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THE IMPACT OF CASH FLOW VOLATILITY ON THE MARKET LEVERAGE OF LISTED COMPANIES IN VIETNAM

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ABSTRACT

This study examines the impact of cash flow volatility on the market leverage of publicly listed non-financial firms in Vietnam. Using a panel dataset of 381 firms listed on the Hanoi Stock Exchange and the Ho Chi Minh Stock Exchange from 2015 to 2024, the research employs a Feasible Generalized Least Squares (FGLS) model. The findings indicate that cash flow volatility negatively correlates with market leverage for firms in the lowest quartile of operating cash flows, while a positive correlation is observed for firms in the highest quartile. No significant relationship is found for the middle quartiles or the full sample. Additionally, industry median market leverage, firm size, and inflation positively influence market leverage, whereas the market-to-book ratio and return on total assets have negative effects. The relationship between fixed tangible assets and market leverage varies depending on firms' cash flow levels. Using sample stratification and panel methodologies, this work refines capital structure theory and improves understanding of financing behavior under cash-flow risk. The managerial implications involve concentrating on cash-flow stabilization for low-cash enterprises, timing debt issuance for high-cash firms, and aligning leverage with industry standards to reduce financing costs. The findings support tailored debt regimes.

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1. Introduction

Capital structure refers to the composition of a firm's funding sources, including equity capital and debt financing, which support its business operations. An optimal capital structure enables firms to maximize firm value while minimizing the cost of capital.

Theoretical research on capital structure has developed through both classical and modern perspectives, with significant contributions from Baker and Wurgler (2002), Myers and Majluf (1984), Jensen and Meckling (1976), and Modigliani and Miller (1958). Empirical studies have built upon these foundations to examine the determinants of capital structure, including Huang and Ritter (2021), Keefe and Yaghoubi (2016), Frank and Goyal (2009). These studies have identified key factors influencing corporate leverage, explored the relationship between cash shortfalls and financial leverage, and analyzed why U.S. firms accumulate substantial cash reserves during certain periods.

Despite these advancements, empirical findings remain inconsistent and, in some cases, statistically inconclusive, particularly regarding the relationship between cash flow volatility and corporate leverage. Addressing this research gap, the present study provides empirical evidence on the impact of cash flow volatility on market leverage among Vietnamese listed firms. By analyzing this relationship within Vietnam's financial and economic landscape, the study contributes to the broader discourse on capital structure determinants and the role of cash flow volatility in corporate financing decisions.

2. Theoretical framework related to corporate capital structure

2.1. Modigliani and Miller's capital structure theory

One of the most significant modern capital structure theories was introduced by Modigliani and Miller (1958). This theory is based on two key propositions: Proposition I on Firm Value and Proposition II on Cost of Capital, under the assumption of a perfect capital market with no transaction costs, no financial distress costs, and no taxes. In the absence of taxes, Proposition I state that the value of a leveraged firm (with debt) is equal to that of an unleveraged firm (without debt), implying that the use of debt has no impact on firm value, and there is no optimal capital structure. Proposition II asserts that in a tax-free environment, the required return on equity increases with financial leverage due to rising financial distress risk. When incorporating corporate taxes, Proposition I suggest that the value of a leveraged firm exceeds that of an unleveraged firm by the present value of the tax shield on interest expenses. Proposition II maintains that the required return on equity remains positively correlated with leverage. Modigliani and Miller's (1958) theory demonstrate that debt financing can enhance firm value through tax shields but simultaneously increases the expected return on equity. However, this theory relies on the unrealistic assumption of a perfect market, overlooking agency costs, financial distress costs, and transaction costs.

2.2. Trade-Off theory of capital structure

The trade-off theory proposes that firms determine their optimal capital structure by balancing the benefits and costs of debt. The primary benefit of debt is the tax shield on interest payments, while the costs include financial distress, agency conflicts, and transaction costs. According to this theory, firms with high profitability and substantial tangible assets tend to use more debt, whereas those with lower profitability and fewer tangible assets opt for lower leverage. This theory also explains capital structure variations across industries (Nam et al., 2024). Within the trade-off theory, two major perspectives exist. The static trade-off theory, proposed by Jensen & Meckling (1976)

and Jensen (1986), suggests that firms have a single optimal capital structure that maximizes firm value, which remains unchanged over time. In contrast, the dynamic trade-off theory, as developed by Strebulaev (2007), Goldstein et al. (2001), Schwartz (1984), and Stiglitz (1973), argues that while firms may have an optimal capital structure, it evolves over time in response to changes in interest rates, inflation, taxation, and capital needs. In the short term, firms' capital structures may fluctuate, but in the long run, they tend to converge toward the optimal level. This theory provides a structured framework for identifying optimal capital structure and explains the effects of taxation, financial distress, and agency costs on financing decisions.

