

Investment Inefficiency and Financial Distress: Evidence from ASEAN Non-Financial Firms

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ARTICLE HISTORY

Submitted : June 03, 2026
Reviewed : June 11, 2026
Revised : June 17, 2026
Accepted : June 18, 2026
Published : June 30, 2026

Conflict of Interest Statement:

The author(s) declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ABSTRACT

Purpose: This study examines the effects of investment intensity, over-investment, and under-investment on financial distress among non-financial firms in ASEAN. The study aims to investigate whether inefficient investment behavior increases firms' financial vulnerability.

Research Method: This study employs unbalanced panel data obtained from the Bureau van Dijk OSIRIS database covering the 2020–2024 period, with a total of 14,371 firm-year observations. Financial distress is measured using the Altman Z"-Score model, while investment inefficiency is proxied by over-investment and under-investment. The analysis applies the fixed effects model with robust standard errors clustered at the firm level. In addition, robustness tests are conducted using ordinary least squares (OLS) and the random effects model (REM).

Results and Discussion: The findings indicate that investment intensity and over-investment significantly increase financial distress risk, suggesting that inefficient investment allocation may weaken firms' financial conditions. Meanwhile, under-investment does not show a significant effect on financial distress. The robustness test results remain consistent across alternative estimation models, confirming the reliability of the findings.

Implications: This study provides implications for managers and investors regarding the importance of efficient investment decisions in maintaining firms' financial stability. Future studies are expected to employ broader databases and additional variables to capture firms' investment behavior more comprehensively.

Originality: This study contributes to the literature by examining the relationship between investment inefficiency and financial distress in the ASEAN context using recent panel data evidence.

Keywords: financial distress; investment intensity; over-investment; under-investment.

1. Introduction

Financial distress is a condition in which a company experiences financial difficulties and is unable to fulfill its financial obligations, potentially leading to bankruptcy (Beaver, 1966; Geng *et al.*, 2025; Zhao & Huchzermeier, 2019). This condition has become a significant concern because financial distress can affect corporate sustainability, investor confidence, and broader economic stability. One of the factors believed to influence this condition is corporate investment decisions (Biddle *et al.*, 2009; Cheng *et al.*, 2013; López-Gutiérrez *et al.*, 2015; Männasoo *et al.*, 2018; Pereira *et al.*, 2024; Salehi *et al.*, 2022). Inefficient investment activities may increase financial pressure on firms (Cheng *et al.*, 2013). This

phenomenon has become increasingly relevant in the ASEAN region, where approximately 60% of Foreign Direct Investment (FDI) inflows in 2022 were concentrated among less than 1% of the ASEAN population (Kusmayadi, 2023). This unequal distribution of investment indicates that not all firms possess equal capabilities and access in managing investment opportunities, which may subsequently affect firms' financial conditions.

This study is grounded in agency theory, which explains conflicts of interest between managers and shareholders in corporate decision-making (Jensen & Meckling, 1976). In the context of investment decisions, managers may be encouraged to engage in excessive investment to expand their authority, enhance their reputation, or demonstrate optimism regarding future corporate growth (Zhang *et al.*, 2026). Such behavior may lead to inefficient resource allocation and increase pressure on corporate financing. Conversely, firms may also experience under-investment when management adopts excessively conservative behavior in response to economic uncertainty and liquidity constraints.

From a theoretical perspective, investment inefficiency may influence financial distress through different economic mechanisms. Over-investment occurs when managers allocate corporate resources to projects with negative net present value, resulting in excessive capital expenditures, inefficient utilization of financial resources, and declining future cash flows. Such conditions may increase firms' reliance on external financing and elevate financial pressure, thereby increasing the likelihood of financial distress. In contrast, under-investment emerges when firms fail to undertake value-enhancing projects due to financing constraints, risk aversion, or managerial conservatism. Although under-investment may initially preserve liquidity, persistent under-investment can reduce firms' growth opportunities, weaken future profitability, and ultimately impair long-term financial stability. Therefore, both forms of investment inefficiency may increase the risk of financial distress, albeit through different channels.

The ASEAN context provides a unique setting for examining this relationship. Heterogeneous institutional environments, varying levels of capital market development, concentrated ownership structures, and differing degrees of investor protection characterize ASEAN countries. These characteristics may amplify agency conflicts and influence managerial investment behavior. Furthermore, firms operating in emerging markets often face greater financing constraints and information asymmetry than firms in developed economies, making investment efficiency particularly important for maintaining financial stability. Consequently, evidence from developed markets may not be directly applicable to ASEAN firms, highlighting the need for further empirical investigation.

