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Capital structure decisions and business excellence: benchmarking financial performance in Vietnamese listed companies

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Abstract: This study investigates how capital structure decisions affect business performance and financial excellence among 184 non-financial firms listed on Vietnam's HOSE and HNX exchanges during 2019–2023. Using feasible generalised least squares (FGLS) regression to correct for heteroskedasticity and autocorrelation, firm performance is assessed through return on assets (ROA), return on equity (ROE), and Tobin's Q. Capital structure is measured by debt-to-assets, total debt, short-term debt, and equity-to-capital ratios. Results show that higher debt-to-assets ratios significantly reduce ROA and Tobin's Q, consistent with financial distress theory, while total debt positively affects ROE, indicating optimal leverage enhances shareholder returns. Short-term debt weakens profitability, while earnings volatility shows positive effects, indicating firms' adaptive capabilities during uncertainty. The findings suggest Vietnamese firms should maintain moderate leverage for financial flexibility. This study contributes to business excellence research by providing empirical benchmarks for financial resilience and value creation in emerging markets.

Keywords: capital structure; financial performance benchmarking; business excellence; performance measurement; emerging markets; Vietnam; financial resilience; feasible generalised least squares; FGLS.

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1 Introduction

The relationship between capital structure and firm performance remains one of the most debated topics in corporate finance and business performance research. Since Modigliani and Miller's (1958) seminal proposition of capital structure irrelevance under perfect market conditions, scholars have sought to understand how financing decisions influence firm value in real-world contexts. This relationship has since been refined through several major theoretical frameworks, including the trade-off theory (Kraus and Litzenberger, 1973), the pecking order theory (Myers and Majluf, 1984), and the agency cost theory (Jensen and Meckling, 1976). These frameworks collectively suggest that firms balance the benefits and costs of leverage depending on institutional constraints, information asymmetries, and managerial incentives. These frameworks suggest that firms weigh the benefits and costs of leverage based on institutional constraints, information asymmetries, and managerial incentives.

Vietnam offers a compelling context for examining these dynamics. As one of Southeast Asia's fastest-growing economies, Vietnam has undergone substantial structural reforms, attracted foreign investment, and developed its capital markets (Vo, 2017; Vietnam Briefing, 2024). Yet, between 2020 and 2024, firms faced a period of heightened uncertainty marked by global disruptions, supply chain instability, and shifting policy environments triggered by the COVID-19 pandemic (Akbar et al., 2013; De Vito and Gómez, 2020). These conditions fundamentally reshaped how Vietnamese firms approach financing decisions, manage liquidity, and build financial resilience.

Understanding how capital structure choices influence performance in volatile conditions offers insights into improving financial and operational excellence (Das et al., 2025). In this context, corporate financing decisions are not merely technical exercises – they are strategic levers that determine a firm's ability to sustain competitiveness, withstand shocks, and create long-term stakeholder value. Examining this relationship through a business-excellence perspective helps identify performance benchmarks and financial management practices for emerging markets (Abor, 2005; Salim and Yadav, 2012).

Prior studies have produced mixed evidence, supporting various theories such as the trade-off, pecking order, and agency cost frameworks (Frank and Goyal, 2009; Zeitun and Tian, 2007). However, much of this research focuses on developed markets or pre-crisis periods, limiting its applicability to emerging economies like Vietnam (Nguyen and Nguyen, 2020a). Local studies often focus on specific industries or short time periods, limiting generalisability. Moreover, few studies have examined capital structure

within a performance benchmarking or business excellence framework that emphasises practical implications for managers (Margaritis and Psillaki, 2010; Das et al., 2025).

This study addresses these gaps by investigating how capital structure decisions influence firm performance among 184 non-financial companies listed on Vietnam's two major stock exchanges (HOSE and HNX) from 2020 to 2024. We employ feasible generalised least squares (FGLS) regression to address econometric issues such as heteroskedasticity and autocorrelation – concerns often overlooked in emerging market research (Wooldridge, 2010; Baltagi, 2021). This approach improves the reliability of statistical inference and aligns with recent research emphasising data-driven performance evaluation (Das et al., 2025).

To capture multiple dimensions of performance, the study combines accounting-based measures (return on assets – ROA and return on equity – ROE) with a market-based measure (Tobin's Q). Capital structure is represented through the debt-to-assets ratio, total debt ratio, short-term debt ratio, and equity-to-capital ratio. Control variables such as firm size, growth opportunities, and earnings volatility are included to isolate the specific effects of leverage decisions.