2.3. Pecking Order theory

The pecking order theory, introduced by Myers and Majluf (1984) and based on Donaldson's (1961) research, asserts that capital structure decisions are influenced by information asymmetry, where managers possess superior knowledge of the firm's value and risks compared to external investors. As a result, firms follow a hierarchical financing preference, prioritizing internal financing (retained earnings) first, followed by debt financing, and resorting to equity issuance only as a last option due to its higher costs and dilution effects. While debt financing offers tax advantages, it also increases financial distress risk due to fixed interest obligations. Debt is only beneficial if it generates stable cash flows sufficient to cover repayment costs; otherwise, it becomes more expensive than equity. This explains why firms with strong internal cash reserves rely less on debt, while low-profitability firms with limited internal financing prefer debt over equity issuance.

2.4. Market Timing theory

The theory proposed by Baker & Wurgler (2002), suggests that firms issue equity when stock prices are overvalued relative to book value and historical market prices, reducing capital costs and leveraging temporary market fluctuations. Conversely, firms repurchase shares when stock prices are undervalued to maximize shareholder value. Firms may also raise capital even without immediate funding needs if market conditions—whether in debt or equity markets—are exceptionally favorable, while delaying equity issuance during unfavorable conditions. As a result, capital structure is shaped by historical market timing decisions (Muhammad et al., 2021). The dynamic market timing model (Myers & Majluf, 1984), highlights the conflict of interest between managers and external investors due to asymmetric information. Firms tend to issue equity after positive disclosures to minimize information asymmetry, boost stock prices, and enhance access to equity financing under favorable conditions. Additionally, Baker and Wurgler (2002) identify the market-to-book ratio as a key indicator of market timing effects on capital structure. Thus, market timing theory argues that capital structure is primarily influenced by market conditions at the time of financing, rather than adhering to a fixed optimal capital structure.

2.5. Related empirical studies

A summary of past empirical investigations indicates extensive global and local study on the structure of capital, notably the link between cash flow volatility and financing utilization.

Around the world, important research such as Huang and Ritter (2021), Harris and Roark (2019), and Frank and Goyal (2009), concentrate on non-financial enterprises in the United States. These research investigations demonstrate how cash flow, industry risk, R&D investment, and cash flow volatility affect financing decisions. Yet, the evidence on the relationship between cash flow volatility and financial leverage remains ambiguous.

In Vietnam, researchers such as Nam et al (2024) and Nguyen et al. (2021) have investigated the link between listed enterprises on HOSE and HNX. Results vary according to business size, operating cash flow, and industry variables. According to the sample categorization and company categories, certain studies reveal a negative association, while others show a positive correlation.

Recent empirical work from 2020-2025 adds fresh angles to the capital-structure debate. Camara & Sangiácomo (2022) employ a panel dataset that includes 15 emerging markets. They demonstrate that, when cash-flow volatility is heightened, it affects both the quantity and the price of debt. From our vantage point, the quantity effects are most obvious. Cash-flow volatility tightens collateral constraints, which certainly is something that the banking system is not in a position to do right now. Those constraints hurt the market-value leverage ratio quite a bit; upper-bound effects are on the order of a 30 % reduction in the highest volatility quartile with those changes manifesting most obviously during stressed episodes. Using the risk-channel perspective, Alter & Elekdag (2020) look into global volatility spillovers affecting corporate balance sheets. They find that a one-standard-deviation jump in the VIX carries into ASEAN corporates' balance sheets and produces a 4–5 pp deleveraging effect. Taken together, this emerging literature confirms that cash-flow instability and global volatility transmission jointly shape firms' optimal debt choices in emerging markets.

3. Data and methodology

3.1. Data

The study utilizes financial statements and market capitalization data of non-financial firms listed on the Hanoi Stock Exchange (HNX) and the Ho Chi Minh Stock Exchange (HOSE) from 2015 to 2024. 2015 marks (i) the HOSE/HNX International Financial Reporting Standards (IFRS)-compliant cash-flow statement mandate, and (ii) the lifting of foreign-ownership caps; 2024 is the last full fiscal year available. The dataset consists of secondary data sourced from Datastream. The sample selection criteria are as follows: industry classification, excludes financial firms (i.e., banks, securities firms, insurance companies), only continuously listed firms from 2015 to 2024 are included and macroeconomic data such as deflated GDP and inflation rates are obtained from the World Bank (worldbank.org).

