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The Impact of Firm Size Moderates the Influence of Capital Structure, Operating Capacity, Liquidity

Davy Parsaoran Hinsa*, Indriana Titerlie, Mark Fritz Imanuel
Universitas Bunda Mulia, Indonesia
Email: davypardede@gmail.com*, indrianatiterlie@gmail.com,
markfritz2809@gmail.com

Abstract

Financial distress has become a critical global concern affecting firms across industries, particularly in the post-pandemic economic recovery period characterized by supply chain disruptions, volatile exchange rates, inflationary pressures, and shifting consumer behaviors. In Indonesia, the transportation and logistics sector has experienced significant financial challenges during 2022–2024, with several listed companies reporting consecutive losses and deteriorating liquidity positions, raising urgent questions about the determinants of financial distress and the protective or amplifying role of firm-specific characteristics. This study aims to analyze the impact of firm size moderating the influence of capital structure, operating capacity, liquidity on financial distress in transportation and logistics sector companies listed on the Indonesia Stock Exchange for the period 2022–2024. This study uses a quantitative approach with a causal-effect research design, where the sample is determined through purposive sampling and data sources are obtained from annual financial reports and company sustainability reports. Data processing uses Stata with moderated regression analysis. The results indicate that capital structure and operating capacity have an insignificant effect on financial distress, while liquidity has a negative and significant effect on financial distress. Meanwhile, the indirect relationship shows that firm size has no moderating effect on the influence of operating capacity or capital structure on financial distress, while firm size has a moderating or strengthening effect on the influence of liquidity on financial distress.

Keywords: *Financial Distress, Capital Structure, Operating Capacity, Liquidity, Firm Size.*

INTRODUCTION

Financial distress represents a critical organizational condition characterized by the inability to meet financial obligations, declining profitability, negative cash flows, and increasing probability of bankruptcy (Sasi et al., 2023). Globally, financial distress has intensified across industries following the COVID-19 pandemic, driven by unprecedented economic shocks, supply chain fragmentation, demand volatility, and macroeconomic instability (Boubaker et al., 2020). The International Monetary Fund (IMF, 2023) reported that corporate distress rates in emerging markets increased by 38% between 2020-2023, with transportation and logistics sectors among the most affected due to their high operational leverage, sensitivity to fuel costs, and dependence on economic activity levels. The post-pandemic recovery period (2022-2024) has been marked by persistent challenges including geopolitical tensions, inflationary pressures, interest rate hikes, and currency fluctuations, creating a complex risk environment for corporations, particularly in capital-intensive and cyclically sensitive sectors (Freeman et al., 2020; Appadurai, 2020).

The transportation and logistics sector serves as critical economic infrastructure, facilitating trade, mobility, and supply chain connectivity (Cedillo-Campos et al., 2022; Netirith & Ji, 2022; Prakash, 2023; Terzi & Kula, 2024). However, this sector's structural characteristics—high fixed costs, capital intensity, regulatory constraints, and exposure to commodity price volatility—render it particularly vulnerable to financial distress during economic downturns (Anwar, 2022). Global evidence shows that transportation companies experienced disproportionate financial stress during 2020-2024, with airline, shipping, and land transport segments reporting heightened bankruptcy rates, liquidity crises, and debt restructuring needs (World Bank, 2023). Understanding the determinants and moderators of financial distress in this sector is therefore not only academically significant but also practically urgent for policymakers, investors, creditors, and managers (Alam et al., 2024; Elgayar, 2026; Purohit et al., 2025; Sewpersadh, 2022).

The transportation and logistics sector is the main locomotive and supports energy, food and other activities in other sectors, especially in ensuring the affordability and availability of goods to remote, outermost, disadvantaged and border areas or 3TP (Ministry of Transportation RI, 2021). The Indonesian government has great hopes that the transportation and logistics sector can be the main driver of economic growth and increase national competitiveness.

However, based on data obtained from the Indonesia Stock Exchange, the transportation and logistics sectors have shown a worrying financial condition in 5 years. This is reflected in several issuers that show negative profits from year to year. One of the issuers that showed negative profits for 5 consecutive years was PT AirAsia Indonesia, Tbk. (CMPP) with a loss in 2024 of IDR 1.53 trillion. One of the main factors that caused the loss was the weakening of the Rupiah exchange rate against the US Dollar compared to 2023 by 5%, from Rp 15,219 to Rp 15,906 per US Dollar. This

has a negative impact with a loss in exchange rate difference of IDR 580 billion, or around 38% of the total loss (AirAsia, 2025).

