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(Research) Article

Leverage, Profitability, and Firm Size as Predictors of Financial Distress in Indonesian Textile Firms

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Abstract: This study aims to determine the relationship between leverage, profitability, and company size on the possibility of financial distress of companies in the textile and garment industry listed on the Indonesia Stock Exchange (IDX) for the period 2022-2024. Several companies were selected using purposive sampling, based on categories determined by the author, such as the availability of data on each company and other relevant factors. The calculations used to analyze the financial difficulties of companies include the Altman Z-score and Zmijewski models, which will then serve as proxies for the dependent variable of financial distress. The results show that the relationship between the independent variables and the dependent variable differs between the models applied. The Altman Z-score model showed results that were more consistent with theoretical expectations, indicating a more robust measure of financial distress in this context. These findings highlight the importance of choosing appropriate models for analyzing financial distress in the textile and garment sector.

Keywords: Altman Z-score; Financial Distress; Firm size; Leverage; Profitability.

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1. Introduction

The manufacturing sector in Indonesia has generally been one of the pillars of the national economy. Manufacturing is a sector that focuses on processing raw materials into finished or semi-finished goods. Of the various industries in the manufacturing sector, the textile and garment industry is one that contributes to economic growth. In recent years, this industry has experienced a decline. This can be seen from the following trade balance data, which shows fluctuations in export and import performance from 2019 to 2024.

Figure 1. Trade Balance of Textile and Garment Industry
Source: BPS

The first decline occurred in 2020, which was very significant, reaching USD 2.27 billion in export performance or around 17.7% from 2019. The import rate this year also showed a decline, which, however, when compared to the decline in exports, was not too sharp, causing the balance of trade surplus to decline slightly to USD 3.25 billion. This condition is indicated to be the impact of the COVID-19 pandemic, which has hampered production activities and weakened international trade.

The fluctuations continued to improve in the following years, namely in 2021 to 2022. It was recorded that in 2021 there was a fairly drastic increase from the previous year. This increase was marked by export figures reaching 13.05 billion USD, and continuing to rise until it peaked in 2022 with an export level of 13.77 billion USD. Even so, the import level in these two years also increased in line with exports. The peak was in 2022, when the import level reached 10.13 billion USD. This caused the trade balance surplus to increase, albeit minimally.

However, this condition did not last long. In 2023 to 2024, there was another decline. The decline in export levels became a problem in 2023, where export levels fell to USD 11.63 billion, or a decrease of 15.5% from the previous year. This was not offset by a significant decline in import levels. Imports in 2023 only fell by USD 1.79 billion, causing the trade surplus to also decline from the previous year.

Meanwhile, in 2024, even though export performance appears to have improved, imports have also increased, causing the difference between exports and imports, or the trade surplus, to fall to USD 3.02 billion, lower than in 2023. Possible factors causing fluctuations in 2023 and 2024 include high competition in the global arena, as well as the result of relaxed import policies. The Ministry of Trade Regulation No. 8 of 2024 on imports has resulted in an influx of foreign products, both legal and illegal. These factors, combined with fluctuations in trade, have led to several companies in the industry being forced to close their factories and lay off hundreds of thousands of employees.

Looking at the current situation in the textile and garment industry, it becomes apparent that several companies are experiencing a decline in their financial performance. This trend is concerning because it could push these companies into financial distress, a state in which their financial health is compromised. According to Fauzi et al. (2021), financial distress occurs when a company struggles to meet its financial obligations or faces difficulty in sustaining its operations, such as being unable to pay debts or fund day-to-day activities. Clearly, financial distress is more than just a number on a balance sheet—it reflects real challenges that can affect the survival of a business.

The factors contributing to this condition are not limited to operational inefficiencies alone. Leverage, profitability, and company size all play roles, and understanding their effects can help explain why some firms are more vulnerable than others. Leverage, for example, has been shown in some studies, such as Arifin et al. (2021), to increase the likelihood of financial distress. In this context, taking on more debt raises the company’s risk, especially if earnings are insufficient to cover obligations. Yet, not all studies agree. Some research argues that leverage has a significant influence on financial distress (Appah et al., 2024), while other studies, like Dirman (2020), suggest that leverage might not have a meaningful impact at all. These contradictions reveal that the relationship between debt and financial health is complex, often depending on the industry, the firm’s management practices, and even broader economic conditions.