The final sample consists of 389 non-financial firms listed on HNX and HOSE over the 2015-2024 period, with a total of 3,810 firm-year observations, categorized by exchange and industry as detailed in Appendix 1 and Appendix 2 (*see Appendix 1 and Appendix 2 online*).

3.2. Research model and variable measurement methods

Dependent variable (Market leverage (TDM))

In the words of Frank and Goyal (2009), financial leverage is capable of being determined by calculating four ratios: (1) market leverage (TDM), which is the ratio of total liabilities to market value of total assets; (2) book leverage (TDA), which is the ratio of total liabilities split by book value of total assets; (3) market leverage employing long-term debt (LDM), which is the proportion of overall long-term debt to market value of total assets; and (4) book leverage utilizing long-term debt (LDA).

Harris and Roark (2019) characterize market leverage (TDM) as the firm's market capitalization plus book value of liabilities less preferred stock liquidation value, deferred taxes, and investment tax credits. Adjusting to the Vietnamese environment, scholars such as Nam et al., 2024 calculate the current market value of total assets differently: market capitalization in addition to total liabilities minus deferred

income taxes payable. In the current research, market leverage ($TDM_{i,t}$) refers to company i's leverage ratio at the time t as computed using this modified technique.

Independen variables

Industry Median Market Leverage (INDTDM)

The industry median market leverage is computed through calculating the average of the market leverage ratios from every company in the identical sector yearly. Yet since numerous industry categorization criteria are present the sorting strategy used changes the final median leverage. Frank and Goyal (2009) used the United States Standard Industrial Classification (SIC) system. In the Vietnamese setting, because the HOSE and HNX stock markets use differing categorization standards, this research uses the Cafef.vn intermediary industry classification system. Particularly, market leverage ratios are determined for all businesses in the group, and the median industry leverage ratio is calculated yearly for every sector. The variable $INDTDM_{i,t}$ represents the median market leverage for the industry of firm *i* at time *t*. We follow Li & Islam (2019) and Frank & Goyal (2009) in using the industry *median* because it is robust to extreme leverage observations in thinly traded Vietnamese industries. INDTDM is expected to have a postive relationship with TDM

Cash Flow Volatility (VCF)

Cash flow volatility may be quantified in several ways. Santosuosso (2015) computes it by dividing the standard error of a company's yearly cash flows across a period of nine years (or less if data is inadequate) by the mean yearly cash flow. Harris & Roark (2019) calculate the standard error of cash flows during the course of five years split by the total value of assets.

Given Vietnam's emerging stock market and small quantity of businesses listing throughout longer time frames, the present research characterizes cash flow volatility (CFV_{i,t}) as the standard error of operational cash flows for company i across periods t, t-1, and t-2. This technique is compatible with Nguyen et al. (2021) findings. To compute operating cash flow (OCF_{i,t}) at time t, use the following formula:

$$OCF_{i,t} = EBITDA_{i,t} - Interest_{i,t} - Taxes_{i,t} - Dividends_{i,t}$$

Operating cash-flows that are unstable increase the likelihood of not being able to pay the interest and principal when they are due, which means lenders might raise their spreads or ration some credit. Managers might then respond to these increases in the cost of debt by substituting away from debt and in favor of equity or retained earnings. Panel evidence shows that a one-standard-deviation increase in cash-flow volatility reduces market-value leverage by about 4 to 6 percentage points in both OECD countries and emerging-market samples (Keefe & Yaghoubi, 2016). A recent worldwide examination of 2024 filings also finds that elevated VCF "significantly impairs firms' capacity to obtain long-term loans," buttressing the anticipated adverse VCF–TDM connection (Ahmed & Elnahass, 2024).

VCF is expected to have a negative relationship with TDM

Market-to-Book Ratio (MB)

According to Nam et al., (2024), The proportion of market value compared to the book value of total assets assesses a company's growth potential. This ratio, frequently referred to as Tobin's Q, is commonly used in capital structure analyses. MB_{i,t} indicates company i's growth ratio at time t. A high market-to-book ratio signals ample growth opportunities and a balance sheet tilted toward intangible, low-collateral assets. Under those conditions, taking on debt risks magnifying under-investment and asset-substitution problems; consequently, managers prefer equity financing. As a result,

high market-to-book firms have a negative leverage effect (Chang et al., 2014).

Tangible Asset Ratio (TANG)

Accoring to Huang and Ritter (2021), the tangible asset ratio (TANG) is defined as the ratio of net property, plant, and equipment to the book value of total assets. TANG_{i,t} represents the tangible asset ratio of firm i at time t. Collateral can come from physical assets like buildings and equipment. These can be used to reduce lenders' expected loss in the event of default, and this, in turn, can reduce the effective interest rates charged by lenders. Firms that have more tangible assets (but not necessarily better credit quality) leverage up. And they do so in a significant way, exploiting what we colloquially refer to as the "collateral channel." The impact is confirmed by recent cross-country evidence and panel studies in the Gulf region (Abdalla et al., 2025), which underscore that bank credit flows toward borrowers who are rich in assets. Therefore, TANG is expected to have a postive relationship with TDM.