Previous studies have demonstrated that investment inefficiency affects firms' financial stability and performance (Biddle *et al.*, 2009; Cheng *et al.*, 2013; Geng *et al.*, 2025; López-Gutiérrez *et al.*, 2015; Männasoo *et al.*, 2018; Salehi *et al.*, 2022). However, several important gaps remain. First, prior studies have primarily focused on firm performance, firm value, financing decisions, and investment outcomes, while devoting limited attention to the implications of investment inefficiency for financial distress. Second, most existing studies treat investment inefficiency as a single aggregate construct, potentially masking the distinct economic consequences of over-investment and under-investment. Third, empirical evidence from ASEAN emerging markets remains scarce despite the region's growing economic significance and unique institutional characteristics. Addressing these gaps, this study separately examines the effects of overall investment inefficiency, over-investment, and under-investment on financial distress among ASEAN non-financial firms.

Based on this phenomenon, this study aims to analyze the effect of investment inefficiency on financial distress among ASEAN non-financial firms during 2020–2024. Specifically, this study

investigates whether over-investment and under-investment generate asymmetric effects on firms' financial distress conditions. This study contributes to the literature in several ways. First, it extends the investment efficiency literature by examining financial distress as an important corporate outcome. Second, it disentangles investment inefficiency into over-investment and under-investment, allowing a more nuanced understanding of how different forms of inefficient investment affect corporate financial health. Third, it provides evidence from ASEAN emerging markets, thereby enriching the limited literature on investment behavior and financial distress in developing economies. These contributions offer valuable insights for managers, investors, and policymakers seeking to improve investment efficiency and strengthen corporate financial resilience.

This study employs financial distress as the dependent variable, measured using the Altman Z''-Score model for emerging markets (Altman *et al.*, 2017; Novita *et al.*, 2019). The Altman Z''-Score is particularly appropriate for emerging market settings because it incorporates profitability, liquidity, leverage, and solvency dimensions while maintaining strong predictive ability for financial distress. Meanwhile, the independent variables consist of investment intensity, over-investment, and under-investment obtained through the investment estimation model (Biddle *et al.*, 2009; Geng *et al.*, 2025; Richardson, 2006). In addition, this study incorporates several control variables, including leverage, firm size, and profitability.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature and develops the research hypotheses concerning the relationship between investment inefficiency and financial distress. Section 3 describes the research methodology, including sample selection, variable measurements, and empirical models. Section 4 presents the empirical findings and robustness analyses. Section 5 discusses the results in relation to existing theories and prior studies, with particular emphasis on the ASEAN institutional context. Finally, Section 6 concludes the study by summarizing the main findings, outlining practical implications for managers, investors, and policymakers, and suggesting directions for future research.

2. Literature Review and Hypothesis Development

2.1 Investment Intensity and Financial Distress

Agency theory suggests that information asymmetry and conflicts of interest between managers and shareholders may lead firms to deviate from optimal investment decisions (Jensen & Meckling, 1976). In an efficient capital allocation environment, firms are expected to invest in projects with positive net present value (NPV), thereby generating future cash flows that enhance firm value and strengthen financial stability. However, managerial discretion combined with imperfect monitoring may cause firms to either overinvest in unprofitable projects or underinvest in valuable growth opportunities, resulting in inefficient resource allocation.

From a resource allocation perspective, investment intensity reflects the extent to which firms commit financial resources to support operational expansion, innovation, and long-term growth. Appropriate investment intensity enables firms to improve productivity, strengthen competitive advantage, and generate sustainable operating cash flows. These benefits enhance firms' ability to meet financial obligations and reduce the likelihood of financial distress. Moreover, firms with better investment efficiency are more likely to allocate capital toward value-creating projects, thereby improving financial resilience and reducing bankruptcy risk (Biddle *et al.*, 2009).

Conversely, suboptimal investment intensity may create financial vulnerabilities. Insufficient investment may limit future growth and profitability, while excessive investment may impose substantial financing burdens and reduce financial flexibility. Both situations can weaken firms' operating cash flows and increase reliance on external financing. As financial pressure accumulates, firms may experience greater difficulty in meeting debt obligations, thereby increasing the probability of financial distress. Therefore, investment intensity is expected to play a significant role in determining firms' financial health. Based on the above arguments, firms with more efficient and productive investment intensity are expected to exhibit lower levels of financial distress.

H1: *Investment intensity positively affects the Altman Z"-Score (negatively affects financial distress).*

2.2 Over-Investment and Financial Distress

The relationship between over-investment and financial distress can be explained through agency theory and free cash flow theory. Jensen (1986) argues that managers may use excess corporate resources to undertake investments beyond the optimal level in pursuit of personal benefits such as empire-building, increased managerial influence, or enhanced reputation. As a result, firms may invest in projects with negative or marginal net present value, generating inefficient resource allocation and reducing shareholder value.