This disparity is also supported by research looking at how profitability affect financial distress. Prior research indicates that profitability negative-significantly impact financial suffering (Jessie & Tannia, 2024). Suyono et al. (2024) discovered, however, that profitability might considerably risen financial distress. This runs counter to the widely held belief that a company's financial susceptibility decreases in tandem with its profits. According to other research, there is either no correlation or a negligible one between financial distress and profitability (Munawaroh et al., 2024).

Different findings have also been drawn from research on firm size. According to Wangsih et al. (2021), a company's size negative and significantly affects its financial distress, meaning that as its overall assets rise, its financial pressure falls. However, there was no discernible link between financial troubles and company size, according to Rahayu et al. (2025). Nonetheless, the same study by Bahri et al. (2022) discovered that a company's size considerably increases financial distress, which means the relationship between firm size and financial distress is positive and significant.

This study aims to explore the actual impact of leverage, profitability, and firm size on the financial challenges faced by companies in the textile and apparel sector listed on the Indonesia Stock Exchange (IDX) between 2019 and 2024. The motivation for this research comes from the fact that previous studies have produced inconsistent results, making it unclear how these factors truly influence financial distress. To address this uncertainty, the study uses two different approaches to measure financial risk: the Altman Z-score and the Zmijewski model. By employing both methods, the research can capture a more complete picture of financial vulnerability, considering that each model emphasizes different aspects of a company's financial condition and may provide slightly different insights into the factors that contribute to distress. This dual approach allows for a richer understanding of how leverage, profitability, and firm size interact with financial health in the real-world context of Indonesian textile and garment firms.

2. Literature Review

Signaling Theory

Developed by Michael Spence in 1973, it is a theory that explains how various parties in the market can convey information efficiently. According to him, this can mean that an individual or a firm uses a signal that can make information conveyed about the quality or characteristics of the other party. This can help overcome the problem of asymmetric information (Bendouzane et al., 2024). Referring to Safitri (2024), this signaling theory is an action from management carried out by the company as a guide regarding how the company's prospects for investors. In the context of this study and referring to Dumitrescu et al. (2025), the calculation of significant financial distress if done, in this context he utilizes Z-Score, shows that quantitative financial indicators are able to serve as a clear signal in predicting the potential crisis of the company. Thus it can be concluded, transparency over financial calculations, one of which is related to financial distress carried out in a company can be a signal, which can contain important information.

Financial Statement

According to Ravshanovna (2024), in this complicated business world, it is necessary to have a financial statement that can bridge between the company and its stakeholders. This makes it a substitute for verbal communication regarding the state or financial health of a company. Or in other words, financial statements are needed especially by stakeholders to obtain the information needed to navigate the complexities of the business landscape. And if we break it down, this financial statement consists of various instruments, such as statement of financial position, income statement, cash flow statement, and statement of changes in equity. Bahodirovich (2025) also said that companies need to prepare financial statements annually for the benefit of their shareholders. In addition, this financial statement has uses on other occasions, for example if a company wants to request for bank loans, the company needs to be accompanied by their recent financial statements.

Financial Ratio

From the various instruments in the financial statement as described above, it can then be analyzed to determine how the health of a company is, one way is to calculate using financial ratios. According to Brigham & Houston (2019), these ratios can help to evaluate a financial statement. This evaluation can be done by calculating with various ratios that have different interpretations from different aspects.

Further related to the financial ratio, the financial ratio has a function as a tool to criticize and dissect the financial health of a company. So that the financial ratio is expected to provide insight into the performance and feasibility of the company and then facilitate investment decision making for investors. These ratios have several categories, and those commonly used in calculations include liquidity, profitability, leverage, and activity (MortezaZadeh et al., 2025).

Leverage Ratio

Leverage ratio is one of the ratios that measures how much debt or obligation must be paid to fund a company (Oktavian & Handoyo, 2023). Generally, if these obligations are recorded as difficult to pay off, the company is considered not to have good management. In line with Maiyo et al. (2025), companies need the right balance in their capital structure in order to minimize the risk of financial difficulties as well as manifest financial health in the long run. One of the calculations for this ratio is the DAR which will be utilized in examining the effect of leverage on financial distress, or Debt to Assets Ratio, where total debt is divided by total equity.

