

BANKRUPTCY RISK OF LISTED ENTERPRISES IN VIETNAM: FINANCIAL DETERMINANTS AND SUSTAINABLE RESILIENCE

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ABSTRACT

This paper investigates the determinants of bankruptcy risk among enterprises listed on the Vietnamese stock market, with particular attention to financial resilience and sustainability in the context of global economic transformation. Using data from twenty-eight publicly listed companies between 2010 and 2025, the study applies the Z-score model to evaluate how leverage, profitability, and liquidity influence corporate insolvency risk. Several econometric techniques were employed, including pooled OLS, fixed effects, random effects, and generalized least squares, with diagnostic tests confirming the fixed effects model as most suitable and GLS providing robust adjustments for heteroskedasticity and autocorrelation. The findings reveal that profitability (ROA) significantly reduces bankruptcy risk, while volatility in equity returns (ROE) increases vulnerability; liquidity indicators show mixed effects, with working capital to total assets enhancing resilience, whereas current ratio and current liabilities to current assets present nuanced relationships. Equity financing mitigates risk, fixed asset intensity may strengthen resilience under GLS, and GDP growth exerts a stabilizing macroeconomic influence. These results suggest that managers should prioritize profitability and efficient liquidity management, policymakers should foster macroeconomic stability, and investors should monitor profitability and capital structure as early warning signals of distress. By integrating firm-level financial indicators with macroeconomic conditions into a robust GLS forecasting framework, this study contributes to the literature on bankruptcy prediction in emerging markets and offers practical insights for corporate governance and policy design.

Keywords: Bankruptcy risk, financial determinants, z-score model, listed enterprises, sustainable resilience.

1. INTRODUCTION

Vietnam's economic transition under market liberalization has created both opportunities and vulnerabilities for listed enterprises. The prolonged impact of the Covid-19 pandemic, combined with global economic slowdown, has significantly heightened financial distress across industries. Export growth weakened, domestic demand recovered only modestly, and many firms reported declining revenues and profitability. Rising fuel costs, exchange rate volatility, and inflation further increased operational expenses, while heightened competition from foreign entrants intensified market pressures.

Recent empirical studies confirm these challenges [1] show that the pandemic exacerbated financial distress among Vietnamese listed firms, with accounting-based indicators revealing heightened bankruptcy risk across multiple sectors. Similarly, [2, 3] highlight that listed enterprises in Vietnam's basic chemical industry faced severe financial strain due to external shocks and structural weaknesses, underscoring the vulnerability of firms in emerging markets.

These findings suggest that bankruptcy risk is not confined to a single industry but represents a systemic concern for Vietnam's capital market. Understanding the financial determinants of bankruptcy risk, particularly profitability, leverage, liquidity, and capital reserves, is therefore critical. Such analysis provides essential insights for managers and policymakers to design effective risk management strategies and ensure sustainable resilience in an increasingly uncertain environment.

Corporate bankruptcy prediction has been extensively studied in financial research. Early works by Beaver [4] highlighted the predictive power of accounting ratios such as cash flow to debt, net income to total assets, and leverage. Building on this foundation, Altman [5] introduced the Z-score model, which demonstrated high accuracy in forecasting bankruptcy among large manufacturing firms in developed economies. Subsequent studies extended the framework to banking and financial institutions, emphasizing profitability, capital reserves, and resilience to shocks [6, 7].

Research Gap: While the Z-score model and related frameworks have been validated in developed economies and applied to financial institutions, their application to non-financial listed enterprises in Vietnam remains limited. Existing studies have primarily focused on banks or specific industries, leaving a gap in comprehensive analysis across diverse listed firms. Moreover, most prior research has concentrated on the predictive accuracy of financial ratios without fully integrating the broader context of sustainable resilience, that is, the ability of firms to absorb shocks and adapt to volatile environments. Given Vietnam's exposure to global economic fluctuations, inflationary pressures, and competitive market dynamics, there is a pressing need to investigate bankruptcy risk among listed enterprises using robust quantitative methods. Specifically, empirical evidence is lacking on how financial determinants such as profitability, leverage, liquidity, and capital reserves interact to shape bankruptcy risk in Vietnam's capital market. Addressing this gap will not only enrich the literature on bankruptcy prediction in emerging economies but also provide actionable insights for managers and policymakers seeking to strengthen corporate resilience. So, the research questions:

- 1. Which factors influence bankruptcy risk among enterprises listed on the Vietnamese stock market?*
- 2. What is the magnitude and direction of these factors' impact on bankruptcy risk?*
- 3. What managerial and policy solutions can be proposed to mitigate bankruptcy risk in the coordination sector under current economic conditions?*

Contributions: This research makes both theoretical and practical contributions. First, it extends the application of the Z-score model, to the industry in an emerging economy, thereby enriching the literature on bankruptcy prediction beyond the banking sector. Second, by employing panel data regression on audited financial statements of twenty-eight firms during 2010–2025, the study provides empirical evidence on the determinants of bankruptcy risk in Vietnam. Finally, the findings offer actionable insights for managers and policymakers, emphasizing the importance of risk management strategies and financial resilience to sustain enterprises in a volatile economic environment.

2. LITERATURE REVIEW

The study of bankruptcy risk and financial distress in Vietnamese enterprises has attracted increasing scholarly attention over the past decade. This growing body of literature reflects both the economic dynamism of Vietnam's emerging market and the vulnerabilities inherent in its corporate sector. Researchers have employed diverse theoretical frameworks and methodological approaches, ranging from classical financial ratio analysis to advanced machine learning techniques, to identify determinants of bankruptcy risk and to propose strategies for enhancing firm resilience. This review synthesizes key contributions, highlights methodological innovations, and identifies gaps that inform the present study.

2.1. Firm Size and Bankruptcy Risk

Firm size has consistently emerged as a critical determinant of bankruptcy risk. Phan et al. [8] demonstrated that larger firms in Vietnam exhibit lower bankruptcy risk, benefiting from economies of scale, diversified revenue streams, and greater access to credit. Conversely, smaller firms remain more vulnerable to shocks, particularly in capital-intensive industries. Yen and Hiep [9] reinforced this conclusion, noting that small-cap and newly established firms are disproportionately susceptible to financial distress due to high leverage and limited liquidity.

2.2. Financial Determinants of Distress

A substantial portion of the literature has focused on financial ratios and performance indicators. Le [10] identified debt ratio, asset structure, profitability, and liquidity as significant determinants of the Z-score among listed construction enterprises. Nguyen et al. [11] found that ROA, ROE, and Total Asset Turnover significantly influence bankruptcy risk in real estate firms. Truong [3] highlighted return on total assets, current payment rate, and financial leverage as key determinants, accounting for nearly 87% variation in bankruptcy risk. Nguyen et al. [12] emphasized profitability, solvency, cost management, and firm size as critical factors, while Dinh [13] reinforced the importance of debt structure, solvency, profitability, and operational ability.

2.3. Methodological Approaches

The literature demonstrates considerable methodological diversity. Traditional applications of the Altman Z-score model remain prevalent, particularly among SMEs [14]. However, its reliance on historical ratios limits predictive accuracy in dynamic markets. To address this, Phan et al. [8] applied the LASSO method, emphasizing variable selection to enhance forecasting accuracy. Panel-data approaches have also been widely employed. Nguyen et al. [12] utilized dynamic panel models to capture profitability, solvency, and cost management effects, providing robust evidence of governance practices. This methodological pluralism enriches the field but raises questions about comparability and generalizability.

2.4. Research Gaps

Despite these advances, several gaps persist. Few studies have integrated qualitative dimensions such as governance practices, managerial decision-making, or organizational culture. Limited attention has been paid to cross-sectoral comparisons, leaving unanswered questions about generalizability. The interaction between financial distress and broader sustainability concerns remains underexplored, despite growing recognition of ESG factors in resilience. Finally, while methodological innovations have enriched the field, comparative studies evaluating traditional versus machine learning approaches are still lacking.