According to money market analyst Ibrahim Assuaibi, the weakening of the Rupiah against the US Dollar is dominated by external factors, including the US-China trade war (Krisnawati, 2024). This tension caused investors to avoid risky assets, which had an impact on the weakening of emerging market currencies such as the Rupiah. The next issuer that has had difficulties in making positive profits is PT Eka Sari Lorena Transport Tbk (LRNA). In 2024, the company posted a net loss of IDR 16.7 billion, a sharp increase compared to a loss of IDR 777 million in 2023. The weakening of the company's performance in 2024 was largely due to a decrease in operating income by 12.94%, from IDR 92.96 billion in 2023 to IDR 80.93 billion in 2024.

The decline in income was triggered by the weakening of people's purchasing power, especially in the lower middle segment, which had a direct impact on the decline in the number of passengers and the demand for transportation services. During the Christmas 2024 and New Year 2025 periods, there was a decrease in the number of passengers on several modes of transportation. For example, road transportation decreased by 30%, and crossing transportation decreased by 32% compared to the same period in the previous year (Ministry of Transportation, 2024). The inability to meet its short-term debts, such as liquidation and solvency requirements, is an early sign of financial difficulties that lead to bankruptcy. A company's financial statements and performance over a certain period of time can generally be used to identify financial distress.

Factors that affect financial distress can be categorized into internal and external factors. Internal factors come from the company itself such as capital structure, operating capacity, liquidity, profitability, leverage, operating cash flow, and company size, while external factors come from economic and environmental conditions beyond the company's control such as macroeconomic conditions, inflation, interest rates, exchange rate changes and others. This study only analyzes internal factors, such as operating capacity, liquidity, capital structure and firm size, on financial distress.

An internal factor that plays an important role in reducing the risk of financial distress is capital structure. Capital structure or capital structure is an internal factor of a company that directly affects the company's finances, where the capital structure is a mixture or collection of debt, preferred stocks, and own capital used to raise company funding (Brigham & Houston, 2022). According to Darmiasih et al. (2022), errors in the implementation of capital structure will have major consequences for companies where the use of debt and the company's inability to pay debts on time will increase the risk of financial distress. Therefore, it is important for a company to implement an effective capital structure to minimize the risk of financial distress. Companies that successfully manage their capital structures effectively can not only improve efficiency.

Research conducted by Erawati et al. (2024) and Ali et al. (2020) proves that capital structure affects financial distress, where the increase in debt owned by companies will also increase the risk of financial distress. Research conducted by

Yemen & Korkmaz (2022) also proves that capital structure affects financial distress, where it is important for management to consider capital structure decisions carefully because aggressive financial policies can increase the risk of financial distress. The results of the research of Indriana T, and Michael C. (2025) state that capital structure has a substantial negative effect on financial distress. This is different from research conducted by Afridayani (2023) and Nuranti et al. (2022) which shows that capital structure has no effect on financial distress, where the presence of high debt in the company does not necessarily result in financial distress because the situation can be overcome if the company has substantial income.

Operating Capacity is a measure of efficiency used to assess how effectively a company uses resources or assets to generate sales, so that it will create a company's operational services. Operating capacity is known as the total asset turnover ratio, which is the ratio of sales to total assets. A relatively large increase in sales compared to an increase in assets will make the ratio higher, on the other hand, the ratio will be lower if the increase in sales is relatively smaller than the increase in assets (Park & Yi, 2022; Dunk, 2003). Operating capacity according to Widhiari and Merkusiwati (2015) explains that operating capacity is a ratio that reflects the authenticity of a company's operational capabilities. If the company manages and uses its assets efficiently, then the company can make sales and make a large profit so that the company is able to avoid financial difficulties. In previous research from Miswaty and Dila Novitasari (2023), it was shown that operating capacity had a positive and significant effect on the prediction of financial distress, while the results of Alifiah et al.'s (2013) research showed that operating capacity had a negative and most significant effect on the prediction of financial distress. This is in line with research conducted by Christon Simanjutak (2017:06) which shows that operating capacity has a significant negative influence on financial distress. Meanwhile, research conducted by Dirman (2021) or Koswara, et.all (2022) states that operating capacity has no effect on Financial Distress.

Liquidity is commonly called the working capital ratio (Kasmir, 2012). A liquid company is going to settle current debt disciplinedly, but it is said to be illiquid if it cannot pay off current debt at maturity (Purnama, 2019). Septiani & Dana (2019) indicate that liquidity represented by the current ratio has a positive impact on financial difficulties. Meanwhile, Rohmadini et al., (2018), Tjahjono (2016), Nurcahyo (2014), Muazaroh (2017), and Rahmawati & Khoiruddin (2017) indicated that liquidity had no impact on financial difficulties.