Profitability Ratio

According to Brigham and Houston (2019), looking at a company's financial ratios can give a detailed glimpse into how the company is run and what kinds of policies it follows. But just analyzing these ratios individually only tells part of the story. To see the full picture of how a company's decisions and operations translate into results, it is important to consider profitability ratios, because they reflect the combined effects of liquidity, asset management, and leverage on overall performance. In this study, profitability is measured using Return on Assets (ROA), which is calculated by dividing net income by total assets. By examining ROA, the research seeks to understand not just whether a company is profitable, but also how its profitability affects the risk of financial distress. In other words, ROA acts as a lens through which the consequences of financial decisions and operational strategies can be observed, showing how well a company can withstand challenges and maintain financial stability.

Firm Size

Although company size by itself does not directly determine the value of a business, larger companies often tend to have higher overall value compared to smaller ones. The concept of company size is essentially a reflection of the scale at which a firm operates, and it can be measured in various ways, such as total assets, the number of employees, sales volume, or market capitalization (Nangih et al., 2025). In this study, firm size (SIZE) is represented by the natural logarithm of total assets, which provides a standardized way to compare companies of different scales. By including SIZE as one of the variables, the research aims to explore how the scale of a company might influence its vulnerability to financial distress, considering that larger firms may have more resources, diversification, and capacity to manage risks, while smaller firms may be more sensitive to economic fluctuations and operational challenges.

Financial Distress

Referring to Rachmawati & Suprihhadi (2021), financial distress is a situation where the company is considered difficult or unable to fulfill its current obligations. This phenomenon that occurs is then interpreted that a company is actually experiencing a downward trend in financial performance. And if this condition that occurs is not quickly handled, it can lead the company to bankruptcy.

Saha & Ahmed (2024) also complement if a company experiences financial and economic distress, it can lead to company bankruptcy. This condition can be seen from how a company requires more costs than its income, and this can be called economic distress. Meanwhile, if the company is considered unable to pay off its debt obligations, it can be categorized as financial distress. In the general case, both conditions will make a company experience negative operating profit which can make them then terminate employment or temporarily close operations in the case of this financial difficulty.

Altman Z-score Model

According to Bunker et al. (2024), in 1968, Altman proposed a model which was later named the Altman Z-score Model which serves to distinguish between bankrupt firms and non-bankrupt firms. This model contains five ratios/factors that can predict how the company's financial condition will be in the future. The ratios include:

X1 = Working capital divided by Total assets
X2 = Retained Earnings divided by Total assets
X3 = Earnings before interest and taxes divided byTotal assets
X4 = Market value of equity divided by Book value of total liabilities
X5 = Sales divided by Total assets

Which then presents an equation to predict bankruptcy according to Altman, namely:

$$Z=1.2X1+1.4X2+3.3X3+0.6X4+1.0X5$$

If the calculation using the equation above results in < 1.81, it is considered that the company will experience bankruptcy in the next few years. If the Z-score result is between 1.81-2.67, then the company is considered to be in distress, but not so severe that bankruptcy is predicted. And if the Z-score is > 2.67, then the company is considered not to be in financial distress and most likely will not experience bankruptcy at all.

Zmijewski Model

Bunker et al. (2024) also stated that Ron Zmijewski also developed a model that has the same use, namely to predict financial distress in 1983. This model is then referred to as the Zmijewski Model. In this model, it does not utilize as many ratios/factors as the models discussed earlier. The Zmijewski Model only uses three ratios in its calculations, including:

X1 = Earnings after tax divided by Total assets

X2 = Total debts divided by Total assets

X3 = Current assets divided by Current Liabilities

And here is the calculation formula by utilizing these three ratios:

$X = -4.3 - 4.5X1 + 5.7X2 - 0.0004X3$

This Zmijewski model is predicted to be able to forecast a company's bankruptcy within two years (Azam et al., 2023). There are only two categories of calculation results from this model, namely if the results show the number> 0 or equal to 0 then the company can be declared to have potential bankruptcy. Meanwhile, if the calculation result shows a number <0, the company is declared not to have the potential for bankruptcy (Muzanni & Yuliana, 2021).