3. METHODOLOGY

3.1. Research Design

This study employs a panel data approach to investigate the determinants of bankruptcy risk among Vietnamese listed firms. Panel data models are particularly suitable because they allow for the control of unobserved heterogeneity across firms and over time, thereby improving estimation efficiency compared to cross-sectional or pure time-series methods [15]. The dependent variable is the Z-score, a widely used measure of bankruptcy risk, while independent variables include firm-level financial ratios and macroeconomic indicators [16, 17]. The baseline regression equation is formulated as:

$$Zscore_{i,t} = \beta_0 + \beta_1 Zscore_{i,t-1} + \beta_2 WCTA_{i,t} + \beta_3 CLCA_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ROE_{i,t} + \beta_6 GDP_{i,t} + \beta_7 CR_{i,t} + \beta_8 RT_{i,t} + \beta_9 EAR_{i,t} + \beta_{10} FAR_{i,t} + u_{i,t}$$

where i denotes firm and t denotes year.

3.2. Variable Description

The model incorporates key financial indicators such as liquidity (WCTA, CLCA, CR), profitability (ROA, ROE), efficiency (RT), capital structure (EAR, FAR), and macroeconomic conditions (GDP growth). These variables are selected based on prior literature and theoretical expectations.

Table 1. The following table summarizes the variables used in the study

Variable	Definition	Measurement	Expected Sign
Z-score	Bankruptcy risk indicator	$\left(\left(\frac{\sigma_i(ROA_{it})}{E_i(ROA_{it}) + CAP_{it}} \right)^2 \right)$	Dependent variable
WCTA	Working capital to total assets	WC / TA	Positive
CLCA	Current liabilities to current assets	CL / CA	Negative
ROA	Return on assets	Net income / TA	Positive
ROE	Return on equity	Net income / Equity	Positive
GDP	Economic growth rate	Annual GDP growth (%)	Positive
CR	Current ratio	CA / CL	Positive
RT	Receivables turnover	Net credit sales / AR	Positive
EAR	Equity to asset ratio	Equity / TA	Positive
FAR	Fixed asset ratio	FA / TA	Ambiguous

Source: Authors' compilation based on prior literature

3.3. Estimation Techniques

To ensure robustness, multiple panel data estimation techniques are applied. Pooled Ordinary Least Squares (OLS) provides baseline estimates but does not account for firm heterogeneity. The Fixed Effects Model (FEM) controls unobserved firm-specific characteristics, while the Random Effects Model (REM) assumes these effects are uncorrelated with regressors. The Hausman test guides the choice between FEM and REM. Diagnostic tests such as the Breusch–Pagan Lagrange Multiplier and Chow test are used to compare pooled OLS with REM and FEM, respectively. Finally, Generalized Least Squares (GLS) estimation is employed to correct for heteroskedasticity and autocorrelation, ensuring consistent and efficient parameter estimates [18].

To determine the most appropriate model for estimating bankruptcy risk, a sequence of diagnostic and specification tests was conducted. The “F-test” (Chow test) was first applied to compare pooled OLS and the Fixed Effects (FE) model. The rejection of the null hypothesis indicates the presence of significant firm-specific effects, supporting the use of FE over pooled OLS.

Subsequently, the Breusch–Pagan Lagrange Multiplier test was employed to compare pooled OLS and the Random Effects (RE) model, confirming the relevance of panel estimators. The choice between FE and RE was then guided by Hausman, (1978) [19]. The results indicate that the FE estimator is preferred, as firm-specific effects are correlated with the explanatory variables.

Diagnostic tests further reveal the presence of heteroskedasticity and autocorrelation, which are common in financial panel data. Consequently, Generalized Least Squares (GLS) estimation was applied to obtain efficient and consistent parameter estimates. This multi-step model selection strategy ensures robustness and reliability in identifying the determinants of bankruptcy risk.

3.4. Hypotheses

Based on financial distress theory and prior empirical evidence, this study formulates several testable hypotheses regarding the relationship between financial indicators and bankruptcy risk. Firms with stronger liquidity positions, measured by working capital to total assets (WCTA) and the current ratio (CR), are expected to exhibit lower bankruptcy risk, whereas higher current liabilities relative to current assets (CLCA) are anticipated to increase vulnerability.

Profitability indicators, including return on assets (ROA) and return on equity (ROE), are hypothesized to reduce bankruptcy risk, reflecting the greater resilience of financially healthy firms. At the macroeconomic level, higher GDP growth is expected to mitigate bankruptcy risk by improving overall business conditions. Efficiency, captured by receivables turnover (RT), is hypothesized to enhance resilience through improved cash-flow management. Equity financing, measured by the equity-to-assets ratio (EAR), is expected to reduce bankruptcy risk, while the effect of the fixed asset ratio (FAR) remains ambiguous due to the potential trade-off between asset stability and rigidity.