In addition to operating capacity, liquidity and capital structure, firm size is also one of the important factors that affect the financial condition of a business entity, including the risk of experiencing financial distress. The larger the size of a company, the greater its need for funds, which can be partially met through external funding such as debt. Large-scale companies generally have broader activities and are better known to the public than small companies. In addition, large companies tend to be more transparent in conveying performance information to external parties, so they are more trusted by creditors (Setiawan, 2022). This condition makes it easier for large

companies to get loans and tends to have a lower risk of financial distress. In contrast, small-scale companies often face limitations in obtaining external funding due to reputations and lower levels of transparency. Small companies also tend to have limited resources and narrower activities, so the risk of financial distress is greater. Research conducted by Dirman (2020) and Wangsih et al. (2021) shows that company size affects financial distress, where the larger the total assets owned, the higher the company's ability to fulfill its financial obligations in the future, so that it can reduce the risk of financial distress.

Despite the substantial body of literature on financial distress determinants, several critical research gaps persist. First, most existing studies examine direct effects of financial variables on distress without adequately considering moderating mechanisms, particularly firm size, which may fundamentally alter these relationships. Second, empirical evidence is fragmented and context-dependent, with limited consensus on whether and how capital structure, operating capacity, and liquidity affect distress in specific industries such as transportation. Third, the unique macroeconomic conditions of 2022-2024 in Indonesia—characterized by post-pandemic recovery, geopolitical shocks, currency volatility, and sector-specific challenges—create a distinct empirical context that has not been adequately studied. Fourth, prior research on the Indonesian transportation sector is limited, with most studies focusing on manufacturing or mixed-industry samples, potentially obscuring sector-specific dynamics.

The research urgency stems from both theoretical and practical imperatives. Theoretically, understanding the conditional nature of financial distress determinants—specifically how firm size moderates the effects of capital structure, operating capacity, and liquidity—can reconcile inconsistent findings in prior literature and advance contingency-based theories of financial distress. Practically, given the strategic importance of Indonesia's transportation sector, the significant financial losses reported by major issuers (CMPP, LRNA), and the ongoing macroeconomic volatility, there is an urgent need to identify actionable financial management strategies that can help firms mitigate distress risk. Without such knowledge, firms may misallocate resources, regulators may lack evidence for policy interventions, and investors may misjudge risk exposures, potentially leading to sector-wide financial instability, employment losses, and disruptions to national logistics infrastructure.

The novelty of this research lies in several dimensions. First, it provides the first comprehensive empirical examination of financial distress determinants in Indonesia's transportation and logistics sector during the critical 2022-2024 period, offering timely insights into a strategically important yet understudied sector during an unprecedented macroeconomic environment. Second, it explicitly tests the moderating role of firm size on three key financial variables (capital structure, operating capacity, liquidity), employing Moderated Regression Analysis (MRA) to quantify interaction effects—an analytical approach rarely applied in Indonesian transportation finance research. Third, it integrates multiple theoretical perspectives (trade-off theory, efficiency theory, liquidity preference theory, and contingency theory) to develop a comprehensive

analytical framework. Fourth, it utilizes panel data econometric techniques with rigorous model specification tests (Chow and Hausman tests) to control for unobserved firm-specific heterogeneity, enhancing internal validity beyond cross-sectional studies. Fifth, by using Altman Z-Score as a continuous measure of financial distress rather than binary bankruptcy indicators, the study captures gradual deterioration in financial health, providing more nuanced insights for early warning and intervention.

The specific research objectives are: (1) To analyze the direct effect of Capital Structure on Financial Distress in Indonesian transportation and logistics companies during 2022-2024; (2) To analyze the direct effect of Operating Capacity on Financial Distress in the same sector and period; (3) To analyze the direct effect of Liquidity on Financial Distress; (4) To test the moderating effect of Firm Size on the relationship between Capital Structure and Financial Distress; (5) To test the moderating effect of Firm Size on the relationship between Operating Capacity and Financial Distress; (6) To test the moderating effect of Firm Size on the relationship between Liquidity and Financial Distress.

