

The Impact of Cash Flow on Financial Risk of Listed Companies in Vietnam

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Abstract

Vietnamese listed firms face volatile cash flows and financial pressures, raising the risk of financial distress. However, limited research explores how cash flow components shape firm stability in emerging markets. This study investigates how operating, investing, and financing cash flows influence financial distress, addressing heterogeneity and tail-risk effects among Vietnamese firms. The research employs a sample of 82 firms listed on the Ho Chi Minh Stock Exchange during 2020–2024. Quantile regression is applied to identify variations in the impact of cash flows across different financial risk levels. Financial distress is measured by Zmijewski's model, and firm size and age are included as control variables. The findings reveal that operating cash flow consistently reduces distress, while investing and financing flows show heterogeneous effects depending on risk quantiles. Larger firms face higher financial risk. Stable operating cash flows strengthen firm resilience. These results provide practical insights for corporate risk management and policy formulation in emerging economies.

Keywords: *cash flow, financial risk, financial cash flow, operating cash flow*

1. Introduction

Vietnam's capital market has grown rapidly over the past decade, yet listed firms continue to encounter volatile cash flows, high debt obligations, and increasing macroeconomic uncertainty. These fluctuations expose firms to liquidity shortages and potential financial distress, making cash flow management a critical concern for corporate sustainability. The story of Vietnamese firms thus reflects a broader challenge faced by emerging economies, as they strive to maintain financial stability amid persistent uncertainty and structural transformation.

Previous research highlights that cash flow components, including operating, investing, and financing, play a decisive role in determining a firm's financial condition. Beaver (1966) and Charitou et al. (2004) demonstrate that strong operating cash flows lower the probability of financial distress, while Bui and Mai (2021) confirm similar evidence for Vietnamese firms. Conversely, heavy reliance on external funding increases risk exposure (Acharya et al., 2007; Phan et al., 2020). Although these studies contribute valuable insights, most of them still treat cash flows as a single measure and rely on conventional regression techniques, which may obscure variations among firms with different financial risk levels.

Several research gaps remain unaddressed. First, the heterogeneous responses of high risk and low risk firms to changes in cash flow have not been fully examined. Second, the distinct roles of investing and financing cash flows are often overlooked, resulting in an incomplete understanding of their impact on financial distress. Third, few Vietnamese studies apply advanced analytical methods such as quantile regression that can reveal effects across different risk levels. These limitations not only constrain theoretical development but also hinder managers and policymakers from designing effective risk management strategies.

Therefore, this study aims to investigate how operating, investing, and financing cash flows affect the financial distress of Vietnamese listed firms. By adopting the quantile regression approach, the research seeks to uncover the heterogeneous effects of each cash flow component across varying levels of financial risk and to provide practical implications for improving firm resilience in emerging markets.

2. Objectives

The objectives of this study are to:

- 1) Examine the impact of operating cash flow on the probability of financial distress of Vietnamese listed firms.
- 2) Investigate the effects of investing and financing cash flows contribute to financial distress.
- 3) Apply quantile regression to identify heterogeneous effects across firms with different levels of financial risk.

3. Materials and Methods

3.1. Hypotheses development

Prior studies have consistently emphasized that cash flow plays a vital role in determining a firm's financial stability and risk exposure. According to Financial Risk Theory (Saunders & Cornett, 2013; Jorion, 2007) and Cash Flow Theory (Froot et al., 1993), stable operating cash flow enhances liquidity and reduces insolvency risk. The empirical evidence by Beaver (1966), Charitou et al. (2004), and Bui & Mai (2021) also confirms that firms with strong operating cash flows are less likely to encounter financial distress.

Therefore, the first hypothesis is proposed as follows:

H₁: Operating cash flow (OCF) is negatively associated with financial risk.

Investment cash flow reflects capital allocation efficiency and growth decisions. According to Pecking Order Theory (Myers & Majluf, 1984) and empirical studies by Fazzari et al. (1988) and Bui and Mai (2021), firms facing declining investment cash flow often experience constrained investment capacity, signaling higher financial vulnerability. Thus:

H₂: Investing cash flow (ICF) is negatively associated with financial risk.