Return on assets (PROF)

The profitability ratio assesses a company's capacity to make earnings from its assets by demonstrating the amount of profit each component of asset may provide. Profitability is often assessed as the operating income before depreciation divided by the entire assets' book value. To arrive at this ratio, the authors add (1) pre-tax accounting profit (item 50), (2) corporate income tax (item 51), (3) interest expenses (item 23) from the income statement, and (4) depreciation expenses (item 02) from the indirect cash flow statement, subsequently divides by the book value of total assets. Depreciation is considered to be zero in organizations that use the direct method cash flow statement and do not have depreciation data. PROF_{i,t} refers to the profitability ratio of company i at time t. PROF is expected to have a negative relationship with TDM. This is consistent with pecking-order theory and emerging-market evidence that profitable firms rely on retained earnings (Nguyen, 2024).

Firm size (SIZE)

Firm size can be calculated using the natural logarithm of total assets or net revenue. Greater enterprises, in accordance with trade-off theory, are less likely to go bankrupt. Models developed by Frank and Goyal (2009) normalize overall asset values to a given year's price level. In this analysis, the authors convert all assets to 2015 values utilizing the World Bank's GDP deflator.

The modification formula is:

$$BVA_{i,t-2015} = (BVA_{i,t} \times Deflator_{2015})/Deflator_{t}$$

Where BVA_{i,t} is the total assets of business i at time t, Deflator_{t} is Vietnam's GDP deflator in year t using the World Bank data, and BVA_{i,t-2015} is firm i's asset value at time t calculated using 2015 prices. Large corporations are more diversified and transparent, hence the probability of their default and the premiums for information asymmetries are lower; ceteris paribus, this allows them to access the capital market at cheaper terms and to realize scale economies in debteconomies of scale in issuing debt. Panel studies of corporate debt behavior in various countries find that SIZE is one of the across-the-board strongest positive drivers of leverage (Armanious & Zhao, 2024). For example, half a dozen studies of UK firms find that leverage is positively correlated with firm size and with the growth of both assets and earnings (Ozkan & Ozkan, 2004). Therefore, SIZE is expected to have a positve relationship with TDM.

Inflation Rate (INFL)

Frank & Goyal (2009), as well as Harris & Roark (2019), utilize projected inflation (INFL) as an indication of expected increases in the Consumer Price Index (CPI), according to

biannual surveys performed by the Federal Reserve Bank of Philadelphia's Livingston Survey for the United States economy. In this analysis, the authors utilize the World Bank's CPI inflation rate to gauge Vietnam's situation. INFL_{i,t} signifies Vietnam's inflation rate at time t. High expected inflation lowers the real cost of servicing nominal debt, encouraging firms to lever up (Brunnermeier et al., 2024). Therefore, INFL is expected to have a positve relationship with TDM.

To analyze the relationship between cash flow volatility and capital structure, the authors employ the multivariate regression model of Harris & Roark (2019) as follows:

$$TDM_{i,t} = \alpha + \beta_1 INDTDM_{i,t} + \beta_2 CFV_{i,t} + \beta_3 MB_{i,t} + \beta_4 TANDG_{i,t} + \beta_5 PROF_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 INFL_{i,t} + \varepsilon_{i,t} \quad (1)$$

Harris and Roark (2019) developed this model based on the original framework of Frank and Goyal (2009). However, to better align with the Vietnamese context, the authors adjust the variables used in this model. For $INFL_{i,t}$, the contemporaneous inflation is used, instead of the lagged inflation variable because Vietnamese listed firms renegotiate short-term bank debt annually, so current CPI captures borrowing-cost expectations better than a 1-year lag (compare Barry et al. (2009) for U.S. syndicated loans) (*see Appendix 3 online*).

3.3. Research methodology

Constructing a panel dataset to analyze the impact of cash flow volatility on market leverage among firms in the sample. To test this relationship, the study employs estimation methods such as Ordinary Least Squares (OLS), Fixed Effects Model (FEM), and Random Effects Model (REM), along with residual diagnostics and the Hausman test to determine the most appropriate model. If issues such as autocorrelation, multicollinearity, heteroskedasticity, or endogeneity arise and cannot be corrected, the Feasible Generalized Least Squares (FGLS) method will be applied with suitable adjustments.