The expected contributions of this research include: (1) Theoretical contribution: Advancing financial distress theory by elucidating the conditional (size-dependent) nature of financial determinants, thereby contributing to contingency-based frameworks in corporate finance; (2) Empirical contribution: Providing robust, sector-specific evidence on financial distress dynamics in Indonesia's transportation sector using advanced panel data methods, filling a significant gap in emerging market finance literature; (3) Practical contribution: Offering actionable insights for corporate managers to design size-appropriate financial strategies for distress mitigation, for investors and creditors to assess risk more accurately, and for policymakers to develop targeted support mechanisms for financially vulnerable transportation firms; (4) Methodological contribution: Demonstrating the application of Moderated Regression Analysis in panel data contexts for testing interaction effects, which can serve as a methodological template for future research in Indonesian financial management.

RESEARCH METHOD

This study employed a causality research design to examine cause-and-effect relationships between variables (Pardede et al., 2023). It aimed to obtain evidence of causal relationships between the independent variables—capital structure (X1), operating capacity (X2), and liquidity (X3)—and the dependent variable, financial distress (Y), moderated by firm size (Z1).

Secondary data consisted of financial statements and sustainability reports from transportation and logistics companies listed on the Indonesia Stock Exchange for the 2022–2024 period. These were obtained from the Indonesia Stock Exchange website, company websites, journals, books, articles, and other relevant sources.

Sampling was conducted using non-probability purposive sampling (Pardede et al., 2023). The sample selection criteria were:

1. Transportation and logistics sector companies listed on the Indonesia Stock Exchange for the 2022–2024 period.
2. Companies not delisted from the Indonesia Stock Exchange during 2022–2024.
3. Companies presenting annual financial statements in rupiah.
4. Companies providing complete data required for the analysis.

RESULTS AND DISCUSSION

Model Selection.

Chow Test

Table 1. Chow Test Output

Number of obs					**159**
Number of groups					53
Obs per group (min/avg/max)					3 / 3.0 / 3
R-squared					
Within					0.5903
Between					0.2553
Overall					0.2895
F Test					
F(7, 99)					20.38
Prob > F					0.0000
corr(u_i, Xb)					0.1339
Variable	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**95% Conf. Interval**
x1	19.91622	195.1538	0.10	0.919	-367.3112 to 407.1436
x2	1230.872	1350.058	0.91	0.364	-1447.937 to 3909.68
x3	-319.8003	49.55791	-6.45	0.000	-418.1339 to -221.4666
z	-12.56231	24.50453	-0.51	0.609	-61.18462 to 36.06
c.x1#c.z	-0.8338978	7.57058	-0.11	0.913	-15.85557 to 14.18778
c.x2#c.z	-44.74705	55.70901	-0.80	0.424	-155.2858 to 65.79171
c.x3#c.z	18.36616	2.602538	7.06	0.000	13.20215 to 23.53016

In the Chow test using Stata, the result of the probability value (P-value) for the cross section random < 0.05 (significant value), then H0 is rejected, so the appropriate model used is the Fixed Effect Model (FEM).

Hausman Test

The Hausman test is a test used to select the best approach between the Random Effect Model (REM) approach model and the Fixed Effect Model (FEM) approach in estimating panel data.

Table 2. Hausman Test Output

Number of obs	**159**
Number of groups	53
Obs per group (min/avg/max)	3 / 3.0 / 3
R-squared	
Within	0.5819
Between	0.3181

Overall					0.3352
Wald Test					
Wald chi2(7)					143.81
Prob > chi2					0.0000
corr(u_i, X)					0 (assumed)
Variable	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**95% Conf. Interval**
x1	-36.21744	192.8332	-0.19	0.851	-414.1636 to 341.7287
x2	-1908.4081	1074.718	1.78	0.076	-198.3276 to 4014.49
x3	-360.8191	47.44733	-7.60	0.000	-453.8142 to -267.8241
z	-11.74591	22.73622	-0.52	0.605	-56.30807 to 32.81625
c.x1#c.z	1.448265	7.487343	0.19	0.847	-13.22666 to 16.12319
c.x2#c.z	-69.58645	43.73745	-1.59	0.112	-155.3103 to 16.13737

In the Hausman test shown in Table 2. using Stata, the result of the probability value (P-value) for a random cross section < 0.05 (significant value) is obtained, then H0 is rejected, so the right model used is the Fixed Effect Model (FEM). Based on the results of the Chow test and the Hausman test, in this study the model that is appropriately used is the Fixed effect model.

Direct Influence of Independent Variables on Dependents

1. Hypothesis 1. Capital Structure has a significant effect on financial distress.

   Based on the results of testing with stata using fixed model effect, the result was obtained with a probability value (p) >0.05, showing that Capital Structure does not have a significant effect on financial distress. This is in line with the results of research by Afridayani (2023) and Nuranti et al. (2022) which show that capital structure has no effect on financial distress, where the presence of high debt in the company does not necessarily result in financial distress because this situation can be overcome if the company has substantial income. This result is different from the results of research conducted by Erawati et al. (2024) and Ali et al. (2020) proving that capital structure affects financial distress, where the increase in debt owned by companies will also increase the risk of financial distress.