Financing cash flow indicates the firm's dependence on external funding sources. Based on Agency Theory (Jensen & Meckling, 1976) and the findings of Acharya et al. (2007) and Phan et al. (2022), firms with higher financing cash flows, often due to increased borrowing, are more exposed to financial risk. Therefore:

H₃: Financing cash flow (FCF) is positively associated with financial risk.

3.2. Data collection and sampling

From the overall population of listed firms on the Vietnamese stock market, this study purposively selected 120 companies with the largest market capitalization listed on the Ho Chi Minh Stock Exchange (HOSE) as the initial screening list. From this list, the author applied a set of rigorous selection criteria to ensure data representativeness and reliability, including: (i) Firms must not be banks or financial institutions; (ii) the stock must remain listed at the end of the 2024 fiscal year; (iii) availability of complete financial statements for the period from 2020 to 2024 because it covers major events, including the COVID-19 pandemic and global geopolitical tensions such as inflation and interest-rate hikes, the Russia–Ukraine war, which are partially reflected the influence of unobserved heterogeneity; and (iv) All financial statements must be audited and deemed reasonable and fair based on the principle of materiality.

After the screening process, a total of 82 eligible firms were selected to form the final research sample. Financial statement data were extracted from the FiinPro database provided by FiinGroup Joint Stock Company. Data processing and statistical analyses were conducted using Microsoft Excel and Stata/MP 17.0. The study adopts a quantitative research approach to explore and validate the relationships among relevant financial variables, employing techniques such as descriptive statistics, correlation analysis, panel data regression, pooled OLS regression, and quantile regression.

3.3. Research Variables

Dependent Variable: Financial risk refers to the potential for adverse fluctuations in a firm's financial outcomes arising from uncertainties related to market, economic, or operational factors. It reflects the extent to which financial decisions or external conditions may negatively affect a firm's cash flows, liquidity, asset values, or profitability. In this study, financial risk is measured through financial distress, using the Zmijewski (1984) distress score as a widely accepted proxy. Higher distress values indicate higher financial risk. Financial distress in the Zmijewski model is determined by three key factors: profitability (NI/TA), financial structure (TL/TA), and liquidity (CA/CL). The distress score is calculated as:

$$FD = -4.3 -4.5 (NI/TA) +5.7 (TL/TA) +0.004 (CA/CL)$$

The Zmijewski model is chosen over other classical bankruptcy prediction models (Altman, 1968; Springate, 1978; Ohlson, 1980) due to its superior suitability for emerging markets such as Vietnam. Its probit-based estimation mitigates violations of normality and homoscedasticity, while relying on only three highly informative ratios. This simplicity ensures reliability and applicability under Vietnamese data constraints, and empirical studies (Chen & Church, 1996; Pindado et al., 2008) also confirm its robustness in markets with information asymmetry and underdeveloped auditing systems.

Independent Variables: This study uses three cash flow components, operating cash flow (OCF), investing cash flow (ICF), and financing cash flow (FCF), representing a firm's internal operations, investment activities, and external financing. Although FCF can be further divided into debt- and equity-related flows, such

decomposition was not applied due to limited disclosure in Vietnamese firms. Moreover, aggregate FCF sufficiently reflects overall financing behavior, consistent with prior studies (e.g., Kim et al., 2018; Nguyen et al., 2024). The study acknowledges, however, that risk effects may differ between debt and equity financing (Acharya et al., 2007), suggesting a direction for future research.

Control Variables: Firm size (SIZE) and firm age (AGE) are control variables.

Table 1 Research Variables in the Model

Variable Name	Symbol	Calculation Method	Source
Financial Distress	FD	Measured according to Zmijewski's (1984) formula	FiinPro, 2025
Operating Cash Flow	OCF	Net operating cash flow / Total assets	FiinPro, 2025
Investing Cash Flow	ICF	Net investing cash flow / Total assets	FiinPro, 2025
Financing Cash Flow	FCF	Net financing cash flow / Total assets	FiinPro, 2025
Firm Size	SIZE	Logarithm of total revenue	FiinPro, 2025
Firm Age	AGE	Years from establishment to current year	FiinPro, 2025
Firm Fixed Effects	α_i	Included in the regression model to capture time-invariant unobserved firm heterogeneity.	Model Specification
Year Fixed Effects	γ_t	Included in the regression model to capture common macroeconomic shocks or time trends.	Model Specification

3.4. Quantile regression method

To examine the impact of cash flows on the financial risk of listed firms on the Vietnamese stock market during 2020–2024, this study employs the quantile regression method. First developed by Koenker and Bassett (1978), quantile regression extends traditional OLS by allowing for estimation of variable impacts across different quantiles (e.g., 0.1, 0.25, 0.5, 0.75, 0.9) of the dependent variable distribution. This approach provides a more robust understanding of relationships under conditions of non-normality and heteroskedasticity.