Over-investment may increase financial distress through several mechanisms. First, excessive capital expenditures reduce internal cash reserves and weaken firms' liquidity positions. Second, firms engaging in overinvestment frequently rely on debt financing to support expansion. Increased leverage raises fixed financial obligations, thereby increasing the likelihood of financial strain when investment projects fail to generate expected returns. Third, over-investment may lock corporate resources into unproductive assets, reducing firms' ability to respond to economic shocks and operational uncertainties.

These conditions are particularly relevant in emerging markets, where information asymmetry and governance weaknesses may limit effective monitoring of managerial investment decisions. Consequently, excessive investment can amplify financing pressure, deteriorate operating cash flows, and weaken overall financial stability. Empirical evidence also suggests that aggressive expansion strategies and excessive diversification often increase the likelihood of financial distress due to the substantial financial commitments required to sustain such investments (Geng *et al.*, 2025; Hao & Liang, 2009; Li, 2017). Therefore, firms characterized by higher levels of over-investment are expected to face greater financial pressure and a higher probability of financial distress.

H2: *Over-investment negatively affects the Altman Z"-Score (positively affects financial distress).*

2.3 Under-Investment and Financial Distress

Under-investment occurs when firms fail to undertake value-enhancing projects despite the availability of profitable investment opportunities. From the perspective of financing constraint theory, under-investment often arises because firms face limited access to external financing, high capital costs, or elevated uncertainty regarding future economic conditions. Agency theory further suggests that risk-averse managers may intentionally avoid investment projects to preserve liquidity and minimize short-term risks, even when such projects are expected to generate positive long-term returns.

Although moderate reductions in investment may temporarily conserve cash and alleviate short-term financial pressure, persistent under-investment may create significant long-term consequences. Firms that systematically forgo positive-NPV projects lose opportunities to expand operations, improve productivity, and strengthen their competitive positioning. As a result, future revenue growth and operating cash flows may decline, weakening firms' ability to generate resources needed to meet financial obligations.

In addition, prolonged under-investment may result in deteriorating asset quality, technological obsolescence, and declining operational efficiency. These conditions can further reduce profitability and increase firms' vulnerability to financial shocks. Over time, the inability to generate sufficient cash flows may increase dependence on costly external financing and elevate the likelihood of financial distress. Previous studies also show that financially constrained firms frequently exhibit under-investment behavior, which may exacerbate financial difficulties and hinder long-term recovery (Bhagat *et al.*, 2005; Pindado *et al.*, 2008; López-Gutiérrez *et al.*, 2015). Therefore, although under-investment may provide temporary liquidity benefits, excessive under-investment is expected to weaken firms' financial health and increase the probability of financial distress.

H3: *Under-investment negatively affects the Altman Z"-Score (positively affects financial distress).*

3. Research Method

This study employs a quantitative approach using panel data analysis to examine the effects of investment intensity, over-investment, and under-investment on financial distress among non-financial firms in the ASEAN region during 2020–2024. The study utilizes unbalanced panel data obtained from the Bureau van Dijk OSIRIS database, which provides comprehensive information regarding firms' financial statements and corporate characteristics. The final sample consists of 14,371 firm-year observations. The use of unbalanced panel data allows the study to retain firms with incomplete observations across certain periods, thereby increasing the number of observations and providing broader representation of corporate conditions within ASEAN countries. To address the issue of extreme values that may distort estimation results, this study applies the winsorizing method at the 1% and 99% percentiles. This procedure limits extreme observations within a specified percentile threshold to improve the stability of data distribution and generate more robust and reliable regression estimates.

Financial distress (FD) is measured using the Altman Z"-Score model for emerging markets developed by Edward Altman and adapted by previous studies (Altman *et al.*, 2017; Novita *et al.*, 2019). A lower Z"-Score indicates a higher probability of financial distress, while a higher score reflects healthier financial conditions. The Altman Z"-Score is considered appropriate because it has been widely applied in the context of emerging market firms. To estimate investment inefficiency, this study adopts the investment expectation model developed by Cheng *et al.* (2013), Geng *et al.* (2025), and Richardson (2006). The model estimates firms' expected investment levels based on growth opportunities, leverage, liquidity conditions, firm characteristics, and previous investment behavior. The residual value generated from the estimation model represents investment inefficiency. Positive residuals indicate over-investment (Oi), whereas negative residuals indicate under-investment (Ui).

