

Financial Ratios as Predictors of Financial Distress Risk for Transportation, Logistics, and Infrastructure Companies on the Indonesia Stock Exchange for the 2022–2024 Period

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Keywords	Abstract
Likuiditas; Leverage; Profitabilitas; Financial distress; Altman Z"-Score.	This study aimed to examine and analyze the effects of liquidity, leverage, and profitability on financial distress risk among companies in the transportation, logistics, and infrastructure sectors listed on the Indonesia Stock Exchange during the 2022–2024 period. The study used secondary data obtained from annual financial reports published on the official website of the Indonesia Stock Exchange (www.idx.co.id). The sample was selected using a purposive sampling technique, resulting in a final sample of 105 observations from 63 companies over the three-year observation period. The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26 through multiple linear regression analysis. Financial distress risk was measured using the Modified Altman Z"-Score model, while liquidity was proxied by the Current Ratio (CR), leverage was proxied by the Debt-to-Equity Ratio (DER), and profitability was proxied by Return on Assets (ROA). The results indicate that liquidity had a positive and significant effect on financial distress risk, leverage had a negative and significant effect on financial distress risk, and profitability had a positive and significant effect on financial distress risk. These findings provide important implications that liquidity, leverage, and profitability ratios can serve as indicators for the early detection of financial distress risk among companies in the transportation, logistics, and infrastructure sectors. For companies, these results emphasize the importance of maintaining healthy working capital, managing debt structures effectively, and improving operational profitability to avoid financial distress conditions. For investors and creditors, these three financial ratios, together with the Modified Altman Z"-Score model, can be utilized as an early warning system to support investment and credit decision-making.

INTRODUCTION

The transportation, logistics, and infrastructure sectors play a crucial role in supporting a country's economic activities by providing the foundation for trade and other business operations. The financial performance of companies in these sectors often receives considerable attention due to their operational complexity and sensitivity to macroeconomic conditions, government policies, and fluctuations in operating costs. Companies that are able to manage their financial conditions effectively tend to demonstrate greater stability, whereas companies with poor financial management face a higher risk of experiencing financial difficulties (Altman, Iwanicz-Drozowska, Laitinen, & Suvas, 2017).

The 2022–2024 period was characterized by various global challenges, including high inflation, monetary policy tightening, continued supply chain disruptions, and the potential slowdown of global economic growth. These conditions directly affected the financial performance of companies in the transportation, logistics, and infrastructure sectors. Since

January 2021, the Indonesia Stock Exchange has implemented a new industry classification system known as the Indonesia Stock Exchange Industrial Classification (IDX-IC) (Bodolica et al. 2016; Marantika et al. 2023; Marwah 2026; Napier et al. 2020; Suroso et al. 2022). Based on this classification, the companies examined in this study were categorized into two main sectors: Transportation & Logistics and Infrastructures.

Previous research on the effects of liquidity, leverage, and profitability on financial distress has produced inconsistent findings. Ningsi, Akila, and Mursalin (2024) found that the Current Ratio (CR) had a significant effect on financial distress, whereas Stevando and Azzumar (2026) reported different results. Regarding leverage, Kristorio, Wany, and Indahwati (2025) identified a significant effect, while Ningsi et al. (2024) found contrasting evidence. Similarly, in terms of profitability, Habib (2023) stated that Return on Assets (ROA) was closely associated with financial distress, whereas Ningsi et al. (2024) concluded that ROA did not have a significant effect. These inconsistencies represent a research gap that motivates this study to provide updated empirical evidence regarding the role of financial ratios in predicting financial distress risk within specific sectors and observation periods.

Signaling Theory

The Signaling Theory introduced by Spence (1973) explains that information asymmetry exists between a company's internal and external stakeholders. In a financial context, information disclosed by a company through financial statements, including financial ratios, serves as a signal that reflects its internal condition to external stakeholders. A high liquidity ratio and consistent profitability represent positive signals indicating sound financial health. Conversely, if the signals consistently indicate weaknesses in financial conditions, they may be interpreted as early indicators of potential financial distress (Altman et al., 2017).

Agency Theory

Jensen and Meckling (1976) introduced *agency theory* which explains the contractual relationship between the owner of the company (*principal*) and management (*agent*). Agency conflicts arise when management makes decisions that are not in line with the interests of shareholders, including funding policies through excessive debt. The use of *leverage* that exceeds the optimal limit can increase the risk of *financial distress* because interest expenses continue to erode the company's ability to meet its financial obligations.