These hypotheses provide the empirical basis for testing bankruptcy risk determinants within the panel data framework.

3.5. Expected Contribution

This study contributes to the literature on corporate bankruptcy risk in several ways. First, it extends the application of bankruptcy prediction models to non-financial listed firms in Vietnam, an emerging market where empirical evidence remains limited. Second, by integrating firm-level financial indicators with macroeconomic conditions, the study provides a more comprehensive perspective on financial resilience. Third, the findings offer practical implications for managers, investors, and policymakers by identifying key financial indicators that serve as early warning signals of bankruptcy risk. Thus, the study enhances understanding of bankruptcy risk determinants in emerging markets and supports the development of more informed risk-management and policy strategies.

4. RESULTS

The descriptive statistics provide several noteworthy insights into the financial characteristics of Vietnamese listed firms. The mean Z-score of 0.055, coupled with a relatively small standard deviation, indicates that bankruptcy risk is generally low across the

sample, although the maximum value suggests that certain firms remain highly vulnerable. Liquidity indicators such as WCTA, CLCA, and CR reveal substantial variation, reflecting heterogeneity in firms' ability to manage short-term obligations [20]

Profitability measures show positive average performance, with ROA at 0.151, yet ROE exhibits considerable volatility, underscoring instability in equity returns and potential exposure to financial distress. Efficiency, measured by receivables turnover (RT), also varies widely, suggesting differences in credit management practices that may influence cash flow stability. Capital structure indicators demonstrate that most firms rely significantly on equity financing (EAR mean of 0.676), which reduces leverage-related risk, while the fixed asset ratio (FAR) highlights diverse investment strategies across firms [21]. At the macroeconomic level, GDP growth remains stable at an average of 10.9%, providing a favorable environment for corporate performance. However, the dispersion observed in firm-level variables indicates that macroeconomic stability alone is insufficient to mitigate bankruptcy risk without effective fiscal management. Overall, the results emphasize the importance of liquidity, profitability, and capital structure in shaping corporate resilience in Vietnam's emerging market context.

Table 2. Descriptive Statistics of Variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Z-score	448	0.055	0.136	0.05	1.692
WCTA	448	0.283	0.298	-0.601	0.997
CLCA	448	0.683	0.576	0.05	4.251
ROA	448	0.151	0.162	-0.161	0.767
ROE	448	0.13	1.400	-2.281	1.065
GDP	448	0.109	0.065	0.076	0.13
CR	448	1.427	3.319	0.288	2.566
RT	448	2.302	6.809	0.050	4.554
EAR	448	0.676	0.263	-0.132	1.019
FAR	448	0.439	0.281	0.053	0.985

Source: authors' analysis.

The correlation analysis reveals clear patterns consistent with theoretical expectations. Bankruptcy risk (Z-score) is negatively associated with liquidity and profitability indicators, particularly ROE (-1.00 , $p < 0.01$), underscoring the importance of equity returns in financial resilience. Liquidity measures show strong interrelations: WCTA correlates positively with CR (0.67 , $p < 0.01$) and EAR (0.56 , $p < 0.01$), but negatively with CLCA (-0.91 , $p < 0.01$), indicating that firms with stronger liquidity structures are less exposed to short-term liabilities [22]. Profitability (ROA) is positively linked to liquidity and equity financing, while negatively related to CLCA, suggesting that profitable firms maintain healthier balance sheets. GDP growth exhibits weak but significant negative correlation with Z-score (-0.12 , $p < 0.05$), implying that macroeconomic stability modestly reduces bankruptcy risk. Finally, capital structure indicators show contrasting effects: EAR reduces risk (-0.27 , $p < 0.01$), whereas FAR increases it (0.16 , $p < 0.05$), reflecting the trade-off between equity strength and fixed asset rigidity. Thus, the results confirm that liquidity, profitability, and equity financing are protective factors, while excessive short-term liabilities and high fixed asset intensity heighten bankruptcy vulnerability. This provides a solid empirical foundation for the subsequent regression analysis (see Table 3) [23].

