistic (p = 0.43) indicates that POLS is also superior to REM.

Consequently, the POLS estimator is selected as the most appropriate model for interpretation. This aligns with the small sample size and minimal firm-specific heterogeneity among the selected ICT companies.

Diagnostic Tests

Autocorrelation and heteroskedasticity are tested to ensure the regression estimates are valid.

Autocorrelation

The Durbin–Watson statistic for the POLS model is 1.54, which deviates from the ideal value of 2, suggesting mild autocorrelation (Field, 2009; Swain, 2008), a common occurrence in time-series cross-sectional data.

Heteroskedasticity

The White test reveals a significant Chi-square statistic ($p < 0.01$), confirming the presence of heteroskedasticity. As such, Heteroskedasticity and Autocorrelation Consistent (HAC) standard errors are employed to obtain robust estimates.

Robust POLS Regression Results (HAC-Adjusted)

After adjusting for heteroskedasticity and autocorrelation, the POLS results (Table 5) provide the basis for the final interpretation.

Table 5: Regression Results of POLS Using Robust (HAC) Standard Errors

	Dependent variable: ROE
CONSTANT	8.89 (1.82)*
STDR	10.65 (1.57)
TDER	-4.83 (-1.71)*
L_AGE	0.12 (0.34)
L_SIZE	-0.62 (-1.90)*
R^2	0.19
F-statistic	2.96 (0.03)**
STD. ERROR	3.09
D-W	1.54

Notes: ** and * indicate significance at 5% and 10%, respectively.
The values in parentheses are t-values for constant and variable, and p-values for those in the F-statistics.

Source: Authors' computation.

An insignificant effect of the short-term debt ratio on ROE was found, as the t-ratio for the variable (1.57) confirmed this. Similarly, TDER was found to have a negative but significant effect on the ROE, as indicated by a t-ratio of -1.71, which is significant at the 10% level. For the control variables, age has a positive t-value; however, it is insignificant, while the effect of size on ROE was significant, although negative, as supported by the negative t-value of -1.90, which is also significant at 10% level.

Robustness Checks

To assess the stability of the baseline findings, the model was re-estimated using Return on Average Assets (ROAA) as an alternative dependent variable. The robustness analysis reveals that STDR remained insignificant, TDER remained negative, the direction and magnitude of the coefficients were broadly consistent with the baseline model, and model diagnostics did not materially alter the conclusions. This consistency enhances confidence in the reliability and validity of the empirical findings.

Discussion of Findings

The regression results reveal that the STDR does not significantly affect ROE. Although the coefficient is positive, the absence of statistical significance suggests that short-term debt is not a meaningful driver of profitability in the Nigerian ICT sector. Several contextual and theoretical reasons explain this finding: Descriptive statistics show that only about 5% of total capital is financed through short-term debt. This extremely low leverage implies insufficient variation for STDR to have a substantial impact on performance. ICT investments such as software development, network expansion, and infrastructure are long-term in nature. Financing these with short-term loans could create liquidity pressures. Firms may therefore avoid significant short-term borrowing to mitigate rollover risk. Nigeria's historically high monetary policy rate increases the cost of short-term debt, making it less attractive. Even if used, the high financing cost may erode potential benefits.

This finding is consistent with the results of Abubakar (2017) and Kakanda et al. (2016), who also reported insignificant relationships for short-term leverage. However, it contrasts with studies such as Cyril (2016) and Alraba et al. (2019), which found that short-term debt positively influences performance in other sectors. These sectoral differences underscore the unique financing patterns within ICT firms.

In theoretical terms, the insignificance of STDR aligns with Pecking Order Theory, which argues that firms with sufficient internal funds will rely less on external debt, especially short-term debt that carries high refinancing risk.

The Total Debt-Equity Ratio (TDER) has a negative and significant impact on ROE, indicating that greater reliance on total interest-bearing debt reduces profitability among ICT firms. Several mechanisms explain this negative effect: Nigeria's tight monetary policy environment during the period under review substantially increased borrowing costs. For ICT firms already coping with limited margins, high interest

expenses further depress profitability. ICT firms typically hold substantial intangible assets, making it difficult for lenders to assess their creditworthiness. This keeps borrowing rates elevated and reduces debt capacity, consistent with findings by Rajan and Zingales (1995). Excessive debt amplifies fixed obligations, which becomes problematic in a volatile sector prone to rapid technological changes and fluctuating revenues. Nigeria's credit markets remain relatively shallow, with banks imposing restrictive covenants and collateral requirements that can hamper operational flexibility.