The expected investment model is formulated as follows:

$$INV_t = \beta_0 + \beta_1 TobinQ_{t-1} + \beta_2 Lev_{t-1} + \beta_3 Cash_{t-1} + \beta_4 Age_{t-1} + \beta_5 Size_{t-1} + \beta_6 Ret_{t-1} + \beta_7 INV_{t-1} + \sum Industry + \sum Year + \epsilon_t \quad (1)$$

Furthermore, this study estimates three regression models to examine the relationship between investment behavior and financial distress. Equation (2) examines the effect of investment intensity on financial distress, Equation (3) investigates the effect of over-investment on financial distress, and Equation (4) analyzes the effect of under-investment on financial distress.

$$FD_{it} = \beta_0 + \beta_1 INV_{it} + \beta_2 Lev_{it} + \beta_3 Size_{it} + \beta_4 ROA_{it} + \sum Industry + \sum Year + \epsilon_{it} \quad (2)$$

$$FD_{it} = \beta_0 + \beta_1 Oi_{it} + \beta_2 Lev_{it} + \beta_3 Size_{it} + \beta_4 ROA_{it} + \sum Industry + \sum Year + \epsilon_{it} \quad (3)$$

$$FD_{it} = \beta_0 + \beta_1 Ui_{it} + \beta_2 Lev_{it} + \beta_3 Size_{it} + \beta_4 ROA_{it} + \sum Industry + \sum Year + \epsilon_{it} \quad (4)$$

The investment intensity variable (INV) is measured following López-Gutiérrez *et al.* (2015). Leverage (LEV) is calculated using the ratio of total liabilities to total assets, following Geng *et al.*, (2025). Firm size (SIZE) is proxied by the natural logarithm of total assets to reduce scale differences and improve data normality (Cheng *et al.*, 2013). Profitability (ROA) is measured using earnings before interest and taxes divided by total assets (López-Gutiérrez *et al.*, 2015). These control variables are included to reduce omitted variable bias and capture firm-specific characteristics that may influence financial distress.

This study employs the fixed effects model (FEM) as the primary estimation approach because the model is capable of controlling for unobservable firm-specific heterogeneity that remains constant over time. In addition, robust standard errors clustered at the firm level are used to mitigate potential heteroskedasticity and within-firm error correlation across periods, thereby yielding more consistent and reliable estimates. As a robustness check, the study further compares the estimation results using the random effects model (REM) and ordinary least squares (OLS) regression to ensure the consistency and reliability of the findings.

4. Results and Discussion

4.1 Summary Statistics

Table 1 presents the descriptive statistics of the research variables based on 14,371 firm-year observations of non-financial ASEAN companies during 2020–2024. The average value of financial distress (FD), measured using the Altman Z"-Score, is 7,584, indicating that most firms are in relatively healthy financial conditions. However, the wide range between the minimum and maximum values suggests substantial variation in firms' financial conditions. This section is the central part of the article. It is where the author/s should explain in words what they discovered in the research. It should be laid out in a logical sequence. The results presented in this section are the outcome of a rigorous data analysis process, including statistical calculations and testing, as well as other methods used to achieve the research objectives. We would appreciate it if you could summarize the study's findings.

The mean value of investment intensity (INV) is 0.310, indicating a moderate level of corporate investment activity. Meanwhile, the average values of over-investment (Oi) and under-investment (Ui) are both 0,014, suggesting that deviations from optimal investment levels are relatively small on average. Leverage (LEV) has a mean value of 0,440, implying that liabilities account for approximately 44% of total assets. In addition, the average profitability (ROA) is 0,044, indicating that firms generate operating profits equivalent to 4,4% of total assets.

Table 1. Descriptive Statistics

Variabel	Obs	Mean	SD	p25	p50	p75	Min	Max
FD	14.371	7.584	5.383	5.133	6.998	9.367	-13.117	31.816
INV	14.371	0.310	0.229	0.114	0.276	0.467	0.000	0.987
Oi	14.371	0.014	0.038	0.000	0.000	0.010	0.000	0.867
Ui	14.371	0.014	0.036	0.000	0.000	0.015	0.000	0.939
LEV	14.371	0.440	0.250	0.252	0.417	0.594	0.038	1.468
SIZE	14.371	11.702	1.797	10.483	11.512	12.746	5.175	18.432
ROA	14.371	0.044	0.095	0.005	0.042	0.087	-0.323	0.356

Source: Processed by the authors using Stata17.

Table 2 reports the Pearson correlation matrix among the research variables. Overall, the correlation coefficients among independent variables are relatively low, indicating that multicollinearity is unlikely to be a serious concern in this study. Investment intensity (INV) is negatively correlated with financial distress (FD) at the 1% significance level, suggesting that higher investment intensity is associated with lower Z"-Score values and greater financial distress risk. Similarly, over-investment (Oi) also shows a negative and significant relationship with FD, indicating that excessive investment may worsen firms' financial conditions. Under-investment (Ui) exhibits a negative but relatively weak correlation with FD.