Pecking Order Theory

Myers and Majluf (1984) through *pecking order theory* stated that companies have a hierarchy of funding preferences: starting from internal funds (retained earnings), then debt, and finally the issuance of new equity. Companies that have high profitability tend to have adequate retained earnings so that dependence on debt is reduced. This condition makes the company more protected from the risk of *financial distress* because the interest obligations that must be borne are lower.

Trade-Off Theory

Modigliani and Miller (1963) stated that the use of debt provides benefits in the form of tax savings (*tax shield*). However, *the trade-off theory* asserts that these benefits have optimal limits. Debt that exceeds the optimal point will make *financial distress* costs exceed the benefits of *tax shield*, thereby increasing the risk of company bankruptcy.

Financial Distress dan Model Altman Z''-Score

Financial distress is a condition in which a company experiences significant difficulties in meeting its financial obligations, potentially leading to bankruptcy (Altman, 1968; Platt & Platt, 2002). Whitaker (1999) further explained that financial distress does not merely represent the final stage before bankruptcy but can also be identified in earlier stages when a company's cash flow becomes insufficient to fulfill its long-term obligations.

In this study, financial distress risk was measured using the Modified Altman Z''-Score model developed by Altman, Hartzell, and Peck (1998). This model represents an improvement of the original Z-Score model introduced by Altman (1968), which was specifically developed for non-manufacturing companies and emerging markets such as Indonesia. The Modified Altman Z''-Score formula is expressed as follows: $Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$, where X_1 represents the ratio of Working Capital to Total Assets, X_2 represents the ratio of Retained Earnings to Total Assets, X_3 represents the ratio of Earnings Before Interest and Taxes (EBIT) to Total Assets, and X_4 represents the ratio of Book Value of Equity to Total Liabilities.

The classification of a company's financial condition based on the Modified Altman Z''-Score model is divided into three zones. Companies with a Z''-Score value greater than 2.6 are categorized as being in the safe zone, indicating healthy financial conditions and a low risk of bankruptcy. Companies with a Z''-Score value between 1.1 and 2.6 are categorized as being in the grey zone, indicating potential financial difficulties that require attention. Meanwhile, companies with a Z''-Score value below 1.1 are categorized as being in the distress zone, indicating a high probability of financial distress and bankruptcy risk (Altman et al., 2017).

This study aimed to examine the effects of liquidity, leverage, and profitability on financial distress risk among companies in the transportation, logistics, and infrastructure sectors listed on the Indonesia Stock Exchange during the 2022–2024 period. Specifically, this research investigated whether these three financial ratios had significant predictive capabilities for financial distress as measured by the Modified Altman Z''-Score model. The novelty of this study lies in its focus on the transportation, logistics, and infrastructure sectors during the post-pandemic period, which remains relatively underexplored in the Indonesian context. Furthermore, the study applied the Modified Altman Z''-Score model, which was designed for emerging markets and non-manufacturing companies, making it more suitable for analyzing the selected sample. The urgency of this research was reinforced by the strategic role of these sectors in the Indonesian economy and the financial risks faced under current economic conditions. This study contributes empirical evidence regarding the effectiveness of financial ratios in predicting financial distress risk, providing valuable insights for companies, investors, and policymakers.

Liquidity, measured by the Current Ratio (CR), reflects a company's ability to meet short-term obligations using current assets. Based on Signaling Theory, a high Current Ratio represents a positive signal regarding a company's financial health. Consistent with Pecking Order Theory, strong liquidity indicates that a company can fulfill operational requirements through internal financing sources. Previous studies by Shi and Li (2021), Adityaningrum, Widyaningrum, and Mahirun (2024), and Alsulami (2025) demonstrated a positive relationship between liquidity and financial stability. Based on these arguments, the following hypothesis was formulated:

H1: Liquidity has a positive effect on financial distress risk as measured by the Modified Altman Z"-Score.

Leverage, measured by the Debt-to-Equity Ratio (DER), reflects the proportion of debt financing relative to equity. Based on Agency Theory, excessive debt policies may increase agency conflicts, while Trade-Off Theory suggests that debt exceeding the optimal level increases financial distress costs. Shi and Li (2021) emphasized that excessive leverage is a major factor contributing to financial vulnerability in the aviation industry. ElBannan (2021), Kristorio et al. (2025), and Kalash (2023) also demonstrated the negative impact of leverage on a company's financial condition. Based on these arguments, the following hypothesis was formulated:

H2: Leverage has a negative effect on financial distress risk as measured by the Modified Altman Z"-Score.