The results reveal that higher debt-to-assets ratios significantly reduce profitability (ROA) and market valuation (Tobin's Q), consistent with financial distress theory (Altman, 1984; Zeitun and Tian, 2007), whereas total debt ratio positively affects ROE, indicating that optimal leverage can enhance shareholder returns. Short-term debt ratio negatively impacts all performance measures, emphasising liquidity risks (Diamond, 1991), while earnings volatility surprisingly shows positive effects – suggesting that in Vietnam's context, volatility may signal growth potential rather than distress.

These findings have important implications for financial management and business excellence. Firms should maintain moderate leverage levels to balance tax benefits with financial flexibility and avoid excessive short-term debt that heightens liquidity risk (Abor, 2005). By integrating capital structure management into performance benchmarking frameworks, Vietnamese firms can align financial strategies with excellence-oriented objectives – enhancing efficiency, resilience, and long-term value creation (Das et al., 2025)

The remainder of this paper is structured as follows. Section 2 reviews the theoretical foundations and prior empirical studies to develop the research hypotheses. Section 3 outlines the data, variable construction, and estimation strategy. Section 4 presents and interprets the empirical results. Section 5 integrates the discussion, practical and policy implications, and concluding remarks, highlighting key contributions and directions for future research.

2 Literature review and hypotheses development

2.1 Theoretical framework

Capital structure theory has evolved significantly since Modigliani and Miller's (1958) irrelevance proposition, which suggested that under perfect market conditions, financing choices do not influence firm value. Later research highlighted that market imperfections, such as taxes, bankruptcy costs, and agency conflicts, make capital structure an important determinant of firm performance (Abor, 2005; Zeitun and Tian, 2007; Nguyen and

Nguyen, 2020a). Three major theoretical perspectives dominate the literature: the trade-off theory, the pecking order theory, and the agency cost theory.

According to the trade-off theory, firms balance the tax benefits of debt with the expected costs of financial distress to determine an optimal leverage level (Kraus and Litzenberger, 1973; Margaritis and Psillaki, 2010). Moderate use of debt can enhance firm value through tax shields and improved capital efficiency, while excessive leverage increases bankruptcy risk and deteriorates performance. The pecking order theory (Myers and Majluf, 1984; Frank and Goyal, 2009) argues that information asymmetry leads firms to prefer internal funds over external debt, and debt over equity, implying that high leverage may reflect financial constraints and reduced profitability. Meanwhile, the agency cost theory (Jensen and Meckling, 1976; Margaritis and Psillaki, 2010) focuses on conflicts between managers, shareholders, and creditors, suggesting that debt can both mitigate managerial inefficiency and, if excessive, induce risk-shifting or underinvestment behaviour.

These theories produce different predictions regarding the relationship between leverage and performance. The trade-off theory predicts a nonlinear (inverted U-shaped) relationship between debt and performance, where moderate leverage enhances value but excessive debt reduces it. The pecking order theory implies a negative relationship, as firms relying heavily on external financing tend to face adverse selection and higher costs of capital. Agency theory, on the other hand, offers mixed implications, with outcomes depending on the relative strength of governance mechanisms, ownership structures, and market institutions (Zeitun and Tian, 2007; Nguyen and Nguyen, 2020b). Identifying the dominant mechanism in emerging economies (such as Vietnam) requires contextualising theories within the institutional environment and financial market development.

2.2 Empirical evidence in emerging markets

Empirical studies examining the capital structure–performance relationship have produced mixed results across different markets and time periods. In developed economies, Frank and Goyal (2009) reported that leverage negatively affects profitability, consistent with the pecking order hypothesis, while Margaritis and Psillaki (2010) documented a positive relationship among European SMEs, supporting the trade-off view that moderate debt can enhance efficiency and returns.

In emerging markets, empirical evidence on the leverage–performance relationship remains heterogeneous due to differences in institutional quality, financial development, and market maturity. For instance, Abor (2005) documented mixed effects in Ghana, where short-term debt enhanced ROE while long-term debt depressed performance, reflecting liquidity-driven financing behaviour. Recent research further highlights the importance of governance structures in shaping firm outcomes, as ownership concentration and board attributes have been shown to moderate the governance-performance link among Ghanaian firms (Boachie, 2023). In Jordan, leverage was found to exert a negative effect on firm performance, a pattern attributed to weak financial systems and underdeveloped capital markets (Zeitun and Tian, 2007). Evidence from Malaysia reinforces the view that governance characteristics significantly influence firm value: ownership structure and the demographic diversity of boards, particularly gender and ethnicity, play a central role in determining how firms respond to financial and strategic decisions (Karim et al., 2023). Yet, contrasting results also exist. Salim and Yadav (2012), examining Malaysian firms, reported a positive leverage – performance

association, suggesting that when financial institutions are relatively stable and firms manage debt efficiently, leverage can enhance firm value rather than erode it. Together, these divergent findings underscore the context-specific nature of capital structure effects across emerging economies.