Harris and Roark (2019) divided sample into four quartiles based on firms' annual operating cash flows and conducted FEM regressions for each quartile. However, this study's dataset includes only 3,810 firm-year observations over 10 years (2015-2024), which may lead to common panel data issues such as heteroskedasticity and serial correlation, especially given the large cross-section (firms) relative to the short time period. Additionally, potential bidirectional relationships between dependent and independent variables may introduce endogeneity concerns (Demiraj et al., 2024). To address these challenges, the authors quartile the dataset based on firms' total operating cash flow from 2015 to 2024, creating one full sample and four quartile-based sub-samples. Quartile 1 consists of firms with the lowest total operating cash flow over 10 years, while Quartile 4 includes firms with the highest total operating cash flow. Quartiles 2 and 3 represent firms with moderate operating cash flows.

4. Results and discussion

The summary statistics for the variables listed previously indicate the sample's features and variants including in general and throughout each of the four quartiles, which are described in Appendix 3 (*see Appendix 3 online*).

Concentrated in real-estate developers, 37% of the sample suffers from sector-specific leverage habits. Property firms tend to keep high debt backed by pledgable land banks. These land banks pump up the positive coefficients on SIZE, TANG, and INFL Cash flow and borrowing costs swing with credit cycles and zoning policy, exaggerating the observed effect of volatility (VCF) on leverage. Construction-in-progress accounting depresses book values, artificially inflating MB and tangibility ratios

and skewing pooled estimates. Re-estimating the models without real-estate firms—or adding robust industry dummies—will confirm whether the main findings hold once these biases are neutralized.

The mean Market Leverage (TDM) for the entire sample is roughly 53.5%, having a standard error of 24.5%, demonstrating significant diversity in enterprises' market leverage levels. The value of the median (56.0%) is substantially greater than the average, indicating a small left skew in the distribution of values. When divided into quartiles, the mean TDM numbers are rather stable, varying from 54.7% in Q2 to 58.7% in Q1, showing that the quartile segmentation successfully reflects slight changes in leverage concentrations. The variation, as measured by standard errors of measurement, is likewise quite consistent among quartiles.

Industry Median Market Leverage (INDTDM) averages 56.0%, which is somewhat higher than firm-specific leverage (TDM), indicating industry-level capital structure trends. Among quartiles, INDTDM stays constant, with the largest means recorded in Q4 (58.4%), implying that companies with greater leverage concentrations function in sectors with greater median leverage.

The average Market-to-Book Ratio (MB) of 1.031 indicates that enterprises have a somewhat greater market valuation than their book value. MB varies significantly, with the highest value reaching 9.047, notably in Q4, showing that some enterprises are overvalued relative to their accounting book value.

The Tangible Asset Ratio (TANG) shows an average value of roughly 18.9%, suggesting that a large portion of the assets of a company are immaterial. Greater physical asset proportions were observed in Q4, suggesting that businesses that have greater leverage prefer to have larger amounts of real resources, which is in line with physical assets' protective use for financing through debt.

Return on Assets (PROF) has an aggregate average of 12.8%, with significant variability, particularly among enterprises in Q4. The larger average and standard deviations in Q4 suggest that enterprises with greater borrowing costs may also have greater earnings, although accompanied by greater variance.

Firm Size (SIZE), calculated as the natural logarithm of total assets, hovers around 28.652 for the whole sample and gradually rises across quartiles, hitting 28.453 in Q4. This trend shows that bigger companies have stronger market leverage, which is in line with beliefs that larger enterprises have reduced bankruptcy risks and better opportunities for financing from outside sources.

The inflation rate (INFL) remains steady throughout all quartiles, having a mean of around 6.2%. Since the INFL is most probably constructed using macroeconomic information instead of firm-level variables, it is predicted to be consistent throughout quartiles. In general, the descriptive statistics show significant differences amongst organizations in terms of leverage, asset structure, profitability, and firm size. These initial results highlight the importance of controlling for company features such as asset tangibility, profitability, and firm size in later regression analysis looking at market leverage factors.

Table 1. Correlation matrix of main variables

Variables	INDTDM	VCF	MB	TANG	PROF	SIZE	INFL
TDM	0.4171*	-0.1607*	-0.4561*	-0.0337*	-0.4068*	0.2557*	0.1255*
INDTDM	1	-0.0571*	-0.2414*	-0.0999*	-0.2046*	0.1747*	0.2594*
VCF		1	0.0663*	0.0313	0.2548*	-0.1151*	-0.0157
MB			1	0.0153	0.3751*	0.0876*	-0.1456*
TANG				1	0.2165*	0.0413*	0.0099
PROF					1	-0.0105	0.0395*
SIZE						1	-0.0327*

Note: * *indicates significance at the 5% level.*

According to Table 1, the market leverage (TDM) has a positive correlation with sector median leverage (INDTDM) and firm size (SIZE), but a negative correlation with cash flow volatility (VCF), market-to-book ratio (MB), tangible assets (TANG), and profitability. All pairwise correlation coefficients are less than 0.6, indicating no significant multicollinearity, and independent correlation studies for quartile subsections have not been undertaken.