Profitability, measured by Return on Assets (ROA), reflects management's efficiency in utilizing total assets to generate profits. Based on Pecking Order Theory, high profitability indicates sufficient retained earnings, thereby reducing dependence on external financing. Consistent with Signaling Theory, profitability serves as a positive signal for investors and creditors regarding a company's financial condition. Habib (2023) and ElBannan (2021) demonstrated that profitability is closely associated with the mitigation of financial distress risk. Based on these arguments, the following hypothesis was formulated:

H3: Profitability has a positive effect on financial distress risk as measured by the Modified Altman Z"-Score.

Based on the development of the proposed hypotheses, the research model describes the relationship between three independent variables, namely liquidity (X1), leverage (X2), and profitability (X3), and the dependent variable, financial distress risk (Y), as measured by the Modified Altman Z"-Score model. Liquidity and profitability were hypothesized to have positive effects (H1 and H3), while leverage was hypothesized to have a negative effect (H2) on the Z"-Score value.

METHOD

This study employed a quantitative descriptive research design to examine the effects of liquidity, leverage, and profitability on financial distress risk. The analysis was conducted using panel data, which combined time-series data from the 2022–2024 observation period and cross-sectional data from companies' annual financial statements. The primary data sources were obtained from the official website of the Indonesia Stock Exchange (www.idx.co.id) and supplemented by information from the official websites of the respective companies.

The research population consisted of companies in the transportation, logistics, and infrastructure sectors listed on the Indonesia Stock Exchange during the 2022–2024 period. Based on the IDX Industrial Classification (IDX-IC), the population comprised 109 issuers. The sampling technique used was purposive sampling based on the following criteria: (1) companies that were continuously listed on the IDX during the 2022–2024 period, (2) companies that did not experience delisting or suspension, and (3) companies that did not conduct an initial public offering (IPO) after January 1, 2022. Based on these criteria, 63 companies were selected. After removing outliers using the boxplot method, the final dataset

consisted of 105 observations.

The dependent variable (Y), financial distress risk, was measured using the Modified Altman Z"-Score model. The independent variables consisted of liquidity (X1), measured by the Current Ratio (CR); leverage (X2), measured by the Debt-to-Equity Ratio (DER); and profitability (X3), measured by Return on Assets (ROA). The data were analyzed using multiple linear regression with the assistance of SPSS version 26. Before conducting regression analysis, classical assumption tests were performed, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests.

RESULTS AND DISCUSSION

The results of data analysis are presented sequentially, starting from descriptive statistics, classical assumption tests, and hypothesis testing.

Descriptive Statistics

Table 1. Descriptive Statistical Results

	N	Minimum	Maximum	Mean	Std. Deviation
X1_LIQ	105	,1389	3,2340	1,2260	,8184
X2_LEV	105	,2056	3,6590	1,3368	,9627
X3_PROF	105	-,0439	,1154	,0394	,0337
Y_FD	105	-2,0366	9,0007	2,7752	2,3130
Valid N (listwise)	105				

Source: Data processed with SPSS (2026)

The results of the descriptive statistical test showed that the liquidity variable (X1) had a minimum value of 0.1389, a maximum of 3.2340, an average of 1.2260, and a standard deviation of 0.8184. The *leverage variable* (X2) recorded a minimum value of 0.2056, a maximum of 3.6590, an average of 1.3368, and a standard deviation of 0.9627. The profitability variable (X3) shows a minimum value of -0.0439, a maximum of 0.1154, an average of 0.0394, and a standard deviation of 0.0337. The *financial distress* (Y) risk variable measured by the Altman Z"-Score had a minimum value of -2.0366, a maximum of 9.0007, an average of 2.7752, and a standard deviation of 2.3130.

Classic Assumption Test

The normality test using the Kolmogorov-Smirnov One-Sample resulted in an Asymp. Sig. (2-tailed) value of 0.200 which is greater than 0.05, so that the research data is distributed normally. The multicollinearity test showed that all independent variables had a tolerance value greater than 0.10 and a VIF less than 10, so that multicollinearity did not occur. The heteroscedasticity test with the Glejser method confirmed that the significance value of all independent variables was greater than 0.05, so that the regression model was free from heteroscedasticity problems. The autocorrelation test yielded a Durbin-Watson value of 1.913 which was in the range of dU (1.7411) to 4-dU (2.2589), so the regression model did not contain autocorrelation symptoms. With the fulfillment of all classical assumption tests, the data is worth analyzing using multiple linear regression.