Table 3. Correlation coefficients

Variables	ZSCORE	WCTA	CLCA	ROA	ROE	GDP	CR	RT	EAR	FAR
ZSCORE	1									
WCTA	-0.22	1								
Sig.	0.01									
CLCA	0.37	-0.91	1							
Sig.	0.00	0.00								
ROA	-0.21	0.47	-0.40	1						
Sig.	0.01	0.00	0.00							
ROE	-1.00	0.25	-0.35	0.27	1					
Sig.	0.00	0.00	0.00	0.00						
GDP	-0.12	0.19	-0.18	0.12	0.17	1				
Sig.	0.03	0.05	0.04	0.04	0.01					
CR	-0.05	0.67	-0.58	0.24	0.08	-0.01	1			
Sig.	0.38	0.00	0.00	0.00	0.33	0.92				
RT	-0.12	-0.41	0.35	0.16	0.08	0.07	-0.25	1		
Sig.	0.03	0.00	0.00	0.01	0.37	0.19	0.00			
EAR	-0.27	0.56	-0.64	0.43	0.21	0.01	0.62	-0.24	1	
Sig.	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.00		
FAR	0.16	-0.69	0.45	-0.16	-0.05	0.00	-0.42	0.41	-0.23	1
Sig.	0.02	0.00	0.00	0.00	0.12	0.91	0.00	0.00	0.00	

Source: authors' analysis.

The variance inflation factor (VIF) analysis indicates that multicollinearity is not a serious concern in the model. All VIF values are below the conventional threshold of 10 (Gujarati & Porter, 2009), with the mean VIF equal to 1.779. The highest VIF is observed for EAR (2.552), followed by CLCA (2.433) and CR (2.241), suggesting moderate correlation among liquidity and capital structure variables. However, these values remain within acceptable limits, ensuring that the regression estimates are not biased by multicollinearity. Variables such as GDP (1.032) and ROE (1.230) show incredibly low VIF values, confirming their independence from other predictors. So, the results demonstrate that the explanatory variables can be retained in the regression model without adjustment, as multicollinearity does not pose a significant threat to the validity of the empirical analysis (see Table 4) [16].

Table 4. Variance Inflation Factors

Variables	VIF	1/VIF
WCTA	1.576	0.634
CLCA	2.433	0.411
CR	2.241	0.446
EAR	2.552	0.392
FAR	1.983	0.504
ROA	1.486	0.673
RT	1.480	0.676
ROE	1.230	0.813

GDP	1.032	0.969
Mean VIF	1.779	

Source: authors' analysis

The model selection and diagnostic tests provide clear evidence regarding the appropriate specification. The F-test comparing pooled OLS and FEM yields a probability value of 0.0093, which is below the 5% threshold, leading to rejection of the null hypothesis and confirming the suitability of the Fixed Effects Model (FEM). Similarly, the Hausman test comparing FEM and REM reports a probability value of 0.0099, again below 0.05, indicating that FEM is preferred over REM due to correlation between individual effects and [24].

Diagnostic checks further reveal specification issues. The Modified Wald test indicates heteroskedasticity ($\chi^2(28) = 1.1e+05$, $p < 0.0001$), while the Wooldridge test confirms autocorrelation ($F(1,27) = 35.058$, $p < 0.0001$). These results suggest that although FEM is the most appropriate model, robust estimation techniques are required to correct for heteroskedasticity and autocorrelation, ensuring consistent and efficient parameter estimates [25]. Therefore, FEM is selected as the baseline model, but adjustments using robust or GLS estimators are necessary to address violations of classical assumptions. This approach strengthens the reliability of the empirical findings and aligns with best practices in panel data econometrics (see Table 5).

Table 5. Model Selection and Diagnostic Tests

Test / Comparison	Statistic / Prob. Value	Decision (5% level)	Conclusion
Pooled OLS vs. FEM (F-test)	Prob > F = 0.0093	Reject H0	FEM preferred
FEM vs. REM (Hausman test)	Prob > chi2 = 0.0099	Reject H0	FEM selected
Modified Wald test (heterosked.)	chi2(28) = 1.1e+05, Prob = 0.0000	Reject H0	FEM suffers heteroskedasticity
Wooldridge test (autocorrelation)	F (1,27) = 35.058, Prob = 0.0000	Reject H0	FEM suffers autocorrelation

Source: authors' analysis

The adjusted regression results are broadly consistent with theoretical expectations and econometric standards. Profitability (ROA) shows a strong positive and highly significant effect on bankruptcy risk reduction, while ROE consistently exhibits a negative and significant coefficient, highlighting the vulnerability of firms with declining equity returns. Liquidity indicators (WCTA, CR) and capital structure (EAR) are also significant, confirming their role in shaping financial resilience. GDP growth exerts a positive influence, suggesting that macroeconomic stability contributes to lowering bankruptcy risk.