Hypothesis Development

Leverage on Financial Distress

The amount of debt a company takes on to finance its operations is determined by its leverage ratio. The obligations that must be paid are then referred to as debt. Companies that are heavily dependent on debt financing can face long-term problems, which can lead to financial difficulties. This study, based on a study by Umam & Yusuf (2024), concludes that leverage significantly increases financial pressure. Since companies need higher returns to pay off debt, leverage, which to describe debt, means that more debt carries greater risk, including higher interest rates and other factors that affect the probability of default, thereby increasing the likelihood of financial difficulties due to various risks. Padang et al. (2025) and Adiputra et al. (2025) reached similar conclusions, observing a positive relationship between the two variables: higher spending is associated with a greater risk of financial difficulties. Therefore, based on several previous studies, the following hypothesis can be proposed:

H1: Leverage has a positive significant effect on Financial Distress

Profitability on Financial Distress

Arief et al. (2024) in their research found a positive profitability measure indicates a good chance for a company to achieve profit in the future. Therefore, the possibility of financial difficulties or distress is low. This is in line with Das (2022), who found that if a company fails to increase profitability, the crisis situation will worsen. To avoid financial difficulties, companies must effectively convert expenses into profits (Amoa-Gyarteng, 2021). Therefore, profitability can be said to have a negative impact on financial distress. Furthermore, based on previous research on profitability, the following hypothesis can be proposed:

H2: Profitability has a negative significant effect on Financial Distress

Firm Size on Financial Distress

Le et al. (2024) found that because large companies are more transparent than small companies and are considered to have external financial support, they are generally better able to cope with financial crises. Therefore, large companies with higher assets are better able to meet their future debt obligations. Therefore, it can be said that firm size can reduce the risk of financial distress.

Shinta & Riharjo (2025) expressed a similar opinion in their research. They argued that large companies have excellent cash management practices, thereby reducing the possibility of financial difficulties. In fact, large companies are assumed to send strong signals to attract investors and reduce the possibility of bankruptcy (Febiyana & Alliyah, 2025). And based on several previous studies, the following hypothesis can be proposed:

H3: Firm Size has a negative significant effect on Financial Distress

Therefore, this study proposes the following hypothesis:

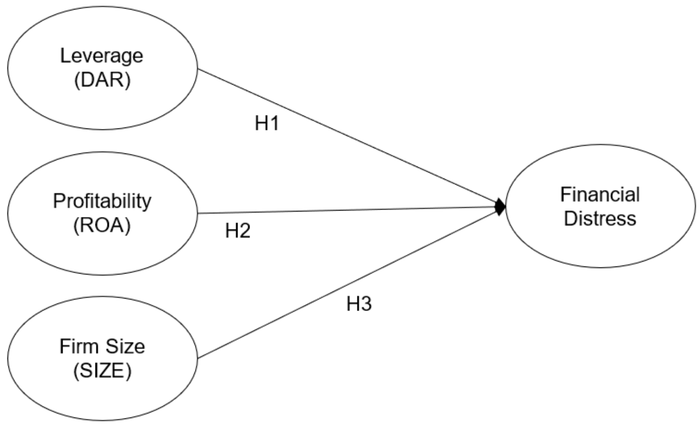

Figure 2. Conceptual Framework
Source: Primary Data, 2025

3. Research Method

To determine whether the leverage (DER), profitability (ROA), and company size (SIZE) affect the severity of financial difficulties, this study uses a quantitative approach combined with factor analysis techniques. The data used is secondary data, meaning that it is collected and disseminated from other sources, including financial reports available on the IDX official website. With the final sample consists of 10 textile and apparel companies from 2019 to 2024 the research population at first consists of 228 manufacturing companies listed on the IDX. Hereby the sampling procedure, using purposive sampling, is described in detail:

Table 1. Sample Determination Criteria.

	Criteria	Total
1.	Companies listed in the manufacturing sector on the IDX during the 2019-2024 period	228
2.	Companies listed in the textile and garment industry on the IDX during the 2019-2024 period	(205)
3.	Companies listed in the textile and garment industry on the IDX before January 1, 2019, and regularly publish annual financial reports during the 2019-2024 period.	(5)
4.	Companies listed in the textile and garment industry on the IDX that have positive profitability for more than 1 year during the 2019-2024 period	(6)
4.	Companies listed in the textile and garment industry on the IDX whose shares have not been suspended for >6 months or delisted during the 2019-2024 period	(2)
	Number of Companies	10
	Research Period	6
	Total Observations	60

