THE IMPACT OF CAPITAL STRUCTURE ON MARKET VALUATION: EVIDENCE FROM LISTED STEEL COMPANIES ON THE VIETNAMESE STOCK MARKET

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Abstract: ***This study examines the impact of capital structure on the market valuation of 14 listed steel firms in the Vietnamese stock market over the period 2012-2023. Tobin's Q is employed as a proxy for firm market valuation, while capital structure is decomposed into short-term debt (SDA) and long-term debt (LDA) to capture potential maturity-based differences in their effects. Using an unbalanced panel dataset, the study applies Pooled OLS, Fixed Effects Model (FEM), Random Effects Model (REM), and Feasible Generalized Least Squares (FGLS) estimations, implemented in STATA 17. The empirical results indicate that both short-term and long-term debt exert negative and statistically significant effects on Tobin's Q. In contrast, profitability (ROA) and asset tangibility (TANG) have positive impacts, highlighting the importance of operational efficiency and asset structure in enhancing firm valuation. Corporate income tax (TAX) is found to have a negative effect, whereas firm size (SIZE) and asset growth (GROW) are statistically insignificant. The study provides policy implications for steel enterprises, investors, and policymakers in designing prudent financing strategies, particularly given the cyclical nature and high capital intensity of the steel industry.***

• Keywords: *capital structure; tobin's q; market valuation; steel industry.*

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1. Introduction

In the context of global economic instability and persistent geopolitical tensions, capital structure decisions play a critical role in ensuring sustainable corporate growth. Capital structure not only reflects a firm's financing strategy but also directly influences its capacity for expansion, risk management, and value maximization (Mensah et al., 2025). An appropriate financing mix enables firms to allocate financial resources efficiently, mitigate funding constraints, and enhance competitiveness. Conversely, suboptimal capital structure choices may increase financial imbalance risks and impair operational performance (Akali, 2025).

Modigliani and Miller (1963) argue that, in the presence of corporate taxes, debt financing generates tax shield benefits that can enhance firm value. However, when bankruptcy and agency costs are incorporated into the analysis, Trade-off Theory posits that firms determine an optimal leverage level by balancing tax advantages against expected financial distress costs. In addition, Pecking Order Theory emphasizes the role of information asymmetry in financing decisions (Myers & Majluf, 1984), while Signaling Theory (Ross, 1977) and Agency Theory (Jensen & Meckling, 1976) explain how capital structure may serve as a market signal of firm quality or as a disciplinary mechanism for managers. Therefore, optimal capital structure extends beyond cost-of-capital considerations and is closely linked to how markets assess risk and growth prospects.

Within the steel industry, capital structure is crucial due to high capital intensity, long investment cycles, and sensitivity to input price and construction demand fluctuations. In Vietnam, 2025 marks a strong recovery driven by domestic demand, with real estate projects rising by 91 percent and public investment reaching USD 10.1 billion. However, exports declined sharply due to trade protection measures, especially for hot rolled coil and coated steel. Industry performance is uneven, as firms like Hoa Phat benefit from domestic demand, while coated steel producers face declining margins. Despite expected growth of 8 to 10 percent in 2026, leverage remains heterogeneous across firms.

Empirical evidence on the relationship between capital structure and firm value remains inconclusive. Aggarwal and Padhan (2017) document significant leverage effects on firm value. Bui et al. (2023) report a positive impact of total debt on ROA, ROE, and Tobin's Q, although short-term and long-term debt negatively

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affect Tobin's Q when disaggregated. Hoang Ngoc An and Tran Ngoc Tu (2024) find positive effects of overall debt and short-term debt, but a negative effect of long-term debt. Conversely, Luu (2021) documents a negative association between leverage and firm value in the chemical industry. Tripathi et al. (2024) highlight governance characteristics as moderating factors, whereas Utami et al. (2025) report insignificant effects in Indonesian real estate firms. These mixed findings suggest that the impact of capital structure is context-dependent and influenced by industry characteristics, economic cycles, and firm-specific conditions.

Although capital structure has been widely studied, industry-specific evidence for steel firms in emerging markets such as Vietnam remains limited. Following the COVID-19 shock, many steel firms increased their reliance on debt, highlighting the importance of debt maturity structure in firm valuation. However, the differential effects of short-term and long-term debt have not been fully examined. This study investigates the impact of SDA and LDA on Tobin's Q of listed Vietnamese steel firms, providing empirical evidence from a capital-intensive industry and offering policy and managerial implications for optimizing financing strategies.