This result aligns closely with POT, which predicts that when external financing is costly or uncertain, firms should minimize their reliance on debt. The negative impact of TDER is supported by empirical evidence from Abata et al. (2017), Ashraf et al. (2017), Habib et al. (2016), and Evgeny (2015), who similarly documented that higher leverage reduces profitability.

Conversely, the finding contradicts studies such as Das and Swain (2018) and Afolabi et al. (2019), which found positive leverage effects. These contrasting outcomes again reflect differences in industry structure, macroeconomic stability, and access to credit. Overall, the result provides compelling evidence that total leverage is detrimental to performance in Nigeria's ICT sector.

Firm age (L_AGE) shows a positive but statistically insignificant effect on ROE. Potential explanations include: ICT firms, regardless of age, must continually innovate. Older firms may not always translate experience into superior performance if they fail to keep pace with technological advancements. Being older reflects survival, not necessarily efficiency. Firms may survive for years while performing poorly due to subsidies, legacy customers, or market positioning. As firms mature, growth opportunities may slow, limiting the impact of age on profitability. This result aligns with Arowoshegbe and Emeni (2014), who observed no significant performance advantage for older Nigerian firms. However, it contrasts with Chinaemerem and Anthony (2012), who argued that age enhances performance in some industries.

Firm size (L_SIZE) is found to negatively and significantly affect ROE. Traditionally, larger firms are expected to enjoy economies of scale, lower transaction costs, and market dominance. However, the opposite effect observed in this study suggests several implications: Larger ICT firms may experience slow decision-making, reduced managerial flexibility, and coordination challenges. Expanding ICT operations often requires additional administrative and technological expenditures that may not yield proportional increases in revenue. Larger firms may face diminishing returns in saturated markets, especially in telecommunications and software services, where competition is intense. These findings align with Himmelberg et al. (1999) and Evgeny (2015), who documented that increases in firm size may decrease performance due to organizational inefficiencies.

CONCLUSION AND IMPLICATIONS

This study examined the effect of financial leverage on the performance of listed ICT companies in Nigeria from 2011 to 2023. Grounded in the Pecking Order Theory and motivated by the methodological inconsistencies identified in literature, the study applied refined measures of leverage that focused exclusively on interest-bearing debt, STDR, and TDER to avoid distortions associated with total liabilities–based indicators. Using data from six ICT firms and employing POLS estimation with robust standard errors, the study provides clear empirical insights into how capital structure choices influence profitability in a dynamic and innovation-driven sector.

The findings reveal that short-term debt does not significantly influence financial performance. This suggests limited reliance on short-term borrowing among ICT firms, likely due to the mismatch between short-term financing instruments and the long-term nature of ICT investments. In contrast, the total debt-to-equity ratio has a negative, statistically significant effect on return on equity (ROE), indicating that higher overall debt levels undermine profitability. This result is consistent with the predictions of the Pecking Order Theory. It reflects the adverse consequences of high interest rates, restrictive credit conditions, and financial market frictions prevalent in Nigeria. Furthermore, firm-specific characteristics such as age and size exhibit no positive influence on performance; age is insignificant, while size negatively affects ROE, suggesting that larger firms may face bureaucratic inefficiencies and higher operating costs.

Overall, the study concludes that financial leverage, particularly long-term and total interest-bearing debt, imposes substantial constraints on the performance of ICT firms in Nigeria. Debt financing tends to reduce shareholder returns rather than enhance them,

especially in environments characterized by high borrowing costs and elevated uncertainty. Consequently, ICT firms rely more heavily on equity and internal financing, consistent with the hierarchy proposed by the Pecking Order Theory.

The study's findings underscore the importance of prudent debt management, especially within sectors driven by technological innovation, intangible assets, and rapid market shifts. As debt becomes increasingly costly and risky, ICT firms must carefully evaluate the trade-offs of external financing, ensuring that borrowed funds are allocated to high-return projects capable of offsetting the fixed costs of debt service. The study contributes to the literature by providing sector-specific evidence from Nigeria's ICT industry, employing theoretically grounded leverage measures, and offering insights relevant to policymakers, managers, and investors seeking to optimize capital structure decisions in volatile economic environments.