The VIF findings indicate that all independent variables have value ranges under 2, with an average VIF of 1.18, implying that multicollinearity is minor and unlikely to affect the regression model's results. As a result, further multicollinearity tests for the quartile smaller samples were judged superfluous (*see Appendix 5 online*).

Table 2. Model selection and tests for autocorrelation and heteroscedasticity

Test		POOL	FEM	REM
Heteroskedasticity	Test Name	Breusch–Pagan/Cook–Weisberg Test	Modified Wald Test	-
	Test Statistic	chi2(1) = 26.58	chi2(381) = 30208.72	-
	p-value	0	0	-
	Conclusion	Reject H0 – Heteroskedasticity exists	Reject H0 – Heteroskedasticity exists	-
Autocorrelation	Test Name	-	Wooldridge Test	Wooldridge Test
	Test Statistic	-	F(1, 380) = 419.224	F(1, 380) = 419.224
	p-value	-	0	0
	Conclusion	-	Reject H0 – Serial correlation exists	Reject H0 – Serial correlation exists

According to Table 2, Diagnostic procedures show considerable heteroskedasticity in the pooled OLS and fixed effects models, as well as serial correlation in the fixed and random effects models. Therefore, feasible generalized least squares (FGLS) estimation with corrections for heteroskedasticity and first-order autocorrelation was used to guarantee the validity of the regression findings. Full regression results for three different regression runs of Pooled OLS, Fixed effects model (FEM), Random effects model (REM) are show in Appendix 6.

Table 3. Comparing regression results across quartiles and the full sample

	TDM				
	All Samples	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
INDTDM	0.454***	0.389***	0.511***	0.379***	0.388***
	[21.23]	[9.94]	[15.09]	[10.37]	[9.11]
VCF	- 0.0529	- 0.221***	0.0857	0.0175	0.387***
	[-1.36]	[-3.16]	[1.04]	[0.21]	[4.19]
MB	- 0.188***	- 0.181***	- 0.179***	- 0.226***	- 0.182***
	[-33.23]	[-16.79]	[-15.98]	[-19.06]	[-17.01]
TANG	- 0.0338**	- 0.0457	0.0117	0.0284	0.110***
	[-2.28]	[-1.08]	[0.31]	[1.16]	[4.39]
PROF	- 0.294***	- 0.332***	- 0.245***	- 0.294***	- 0.361***
	[-15.80]	[-9.29]	[-6.63]	[-6.81]	[-7.75]
SIZE	0.0625***	0.125***	0.156***	0.108***	0.0303***
	[21.79]	[18.58]	[21.16]	[12.94]	[4.52]
INFL	0.158***	0.163**	0.0367	0.197***	0.249***
	[4.65]	[2.31]	[0.63]	[3.26]	[3.63]
Total Observations	**3810**	**960**	**950**	**950**	**950**

Notes: *(*), (**), (***) Corresponding to statistical significance levels of 10%, 5%, and 1%. Values in [ ] represent z-values. All quartile regressions use Feasible GLS with panel-specific AR(1) and heteroskedasticity-robust covariance; pooled OLS/FEM/REM results are reported in Appendix A1 for comparison.*

4.2. Discussion

The results from Table 3 show following findings:

Cash Flow Volatility – VCF (*)

Regression analysis shows no significant correlation between cash flow volatility and market leverage among Vietnamese listed firms. However, firms in the lowest cash flow quartile show a negative correlation, while those in the highest quartile exhibit a positive correlation. These findings align with Nam et al. (2024) when considering differences in financial capacity between U.S. and Vietnamese firms.

The variation stems from sample differences. Harris and Roark (2019) examined U.S.-listed firms with higher capitalization, while Vietnamese firms generally have lower financial capacity. Additionally, the Vietnamese dataset includes firms with negative cash flow and equity, impacting the results.

In Vietnam, firms with low cash flow struggle to secure loans and rely on equity financing, reducing leverage, consistent with Nguyen et al. (2021). Conversely, firms with strong cash flow increased leverage through debt issuance, supporting pecking order theory and Le Dat Chi (2013). For firms in Nam et al.'s (2024) highest cash flow quartiles, no correlation between cash flow volatility and leverage was found. These firms employ different financial strategies, such as increasing cash reserves (Bates et al., 2009), issuing equity (market timing theory), or raising debt (trade-off theory). Similarly, for Vietnamese firms in middle quartiles, varying financial responses result in no significant correlation.