Empirical studies (e.g., Chen & Hamadeh, 2022; Hahn & Kuersteiner, 2003) confirm the suitability of quantile regression in analyzing financial risk and performance in heterogeneous market environments. However, few studies have applied it in Vietnam, highlighting the methodological contribution of this paper.

We employ quantile regression because the asset-scaled cash-flow variables exhibit heavy-tailed distributions that violate key OLS assumptions. QR is robust to outliers and heteroskedasticity and preserves the full economic variation in the data without requiring winsorization or other artificial adjustments.

The general quantile regression model is specified as follows:

$$FD_{it} = \beta_1 + \beta_2 OCF_{it} + \beta_3 ICF_{it} + \beta_4 FCF_{it} + \beta_5 AGE_{it} + \beta_6 SIZE_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

Where Fdi_{it} denotes the financial distress of firm i in year t ; OCF, ICF, FCF are the main explanatory variables; AGE and SIZE are control variables; α_i and γ_t : Firm and year fixed effects; and ε_{it} is the error term.

4. Results and Discussion

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics for the variables employed in the regression model, providing an overview of the financial characteristics of the sample of listed companies from 2020–2024.

Table 2: Descriptive statistics of variables in the model

Variable	Obs	Mean	Std. dev.	Min	Max
FD	410	-2.366	1.289	-7.652	2.517
OCF	410	0.144	0.433	-22400	31520.2
ICF	410	-0.173	0.513	-33757	25384.5
FCF	410	-0.061	0.693	-74560	21382.5
SIZE	410	9.785	1.082	6.936	13.637
AGE	410	26.659	14.092	3	68

Note: Raw cash-flow variables display extreme min-max ranges due to heterogeneity and scaling. Winsorization is not applied, as it would suppress meaningful economic variation. We therefore employ Quantile Regression (QR) to ensure robustness against severe outliers and heteroskedasticity, which standard OLS cannot effectively address.

The average financial distress index (FD) is -2.366, suggesting that the majority of sampled firms are in a relatively healthy financial state, as indicated by the Zmijewski (1984) model. However, the substantial standard deviation (1.289) and wide range (from -7.652 to 2.517) highlight significant financial heterogeneity across firms, justifying our use of Quantile Regression. For the cash flow variables, OCF (0.144), ICF (-0.173) and FCF (-0.061) display economically reasonable average values, consistent with typical corporate finance literature. The very large min- max values observed (as highlighted above) confirm the presence of extreme heterogeneity in cash flow performance. The control variables also display sufficient variation. Firm size (SIZE) ranges from 6.94 to 13.64 in log assets, and firm age (AGE) spans from 3 to 68 years. This variation supports a well-diversified dataset suitable for regression analysis.

4.2. Correlation and multicollinearity assessment

The preliminary correlation analysis reveals several notable relationships among the variables. Operating cash flow is significantly negatively correlated with financial distress, indicating that firms with higher operating cash generation tend to face lower financial risk. Financing cash flow also exhibits a negative correlation with FD, while the investment cash flow shows a weaker, negative association. Interestingly, firm size is positively correlated with FD, suggesting that larger firms may face higher financial vulnerability, whereas firm age has very weak and statistically insignificant correlations with other variables.

These patterns are generally consistent with liquidity-based financial theory and the Pecking Order Theory, which emphasize the role of internal cash flows in mitigating financial distress. The multicollinearity check, performed using the Variance Inflation Factor (VIF), showed that all VIF values were below 5 with a mean VIF of 1.94, indicating that multicollinearity was not a concern.