Hypothesis Testing

1. Statistical Test F (Simultaneous Test)

The analysis of the F Test in this study is intended to test the feasibility of the regression

model as a whole, namely to see whether the formulated regression model is feasible to use in predicting dependent variables. This test is not to test simultaneous hypotheses, but rather to be a mandatory part of multiple linear regression analysis to ensure the model is feasible to use before interpreting the influence of each variable. The results of the F test based on SPSS output are as follows:

Table 2. Statistical Test Results F

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	521,524	3	173,841	503,789	0,001 ^b
Residual	34,852	101	0,345	–	–
Total	556,376	104	–	–	–

Explanation:

a. Dependent Variable: Y_FD

b. Predictors: (Constant), X3_PROF, X1_LIQ, X2_LEV

Source: Data processed with SPSS (2026)

The results of the calculation in Table 2. shows the influence of all independent variables simultaneously on the dependent variables, the F-calculated value is 503.789 with a significance value of 0.001. To compare, the researcher determined the F-table values with the formula $df1 = k = 3$ and $df2 = n - k - 1 = 105 - 3 - 1 = 101$ at a significance level of 0.05. The F-table value obtained was 2.69.

Because the F-calculation value (503.789) > F-table (2.69) and significance value (0.001) < 0.05, it can be concluded that liquidity, leverage, and profitability simultaneously have a significant effect on financial distress in companies in the transportation, logistics, and infrastructure sectors listed on the Indonesia Stock Exchange for the 2022-2024 period.

These results also answer the main purpose of the F Test in this study, which is to assess the feasibility of the regression model as a whole. The F-calculated value that far exceeds the F-table value with significance below the 0.05 threshold indicates that the formulated model is really feasible to predict the dependent variable, namely the risk of *financial distress*. Thus, the combination of the three independent variables used meets the feasibility requirements of the model, so that the interpretation of the influence of each variable on the next partial test (t-test) can be validly carried out and statistically accounted for.

2. Statistical Tests (Partial Tests)

Multiple linear regression analysis was used to test the influence of three independent variables on one dependent variable used in this study with the aim of finding out how much influence the independent variables *Liquidity* (X1), *Leverage* (X2), and *Profitability* (X3) exert on *financial distress* in transportation, logistics and infrastructure companies listed on the IDX for the 2022–2024 period. The regression results for the research model are presented in the table below.

Table 3. Statistical Test Results t (Coefficients)

Model	Variabel	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
1	(Constant)	0,625	0,230	–	2,715	0,008
	X1_LIQ	1,978	0,087	0,700	22,668	0,001
	X2_LEV	-0,640	0,081	-0,266	-7,916	0,001

Model	Variabel	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
	X3_PROF	14,686	1,904	0,214	7,712	0,001

Keterangan:

a. Dependent Variable: Y_Financial Distress

Source: Data processed with SPSS (2026)

Based on Table 3. Multiple linear regression equations can be arranged as follows:

$$Z = 0.625 + 1.978 LIQ - 0.640 LEV + 14.686 PROF + e$$

The above regression equation can be interpreted as follows. The constant value of 0.625 indicates that if all independent variables are zero, then the value of financial distress risk measured by the Altman Z"-Score is 0.625. Next, the researcher determined the value of the t-table as a comparison with the formula $df = n - k - 1$, where $n = 105$ and $k = 3$, so that $df = 105 - 3 - 1 = 101$ with a significance level of $0.05/2 = 0.025$ (double-sided test at $\alpha = 0.05$). The t-table value obtained is 1.9837.

To test the partial hypothesis, the researcher compared the t-calculated value with the t-table as well as the significance value with a significance level of 0.05. The results of the testing of each hypothesis are described as follows.

a. First Hypothesis Testing (H1)

The first hypothesis states that liquidity has a positive effect on financial distress as measured by the Altman Z"-Score. Based on Table 3, the liquidity variable (X1) obtained a t-calculated value of 22.668 with a significance value of 0.001. When compared with the t-table value of 1.9837 at a significance level of 0.05, the following results were obtained: the t-calculated value (22.668) is greater than the t-table (1.9837) and the significance value (0.001) is less than 0.05. In addition, a regression coefficient of +1.978 indicates a positive direction of influence, which means that every one unit increase in the Current Ratio will increase the Z"-Score value by 1.978 assuming other variables are constant. This condition puts the company in a position to move away from the distress zone to the safe zone.