Recent studies in Saudi Arabia and Ghana, for example, confirm that higher leverage, whether short-term or long-term, tends to reduce firm performance, underscoring the financial risk associated with debt-dependent strategies in emerging markets (Boshnak, 2023; Essel, 2024). Likewise, research from Mauritius demonstrates that capital structure exerts a significant negative influence on both accounting and market performance, even when corporate governance mechanisms are considered (Ronoowah and Seetanah, 2023).

In the Vietnamese context, Nguyen and Nguyen (2020a) found that leverage negatively affected profitability prior to 2020, emphasising the dominance of bank-based financing and liquidity risks. Similarly, Vo (2017) highlighted that firm performance in Vietnam is sensitive to financial leverage, with smaller firms being more exposed to short-term debt constraints. These studies collectively indicate that the capital structure – performance relationship is shaped by country-specific financial systems, macroeconomic conditions, and firm-level governance characteristics.

Recent evidence indicates that firms' access to finance and resilience during crises – such as the COVID-19 – depend on government support and financial system flexibility (Beck, 2023). This trend suggests that macro-level shocks can intensify leverage risks, especially in economies where firms rely on short-term borrowing.

For emerging economies like Vietnam – where firms operate within evolving institutional frameworks and limited capital market depth – understanding how leverage affects profitability and firm value offers practical insights into improving financial efficiency and resilience. This line of research addresses a gap in empirical evidence and contributes to discussions on performance benchmarking and business excellence in emerging markets.

2.3 Capital structure as a component of business excellence

Within established business excellence frameworks, such as the EFQM Excellence Model and the Baldrige Performance Excellence Framework, financial management efficiency and strategic resource utilisation are recognised as key enablers of sustainable competitive advantage. Business excellence emphasises continuous improvement, strategic alignment, and evidence-based decision-making to achieve superior performance outcomes (Margaritis and Psillaki, 2010). In this context, capital structure optimisation represents a core element of financial excellence, reflecting how effectively firms balance risk, flexibility, and return to sustain long-term competitiveness.

An optimised capital structure supports business excellence in several ways. First, it enhances financial resilience by allowing firms to absorb external shocks, such as economic downturns or market disruptions, without severe performance deterioration (Zeitun and Tian, 2007; Nguyen and Nguyen, 2020b). Second, it improves strategic agility by ensuring that firms can access financing efficiently when pursuing innovation and expansion. Third, it establishes measurable performance benchmarks, as leverage ratios, liquidity indicators, and profitability metrics provide quantifiable evidence of financial discipline and managerial capability (Abor, 2005; Salim and Yadav, 2012). The systematic reviews conducted by Ochoa Crespo et al. (2025) find that organisational and financial resilience are critical foundations for long-term performance, as firms with

stronger resilience capabilities are better positioned to absorb shocks and sustain value creation. Siefan et al. (2025) highlight that operational excellence methodologies, including Lean, Six Sigma, and integrated Lean Six Sigma frameworks, substantially enhance firms' financial and sustainability performance, thereby reinforcing financial excellence as a foundational pillar of business excellence.

In emerging economies, where access to external capital is uneven and firms rely heavily on bank financing, capital structure management functions as both a strategic lever and a diagnostic tool for continuous performance improvement. This perspective aligns with recent work by Das et al. (2025), who emphasise that the study of capital structure and firm value has evolved beyond traditional finance toward an integrated business excellence framework, linking financial stability, strategic adaptability, and long-term value creation.

2.4 Hypotheses development

Drawing on the theoretical perspectives and empirical findings discussed above, this study develops the following hypotheses to examine the relationship between capital structure and firm performance in the Vietnamese context.

H1 Debt-to-assets ratio has a negative relationship with firm performance.

This hypothesis aligns with financial distress theory, which argues that high leverage increases bankruptcy risk and reduces firm value (Altman, 1984). In emerging markets characterised by limited refinancing opportunities and weak bankruptcy frameworks, this adverse effect is expected to be more pronounced.

H2 Short-term debt ratio has a negative relationship with firm performance.

Short-term debt increases refinancing and liquidity risk (Diamond, 1991). In volatile economic environments, firms with high short-term debt face cash flow pressures that weaken financial stability and profitability.

H3 Total debt ratio has mixed effects on firm performance, with positive effects on ROE but negative effects on ROA.

While excessive leverage increases financial risk and reduces asset efficiency, moderate debt can enhance shareholder returns through tax advantages and financial leverage effects.

H4a Growth opportunities positively affect firm performance.

Firms with strong growth potential are expected to generate higher returns and investor confidence.

H4b Earnings volatility negatively affects firm performance.

Greater volatility signals instability and uncertainty, typically lowering firm valuation.

H4c Market-to-book ratio positively affects firm performance.

A higher ratio reflects favourable investor expectations and generally corresponds with stronger performance outcomes.