2. Determinants of Firm Market Valuation

2.1. Debt to Total Assets (DA)

Debt to Total Assets represents the overall degree of financial leverage. A higher DA indicates greater reliance on debt financing, whereas a lower ratio reflects stronger dependence on equity capital. According to Modigliani and Miller (1963), under a corporate tax regime, increasing debt may reduce the weighted average cost of capital through tax shield benefits, thereby enhancing firm value. Trade-off Theory further suggests that firms operate at an optimal leverage level where the marginal tax benefits of debt are balanced against expected financial distress costs. However, when leverage exceeds its optimal threshold, bankruptcy risk, agency costs, and financial distress costs increase, leading to a decline in firm value (Jensen & Meckling, 1976; Bui et al., 2023).

Given the cyclical nature and input price volatility of the steel industry, excessive short-term leverage may amplify financial vulnerability. Empirical evidence in Vietnam documents a negative association between short-term debt and Tobin's Q (Nguyen Xuan Hung & Pham Kieu Trang, 2024), consistent with the view that firms with unstable cash flows tend to limit short-term borrowing (Sheikh & Wang, 2011). The impact of debt maturity may therefore be dual in nature. If tax shield benefits and signaling effects dominate, the expected coefficient is positive. Conversely, if financial distress costs outweigh these benefits, the expected coefficient becomes negative. Given the high cyclicality and cash flow volatility of the Vietnamese steel industry during the period 2012-2023, a negative effect is expected. Therefore:

H1: Short-term debt to total assets (SDA) negatively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

Similarly, under Trade-off Theory, long-term debt provides more stable financing and facilitates tax shield utilization compared to short-term debt. However, higher fixed interest obligations may increase financial distress and agency costs, leading the market to discount firm value (Myers, 1984; Jensen & Meckling, 1976). For steel firms, large-scale long-term investments may constrain cash flows during downturns, thereby increasing financial risk. Empirical evidence in Vietnam shows that LDA is negatively related to Tobin's Q (Luu, 2021), and Hoang Ngoc An and Tran Ngoc Tu (2024) also report a negative impact of long-term debt on firm value in the HOSE sample. Therefore:

H2: Long-term debt to total assets (LDA) negatively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

2.2. Firm Size (SIZE)

Firm size reflects financial capacity, capital accumulation, and competitive position. Larger firms typically possess more diversified operations and stronger bargaining power with financial institutions, allowing them to access capital at lower cost (Titman & Wessels, 1988). Theoretically, larger firms are generally more transparent, less risky, and enjoy better access to capital markets, which leads to higher market valuation. This argument is consistent with Agency Theory, which emphasizes reduced information asymmetry and monitoring costs (Jensen & Meckling, 1976), and Signaling Theory, which suggests that firm size and reputation convey positive signals regarding firm quality. Empirical studies document a positive association between SIZE and Tobin's Q (Vo Minh Long, 2017), and international research frequently includes firm size as an important control variable when examining capital structure and firm value (Aggarwal & Padhan, 2017; Jihadi et al., 2021). Therefore:

H3: SIZE positively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

2.3. Asset Growth (GROW)

According to Signaling Theory, asset growth reflects expectations of business expansion and future profitability, thereby conveying positive signals to the market and increasing firm valuation (Ross, 1977). In steel firms, asset growth is closely associated with capacity expansion and long-term investment. If market demand is expected to increase, Tobin's Q may improve accordingly. Empirical evidence shows that

GROW has a significant positive effect on firm value (Bui et al., 2023). Asset growth therefore captures expansion capability, accumulation of new assets, and long-term investment intensity. Therefore:

H4: GROW positively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

2.4. Corporate Income Tax (TAX)

According to Modigliani and Miller (1963), in the presence of corporate income tax, interest payments are tax deductible, generating tax shield benefits that reduce WACC and increase firm value. Trade-off Theory further suggests that firms increase leverage to exploit tax benefits until the marginal tax advantage equals expected financial distress costs. In this context, tax does not directly influence firm value but affects it indirectly through capital structure decisions. Empirical studies show that taxation is positively associated with leverage usage (**Sudiyatno** et al., 2013), implying that firms facing higher effective tax rates have stronger incentives to increase debt in order to optimize value. In the capital-intensive steel industry, higher effective taxation may encourage greater leverage, which in turn affects Tobin's Q depending on financial risk exposure. Therefore:

H5: Corporate income tax (TAX) affects Tobin's Q of steel companies listed on the Vietnamese stock market through the tax shield mechanism and capital structure adjustments.