Based on the results of the test, it can be concluded that H01 is rejected and Ha1 is accepted. Thus, liquidity has been proven to have a positive and significant effect on financial distress risk as measured by the Altman Z"-Score in companies in the transportation, logistics, and infrastructure sectors listed on the Indonesia Stock Exchange for the 2022-2024 period.

b. Second Hypothesis Testing (H2)

The second hypothesis states that leverage has a negative effect on financial distress as measured by the Altman Z"-Score. Based on Table 3, the leverage variable (X2) obtained a t-calculated value of -7.916 with a significance value of 0.001. When compared with the t-table value of 1.9837 at a significance level of 0.05, the following results are obtained: value $|t\text{-calculate}|$ (7.916) is greater than the T-table (1.9837) and the significance value (0.001) is smaller than 0.05. In addition, a regression coefficient of -0.640 indicates a negative direction of influence, which means that every increase in the Debt to Equity Ratio will decrease the value of the Z"-Score by 0.640 assuming other variables are constant. This condition puts the company in a position that is getting closer to the distress zone.

Based on the results of these tests, it can be concluded that H02 is rejected and Ha2 is accepted. Thus, leverage has been proven to have a negative and significant effect on financial distress risk as measured by the Altman Z"-Score in companies in the transportation, logistics,

and infrastructure sectors listed on the Indonesia Stock Exchange for the 2022-2024 period.

c. Testing the Third Hypothesis (H3)

The third hypothesis states that profitability has a positive effect on financial distress as measured by the Altman Z"-Score. Based on Table 3, the profitability variable (X3) obtained a t-calculated value of 7.712 with a significance value of 0.001. When compared with the t-table value of 1.9837 at a significance level of 0.05, the following results were obtained: the t-calculated value (7.712) was greater than the t-table (1.9837) and the significance value (0.001) was smaller than 0.05. In addition, a regression coefficient of +14.686 indicates a positive direction of influence, which means that every increase in one unit of Return on Assets will increase the Z"-Score value by 14.686 assuming other variables are constant. This large regression coefficient shows that among the three independent variables, profitability makes the strongest contribution in moving a company's Z"-Score away from the distress zone.

Based on the results of these tests, it can be concluded that H03 is rejected and Ha3 is accepted. Thus, profitability has been proven to have a positive and significant effect on the risk of financial distress as measured by the Altman Z"-Score in companies in the transportation, logistics, and infrastructure sectors listed on the Indonesia Stock Exchange for the 2022-2024 period.

3. Coefficient of Determination Test (R2)

The results of the determination coefficient test in this study are presented in the following Table 4:

Table 4. Coefficient Determination Test (*Model Summary*)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,968 ^a	0,937	0,935	0,5874249

Keterangan:

a. Predictors: (Constant), X3_PROF, X1_LIQ, X2_LEV

Source: Data processed with SPSS (2026)

Based on Table 4, several key statistical values were obtained from the results of data processing with SPSS. The Multiple R value of 0.968 illustrates the strength of the correlation between independent variables and dependent variables which are classified as very high. The R Square value of 0.937 indicates a simple determination coefficient, while the Adjusted R Square value of 0.935 is the main reference for interpretation because it has been adjusted to the number of independent variables. The Std. Error of the Estimate value of 0.5874 indicates the average level of deviation between the Z"-Score value predicted by the model and the actual value.

The Adjusted R Square value of 0.935 or 93.5% has a very important meaning for this study. This figure means that 93.5% of the variation that occurs in financial distress risk as measured by the Altman Z"-Score in transportation, logistics, and infrastructure sector companies listed on the Indonesia Stock Exchange for the 2022-2024 period can be explained simultaneously by three independent variables, namely liquidity proxied by the Current Ratio, leverage proxied by Debt to Equity Ratio, and profitability proximate with Return on Assets. The remaining 6.5% is a variation explained by other variables outside this research model.