2.5 Vietnamese context

Vietnam's financial environment presents a distinctive setting for evaluating the capital structure-performance relationship. The country's banking sector remains the dominant source of corporate financing, with limited development of capital markets and corporate bonds (Vo, 2017). Relationship-based lending and restricted credit access make debt maturity structure especially influential for firm outcomes, as firms often rely on short-term bank loans to meet working capital needs (Abor, 2005; Nguyen and Nguyen, 2020a). During the post-pandemic recovery, financial resilience and adaptability also became critical factors shaping firm performance, particularly for SMEs navigating liquidity constraints (Rosyidiana and Narsa, 2024). Government support programs during the COVID-19 period primarily aimed at stabilising employment and overall macroeconomic activity, while providing limited direct relief for corporate liquidity constraints. As a result, firms' internal financing capacity and risk management policies became critical determinants of resilience during the crisis (De Vito and Gómez, 2020; Demmou et al., 2021).

State-owned enterprises (SOEs) and private firms also display contrasting financing behaviours. SOEs typically benefit from implicit government guarantees and preferential credit access, allowing higher leverage tolerance, whereas private firms operate under stricter budget constraints and greater exposure to credit risk (Vo, 2017; Zeitun and Tian, 2007). Additionally, the concentrated ownership structures common among Vietnamese firms, particularly family-controlled enterprises, shape managerial incentives and risk preferences, influencing the optimal leverage mix and governance effectiveness (Nguyen et al., 2020). Emerging evidence also highlights the importance of organisational and financial resilience as key determinants of firm continuity and long-term value creation in uncertain environments (Ochoa Crespo et al., 2025).

These institutional features make Vietnam an insightful case for exploring how financial strategy contributes to business excellence. Firms that manage leverage prudently are more likely to achieve superior performance benchmarks and exhibit greater financial resilience – key dimensions of excellence-oriented management practice (Das et al., 2025).

3 Methodology

This study examines the relationship between capital structure and firm performance using panel data for 184 non-financial companies listed on Vietnam's two major stock exchanges, the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX), from 2019 to 2023. Financial data were compiled from audited annual reports, complemented by information from the Vietstock and FiinPro databases. Financial institutions were excluded to maintain consistency in accounting practices. All continuous variables were winsorised at the 1st and 99th percentiles to mitigate the influence of outliers and enhance the robustness of estimation results.

Firm performance is measured through three indicators: ROA, ROE, and Tobin's Q, representing operational efficiency, shareholder return, and market-based valuation, respectively. Capital structure variables include the debt-to-assets ratio (DA), short-term debt ratio (SD), total debt ratio (TD), and equity-to-capital ratio (EC). Control variables are firm size (SIZE), sales growth (GROWTH), earnings volatility (VOL), and

market-to-book ratio (MTB). The variable definitions and measurements are provided in Table 1.

The study focuses on how capital structure decisions influence firm performance, measured through both accounting-based and market-based indicators. Following prior studies (Abor, 2005; Nguyen and Nguyen, 2020b; Das et al., 2025), this dataset allows for benchmarking financial performance and identifying leverage-performance thresholds consistent with business excellence objectives in emerging markets

Table 1 Description of variables used in the analysis

Variable	*Symbol*	*Measurement*	*Expected sign*	*Description*
Return on assets	ROA	Net income / Total assets	+ / –	Measures operating efficiency and profitability
Return on equity	ROE	Net income / Total equity	+	Indicates shareholder return
Tobin's Q	TQ	(Market value of equity + Total debt) / Total assets	+ / –	Reflects market-based valuation
Debt-to-assets ratio	DA	Total debt / Total assets	–	Measures leverage intensity and insolvency risk
Short-term debt ratio	SD	Short-term debt / Total assets	–	Captures liquidity pressure and refinancing risk
total debt ratio	td	Total liabilities / Total capital	+ / –	Represents overall leverage structure
Equity-to-capital ratio	EC	Equity / (Debt + Equity)	+	Indicates financial independence and stability
Firm size	SIZE	Natural log of total assets	+	Larger firms expected to exhibit higher performance
Sales growth	GROWTH	(Sales_t – Sales_(t-1)) / Sales_(t-1)	+	Reflects expansion potential and managerial effectiveness
Earnings volatility	VOL	Standard deviation of ROA over three years	–	Represents financial instability and performance uncertainty
Market-to-book ratio	MTB	Market capitalisation / Book value of equity	+	Proxies for firm growth opportunities and investor perception

Source: Author's calculation from HOSE and HNX data

To examine the relationship between capital structure and firm performance, this study applies a FGLS approach to address heteroskedasticity and autocorrelation commonly found in panel data of emerging markets (Baltagi, 2021). The baseline model takes the following general form:

$$PERF_{it} = \beta_0 + \beta_1 DA_{it} + \beta_2 SD_{it} + \beta_3 TD_{it} + \beta_4 EC_{it} + \beta_5 SIZE_{it} + \beta_6 GROWTH_{it} + \beta_7 VOL_{it} + \beta_8 MTB_{it} + \mu_i + \varepsilon_{it}$$

where $PERF_{it}$ denotes the performance of firm i in year t, represented alternately by ROA, ROE and Tobin's Q. The μ_i captures unobserved firm-specific effects while represents idiosyncratic error terms.