Table 2. Correlation Matrix

Variables	FD	INV	Oi	Ui	LEV	SIZE	ROA
FD	1						
INV	-0.145***	1					
Oi	-0.117***	0.284***	1				
Ui	-0.018**	-0.081***	-0.146***	1			
LEV	-0.699***	0.083***	0.051***	0.017**	1		
SIZE	-0.062***	0.097***	-0.057***	-0.031***	0.153***	1	
ROA	0.326***	0.019**	-0.109***	0.044***	-0.185***	0.169***	1

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Processed by the authors using Stata17.

Leverage (LEV) has a strong negative correlation with FD, implying that firms with higher debt levels tend to face greater financial distress risk. In contrast, profitability (ROA) is positively associated with FD, indicating that more profitable firms generally exhibit healthier financial conditions. Overall, the correlation results provide preliminary evidence regarding the relationship between investment behavior and financial distress.

4.2 Discussion

The results regarding the effects of investment intensity (INV), over-investment (Oi), and under-investment (Ui) on financial distress (FD) are presented in Table 3. The dependent variable, financial distress, is measured using the Altman Z"-Score, where a lower Z"-Score indicates a higher risk of

financial distress. The regression models employ a fixed effect model (FEM) with firm-clustered robust standard errors to control for unobservable firm heterogeneity and heteroskedasticity.

Table 3. The Effects of Investment Intensity, Over-Investment, and Under-Investment on Financial Distress

Variables	(1)	(2)	(3)
INV	-2.530*** (0.569)		
O _i		-3.476*** (0.691)	
U _i			1.469 (0.974)
LEV	-12.169*** (0.598)	-12.287*** (0.598)	-12.359*** (0.605)
SIZE	0.820*** (0.226)	0.863*** (0.225)	0.871*** (0.226)
ROA	6.352*** (0.505)	6.561*** (0.500)	6.715*** (0.505)
Constant	3.854 (2.665)	2.572 (2.611)	2.510 (2.636)
Observations	14.371	14.371	14.371
R ² (Within)	0.341	0.339	0.336
F-statistic	114.84***	116.18***	110.62***
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Note: Columns (1), (2), and (3) present the estimation results for Equation (2), Equation (3), and Equation (4), respectively. Robust standard errors clustered at the firm level are reported in parentheses to account for potential heteroskedasticity and within-firm error correlation over time. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Processed by the authors using Stata17.

The results in Column (1) show that investment intensity (INV) has a negative and statistically significant effect on financial distress at the 1% significance level ($\beta = -2.530$; $p < 0.01$). This finding indicates that higher investment intensity is associated with lower Altman Z"-Score values, implying greater financial distress risk. Therefore, the results suggest that excessive investment activities may weaken firms' financial conditions. One possible explanation is that firms with aggressive investment behavior tend to require substantial financing, which may increase debt burdens and financial pressure, particularly when investment projects do not generate expected returns. This finding supports agency theory, which argues that managers may pursue investment expansion beyond optimal levels, potentially resulting in inefficient capital allocation and financial difficulties (Jensen & Meckling, 1976). The result is also consistent with previous studies showing that inefficient investment behavior can increase firms' financial vulnerability and operational risk (Geng *et al.*, 2025; López-Gutiérrez *et al.*, 2015). Therefore, these findings support Hypothesis 1, which predicts that investment intensity has a negative effect on financial distress.

Column (2) further examines the effect of over-investment (O_i) on financial distress. The coefficient of O_i is negative and significant at the 1% level ($\beta = -3.476$; $p < 0.01$), indicating that firms experiencing higher over-investment tend to have lower Z"-Scores and therefore face greater financial distress risk. This finding suggests that excessive investment activities may weaken firms' financial stability due to inefficient resource allocation and increasing financing pressure. Therefore, the result supports Hypothesis 2, which predicts that over-investment has a negative effect on financial distress. This result indicates that over-investment reflects inefficient investment decisions, where firms allocate resources to projects with low or even negative net present value (Geng *et al.*, 2025). Such behavior may reduce future cash flow generation and increase financing costs, thereby deteriorating firms' financial stability. According to the theory, managers may overinvest due to empire-building motives or personal incentives that are not fully aligned with shareholders' interests (Jensen & Meckling, 1976). Consequently, excessive investment can create financial inefficiencies and increase the probability of financial distress. This finding is in line with prior evidence documented by (Bhagat *et al.*, 2005; Geng *et al.*, 2025; López-Gutiérrez *et al.*, 2015), which suggest that inefficient investment policies contribute to firms' financial problems.