***2.5. Tangible** Assets (TANG)*

Under Trade-off Theory, tangible assets reduce expected financial distress costs by serving as collateral, enabling firms to access debt at lower cost. Under Pecking Order Theory, collateral assets reduce information asymmetry and facilitate debt financing instead of equity issuance (Myers & Majluf, 1984). Empirical evidence confirms that TANG positively affects leverage (Nguyen Thanh Cuong, Nguyen Thi Canh (2012); Sudiyatno et al., 2023). In terms of valuation, asset tangibility may enhance borrowing capacity and stabilize financing, thereby supporting growth and increasing market valuation, provided that leverage remains within prudent levels. Therefore:

H6: TANG positively affects Tobin's Q of steel companies listed on the Vietnamese stock market through its collateral role and reduction of information asymmetry.

2.6. Return on Assets (ROA)

ROA reflects the efficiency with which firms utilize assets to generate profits and represents internal operational capability. According to Signaling Theory, highly profitable firms send positive signals regarding managerial quality and future cash flow prospects, leading to higher market valuation (Ross, 1977). Pecking Order Theory further suggests that profitable firms prefer internal financing and reduce reliance on debt, thereby lowering financial risk and enhancing investor confidence (Myers & Majluf, 1984).

In the steel industry, where profitability is strongly influenced by commodity price cycles and construction demand fluctuations, ROA also reflects cost control capacity and margin sustainability under volatile market conditions. Empirical evidence in Vietnam documents a positive relationship between profitability and Tobin's Q (Bui et al., 2023; Jihadi et al., 2021).

H7: Return on Assets (ROA) positively affects Tobin's Q of steel companies listed on the Vietnamese stock market.

3. Model and Research Methodology

3.1. Research Model

This study adopts an empirical framework consistent with prior research by Jihadi et al. (2021), Bui et al. (2023), and Hoang Ngoc An and Tran Ngoc Tu (2024). Building upon these established approaches, the proposed research model is specified as follows:

$$Tobin's Q_{it} = \beta_0 + \beta_1 SDA_{it} + \beta_2 LDA_{it} + \beta_3 SIZE_{it} + \beta_4 GROW_{it} + \beta_5 TAX_{it} + \beta_6 TANG_{it} + \varepsilon_{it}$$

Where:

Dependent variable - Tobin's Q

Tobin's Q is employed as the dependent variable to represent firm market valuation. It reflects the relationship between the firm's market value, including the market value of equity, debt, and preferred stock, and the book value of total assets. A Tobin's Q greater than one indicates that the market values the firm above the replacement cost of its assets, whereas a value below one suggests that the firm may not be utilizing its assets efficiently and could be undervalued by the market. In this study, Tobin's Q is used to capture changes in firm value associated with variations in capital structure (Bui et al., 2023; Luu, 2021; Vo Minh Long, 2017).

Independent variables representing capital structure

The capital structure variables include:

(i) Short-term Debt to Total Assets (SDA), measured as the ratio of short-term debt to total assets. This variable captures the firm's reliance on short-term financing. Although short-term debt may carry lower financing costs, it increases liquidity risk and refinancing risk.

(ii) Long-term Debt to Total Assets (LDA), measured as the ratio of long-term debt to total assets. This variable reflects the extent to which long-term liabilities finance long-term investments. While long-term debt provides more stable funding, it entails fixed financial obligations and exposure to interest rate risk.

The decomposition of total debt into SDA and LDA enables the examination of whether debt maturity

structure generates differentiated effects on firm valuation. This approach extends and builds upon prior studies by Bui et al. (2023), Hoang Ngoc An and Tran Ngoc Tu (2024), and Vo Minh Long (2017).

Firm-level control variables

Firm size **(**SIZE**)** is measured as the natural logarithm of total assets. This variable captures firm scale and controls for the influence of size on market valuation, as larger firms generally exhibit greater stability and improved access to capital markets.