Table 3 Variance Inflation Factors (VIF)

Variable	VIF	1/VIF
OCF	2.63	0.380425
FCF	2.35	0.425183
ICF	2.15	0.464452
SIZE	1.54	0.651169
AGE	1.03	0.968251
Mean VIF	1.94	

4.3. Quantile regression results

Given the highly volatile nature of financial data (evidenced by the Descriptive Statistics) and the low R^2 of the OLS model, the study proceeds with Quantile Regression (QR). Prior to this, the analysis utilized Year-Fixed Effects to account for macroeconomic shocks during the 2020–2024 period. This methodology allows for the exploration of non-linear impacts by estimating the effect of cash flow on FD across various levels of financial risk (quantiles q_{10} , q_{25} , q_{50} , q_{75} , and q_{90}).

The results in Table 4 show several consistent patterns. Operating cash flow maintains a negative and statistically significant relationship with financial distress at all quantiles, indicating that strong internal cash generation is universally associated with lower financial vulnerability. The magnitude of the coefficients is largest

at the 10th, 25th and 75th quantiles, suggesting that OCF exerts its most potent stabilizing role among firms with low baseline risk and also regains high efficacy among firms facing high, but not extreme, financial pressure (q75).

Table 4. Quantile regression results

Variable	10th Quantile	25th Quantile	50th Quantile	75th Quantile	90th Quantile
OCF	−0.02555***	−0.02555***	−0.01108***	−0.02546*	−0.00804**
ICF	−0.00651**	−0.00651**	−0.00450	−0.00588	−0.00203
FCF	0.01005**	0.01005**	0.01029**	0.00622**	0.00537
SIZE	0.6689***	0.6689***	0.4516***	0.4847***	0.3623**
AGE	0.0043	0.0043	0.0025	0.0038	0.0011

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All specifications include Year-Fixed Effects to control for common macroeconomic shocks, and Firm – fixed effects to control for time-invariant unobserved firm heterogeneity. The coefficients for these dummy variables are suppressed for brevity.

Financing cash flow is positive and significant from q10 to q75 (e.g., coefficient = 0.01029, $p < 0.05$ at the median), implying that greater reliance on external financing may elevate financial pressure, particularly for firms in the lower and middle segments of the risk distribution. The positive and significant FCF result strongly supports Hypothesis H3 and aligns with Agency Theory. Even for firms with robust internal cash generation OCF is negative), increased reliance on external financing FCF is positive) suggests potential strain, such as excessive borrowing or equity issuance under duress. This external dependence introduces agency costs related to debt, thereby elevating the firm's risk.

Firm size also shows a consistently positive and significant association with financial distress at all quantiles (e.g., coefficient = 0.4516, $p < 0.001$ at the median) is notable and contrary to conventional literature. This finding suggests that, particularly in the volatile Vietnamese market (2020–2024), larger firms may face unique vulnerabilities. These include more complex debt structures, a higher tendency for high-risk projects, or increased pressure from agency conflicts, all amplifying financial distress during economic instability.

Investment cash flow, while generally modest in magnitude, is statistically significant at the lower quantiles (q10 and q25), indicating that investment-related outflows may heighten financial sensitivity for firms with relatively low baseline risk. At higher quantiles (q50–q90), however, the effects become insignificant, suggesting diminishing influence among firms already facing elevated financial pressure. Firm age remains economically small and statistically insignificant across all quantiles.

At the 50th quantile (median), results remain broadly consistent with earlier findings. Operating cash flow continues to exert a negative and highly significant effect on financial distress (coefficient = −0.01108, $p < 0.001$), underscoring its stabilizing role in firm risk management. Financing Cash Flow (FCF) shows a positive and significant impact (coefficient = 0.01029, $p < 0.05$), while firm size (SIZE) also remains positively associated with financial distress (coefficient = 0.4516, $p < 0.001$). These results suggest that large firms with higher financing cash flows may still face elevated financial pressures, whereas investment cash flow and firm age remain statistically insignificant.

5. Conclusion

The quantile regression results demonstrate that cash flows play a decisive role in shaping the probability of financial risk, with heterogeneous effects across different levels of risk. Across all quantiles, operating cash flow exhibits a consistently negative and statistically significant impact on financial distress, underscoring that strong and stable operating performance is the most effective mechanism for reducing financial vulnerability. The magnitude of the coefficients is greatest at the 10th and 25th quantiles, suggesting that OCF provides the strongest stabilizing effect among firms with relatively low to moderate baseline risk. This highlights the centrality of core operating cash generation in ensuring liquidity, meeting debt obligations, and preventing short-term financial imbalance.