Source: Primary Data, 2025

This research was carried out in multiple stages, each designed to gradually build a clear understanding of what drives financial distress in companies. In the first stage, financial distress was measured from two perspectives: the Altman Z-score and the Zmijewski model. Using these two models allows for a more nuanced view, since each one captures slightly different aspects of a company's financial health. Moving on to the second stage, the study explored how three key factors (leverage (DAR), profitability (ROA), and firm size (SIZE)) relate to financial distress, examining not just whether they have an effect, but also how strong and in what direction that effect might be. Before relying on these models, it was important to make sure they met certain requirements, so diagnostic tests such as normality, multicollinearity, and heteroscedasticity checks were conducted to ensure the data behaved properly. After confirming the models were sound, the overall fit was evaluated using the F test, which provides insight into whether the independent variables collectively explain

financial distress. Then, the t test was applied to see the contribution of each variable individually, while the coefficient of determination, R^2, was calculated to measure how much of the variation in financial distress could be accounted for by these three factors. In the final stage, all these findings were brought together, comparing the effects of leverage, profitability, and firm size to paint a full picture of how they influence financial distress. This approach allows not only an understanding of whether these factors matter, but also a deeper appreciation of the relative strength and direction of their impact, helping to explain why some companies struggle while others remain financially stable.
The following is an explanation of each variable used:

Table 2. Operations Research Variables

Variables	Definition	Measures
FD	Financial Distress	1. ALT $Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5$ Where: X1 = Working capital ÷ Total assets X2 = Retained Earnings ÷ Total assets X3 = EBIT ÷ Total assets X4 = Market value of equity ÷ Total liabilities X5 = Sales ÷ Total assets 2. ZMI $X = -4.3 - 4.5X1 + 5.7X2 - 0.0004X3$ Where: X1: Earnings after tax ÷ Total assets X2: Total liabilities ÷ Total assets X3: Current assets ÷ Current liabilities
DER	Leverage	$\frac{Total\ liabilities}{Total\ equity}$
ROA	Profitability	$\frac{Net\ income}{Total\ assets}$
SIZE	Firm Size	Natural logarithm of Total assets

Testing was carried out with the help of the SPSS program. Referring to Suri & Arifin (2022), SPSS or Statistical Product and Service Solution is a software that can help with data processing. This program can be used to make statistical analysis via computer. Apart from data analysis, SPSS also has many other features including data management and data documentation.

4. Results and Discussion

Results

Descriptive Analysis

Based on the dependent variable in this study, namely Financial Distress, which has two proxies or calculations to determine the value of the possibility of Financial Distress, including the Altman Z-score and the Zmijewski model, the data processing is also carried out separately which results in two output models, each of which can be seen below:

Table 3. Descriptive Statistics Test Result of Altman Z-score Model

	N	Minimum	Maximum	Mean	Std. Deviation
DAR	60	-1.77	.12	-.0178	.23386
ROA	60	.07	1.47	.5673	.26908
SIZE	60	26.71	30.25	28.2022	1.16779
ALT	60	-1.59	9.01	2.0482	2.47623
Valid N (listwise)	60				

Source: Primary Data SPSS Output, 2025

Table 4. Descriptive Statistics Test Result of Zmijewski Model

	N	Minimum	Maximum	Mean	Std. Deviation
DAR	60	-1.77	.12	-.0178	.23386
ROA	60	.07	1.47	.5673	.26908
SIZE	60	26.71	30.25	28.2022	1.16779
ZMI	60	-3.96	12.04	-.9893	2.24385
Valid N (listwise)	60				

Source: Primary Data SPSS Output, 2025

Both models were examined using the same set of 60 observations, which makes it easier to compare results across variables. Starting with leverage (DAR), the values ranged from –1.77 to 0.12, with a mean of –0.178 and a standard deviation of 0.23386. Since the standard deviation is larger than the mean, this suggests that leverage varies widely among the companies, indicating a heterogeneous pattern. Profitability (ROA) tells a different story: values range from 0.07 to 1.47, with a mean of 0.5673 and a standard deviation of 0.26908. Here, the mean is higher than the standard deviation, suggesting that profitability is relatively consistent across firms, showing a more homogeneous pattern. Firm size (SIZE) exhibits a similar trend, with values from 26.71 to 30.25, a mean of 28.2022, and a standard deviation of 1.16779, indicating limited variation among companies in terms of size. The last variable, Financial Distress, where the values are generated from two calculation models, namely Altman Z-score and Zmijewski, also has the same characteristic, namely heterogeneity or variability. This is shown by (ALT) with a mean value of 2.0482 < 2.47623, which is the standard deviation. Similarly, (ZMI) has a mean value of -0.9893 < 2.24385, which is the standard deviation. ALT has a fairly large gap, with a minimum value of -1.59 and a maximum value of 9.01. However, ZMI has a larger gap, with a minimum value of only -3.96 and a maximum value of 12.04.