The findings align with previous studies, including Keefe & Yaghoubi (2016). Nguyen (2024) found a negative correlation between cash flow volatility and book leverage in Vietnam, suggesting firms with volatile cash flow reduce debt to mitigate financial distress. However, as volatility can have both positive (liquidity) and negative (uncertainty) effects, this may not always apply. Frank & Goyal (2009) also noted that some factors lose explanatory power over time, justifying differences in findings.

The result provides insights into capital structure decisions in Vietnam, showing how firms adapt financing strategies based on financial constraints. The results support pecking order and trade-off theories, emphasizing the dynamic link between cash flow volatility, financing choices, and leverage in an emerging market.

Industry Median Market Leverage (INDTDM) (+)

Regression results indicate a strong positive correlation between the market leverage of Vietnamese listed firms and the industry median market leverage, with high statistical significance. This finding is consistent with Harris and Roark (2019), and Frank and Goyal (2009). According to the trade-off theory, variations in industry characteristics lead to differences in capital structure. Corporate managers tend to align leverage levels with industry norms, explaining the observed correlation, which remains unaffected by firms' operating cash flow levels.

Market-to-Book Ratio (MB) (-)

Also known as Tobin's Q, this ratio measures a firm's market value relative to its book value. Regression results reveal a negative correlation between market leverage and Tobin's Q, aligning with Nguyen (2024). According to market timing theory, firms prefer issuing equity when their stock prices are high to fund operations, reducing their reliance on debt. Consequently, higher Tobin's Q leads to lower leverage levels, regardless of cash flow conditions.

Tangible Asset Ratio (TANG) (-)

For the full sample, tangible assets show a negative correlation (-) with market leverage, with statistical significance at the 5% and 10% levels. However, in Quartile 4 (highest cash flow firms), tangible assets exhibit a positive correlation (+) with market leverage, with strong statistical significance.

For the full sample, the negative correlation (-) between tangible assets and leverage suggests that Vietnamese firms primarily finance fixed assets with equity. Under trade-off theory, firms with high tangible assets should increase debt usage, provided they achieve efficient asset utilization. However, the statistical results indicate that Vietnamese firms may not be fully leveraging their fixed assets, explaining the negative correlation in the full sample.

Profitability (PROF) (-)

Profitability is negatively correlated (-) with market leverage, consistent across the full sample and quartiles, with strong statistical significance. This supports pecking order theory, which states that firms prioritize internal financing over external borrowing.

When retained earnings are sufficient, firms reduce debt usage. Conversely, less profitable firms must rely on debt financing, leading to the negative correlation (-) between profitability and leverage. This finding aligns with Nam et al. (2024), Nguyen et al. (2021), Harris and Roark (2019), and Frank and Goyal (2009).

Firm Size (SIZE) (+)

Firm size exhibits a positive correlation (+) with market leverage, consistent with Nam et al. (2024), and Nguyen et al. (2021). Larger firms have greater access to debt financing at lower costs due to economies of scale and lower perceived risk, supporting the trade-off theory. This correlation is statistically significant across all quartiles, independent of operating cash flow levels.

Inflation (INFL) (+)

Inflation is positively correlated with market leverage, indicating that firms increase debt levels in response to rising inflation. Higher expected inflation reduces the real cost of borrowing, encouraging firms to use more debt, aligning with trade-off and market timing theories. Previous research, including Barry et al. (2009) and Taggart (1985), found similar trends, where firms issue more debt when inflation expectations rise. However, these studies were conducted in stable macroeconomic environments, while Vietnam's inflation history has been more volatile.

To analyze this impact, the study runs regression models over two periods: 2015-2019 and 2019-2024 (Table 4). In high-volatility regimes (2015-19) the debt-inflation channel dominates, i.e., nominal liabilities are partly deflated away (Brunnermeier et al., 2024). For 2019-24, when monetary tightening anchored expectations (State Bank of Vietnam's ceiling-rate directive 01/2020), the effect vanishes, similar to the 'debt-surprise' result for 34 emerging markets in Le et al. (2025). This segmentation allows for a better understanding of how inflation affects market leverage under different macroeconomic conditions.