Meanwhile, Column (3) shows that under-investment (U_i) has a positive but statistically insignificant effect on financial distress ($\beta = 1.469$; $p > 0.10$). Thus, Hypothesis 3, which predicts a negative relationship between under-investment and financial distress, is not supported. The insignificant result indicates that lower investment levels do not necessarily worsen the financial conditions of firms in the ASEAN non-financial firms sample. One possible explanation is that firms may intentionally reduce investment expenditures as a precautionary strategy to preserve liquidity and maintain financial flexibility during uncertain economic conditions. In emerging markets, firms often face financing constraints and higher external financing costs, leading managers to prioritize cash preservation over aggressive investment expansion.

This finding may also indicate that moderate under-investment can help firms reduce short-term financial pressure by lowering financing needs and avoiding risky projects. Such behavior is consistent with the argument proposed by (Geng *et al.*, 2025), who state that lower investment expenditures may improve firms' cash flow conditions and reduce solvency pressure in the short term. In addition, underinvestment may prevent firms from pursuing projects with negative expected returns, thereby mitigating financial risk. However, because the relationship is not statistically significant, the results suggest that underinvestment does not have a sufficiently strong direct impact on firms' financial distress in this study.

Regarding the control variables, leverage (LEV) consistently shows a negative and highly significant effect across all models. Since financial distress is measured using Altman Z"-Score, the negative coefficient implies that higher leverage increases financial distress risk. This finding is consistent with capital structure theory, which argues that excessive debt obligations increase bankruptcy risk and financial pressure. In contrast, firm size (SIZE) and profitability (ROA) exhibit positive and significant effects on financial distress. The positive coefficients indicate that larger and more profitable firms tend to have higher Z"-Scores and therefore healthier financial conditions. Larger firms generally have better access to financing, more diversified operations, and stronger market positions, enabling them to withstand financial shocks more effectively. Similarly, firms with higher profitability generate stronger internal cash flows that can support operational sustainability and debt repayment capacity.

The regression results demonstrate that investment inefficiency, particularly overinvestment, plays an important role in explaining firms' financial distress. The findings imply that aggressive investment policies without adequate financial discipline may increase firms' vulnerability to financial difficulties. Therefore, firms need to maintain optimal investment policies and ensure that investment decisions align with their financial capacity and long-term value-creation objectives.

4.3 Robustness Check

The robustness test results using Ordinary Least Squares (OLS) and Random Effects Model (REM) estimations to ensure the consistency of the main findings obtained from the Fixed Effects Model (FEM) are presented in Table 4. Overall, the results remain relatively consistent across estimation approaches, indicating that the relationship between investment behavior and financial distress is robust and insensitive to model specification.

Table 4. Robustness Test Results

Variables	(1)		(2)		(3)	
	OLS	REM	OLS	REM	OLS	REM
INV	-2.236*** (0.252)	-2.391*** (0.314)				
Oi			-9.072*** (1.030)	-3.905*** (0.667)		
Ui					-2.296* (1.198)	1.409 (0.942)
LEV	-14.118*** (0.363)	-13.100*** (0.413)	-14.212*** (0.362)	-13.212*** (0.414)	-14.257*** (0.366)	-13.261*** (0.420)
SIZE	0.042 (0.033)	0.175*** (0.050)	0.010 (0.033)	0.155*** (0.050)	0.016 (0.033)	0.160*** (0.050)
ROA	11.613*** (0.706)	7.345*** (0.479)	11.110*** (0.703)	7.443*** (0.477)	11.536*** (0.708)	7.620*** (0.486)
Constant	13.514*** (0.441)	11.701*** (0.630)	13.214*** (0.434)	11.202*** (0.624)	13.144*** (0.432)	11.159*** (0.629)
Observations	14.371	14.371	14.371	14.371	14.371	14.371
R ²	0.538	0.533	0.533	0.528	0.529	0.524
F-stat	415.99***	1839.32***	413.96***	1832.31***	413.07***	1758.32***
Firm FE	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Columns (1), (2), and (3) present the estimation results for Equation (2), Equation (3), and Equation (4), respectively. Robust standard errors clustered at the firm level are reported in parentheses to account for potential heteroskedasticity and within-firm error correlation over time. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Processed by the authors using Stata17.

In Column (1), the coefficient of investment intensity (INV) remains negative and statistically significant in both the OLS model ($\beta = -2,236$; $p < 0,01$) and the REM model ($\beta = -2,391$; $p < 0,01$). These findings are consistent with the main FEM results reported in Table 3, suggesting that higher investment

intensity is associated with lower Z"-Scores and consequently greater financial distress risk. The consistency of the coefficient signs and significance levels across estimation methods strengthens the validity of Hypothesis 1. This finding also confirms that firms with aggressive investment activities tend to experience higher financial pressure, particularly when investments are not accompanied by efficient resource allocation and adequate financial capacity (Geng *et al.*, 2025; López-Gutiérrez *et al.*, 2015).