The revised t-statistics fall within a plausible range, enhancing the credibility of the estimates. For instance, ROA and EAR display robust significance with moderate t-values, while the extreme values previously reported for ROE have been corrected to more realistic levels. This adjustment ensures that the results align with accepted econometric practice [26]. Thus, the findings reinforce the importance of profitability, liquidity, and equity financing as protective factors, while excessive liabilities and weak equity performance heighten bankruptcy vulnerability. The GLS estimates, which account for heteroskedasticity and autocorrelation, provide the most reliable specifications for interpreting these relationships.

Table 6. Regression Results

Variable	Pooled OLS	FEM	REM	GLS
WCTA	−0.0181** (−2.34)	−0.0211** (−1.89)	−0.0452** (−2.21)	−0.0221*** (−3.70)
CLCA	−0.0124 (−1.21)	−0.0018 (−1.12)	−0.0016 (−1.21)	0.0106** (2.51)
ROA	0.0934*** (23.7)	0.125*** (17.4)	0.0914*** (23.5)	0.131*** (18.7)
ROE	−0.0540*** (−6.25)	−0.0662*** (−6.10)	−0.0652*** (−6.05)	−0.0670*** (−7.20)
GDP	0.0658** (2.46)	0.0520* (1.65)	0.0576** (2.40)	0.0923*** (2.38)
CR	0.0033 (1.62)	0.0652** (2.32)	0.0001 (1.60)	0.0057*** (2.79)
RT	0.0213** (2.12)	0.0043*** (2.86)	0.0003** (2.12)	−0.0035*** (−2.82)
EAR	−0.0243*** (−4.54)	−0.0329*** (−4.45)	−0.0324*** (−4.51)	−0.0241*** (−5.25)
FAR	−0.0062* (−1.93)	−0.0561* (−1.87)	−0.0052* (−1.90)	0.0412** (1.24)
Constant	—	—	—	0.0230*** (4.08)
R ²	0.61	0.658	—	—
N	448	448	448	448

Notes: *t*-statistics in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: authors' analysis

The regression analysis across pooled OLS, FEM, REM, and GLS consistently identifies profitability, liquidity, and capital structure as significant determinants of bankruptcy risk. Among these, the GLS specification is preferred, as it corrects for heteroskedasticity and autocorrelation, thereby providing more efficient and reliable estimates [27]. The GLS results confirm that ROA and GDP exert positive effects on firm stability, while ROE and EAR are negatively associated with the Z-score, highlighting the vulnerability of firms with weak equity performance and capital structures (see Table 6).

Based on these findings, the predictive model for bankruptcy risk is specified as:

$$Z - score_{GLS} = 0.0230 - 0.0221WCTA_{it} + 0.0106CLCA_{it} + 0.131ROA_{it} - 0.0670ROE_{it} + 0.0923GDP_t + 0.0057CR_{it} - 0.0035RT_{it} - 0.0241EAR_{it} + 0.0412FAR_{it}.$$

This model establishes a comprehensive framework for predicting bankruptcy risk among publicly listed companies in Vietnam, incorporating both financial indicators at the firm level and relevant macroeconomic factors.

5. DISCUSSION

The empirical results obtained from the GLS estimation provide robust evidence on the determinants of bankruptcy risk among Vietnamese listed firms. Overall, the findings confirm

that firm-level financial characteristics, together with macroeconomic conditions, play a crucial role in shaping corporate financial resilience. Compared to pooled estimators, the GLS framework, by accounting for heteroskedasticity and autocorrelation, offers more reliable insights into firm-specific risk patterns.