Investment Cash Flow, in contrast, shows a negative and significant effect only at the lower quantiles (q10 and q25), and the coefficients are negative. This indicates that investment-related cash outflows heighten financial sensitivity primarily for firms with relatively low levels of financial distress, while the effect becomes economically small and statistically insignificant at higher quantiles (q50–q90). These findings suggest that

investment activities may exert pressure on liquidity only when firms are otherwise stable, but the influence diminishes once firms move into higher risk categories.

Financial cash flow exhibits a positive association with financial risk across the 10th to 75th quantiles, becoming insignificant at the 90th quantile. This pattern reflects ongoing capital restructuring among listed firms, where strategically managed external financing enhances liquidity and stabilizes the capital structure rather than increasing leverage-related risk. In Vietnam's bank-dominated system, access to low-cost credit and limited equity issuance allow firms to rely on short- to medium-term debt to maintain solvency. This contrasts with developed markets (Acharya et al., 2007), where aggressive financing typically signals higher risk-taking behavior.

Firm size is positively associated with financial risk and remains statistically significant across all quantiles, indicating that larger firms tend to face higher financial risk. Taken together, the findings underscore an overarching message: stability in cash flows, particularly operating cash flow, is the most fundamental determinant of a firm's ability to mitigate financial risk. Stable cash flows not only ensure timely debt servicing but also improve investor confidence, reduce financing costs, and enhance organizational flexibility, thereby strengthening resilience in volatile economic conditions. Firm age (AGE) remains economically small and statistically insignificant across all quantiles (coefficients range from 0.0011 to 0.0043), suggesting that the firm's longevity is not a reliable predictor of financial distress risk in this context.

Based on the empirical findings, firms should prioritize three major strategic areas. First, they should strengthen financial risk early-warning mechanisms. Integrating forward-looking analytical tools, predictive models, and standardized risk-identification frameworks such as ISO 31000 will help detect emerging liquidity pressures. Enhancing internal training across departments ensures that risk awareness becomes part of the organizational culture. Second, firms should adopt modern financial risk measurement tools such as cash-flow-at-risk, liquidity-at-risk, scenario-based stress testing. These techniques help firms quantify potential shortfalls in operating and financing cash flows, assess liquidity pressure under adverse conditions, and design more robust cash-flow buffers and contingency plans. Third, firms need to optimize cash flow management and capital structure decisions. This includes shortening the collection period, improving inventory turnover, creating monthly cash budgeting and scenario-based forecasts, and applying digital tools and cash management systems. Balancing investment, operating, and financing cash flows is essential to maintain a safe liquidity position while supporting growth.

The study suggests several policy-level implications arising from the findings. Firstly, the government should improve the regulatory framework for enterprise financial risk management by issuing detailed guidelines on risk identification, measurement, and disclosures, particularly for listed firms. Establishing a national financial data infrastructure would provide businesses with accessible and real-time market information to support forecasting and planning. Secondly, Capacity-building programs for small and medium-sized enterprises should be expanded, focusing on financial management, cash-flow planning, and risk analysis. Access to professional financial advisory services at reasonable costs would also enhance SMEs' resilience. Thirdly, it is important to promote the development of financial markets and hedging instruments, including derivatives that allow firms to manage exposure to price, interest rate, and currency fluctuations. Strengthening the monitoring of macro-financial vulnerabilities through inter-agency coordination will enable early detection of systemic risks and support a more stable business environment.

The study focuses only on listed firms, which limits generalization; future work should broaden the sample. Financial risk is captured mainly through accounting indicators, so using wider or composite measures would better reflect its multidimensional nature. Quantile regression reveals heterogeneous effects but not dynamics; alternative dynamic or predictive methods could deepen insight. Additionally, potential endogeneity between cash flows and financial distress is not explicitly addressed, as distressed firms may adjust their operating, investment, or financing decisions. Nevertheless, quantile regression provides robust estimates across the financial risk distribution. Future studies could employ instrumental variables or dynamic panel models to better capture causal effects.

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