The Adjusted R Square value of 93.5% is very high and illustrates that the regression model formulated in this study has excellent predictive capabilities. This condition is quite

reasonable considering that the three financial ratios used (liquidity, leverage, and profitability) are also components that form the variables X1, X2, X3, and X4 in the Altman Z"-Score formula itself. The high value of Adjusted R Square shows that the regression model built with the three financial ratios is able to comprehensively map the dynamics of financial distress risk of companies in the transportation, logistics, and infrastructure sectors. However, the remaining variation of 6.5% indicates that there is still room for further researchers to expand the model to include other variables that have the potential to affect financial distress risk, such as company size, good corporate governance, operating cash flow, and macroeconomic variables such as inflation and interest rates.

1. The Effect of Liquidity on Financial Distress

The results of the first hypothesis test prove that liquidity has a positive and significant effect on financial distress as measured by the Altman Z"-Score. This finding means that the higher the company's liquidity level, the higher the Z"-Score achieved, which means that the company is further away from the distress zone and the healthier its financial condition is. This result is in line with the signal theory that a high Current Ratio is a positive signal to the market about the company's ability to meet short-term obligations. In line with the pecking order theory, good liquidity describes that a company is able to meet its operational needs from internal funding sources without having to rely on debt.

These findings support the results of Shi and Li's (2021) research which proves that liquidity is positively related to financial stability in the European aviation industry. Alsulami (2025) also obtained similar results in airlines in South Asia. In the Indonesian context, these findings are in line with Ningsi et al. (2024) and Adityaningrum et al. (2024) who prove that liquidity has a significant effect on financial distress. In the transportation, logistics, and infrastructure sectors that are loaded with fleet investment and supporting facilities, the availability of adequate current assets is the key to daily operational continuity. Companies that are able to meet short-term obligations on time will avoid pressure from creditors and suppliers, so the risk of bankruptcy can be reduced.

However, the results of this study are not entirely in line with some previous studies. Stevando and Azzumar (2026) who researched transportation and logistics companies in the post-pandemic period actually found that liquidity had a negative but not significant effect on financial distress. Similar results were stated by Kristorio et al. (2025) on infrastructure, utilities, and transportation companies on the Indonesia Stock Exchange for the 2019-2023 period, which stated that liquidity has not been proven to affect financial distress even though company size has been involved as a moderation variable. This difference in results can be explained by a combination of factors such as the span of observation period, the composition of the sub-sectors analyzed, and different methods of measuring financial distress. In this study, the combination of the 2022-2024 period and the use of the Altman Z"-Modified Score as a proxy allows the liquidity contribution to be more obvious because the formula is indeed sensitive to the ratio of working capital to total assets. This variation in results suggests that the effect of liquidity on financial distress risk is contextual and still relevant to be retested in various research settings.

The relationship between average liquidity and average Altman Z"-Score for the transportation, logistics, and infrastructure sectors over the period 2022-2024 is presented in Figure 1.

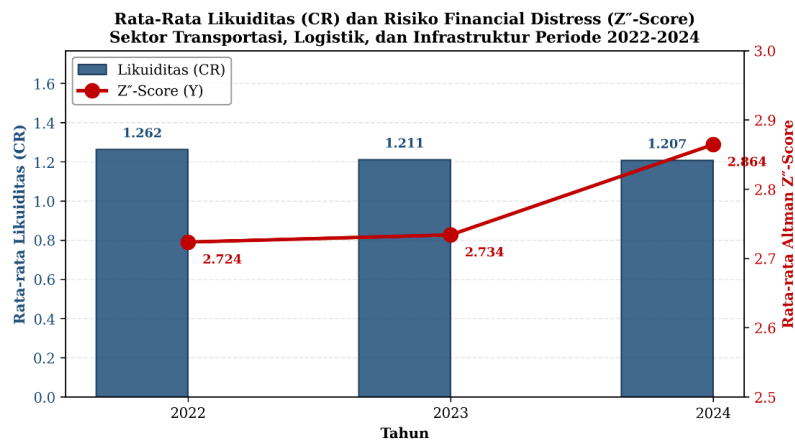


Figure 1. Average Liquidity and Risk of *Financial Distress* (Z''-Score) of the Transportation, Logistics, and Infrastructure Sectors for the 2022-2024 Period

2. The Effect of *Leverage* on *Financial Distress*

The results of the second hypothesis test prove that leverage has a negative and significant effect on financial distress as measured by the Altman Z''-Score. This finding means that the higher the level of leverage the company, the lower the Z''-Score achieved, which means that the company is getting closer to the distress zone and the more vulnerable its financial condition is. This result is in line with agency theory that management policies that lean towards excessive debt financing can trigger conflicts with shareholders. In line with the trade-off theory, debt that exceeds the optimal point will make the benefits of the tax shield no longer proportional to the cost of financial hardship that must be incurred.