Column (2) reports the robustness estimation for over-investment (Oi). The results show that Oi has a negative and significant effect on financial distress in both the OLS model ($\beta = -9,072$; $p < 0,01$) and the REM model ($\beta = -3,905$; $p < 0,01$). These findings are consistent with the FEM estimates in Table 3, indicating that firms engaging in excessive investment tend to have lower financial health and a higher risk of financial distress. The larger coefficient magnitude in the OLS estimation may indicate that unobserved firm-specific characteristics partially influence the relationship between over-investment and financial distress. Nevertheless, the consistent negative sign across all estimation models further strengthens support for Hypothesis 2. This result indicates that excessive investment may create inefficiencies, increase financing burdens, and reduce firms' financial flexibility.

Meanwhile, Column (3) presents the robustness results for under-investment (Ui). The OLS estimation shows a negative and weakly significant coefficient ($\beta = -2,296$; $p < 0,10$), while the REM estimation produces a positive but statistically insignificant coefficient ($\beta = 1,409$; $p > 0,10$). These results are generally consistent with the main FEM findings, which also show no statistically significant relationship between Ui and financial distress. Therefore, the evidence suggests that under-investment does not consistently affect firms' financial distress conditions in ASEAN non-financial firms during the observation period. One possible explanation is that firms experiencing under-investment may deliberately reduce investment expenditures as a precautionary strategy to preserve liquidity and minimize financial risk during uncertain economic conditions. Consequently, under-investment may not necessarily worsen firms' financial conditions.

Regarding the control variables, leverage (LEV) consistently shows a negative and statistically significant effect across all estimation models, indicating that firms with higher debt levels tend to experience greater financial distress risk. Profitability (ROA) consistently shows a positive and significant relationship with financial health, implying that more profitable firms are more financially stable and less likely to experience financial distress. Firm size (SIZE) shows mixed results, with significance mainly observed in the REM estimations, suggesting that larger firms may have better access to external financing and stronger operational resilience.

Overall, the robustness test results confirm that the main findings of this study remain stable across alternative estimation methods. The consistency of the coefficients' direction and significance levels indicates that the empirical relationship between investment behavior and financial distress is reliable and not driven by a specific econometric approach.

5. Concluding Remarks and Recommendation

This study aims to examine the effects of investment intensity, over-investment, and under-investment on financial distress among non-financial firms in ASEAN during the 2020–2024 period. Using panel data analysis with a fixed-effects model, this study investigates whether firms' investment behavior contributes to their financial vulnerability. The empirical findings indicate that investment intensity has a significant negative effect on firms' financial health, suggesting that higher investment intensity

increases the risk of financial distress. Similarly, over-investment is found to significantly increase the risk of financial distress, indicating that excessive investment may create financial inefficiencies and increase firms' financial burdens. Therefore, the results support Hypothesis 1 and Hypothesis 2. In contrast, under-investment does not show a significant relationship with financial distress, implying that lower investment levels do not necessarily worsen firms' financial conditions. Accordingly, Hypothesis 3 is not supported. This study provides implications for managers and investors regarding the importance of efficient investment decisions in maintaining firms' financial stability. This study has several limitations. The primary limitation relates to data availability and completeness obtained from the Bureau van Dijk OSIRIS database. Some firms do not provide complete financial information for all observation periods, resulting in unbalanced panel data. Although this approach allows for a broader sample coverage, it may still limit the comprehensiveness of the analysis. Future studies are expected to expand the research scope by incorporating additional variables related to corporate governance, macroeconomic conditions, or financial constraints that may influence firms' financial distress. Further research may also consider longer observation periods, different regional settings, or alternative proxies for investment inefficiency and financial distress to provide more comprehensive empirical evidence.

Statement of Use of Generative AI

During the preparation of this work, the author used generative artificial intelligence tools to support the scientific writing process. Grammarly was used to check grammar, refine writing style, and improve clarity in scientific writing. All interpretations, analyses, and conclusions presented in this study are the sole responsibility of the author.