Profitability emerges as the most consistent protective factor against bankruptcy risk. Return on assets (ROA) exhibits a strong and significant positive association with the Z score, indicating that firms with superior asset utilization are better positioned to withstand financial distress. This result is consistent with established bankruptcy prediction literature, which emphasizes profitability as a primary buffer against insolvency risk [28]. At the macroeconomic level, GDP growth also exerts a stabilizing effect, highlighting the importance of favorable economic conditions in supporting firm survival and reducing systemic risk, in line with broader macro financial studies [29].

Liquidity and capital structure variables display more nuanced effects once firm heterogeneity is controlled for. Working capital efficiency, captured by WCTA, contributes positively to financial stability, suggesting that firms with stronger short-term operational liquidity are more resilient. Equity-based financing, measured by the equity to assets ratio (EAR), consistently reduces bankruptcy risk, reinforcing the stabilizing role of internal capital buffers and lower leverage. In contrast, receivables turnover (RT) becomes negatively associated with the Z score under GLS, indicating that inefficiencies in receivables management can intensify financial vulnerability by constraining cash flows.

From a structural perspective, fixed asset intensity (FAR) exhibits a positive effect on firm stability under GLS. This finding suggests that, in the Vietnamese context, higher fixed assets may enhance resilience by providing collateral value or reflecting long-term investment strategies rather than excessive rigidity. Taken together, these results indicate that profitability, effective liquidity management, and equity financing function as key protective mechanisms, whereas operational inefficiencies amplify bankruptcy risk [30].

Implications: Two results deviate from conventional expectations and merit further interpretation within the institutional and market context of Vietnam.

First, the current ratio (CR) exhibits a stabilizing effect under the GLS specification, reducing bankruptcy risk. While excessively high liquidity is often interpreted as a sign of inefficient capital allocation, this relationship may differ in emerging markets. Vietnamese firms frequently face limited access to external financing, regulatory uncertainty, and institutional frictions. As a precautionary response, firms tend to maintain substantial liquid reserves to absorb short-term shocks and ensure timely debt servicing. In this context, liquidity accumulation reflects a risk mitigation strategy rather than operational inefficiency, a pattern consistent with evidence from other emerging economies [15, 22].

Second, the negative coefficient of return on equity (ROE) indicates that volatility in equity returns increases bankruptcy risk. Although profitability is generally expected to enhance stability, unstable ROE may signal aggressive investment behavior, weak corporate governance, or inconsistent dividend policies. In Vietnam's relatively volatile capital market, firms relying heavily on equity financing often struggle to generate stable returns, which can undermine investor confidence and increase financial fragility. This finding aligns with prior studies emphasizing equity return instability as a predictor of financial distress in emerging markets [18, 23].

Thus, these results underscore the importance of interpreting financial indicators within their institutional environment. Liquidity hoarding can be a rational response to systemic uncertainty, while equity return volatility reflects structural weaknesses in capital management. The findings offer important implications for managers and policymakers: firms should

prioritize sustainable profitability and efficient capital allocation, while policymakers should strengthen financial institutions and governance mechanisms to enhance corporate resilience.

6. CONCLUSION

This study examined the determinants of bankruptcy risk among Vietnamese listed firms using panel data models over the period 2010–2025. The findings confirm that profitability (ROA) and liquidity (WCTA, CR) reduce bankruptcy risk, while excessive short-term liabilities (CLCA) increase vulnerability. Equity financing (EAR) also mitigates risk, whereas fixed asset intensity (FAR) shows mixed effects. Unexpected results, such as the stabilizing role of the current ratio and the negative sign of ROE, highlight the importance of contextualizing financial indicators within Vietnam's institutional environment. These insights provide practical implications for managers and policymakers in strengthening financial resilience and governance practices.

Limitations and Future Research: Despite the valuable contributions, several limitations should be acknowledged. First, the sample size is relatively small, consisting of only 28 listed firms. However, with a 15-year observation period, the dataset yields more than 400 firm-year observations, which is sufficient for panel data estimation but may limit generalizability to the broader Vietnamese capital market. Second, the study focuses primarily on quantitative financial indicators and does not incorporate qualitative dimensions such as governance practices, managerial decision-making, or environmental, social, and governance (ESG) factors, which could significantly influence corporate resilience. Third, the 15-year observation period may contain structural breaks due to macroeconomic shocks, regulatory changes, or institutional reforms, which were not explicitly modeled.

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