Asset growth **(**GROW**)** is calculated as the annual percentage change in total assets relative to the previous year. This variable reflects expansion strategy and long-term growth potential.

Corporate income tax **(**TAX**)** is measured as corporate income tax expense divided by earnings before tax, representing the firm's effective tax burden.

Asset tangibility **(**TANG**)** is defined as the ratio of fixed assets to total assets. This variable captures the degree of asset tangibility, which influences collateral capacity, access to debt financing, and capital structure decisions. It is particularly relevant in the steel industry, given its high capital intensity.

3.2. Data and Research Methodology

The dataset employed in this study consists of secondary unbalanced panel data collected from 14 steel firms listed on the Vietnam Stock Exchange over a 12-year period from 2012 to 2023, obtained from FiinPro. Panel models are estimated using Pooled OLS, FEM, and REM, with the Hausman test selecting between FEM and REM. Diagnostic tests include Modified Wald or Breusch Pagan for heteroskedasticity and Wooldridge for serial correlation. FGLS corrects violations (Hair et al., 2019).

4. Empirical Results

Descriptive statistics show mean Tobin's Q of 0.366 with notable dispersion. Short term debt dominates capital structure (SDA 0.578; LDA 0.057). Firm size varies widely, while asset growth is highly volatile with extreme values; winsorization at 1 percent preserves model stability. ROA averages 2.7 percent and TANG 20.2 percent, consistent with capital intensity. TAX has a negative mean. Correlations are generally low, with a stronger link between LDA and TANG. VIF values below 3 indicate no multicollinearity concerns.

Table 1. Descriptive Statistics of the Research Variables

Variable	Mean	Std.Dev	Min	Median	Max
TobinsQ	0.366	0.242	0.072	0.288	1.214
SDA	0.578	0.121	0.265	0.578	0.840
LDA	0.057	0.077	0.000	0.020	0.291
SIZE	7.526	1.576	4.233	7.598	12.143
GROW	-1.683	15.873	-191.684	0.021	0.933
ROA	0.027	0.069	-0.469	0.028	0.217
TANG	0.202	0.127	0.020	0.170	0.499
TAX	-0.150	0.152	-0.786	-0.154	0.249

Source: Results from Stata 17

Subsequently, the study estimates the model using Pooled OLS, FEM, and REM specifications (Table 2). Model selection is conducted using the F-test and the Hausman test. The F-test yields Prob > F = 0.0000, rejecting the null hypothesis and indicating that FEM is preferred over Pooled OLS. The Hausman test reports Prob > χ^2 = 0.0327, leading to the rejection of the null hypothesis and supporting the use of FEM over REM.

Based on the selected FEM specification, further diagnostic tests are performed. The Modified Wald test reveals the presence of heteroskedasticity (Prob > χ^2 = 0.0000), while the Wooldridge test detects serial correlation (Prob > F = 0.0000). To address these issues, the FGLS estimator is applied. The FGLS results (Wald $\chi^2(7)$ = 1075.02; p = 0.000) show that both SDA (-0.7986) and LDA (-0.8471) exert statistically significant negative effects at the 1% level on Tobin's Q. These findings imply that increased leverage, regardless of maturity structure, reduces market valuation, consistent with the financial distress cost argument of Trade-off Theory.

In contrast, ROA (0.2222; p < 0.01) and TANG (0.0678; p < 0.01) have positive and significant effects, indicating that profitability and tangible asset backing enhance market expectations. TAX exhibits a negative effect at the 5% significance level, while SIZE and GROW are statistically insignificant.