2. Hypothesis 2. Operating Capacity has a significant effect on Financial Distress.

   Based on the results of the test with Stata using a fixed model effect, the result was obtained with a probability value (p) >0.05, this result shows that Operating Capacity does not have a significant effect on financial distress. These results are in line with research conducted by Dirman (2021) or Koswara, et.all (2022) stating that operating capacity has no effect on Financial Distress. Although the company is able to rotate its assets quickly to generate high sales (high operating capacity), this does not guarantee a higher net profit if the operating costs and interest expense are also high. This result is different from the results of the research of Miswaty and Dila Novitasari (2023) showing that operating capacity has a positive and significant effect on the prediction of financial distress, and the results of Alifiah et al's (2013) research show that operating capacity has a negative and most significant effect on the prediction of financial distress.

3. Hypothesis 3: Liquidity has a significant effect on financial distress.

Based on the results of testing with stata using the fixed effect model, the result of the probability value (p) <0.05, this result shows that Liquidity has a negative and significant influence on financial distress, meaning that the higher the liquidity, the lower the risk of the company experiencing financial distress. The company is considered to still have the breath (cash or current assets to pay debts that are due soon. This is in line with the results of Septiani & Dana (2019) research stating that liquidity has a significant effect on financial difficulties, while studies that are not in line are, Rohmadini et al., (2018), and Rahmawati & Khoiruddin (2017) indicate that liquidity does not have an impact on financial difficulties.

Indirect Influence of Moderating Variables

1. Hypothesis 4. Firm Size moderates significantly the Influence of Capital Structure on Financial Distress.

Based on the results of testing with stata using the fixed effect model, the result was a probability value (p) >0.05, this result shows that Firm Size does not have a significant effect to moderate the influence of Capital Structure on financial distress, meaning that the size of the company is not able to strengthen or weaken the relationship between the level of debt (capital structure) with the risk of financial distress or how large the company is does not change the way the capital structure affects its probability of experiencing financial difficulties, and it could be because other factors such as profitability or cash flow are more dominant

2. Hypothesis 5. Firm Size moderates significantly the Effect of Operating Capacity on Financial Distress.

Based on the results of testing with stata using the fixed effect model, the result was obtained with a probability value (p) >0.05, showing that Firm Size does not have a significant effect on moderating the effect of operating capacity on financial distress, meaning that the size of the company (Firm Size) does not change the strength or direction of the relationship between Operating Capacity (Operating Capacity) and Financial distress, which suggests that both large and small transportation companies will be similarly affected by the efficiency of using their assets against the risk of bankruptcy, or studies have found no significant interaction, so the effect of operating capacity remains the same regardless of the size of the transportation company

3. Hypothesis 6. Firm Size moderates significantly the Effect of Liquidity on Financial Distress.

Based on the results of testing with stata using the fixed effect model, the result was obtained with a probability value (p) <0.05, this result shows that Firm Size has a significant effect or is able to strengthen the influence of liquidity on financial distress, meaning that company size (Firm Size) plays an important role in moderating or strengthening the relationship between liquidity and financial distress. The influence of Firm Size shows that the level of risk posed by such low liquidity is not the same for all transportation companies.

Coefficient of Determination

Interpretation of Coefficient of Determination (R^2)

In the Fixed Effect (or Random Effect) model using Stata, the Within R-squared value (0.5903) was obtained: This means that independent and moderate variables were able to explain the fluctuation in Financial Distress (Y) internally in transportation sector companies by 59.03% over time, while the other 40.97% were influenced by other variables that were not included in the model. This is a pretty strong value for panel data.

CONCLUSION

This study in transportation companies listed on the Indonesia Stock Exchange (2022–2024) found that capital structure and operating capacity had no significant effects on financial distress, indicating that debt proportions and asset utilization efficiency were not primary drivers of crisis risk in this sector. In contrast, liquidity exerted a significant negative effect, such that higher short-term debt-paying ability reduced financial distress. Firm size did not moderate the impacts of capital structure or operating capacity on financial distress but positively strengthened the liquidity-financial distress relationship, meaning larger firms leveraged liquidity more effectively to mitigate risks. For future research, scholars could extend this analysis to other Indonesian sectors (e.g., manufacturing) or incorporate additional moderators like governance quality during prolonged economic volatility to enhance generalizability.

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