Study Implications

The findings of this study have important implications. The study's findings strongly reinforce the core propositions of the Pecking Order Theory. Specifically, the negative and significant effect of total leverage on profitability affirms that firms prefer internal financing to external debt, especially in high-risk, innovation-driven sectors. This demonstrates that, under conditions of high information asymmetry, which are common in ICT firms due to their intangible asset structures, equity financing is more efficient than debt financing. By isolating interest-bearing debt from total liabilities, the study demonstrates that the choice of leverage measurement significantly influences theoretical interpretations. Earlier studies that used total liabilities may have overstated the role of debt in firm performance. This study, therefore, provides a theoretical refinement: leverage–performance relationships must be examined using debt structures that truly represent financing decisions, not operational obligations.

Policymakers seeking to support ICT sector growth should consider: reducing borrowing costs by improving access to long-term credit; strengthening financial market infrastructure to encourage capital market participation; offering tax incentives for equity financing and innovation-driven investments; and fostering technological research hubs that reduce financing burdens on ICT firms. Such interventions can improve competitiveness and enhance the contribution of ICT firms to national economic development. Investors should be cautious when evaluating ICT firms with high leverage ratios. The findings indicate that increased debt exposure may signal higher risk and lower profitability. Investors may therefore prioritize firms with conservative leverage structures, strong internal cash flows, and efficient cost management systems.

Methodologically, this study demonstrates that employing total liabilities as a measure of leverage may lead to biased estimates and incorrect conclusions. Future research in emerging-market contexts should adopt more theoretically sound leverage measures that distinguish interest-bearing debt from non-debt liabilities (e.g., payables, accruals, provisions). This enhances construct validity and improves empirical accuracy.

Limitations and Future Research Directions

Although the study provides relevant insights into the leverage–performance nexus in Nigeria's ICT sector, it acknowledges certain limitations that limit its ability to contextualize the findings and guide the interpretation of the results. The study focuses exclusively on listed ICT firms in Nigeria, resulting in a small sample size of six firms due to data availability constraints. While this enhances internal validity within the sector, it limits the generalizability of the findings to unlisted ICT firms or other industries with distinct financing structures. Further, the analysis is based solely on audited financial statements and publicly available reports. Although these are credible sources, they may not capture qualitative factors such as managerial risk preferences, innovation strategies, or corporate governance practices that could influence both leverage decisions and firm performance. Additionally, the study does not explicitly incorporate macroeconomic indicators such as inflation, exchange rates, monetary policy rate, or institutional quality, all of which may affect capital structure choices and firm performance. Their exclusion may limit the ability to disentangle firm-level effects from economy-wide influences. The study relies primarily on ROE, with ROAA used for robustness checks. While these measures are widely accepted, they do not capture market-based performance indicators such as Tobin's Q, stock returns, or market value added (MVA), which may offer additional insights into how leverage affects firm valuation. Although control variables such as size and age are included, other potentially relevant determinants such as asset tangibility, liquidity, growth opportunities, and corporate governance are omitted. Their exclusion may influence coefficient estimates.

To build on the insights generated by this study and further advance knowledge in this area, future research could consider the following directions: Expanding coverage across sectors and firm types. Researchers can extend the analysis to include unlisted ICT firms, SMEs, and start-ups in technology-based industries, as well as comparative studies across sectors (e.g., ICT vs. manufacturing). This will help determine whether the leverage–performance dynamics observed in this study are sector-specific or general across industries.

Future studies should include market-based measures such as Tobin's Q, stock price volatility, market-adjusted returns, and economic value added. These indicators may offer deeper insights into how investors perceive leverage decisions in ICT firms.

Expanding the models to incorporate macro-level and institutional variables could reveal broader environmental influences on capital structure. Future research could consider including relevant variables such as inflation, interest rate regimes, exchange rate movements, credit market depth, and regulatory quality. Such additions would enhance explanatory power and reveal the sensitivity of ICT firms to economic shocks.

Future researchers may consider employing alternative econometric techniques, such as dynamic panel models (GMM) to address endogeneity and quantile regression to capture performance variation across profitability levels. Given the nature of the ICT sector, further research may examine how R&D intensity, innovation output, digital transformation strategies, and intellectual property assets interact with financial leverage to influence firm performance.

Declaration of Conflict of Interests

The author has no conflict of interest to declare pertaining to the publication of this article.

Declaration of AI Usage

During the preparation of this work, the author(s) used ChatGPT to improve the flow and readability of the manuscript. Following this process, the author(s) reviewed and edited the content as necessary and take(s) full responsibility for the final version of the paper.

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