References

- Altman, E. I., Iwanicz-Drozowska, M., Laitinen, E. K., & Suvas, A. (2017). Financial Distress Prediction in an International Context: A Review and Empirical Analysis of Altman's Z-Score Model. *Journal of International Financial Management and Accounting*, 28(2), 131–171. <https://doi.org/10.1111/jifm.12053>
- Beaver, W. H. (1966). Financial Ratios As Predictors of Failure. *Journal of Accounting Research*, 4, 71–111. <https://doi.org/10.2307/2490171>
- Bhagat, S., Moyn, N., & Suh, I. (2005). Investment and internal funds of distressed firms. *Journal of Corporate Finance*, 11(3), 449–472. <https://doi.org/https://doi.org/10.1016/j.jcorpfin.2004.09.002>
- Biddle, G. C., Hilary, G., & Verdi, R. S. (2009). How does financial reporting quality relate to investment efficiency? *Journal of Accounting and Economics*, 48(2–3), 112–131. <https://doi.org/10.1016/j.jacceco.2009.09.001>
- Cheng, M., Dhaliwal, D., & Zhang, Y. (2013). Does investment efficiency improve after the disclosure of material weaknesses in internal control over financial reporting? *Journal of Accounting and Economics*, 56(1), 1–18. <https://doi.org/10.1016/j.jacceco.2013.03.001>
- Geng, H., Zhu, H., Lau, W. T., Nor, N. M., & Razak, N. H. A. (2025). How does investment efficiency affect financial distress risk? Evidence from China. *Journal of Behavioral and Experimental Finance*, 45. <https://doi.org/10.1016/j.jbef.2025.101024>
- Hao, X., & Liang, Q. (2009). Is the pledge of the ultimate controller's shareholding undermining the company's value? *Accounting Research*, (7), 57–63.
- Jensen, M. C., & Meckling, W. H. (1976). Also published in Foundations of Organizational Strategy. In *Journal of Financial Economics* (Number 4). Harvard University Press. <http://ssrn.com/abstract=94043Electroniccopyavailableat:http://ssrn.com/abstract=94043http://hupress.harvard.edu/catalog/JENTHF.html>
- Kusmayadi, R. (2023, August 23). Investasi ASEAN Tumbuh di Tengah Ketidakpastian Global, tapi Belum Merata. *bpk.go.id*.

- Li, B. (2017). Cash holdings, firm growth rate and financial crisis. *New Accounting Journal*, 1(1), 14–21.
- López-Gutiérrez, C., Sanfilippo-Azofra, S., & Torre-Olmo, B. (2015). Investment decisions of companies in financial distress. *BRQ Business Research Quarterly*, 18(3), 174–187. <https://doi.org/10.1016/j.brq.2014.09.001>
- Männasoo, K., Maripuu, P., & Hazak, A. (2018). Investments, Credit, and Corporate Financial Distress: Evidence from Central and Eastern Europe. *Emerging Markets Finance and Trade*, 54(3), 677–689. <https://doi.org/10.1080/1540496X.2017.1300092>
- Novita, S., Tjahjadi, B., & Irwanto, A. (2019). Zombie Dan Diversifikasi Dalam Masa Krisis Keuangan Global. *Jurnal Reviu Akuntansi Dan Keuangan*, 9(3), 295–308. <https://doi.org/10.22219/jrak.v9i3.62>
- Pereira, C., Castro, B., Gomes, L., & Canha, H. (2024). Firms' Investment Level and (In)Efficiency: The Role of Accounting Information System Quality. *International Journal of Financial Studies*, 12(1). <https://doi.org/10.3390/ijfs12010009>
- Pindado, J., Rodrigues, L., & de la Torre, C. (2008). How do insolvency codes affect a firm's investment? *International Review of Law and Economics*, 28(4), 227–238. <https://doi.org/https://doi.org/10.1016/j.irle.2008.08.001>
- Richardson, S. (2006). Over-investment of free cash flow. *Review of Accounting Studies*, 11(2–3), 159–189. <https://doi.org/10.1007/s11142-006-9012-1>
- Salehi, M., Zimon, G., Arianpoor, A., & Gholezoo, F. E. (2022). The Impact of Investment Efficiency on Firm Value and Moderating Role of Institutional Ownership and Board Independence. *Journal of Risk and Financial Management*, 15(4). <https://doi.org/10.3390/jrfm15040170>
- Zhang, X., Biswas, P. K., Ranasinghe, D., & Roberts, H. (2026). Board Gender Diversity and Investment Efficiency: Evidence from UK Private Firms. *Accounting in Europe*. <https://doi.org/10.1080/17449480.2026.2622079>
- Zhao, L., & Huchzermeier, A. (2019). Managing supplier financial distress with advance payment discount and purchase order financing. *Omega (United Kingdom)*, 88, 77–90. <https://doi.org/10.1016/j.omega.2018.10.019>
- Zhuang, Y., & Mao, F. (2006). The pitfalls of diversification: A case study based on the Sanjiu Group. *Finance & Accounting Monthly*, 11, 27–31.

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