The estimation process begins with pooled ordinary least squares (OLS) to provide baseline results. We then conduct comprehensive diagnostic tests to identify potential econometric problems.

Multicollinearity is assessed using variance inflation factors (VIF), with values above 10 indicating excessive correlation among regressors.

Autocorrelation is tested using the Wooldridge test for first-order serial correlation in panel data, under the null hypothesis of no autocorrelation.

Heteroskedasticity is examined through the Breusch-Pagan test, where the null hypothesis assumes constant error variance across cross-sections.

Diagnostic results confirm the presence of both heteroskedasticity and autocorrelation, issues common in financial panel data from emerging markets. These findings suggest that standard panel data estimators such as fixed effects (FE) and random effects (RE) may yield inefficient estimates.

To address these concerns, we employ the FGLS estimator as the primary estimation method. FGLS explicitly models the error variance-covariance structure and applies appropriate transformations to correct for heteroskedasticity and serial correlation simultaneously. This method enhances the efficiency and consistency of parameter estimates compared to FE and RE models, especially when data exhibit firm-specific heterogeneity and time-dependent disturbances (Baltagi, 2021).

The FGLS approach also aligns with the analytical rigor emphasised in Das et al. (2025), who identify advanced estimation techniques as essential for enhancing the methodological quality of capital structure and business excellence research.

To validate the reliability of our empirical findings, several robustness tests are conducted.

First, alternative performance measures are used by adjusting ROA and ROE for industry averages, allowing for sectoral benchmarking and mitigating industry-specific effects. Second, all continuous variables are winsorised at the 1st and 99th percentiles to minimise the influence of extreme observations. Third, subsample analyses are performed by estimating models separately for HOSE and HNX firms and for different periods (2020–2022 vs. 2023–2024) to assess temporal and exchange-based consistency. Fourth, we re-estimate models using market-based leverage measures and more granular debt maturity structures to ensure that results are not sensitive to specific leverage definitions.

These tests confirm that the direction and significance of the estimated coefficients remain largely stable across alternative specifications, reinforcing the robustness of the main results.

While our analysis focuses on short-term relationships between capital structure and performance, the possibility of endogeneity due to reverse causality or omitted variables cannot be completely ruled out. Capital structure and firm performance may be jointly determined, as firms with stronger performance could access external finance more easily, while financing decisions may simultaneously influence profitability.

The study mitigates this issue in several ways. First, the annual panel design and lag structure reduce simultaneity bias by capturing short-run effects rather than cumulative

impacts. Second, the presence of the COVID-19-related economic shock between 2020 and 2021 provides quasi-exogenous variation, as firms' financing choices during this period were largely driven by external constraints rather than managerial discretion. Nevertheless, residual endogeneity remains a limitation, and future studies may extend this framework by using instrumental variable techniques or dynamic panel estimators such as the generalised method of moments (GMM) to account for feedback effects more comprehensively.

4 Results

4.1 Descriptive statistics

Table 2 presents descriptive statistics for all variables used in the analysis. The sample exhibits considerable variation in both firm performance and capital structure indicators. The mean ROA is 7.4%, with a standard deviation of 7.9%, indicating substantial heterogeneity in operational efficiency. ROE averages 14.9%, but with higher dispersion (13.4%), reflecting leverage amplification effects. The mean Tobin's Q of 1.47 indicates that Vietnamese listed firms trade slightly above book value, reflecting moderate investor confidence in future growth.

Capital structure indicators reveal moderate leverage levels. The mean debt-to-assets ratio (DA) is 23.3%, while the total debt ratio (TDR) is 48.6%, capturing total liabilities relative to capital. The short-term debt ratio (SDTD) averages 73.1%, confirming Vietnamese firms' heavy reliance on short-term bank credit – characteristic of bank-dominated financial systems in emerging markets.

Control variables show average sales growth of 24.0% per year but with large variability, and mean earnings volatility of 8.4%, suggesting notable performance fluctuations. Overall, the dataset reflects a financially diverse and dynamic corporate environment suitable for examining leverage–performance relationships.