These findings support the results of the Kalash (2023) study which proves that leverage has a significant effect on financial performance, with an effect that is stronger when the risk of financial distress increases. ElBannan (2021) also obtained similar results in 11 emerging market countries, namely high leverage increases the probability of bankruptcy. In the Indonesian context, these findings are in line with Kristorio et al. (2025) and Adityaningrum et al. (2024). In the transportation, logistics, and infrastructure sectors that require large investments, it is indeed difficult for companies to avoid the use of debt. However, when the portion of debt swells beyond the capacity of return, the interest expense will still erode operating cash flow, weaken the financial position, and push the company into a distress zone.

However, these results are not fully supported by all previous studies. Stevando and Azzumar (2026) found that leverage has a negative but insignificant effect on financial distress in transportation and logistics companies for the 2022-2024 period. Similarly, Ningsi et al. (2024) who researched transportation sub-sector companies on the Indonesia Stock Exchange stated that the Debt to Equity Ratio has no effect on financial distress. This difference in results should be interpreted as a reflection of the heterogeneity of leverage impact between sectors and between observation periods. In companies with relatively stable operating cash flows, a high level of leverage does not necessarily increase the risk of financial difficulties because the company is still able to cover interest obligations consistently. In contrast, in the transportation, logistics, and infrastructure sectors that are fraught with uncertainty about demand and fuel costs, leverage remains a major triggering factor that worsens financial conditions, as found in this study.

The relationship between the average leverage and the average Altman Z"-Score of the transportation, logistics, and infrastructure sectors over the period 2022-2024 is presented in Figure 2.

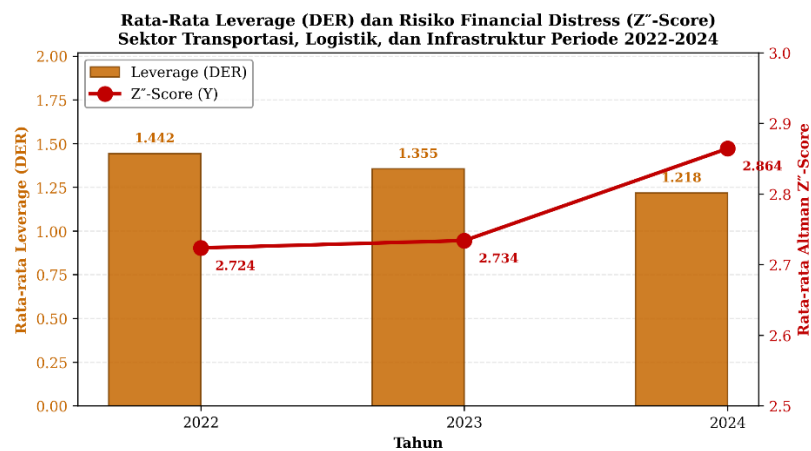


Figure 2. Average *Leverage* and Financial *Distress Risk* (Z"-Score) of the Transportation, Logistics, and Infrastructure Sectors for the 2022-2024 Period

3. The Effect of Profitability on *Financial Distress*

The results of the third hypothesis test prove that profitability has a positive and significant effect on *financial distress* as measured by the Altman Z"-Score. This finding means that the higher the company's profitability level, the higher the Z"-Score achieved, which means that the company is further away from *the distress zone* and the healthier its financial condition. This result is in line with *the pecking order* theory which states that high profitability indicates the availability of adequate retained earnings, so that the company's dependence on debt becomes less. In line with signal theory, consistent profitability is a positive signal that management sends to investors and creditors about the company's ability to generate profits sustainably, thereby strengthening market confidence in the company's financial stability.

These findings support the results of Habib's (2023) research which proves profitability is related to *financial distress* risk in 1,970 company observations in the United States. ElBannan (2021) also obtained consistent results in companies in 11 emerging market countries, namely low profitability is the main determinant of financial difficulties. In the Indonesian context, these findings are in line with Adityaningrum et al. (2024) and Kristorio et al. (2025). High profitability provides two benefits at once, namely strengthening the company's internal capital and being a positive signal that increases investor and creditor confidence. In the transportation, logistics, and infrastructure sectors, the ability to generate profits consistently is the main bulwark to deal with external shocks such as rising fuel prices and fluctuations in demand for transportation services.