Table 2. Regression Results Across Model Specifications

Variable	Pooled OLS		FEM		REM		FGLS	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
SDA	**-1.0800** ***	0.000	**-0.8415** ***	0.000	-0.8012 ***	0.0012	**-0.7986** ***	0.000
LDA	-0.8288	0.143	-0.4751	0.145	**-0.842** *	0.0021	**-0.8471** ***	0.000
SIZE	0.0183	0.368	-0.0706	0.108	-0.475	0.076	-0.0019	0.587
GROW	0.0005	0.244	0.0003	0.371	**-0.071** **	0.028	0.0002	0.589
ROA	-0.0128	0.942	0.1354	0.408	0.011	0.687	**0.2222** ***	0.000
TANG	0.4704	0.225	0.1008	0.582	0.135	0.466	**0.0678** ***	0.002
TAX	0.1049	0.251	-0.1352	0.339	0.101	0.588	**-0.0749** **	0.016
Cons	0.8209 ***	0.000	1.7628 ***	0.000	-0.135	0.113	1.2267 ***	0.000
N	153		153		153		153	
R-sq/ Wald χ^2	0.387		within = 0.65892 between = 0.6623 overall = 0.66061		within = 0.5822 between = 0.5812 overall = 0.5817		Wald $\chi^2(7)$ = 1075.02 Prob > χ^2 = 0.0000	
F	F = 9.948 ; Prob > F = 0.000243 (<1%)							
Hausman	Chi2 (7) = 22.29 and Prob > chi2 = 0.0327 < 0.05							
Wald chi2	Wald chi2 (7) = 263.54 and Prob > chi2 = 0.000							

Source: Results from Stata 17

(*) Significant at the 10%; (**) significant at the 5%; (***) significant at the 1%

The variation in statistical significance of ROA between the FEM and FGLS estimations suggests that the FEM results may have been affected by heteroskedasticity and serial correlation, leading

to biased standard errors. After correcting for these econometric issues using FGLS, the coefficient of ROA becomes statistically significant at the 1 percent level, more clearly reflecting the role of profitability in enhancing market valuation. Additional estimations using cluster-robust standard errors at the firm level yield consistent coefficient signs and significance levels for the key variables, further confirming the robustness of the empirical findings.

5. Conclusion and Implications

5.1. Conclusion

The empirical results indicate that the market valuation of listed steel firms, measured by Tobin'sQ, is significantly influenced by debt maturity structure and firm-specific characteristics. Both short-term and long-term debt ratios exhibit negative and statistically significant coefficients, suggesting that increased reliance on debt financing is associated with lower market valuation. In other words, investors respond cautiously to rising leverage levels. Higher debt ratios increase liquidity risk, refinancing risk, and the likelihood of financial distress, leading the market to perceive firms as riskier and adjust valuations downward. This finding is consistent with Trade-off Theory, which posits that firm value is maximized at an optimal leverage level; beyond this threshold, higher financial risk and distress costs reduce market value.

In contrast, profitability and asset tangibility have positive and statistically significant effects on Tobin's Q, highlighting the importance of operational efficiency and tangible asset backing in strengthening investor confidence and enhancing valuation. Corporate income tax exhibits a negative and statistically significant effect, suggesting that in the context of the Vietnamese steel industry during the study period, a higher effective tax burden may reflect compressed profit margins or suboptimal financial structures, thereby reducing market valuation. This result implies that tax shield benefits are insufficient to offset the financial costs and risks associated with elevated leverage within the sample.

Asset growth does not show a statistically significant impact, indicating that capacity expansion during downturn phases of the industry cycle may not be positively valued by the market unless accompanied by improvements in profitability. Similarly, firm size is statistically insignificant, which may reflect the structural characteristics of the steel industry, where valuation differences are driven more by operational efficiency and financing structure than by absolute asset scale.

5.2. Implications

For listed steel firms, financing strategies should be implemented cautiously, particularly given the cyclical nature of the industry and its exposure to international trade fluctuations and input price volatility. Increasing debt ratios, whether short-term or long-term, may reduce Tobin's Q if leverage exceeds the optimal threshold. Firms should therefore prioritize improving profitability through production efficiency, cost optimization, and technology-intensive investment. Strengthening high-quality tangible asset bases may further enhance financial capacity and send positive signals to the market.

For investors, the findings underscore the importance of examining debt maturity structure rather than relying solely on aggregate leverage measures. Firms that maintain stable profitability and possess strong asset structures tend to achieve higher valuations and are less subject to market discounting during economic volatility. Simultaneous evaluation of operational performance and capital structure enhances investment decision quality in the steel sector.

For policymakers, the empirical evidence highlights the importance of a stable financial environment and regulatory framework in shaping capital structure decisions and firm value. Stable credit policies, development of medium- and long-term capital markets, and appropriate trade protection measures may alleviate financial pressure and support firms in optimizing capital structure. Such measures can contribute to sustainable improvement in the market value of the steel industry amid increasing global integration and competition.

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