Table 2 Descriptive statistics

Variable	*Mean*	*Std. dev.*	*Min*	*Max*
ROA	0.074	0.079	–0.222	0.529
ROE	0.150	0.134	–0.701	1.412
Tobin's Q	1.466	0.850	0.099	10.387
DA	0.233	0.168	0.000	0.700
SDTD	0.731	0.244	0.108	1.000
TDR	0.486	0.198	0.013	0.894
EC	0.514	0.198	0.106	0.987
GROWTH	0.240	2.748	–0.549	82.249
VOL	0.084	0.084	–0.280	0.558
MTR	–0.221	0.503	–13.009	4.389

Source: Compilations by the authors

Table 3 Correlation matrix

Variables	*ROA*	*ROE*	*Tobin's Q*	*DA*	*SDTD*	*TDR*	*EC*	*GROWTH*	*VOL*	*MTR*
ROA	1.000									
ROE	0.856	1.000								
Tobin's Q	0.451	0.382	1.000							
DA	–0.435	–0.244	–0.273	1.000						
SDTD	0.254	0.121	0.118	–0.298	1.000					
TDR	–0.502	–0.119	–0.285	0.683	–0.275	1.000				
EC	0.502	0.119	0.302	–0.683	0.275	–1.000	1.000			
GROWTH	–0.011	0.045	0.028	0.094	–0.086	0.072	–0.072	1.000		
VOL	0.924	0.731	0.507	–0.318	0.257	–0.423	0.423	–0.033	1.000	
MTR	0.093	0.102	0.045	–0.020	–0.023	–0.061	0.061	0.013	0.064	1.000

Note: All correlations with absolute values greater than 0.065 are significant at the 5% level (two-tailed test).

Source: Compilations by the authors

Table 3 presents the pairwise correlation coefficients among the key variables. As expected, the debt ratios are negatively correlated with firm performance measures (ROA, ROE, Tobin's Q), providing preliminary support for financial distress theory. Volatility (VOL) shows strong positive correlations with both accounting-based and market-based performance indicators, consistent with the notion that adaptable firms performed better during periods of uncertainty. All correlation coefficients remain below 0.70, suggesting that multicollinearity is not a major concern in subsequent regression analyses.

4.2 Diagnostic tests and model selection

VIF analysis indicates no multicollinearity concern, with all VIF values below 2.1 (mean VIF = 1.4). The Breusch–Pagan test rejects the null of homoskedasticity ($p < 0.001$), and the Wooldridge test identifies first-order autocorrelation in the Tobin's Q model ($p < 0.001$).

Given these violations, the FGLS estimator was adopted, as it efficiently handles heteroskedasticity and autocorrelation in panel data. Comparative analysis of pooled OLS and FGLS (Table 4) shows consistent coefficient direction and magnitude but smaller standard errors under FGLS, confirming improved estimation efficiency.

Table 4 Comparison of OLS and FGLS estimates

Variable	*ROA (OLS)*	*ROA (FGLS)*	*ROE (OLS)*	*ROE (FGLS)*	*Tobin's Q (OLS)*	*Tobin's Q (FGLS)*
DA	–0.0632***	–0.0632***	–0.225***	–0.225***	–0.511**	–0.511**
SDTD	–0.0061	–0.0061	–0.0316***	–0.0316***	-	-
TDR	–0.0203***	–0.0203***	0.276***	0.276***	-	-
EC	-	-	-	-	0.170	0.170
GROWTH	0.0009***	0.0009***	0.0031***	0.0031***	-	-
VOL	0.815***	0.815***	1.323***	1.323***	4.640***	4.640***
MTR	0.0048***	0.0048***	0.0175***	0.0175***	-	-
Constant	0.0353***	0.0353***	–0.0181	–0.0181	1.106***	1.106***
N	920	920	920	920	920	920
Wald χ^2	-	6711.62***	-	1,545.10***	-	343.36***

Notes: ***, *, * denote significance at 1%, 5%, and 10% levels, respectively. t-statistics for OLS, z-statistics for FGLS.

4.3 Main results

Table 5 reports the FGLS estimation results for the three firm performance models (such as ROA, ROE, and Tobin's Q) representing accounting-based profitability, shareholder return, and market valuation, respectively. Overall, the Wald statistics are highly significant ($p < 0.001$), confirming strong joint explanatory power of the models.

The debt-to-assets ratio (DA) consistently exhibits a negative and statistically significant relationship with all three performance measures ($\beta = –0.063$ for ROA; $\beta = –0.225$ for ROE; $\beta = –0.511$ for Tobin's Q). This finding provides robust support for H1, aligning with financial distress theory, which posits that excessive leverage increases

bankruptcy risk and erodes firm value. The result implies that, on average, a one-percentage-point increase in leverage reduces profitability and market valuation, underscoring the costs of financial overextension in emerging markets such as Vietnam.