Classical Assumption Test

Classical assumption tests are carried out on two regression models, namely the Altman Z-score (ALT) and Zmijewski (ZMI) models. However, due to the test on the Altman model which indicated autocorrelation, it was transformed on all independent and dependent variables for the Altman model using the Cochrane-Orcutt method. Thus, the tests carried out on the Altman model are then tests on models that have been adjusted with new lag-shaped variables (LAG_).

Normality Test

Data in research is required to have a normal distribution. This requirement needs to be met in regression analysis so that the parameter estimation results are not biased and can be used in making valid decisions. Therefore, before proceeding to other tests, it is necessary to have information related to how the distribution of the data to be tested first. The test was conducted by implementing the Kolmogorov-Smirnov method with the following results:

Table 5. Normality Test Result of Altman Z-score and Zmijewski Model One-Sample Kolmogorov-Smirnov Test

One-Sample Kolmogorov-Smirnov Test	
Model	**Asymp. Sig. (2-tailed)c**
ALT	.200d
ZMI	.200d

Source: Primary Data Output SPSS, 2025

To check whether the data could be properly analyzed, the Kolmogorov–Smirnov test was applied to assess normality. In this test, a data set is considered normally distributed if the Asymp. Sig. (2-tailed) value is greater than 0.05. For both the Altman Z-score (ALT) and the Zmijewski (ZMI) models, the test returned a value of 0.200. This result suggests that the data do not deviate significantly from a normal distribution, which is important because many regression techniques assume normality for reliable results. In other words, the data are well-behaved enough to proceed with further analysis, and any conclusions drawn from these models can be considered statistically sound.

Multicollinearity Test

Multicollinearity is considered absent if the tolerance value exceeds 0.10 and the VIF value is less than 10. The outcomes of the test for the two models are as follows:

Table 6. Multicollinearity Test Result of Altman Z-score Model

Coefficients[a]				
Model		**Collinearity Statistics**		**Description**
		Tolerance	**VIF**	
1	(Constant)			
	LAG_DAR	.309	3.238	No Multicollinearity
	LAG_ROA	.301	3.328	No Multicollinearity
	LAG_SIZE	.759	1.317	No Multicollinearity
a. Dependent Variable: LAG_ALT				

Source: Primary Data SPSS Output, 2025

Table 7. Multicollinearity Test Result of Zmijiwski Model.

Coefficients[a]				
Model		**Collinearity Statistics**		**Description**
		Tolerance	**VIF**	
1	(Constant)			
	DAR	.747	1.339	No Multicollinearity
	ROA	.755	1.325	No Multicollinearity
	SIZE	.983	1.017	No Multicollinearity
a. Dependent Variable: ZMI				

Source: Primary Data SPSS Output, 2025

The results show that none of the models exhibit signs of multicollinearity, with tolerance values less than 0.10 and VIF values greater than 10. In the first regression model, the maximum VIF value is 3.328, which also meets the minimum requirement of 10, while the minimum tolerance value is 0.301, but still greater than 0.10. Similarly, in the second regression model, the maximum VIF value was 1.339, which was also well below the requirement of less than 10, and the minimum tolerance value was 0.747, which was well above 0.10. Therefore, neither of the two models showed the effect of multicollinearity on the independent variables.

Heteroscedasticity Test

The following are the results of heteroscedasticity testing by analyzing the scatter plot graphs on both regression models:

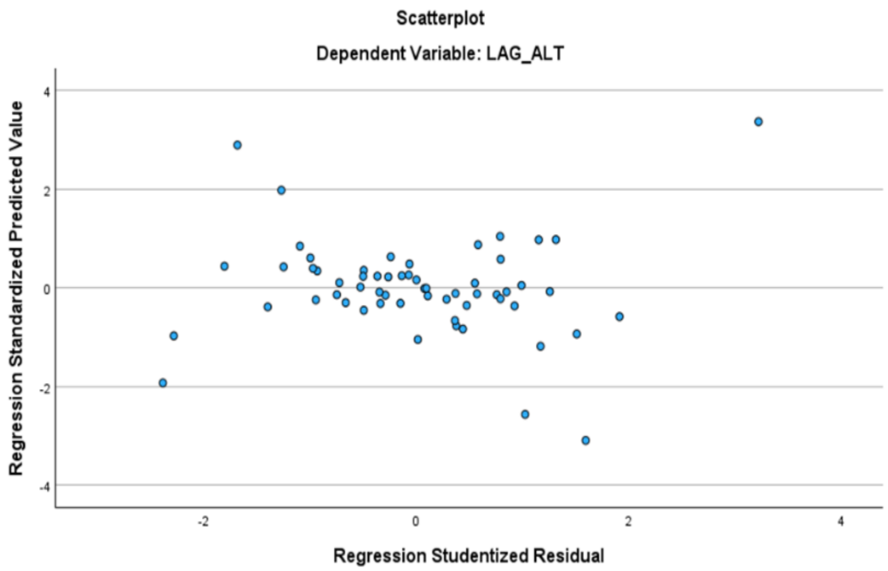

Figure 3. Heteroscedasticity Test (Scatter plot) Result of Altman Z-score Model.
Source: Primary Data SPSS Output, 2025

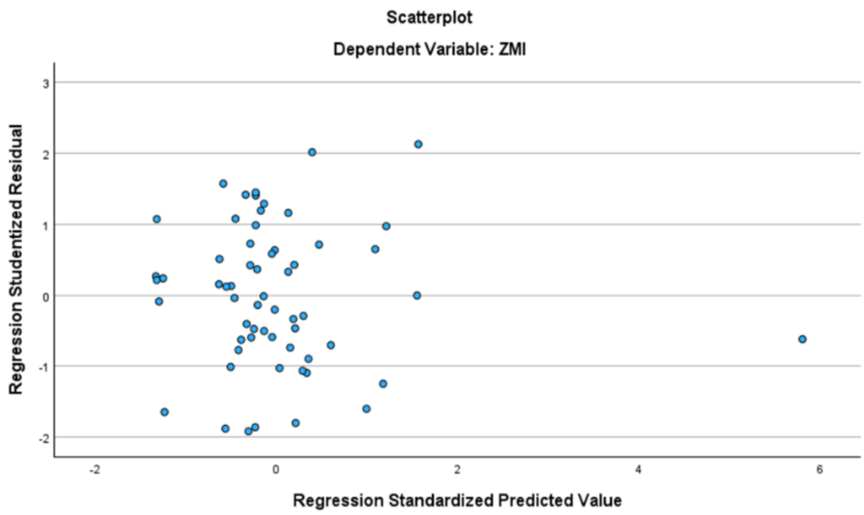

Figure 4. Heteroscedasticity Test (Scatter plot) Result of Zmijewski Model.
Source: Primary Data SPSS Output, 2025

The regression model is said to be homoscedasticity, where the residual variance is constant, or there is no heteroscedasticity if the sample data points on the scatter plot are randomly spread and do not form a certain pattern. In the two graphs above, it can be seen that the distribution of points meets the conditions of no heteroscedasticity. So it can be stated that both regression models are included in homoscedasticity.

Autocorrelation Test

The method used in testing autocorrelation is by using Durbin-Watson (DW), where the results for both regression models are as follows

Table 8. Autocorrelation Test Result of Altman Z-score and Zmijewski Model.

Model	DW
ALT (before the Cochrane-Orcutt test)	.561
LAG_ALT (after the Cochrane-Orcutt test)	1.829
ZMI	2.228

Source: Primary Data SPSS Output, 2025

To determine whether the regression models were affected by autocorrelation, the Durbin-Watson test was applied. This test was conducted with a significance level of 5%, using a sample of 60 observations and three independent variables. The lower bound (dL) was calculated as 1.4797, and the upper bound (dU) as 1.6889. The general rule for interpreting the Durbin-Watson statistic is that if the DW value falls between dU and 4-dU, the model can be considered free from autocorrelation. In this particular case, 4-dU equals 2.311, while dU remains 1.6889. This range provides a reference to determine whether the residuals of the regression are independent or if there is a pattern that might indicate correlation over time. Understanding this is important because autocorrelation can distort the results of regression analysis, making it difficult to draw reliable conclusions about the relationships between the variables.

Before adjusting for autocorrelation, the Altman regression model showed a pre-test Cochrane-Orcutt value of 0.561, indicating that the model was autocorrelated because DW fell below dU. To correct this, a lagged variable (LAG_) was added using the Cochrane-Orcutt method, which adjusted the DW to 1.829 and eliminated autocorrelation. On the other hand, the second regression model, which did not require the Cochrane-Orcutt adjustment, already had a DW value between dU and 4-dU, showing that it was free from autocorrelation from the beginning.