Table 4. Regression results for 2015-2019 and 2020-2024

	TDM		
	Full period	**From 2015 to 2019**	**From 2020 to 2024**
INDTDM	0.454***	0.434***	0.395***
	[21.23]	[19.75]	[14.92]
VCF	- 0.0529	- 0.613***	0.026
	[-1.36]	[-9.05]	[0.53]
MB	- 0.188***	- 0.227***	-0.164***
	[-33.23]	[-25.04]	[-26.03]
TANG	- 0.0338**	- 0.00288	-0.0354**
	[-2,28]	[-0.18]	[-2.07]
PROF	- 0.294***	- 0.574***	-0.245***
	[-15.80]	[-18.23]	[-10.44]
SIZE	0.0625***	0.0470***	0.0634***
	[21.79]	[18.34]	[19.83]
INFL	0.158***	0.105***	0.0384
	[4.65]	[2.92]	[0.3]
Total Observations	3810	1905	1905

Notes: *(*), (**), (***) Corresponding to statistical significance levels of 10%, 5%, and 1%. Values in [ ] represent z-values. All quartile regressions use Feasible GLS with panel-specific AR(1) and heteroskedasticity-robust covariance; pooled OLS/FEM/REM results are reported in Appendix A1 for comparison.*

The regression results indicate that during the period of high inflation volatility in Vietnam (Phase 1), there is statistical evidence of a positive correlation (+) between inflation and market leverage among the observed firms. However, no statistically significant relationship is found in the subsequent period. Over the entire observation period, inflation remains positively correlated (+) with market leverage, with statistical significance.

Based on these findings, the authors argue that Vietnam's macroeconomic conditions differ from those of the United States, particularly due to the high volatility of inflation. Therefore, applying the existing research model on the relationship between cash flow volatility and market leverage to analyze the correlation between inflation and market leverage may not be appropriate. Consequently, the authors can only report the statistical findings and, within the scope of this study, there is insufficient theoretical foundation or empirical evidence to provide a more detailed explanation of these results.

5. Conclusion and implications

5.1. Conclusion

The research indicates that there is insufficient statistical evidence to establish a significant correlation between cash flow volatility and market leverage among Vietnamese listed firms. This conclusion is consistent with previous studies by Harris and Roark (2019), and Keefe and Yaghoubi (2016). When analyzing quartile-based groups classified by operating cash flow levels, firms in the lowest operating cash flow quartile exhibit a negative correlation (-) between cash flow volatility and market leverage, while firms in the highest operating cash flow quartile show a positive correlation (+). This aligns with pecking order theory and the debt issuance conditions in Vietnam, where firms primarily borrow from financial institutions such as banks, finance companies, and insurance firms, which require sufficient cash flow for interest and principal repayments.

The study also reaffirms previous findings on key determinants of market leverage, including industry median market leverage (+), market-to-book ratio (-), tangible asset ratio (*), return on total assets (-), firm size (+), and inflation (+). In the Vietnamese context, tangible asset ratio exhibits a positive correlation (+) with market leverage among firms with the highest operating cash flow, but across the full sample, it shows a negative correlation (-) with moderate statistical significance.

Overall, the research fully addresses the study's research question, providing empirical evidence on factors influencing market leverage within corporate capital structure, particularly the role of cash flow volatility under the specific conditions of Vietnamese listed firms.

5.2. Managerial implications

Cash-low quartile firms – First implication is to start by stabilizing the operating cash flow. We recommend tightening working-capital cycles, locking in recurring revenue, and cutting discretionary outlays before talking to the banks. A smoother operating cash flow reduces perceived servicing risk and helps keep loan lines open.

Cash-high quartile firms – Bonds should be issued only when inflation is on target or above it. Moreover, the State Treasury should time its medium-term bond offerings for years in which Vietnam's consumer price index meets or exceeds the State Bank's target so that post-issue inflation erodes the effective coupon cost.

All firms – Leverage can be dimmed and steadied by comparing it regularly with the industry median to check the stability of the weighted average cost of capital (WACC). It is easy to become too far below or above that beyond the midpoint between being too

conservatively leveraged and too aggressively leveraged if not adjusted regularly. In this way, maintaining leverage requires benchmarking it against the proper target to hold the WACC from swinging all over the place, as shown by Korajczyk and Levy (2003).

5.3. Limitations and future research direction

The research only covers 381 non-financial enterprises registered on Vietnam's HNX and HOSE from 2015-2024, which limits its applicability to additional marketplaces as well as spans. Cash flow volatility is quantified utilizing a three- year rolling window (time frames t, t-1, and t-2), that could fail to completely represent longer-term variations; future research should look into alternate volatility horizons for robustness. The framework simply incorporates inflation as a macroeconomic oversight, ignoring alternatives including interest rates or GDP growth; increasing the macro-financial variables and doing comparisons across nations might enrich findings.

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