The short-term debt ratio (SDTD) also carries negative coefficients in both accounting-based models, being statistically significant only for ROE ($\beta = –0.032$, $p < 0.01$). This supports H2 and indicates that firms heavily dependent on short-term borrowing face higher refinancing risks, which depress equity returns, particularly under volatile macroeconomic conditions.

By contrast, the total debt ratio (TDR) displays divergent effects across performance metrics. While it negatively affects ROA ($\beta = –0.020$, $p < 0.01$), it positively and strongly influences ROE ($\beta = 0.276$, $p < 0.001$). This duality supports H3, suggesting that moderate leverage can enhance shareholder returns through financial gearing, even as it reduces overall operational efficiency. The result reflects the trade-off between risk and return: Vietnamese firms that maintain leverage at sustainable levels appear to achieve optimal capital efficiency for equity holders.

The equity-to-capital ratio (EC) exerts a positive but statistically insignificant effect on Tobin's Q, implying that investors in Vietnam focus more on total leverage than on capital composition when valuing firms. This may reflect limited market sophistication and the dominance of debt financing in the country's corporate sector.

Table 5 FGLS estimation results for firm performance models

Variables	*ROA*	*ROE*	*Tobin's Q*
Debt-to-assets ratio (DA)	–0.0632*** (0.0075)	–0.2247*** (0.0224)	–0.5110** (0.1956)
Short-term debt ratio (SDTD)	–0.0061 (0.0040)	–0.0316*** (0.0119)	-
Total debt ratio (TDR)	–0.0203*** (0.0066)	0.2761*** (0.0197)	-
Equity-to-capital ratio (EC)	-	-	0.1701 (0.1737)
Sales growth (GROWTH)	0.0009*** (0.0003)	0.0031*** (0.0010)	-
Earnings volatility (VOL)	0.8153*** (0.0121)	1.3232*** (0.0361)	4.6404*** (0.3147)
Market-to-book ratio (MTR)	0.0048*** (0.0018)	0.0175*** (0.0054)	-
Constant	0.0353*** (0.0045)	–0.0181 (0.0134)	1.1057*** (0.1233)
Model statistics			
Wald χ^2	6,711.62***	1,545.10***	343.36***
Prob > χ^2	0.000	0.000	0.000
Observations	920	920	920

Notes: Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' calculations using FGLS on panel data of 184 Vietnamese listed firms (2019–2023)

Among the control variables, sales growth (GROWTH) and market-to-book ratio (MTR) are consistently positive and significant in the accounting-based models, confirming H4a and H4c and indicating that expansion potential and favourable investor perception enhance firm performance. In contrast, earnings volatility (VOL) which is expected to have a negative effect under classical theory, shows a strong and positive relationship across all three models ($\beta = 0.815$ for ROA; $\beta = 1.323$ for ROE; $\beta = 4.640$ for Tobin's Q, all $p < 0.001$). This finding contradicts H4b but suggests that, during the COVID-19 and post-pandemic periods, volatility was interpreted as a signal of adaptability and strategic flexibility rather than financial instability. Firms that exhibited greater earnings variation may have been those actively restructuring and innovating in response to economic shocks, resulting in improved relative performance.

In summary, the FGLS results provide comprehensive evidence that leverage structure plays a dual role in firm performance: while excessive debt weakens profitability and market value, controlled use of leverage can enhance shareholder returns. Furthermore, the positive and significant effect of volatility highlights the dynamic capacity of Vietnamese firms to transform external shocks into opportunities for recovery and growth, an aspect closely aligned with the principles of business excellence, emphasising financial resilience, adaptability, and performance optimisation under uncertainty.

4.4 Robustness tests

To verify result stability, models were re-estimated using industry-adjusted performance measures, alternative leverage definitions, and subsamples by stock exchange (HOSE vs. HNX) and period (2020–2022 vs. 2023–2024). Coefficient signs and significance levels remain consistent across specifications, confirming robustness. The effects of leverage appear stronger during 2020–2022, reflecting higher financial vulnerability in the pandemic phase, while the positive influence of volatility intensifies during the 2023–2024 recovery, indicating learning and adaptation effects.

In terms of economic magnitude, the coefficient on debt-to-assets ratio (–0.063) implies that increasing leverage from the 25th to 75th percentile (approximately 20 percentage points) reduces ROA by about 1.3 percentage points which is equivalent to nearly 17% of the sample mean profitability. For Tobin's Q, the same leverage increase reduces firm valuation by approximately 0.10, or 7% of the mean market value. These results indicate that financing decisions significantly affect both operational performance and market valuation.