Contrary to these findings, a number of other studies obtained different results. Ningsi et al. (2024) found that *Return on Assets* had no effect on *financial distress* in transportation sub-sector companies on the Indonesia Stock Exchange for the 2019-2022 period. Stevando and Azzumar (2026) who researched post-pandemic transportation and logistics companies also reported that profitability had a negative but not significant effect on *financial distress*. These

differences in results can be traced to the variety of proxies used to measure *financial distress*, differences in observation time spans, and different macroeconomic conditions in each study period. In this study, the recovery of sectoral profitability in 2024 after fuel price pressures and logistics costs during 2023 makes the impact of *Return on Assets* on the *Z''-Score* value very statistically felt. Consistent profitability has proven to play a role as the most dominant variable in moving the company's position away from the *distress zone* to the safe zone.

The relationship between average profitability and the average Altman *Z''-Score* of the transportation, logistics, and infrastructure sectors over the period 2022-2024 is presented in Figure 3. below.

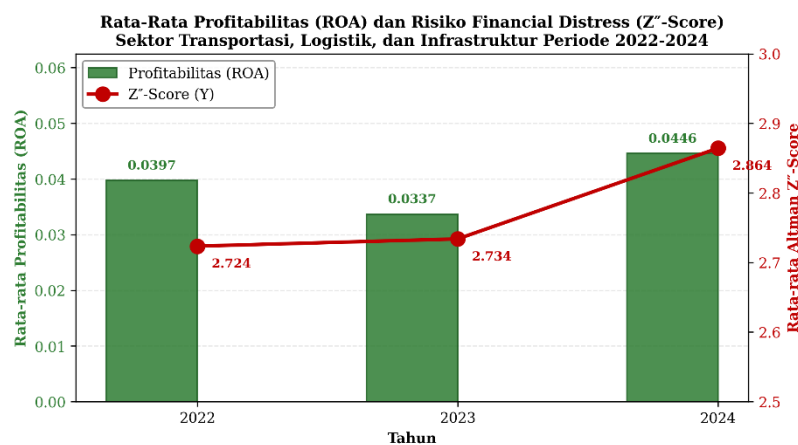


Figure 3. Average Profitability and Risk of *Financial Distress (Z''-Score)* of the Transportation, Logistics, and Infrastructure Sectors for the 2022-2024 Period

CONCLUSION

Liquidity had a positive and significant effect on financial distress risk. Adequate liquidity reflects a company's ability to meet short-term obligations and maintain operational continuity, allowing the company to reduce pressure from creditors and suppliers. Therefore, companies that maintain healthy liquidity levels tend to have financial positions that are further away from the distress zone.

Leverage had a negative and significant effect on financial distress risk. High levels of debt impose fixed interest obligations on companies, which may reduce operating cash flow and weaken financial conditions. Therefore, companies need to maintain an optimal capital structure, where debt restructuring, deleveraging strategies, and refinancing with lower interest costs can serve as effective measures to preserve financial stability.

Profitability had a positive and significant effect on financial distress risk. Consistent profitability strengthens internal financing capacity through retained earnings while providing positive signals to investors and creditors regarding the company's ability to generate sustainable profits. Among the three variables examined, profitability was the strongest factor contributing to the improvement of a company's financial condition from the distress zone toward the safe zone. Therefore, enhancing profitability through operational efficiency, revenue diversification, and service innovation should be prioritized to maintain long-term financial stability.

This study had several limitations that should be considered. First, the research sample

was limited to companies in the transportation, logistics, and infrastructure sectors; therefore, the findings may not be generalized to other industries. Second, the independent variables were limited to three financial ratios, namely liquidity, leverage, and profitability, while other factors may also influence financial distress risk. Third, the observation period covered only three years (2022–2024), which may not fully capture long-term financial dynamics.

Based on these limitations, future research is recommended to expand the sample by including companies from other industry sectors or multiple sectors to improve the generalizability of findings. Future studies may also incorporate additional variables, such as company size, good corporate governance, operating cash flow, and macroeconomic factors, including inflation and interest rates. Furthermore, extending the observation period and applying alternative analytical methods, such as logistic regression or panel data analysis, are suggested to provide a more comprehensive understanding of financial distress risk.

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