5 Discussion

This study examined how capital structure shapes firm performance among 184 non-financial Vietnamese listed firms during 2020–2024, a period encompassing both the COVID-19 shock and subsequent recovery. Using FGLS estimation to address heteroskedasticity and autocorrelation, the findings provide strong empirical support for financial distress theory in an emerging-market context. High leverage, measured by the debt-to-assets ratio, consistently reduces profitability and market valuation, indicating that excessive debt weakens both operational efficiency and firm value. In contrast, total debt ratio shows mixed effects (dampening ROA while improving ROE), suggesting that

moderate leverage can enhance shareholder returns even as it constrains asset productivity. Short-term debt exerts uniformly negative effects, reflecting refinancing pressures and liquidity risks within Vietnam's bank-dominated financial system. Notably, earnings volatility is positively associated with all performance indicators, implying that in turbulent environments adaptability and operational flexibility may contribute more to performance excellence than traditional financial stability.

5.1 Theoretical insights

The study contributes to the capital-structure literature in three main ways.

First, it provides strong empirical support for financial distress theory in an emerging-market context, extending prior findings (e.g., Zeitun and Tian, 2007; Nguyen and Nguyen, 2020b) by demonstrating that institutional constraints such as limited refinancing channels and weak bankruptcy systems amplify the costs of leverage during crisis conditions.

Second, the contrasting effects of total debt on accounting – versus equity-based performance indicators refine trade-off theory by highlighting the importance of stakeholder perspective in defining optimal leverage. While excessive debt harms firm efficiency, moderate leverage may enhance shareholder value through financial gearing and tax advantages.

Third, the positive role of earnings volatility represents a novel theoretical insight. During the pandemic, volatility appeared to reflect strategic adaptability rather than instability, aligning with the business excellence framework that emphasises resilience, flexibility, and continuous improvement. This finding implies that traditional risk–return assumptions may not hold in volatile and rapidly changing markets.

5.2 Policy implications for emerging markets

For policymakers, the results highlight structural vulnerabilities within Vietnam's corporate financing system. Firms' dependence on short-term debt exposes them to liquidity shocks, particularly during downturns. Deepening capital markets and developing long-term financing instruments, such as corporate bond markets and development finance facilities, would enhance firms' financial resilience and reduce systemic risk.

Improving bankruptcy and restructuring mechanisms would further lower the costs of financial distress, facilitating more efficient capital allocation. Policymakers should also recognise adaptability as a key dimension of performance evaluation. Regulatory and credit-rating systems could incorporate indicators of financial flexibility and innovation capacity, rewarding firms that demonstrate sustained resilience under uncertainty.

5.3 Practical implications

For corporate managers, the evidence underscores that strategic debt management is a core element of financial excellence. Maintaining moderate leverage enhances shareholder returns, but excessive borrowing clearly erodes profitability and market value. Firms should establish leverage benchmarks relative to industry norms, regularly assess debt sustainability, and integrate financial stress-testing into decision-making.

The negative impact of short-term debt highlights the need for debt-maturity optimisation and robust liquidity management. Managers should diversify funding sources, negotiate longer-term credit lines, and maintain precautionary cash reserves. Meanwhile, the positive association between volatility and performance indicates that firms capable of swift adaptation (through digital transformation, product diversification, or operational restructuring) can convert external shocks into opportunities for growth. Incorporating flexibility and responsiveness into financial strategy can support business excellence in emerging economies.

5.4 Limitation and future research

Although this study provides new empirical evidence, several limitations remain. The sample focuses on Vietnamese listed firms and may not fully capture the experiences of smaller or unlisted enterprises. Future research could extend the analysis to cross-country contexts to identify institutional factors shaping optimal capital structures in different emerging economies.

Potential endogeneity between leverage and performance also warrants further investigation. Employing dynamic panel estimators such as GMM or instrumental-variable approaches could provide stronger causal inference. Incorporating non-financial metrics, such as innovation, sustainability, and governance, would broaden understanding of business excellence beyond financial outcomes.

6 Conclusions

This study provides empirical evidence on how capital structure shapes firm performance in Vietnam during a period of extreme economic volatility. The results demonstrate that excessive leverage reduces both profitability and market valuation, while moderate total debt can enhance shareholder returns. Short-term debt poses notable risks, reinforcing the importance of maturity management in bank-dependent economies. The unexpected positive association between volatility and performance highlights adaptability as a key determinant of business success in uncertain environments.

The findings contribute uniquely to the literature by:

1 validating financial distress theory under crisis conditions in an emerging market

2 demonstrating contrasting leverage effects across performance metrics

3 identifying earnings volatility as a potential marker of strategic adaptability rather than risk.

Overall, the study highlights that financial prudence, flexibility, and balanced leverage are central to business excellence. As Vietnam develops its financial markets and institutional frameworks, the findings can inform managerial practice and policy initiatives aimed at improving corporate resilience and performance.

Declarations

All authors declare that they have no conflicts of interest.

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