Multiple Linear Regression Analysis

Once the regression model passed the classical assumption tests, the analysis proceeded to evaluate the influence of the independent variables: Leverage (DAR), Profitability (ROA), and Firm Size (SIZE), on Financial Distress as the dependent variable. The findings from this analysis are presented below:

Table 9. Multiple Linear Regression Analysis Result of Altman Z-score Model.

Coefficients[a]								
	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-5.032	1.419		-3.545	<,001		
	LAG_DAR	-1.997	.588	-.352	-3.399	.001	.309	3.238
	LAG_ROA	-8.186	.882	-.975	-9.282	<,001	.301	3.328
	LAG_SIZE	.866	.168	.340	5.144	<,001	.759	1.317

a. Dependent Variable: LAG_ALT

Source: Primary Data SPSS Output, 2025

According to table 9 above which is the result of multiple linear analysis of the Altman Z-score (ALT) regression model, the regression equation is obtained as follows:

$$ALT = -5.032 - 1.997(DAR) - 8.186(ROA) + 0.866(SIZE) + e$$

The regression equation indicates a constant of –0.532, which essentially means that if all the independent variables (DAR, ROA, and SIZE) were hypothetically zero, the Altman Z-score would stand at –5.032. Looking at the individual variables, both DAR and ROA have negative coefficients, –1.997 and –8.186 respectively. This implies that for each one-unit increase in leverage or profitability, the Altman Z-score decreases by 1.997 and 8.186, assuming all other factors remain unchanged. On the other hand, firm size (SIZE) behaves differently, showing a positive coefficient of 0.866. This indicates that as the size of a company grows by one unit, the Altman Z-score increases by 0.866, again assuming the other variables are held constant. In essence, these results illustrate that each factor has a distinct effect on the Altman Z-score: while higher leverage and higher profitability seem to lower the score, suggesting more potential financial risk, a larger firm size contributes to a higher score, which could indicate a certain level of resilience against financial distress. This nuanced pattern highlights that financial health is shaped by multiple forces acting in different directions, making it important to consider each variable in context rather than in isolation.

Table 10. Multiple Linear Regression Analysis Result of Zmijewski Model

Coefficients[a]								
	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	**(Constant)**	-4.200	.078		-53.889	<,001		
	DAR	-4.512	.016	-.470	-288.526	<,001	.747	1.339
	ROA	5.683	.014	.681	420.428	<,001	.755	1.325
	SIZE	-.003	.003	-.002	-1.219	.228	.983	1.017

a. Dependent Variable: ZMI

Source: Primary Data SPSS Output, 2025

In the second regression model above, namely the Zmijewski model, the regression equation is obtained as follows:

$$\boldsymbol{ZMI = -4.200 - 4.512(DAR) + 5.683(ROA) - 0.003(SIZE) + e}$$

In the regression equation, the constant is –4.200, which implies that if DAR, ROA, and SIZE were all zero, the Zmijewski index would equal –4.200. Looking at the individual variables, leverage (DAR) has a negative coefficient of –4.512, indicating that for each one-unit increase in DAR, the Zmijewski index decreases by 4.512, reflecting a lower risk of financial distress. Profitability (ROA), on the other hand, has a positive coefficient of 5.683, meaning that an increase of one unit in ROA raises the Zmijewski index by 5.683, suggesting that more profitable firms are more likely to experience financial distress. Firm size (SIZE) shows a very small negative coefficient of –0.003, which implies that, holding other variables constant, each additional unit of SIZE slightly lowers the Zmijewski index also the risk of financial distress. Overall, these results highlight how each factor contributes differently to financial distress according to the Zmijewski model.

Coefficient of Determination Test

Table 11. Coefficient of Determination Test Result of Altman Z-score Model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.904[a]	.818	.808	.71328

a. Predictors: (Constant), LAG_SIZE, LAG_DAR, LAG_ROA
b. Dependent Variable: LAG_ALT

Source: Primary Data SPSS Output, 2025

Table 12. Coefficient of Determination Test Result of Zmijewski Model.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000[a]	1.000	1.000	.02427

a. Predictors: (Constant), SIZE, ROA, DAR
b. Dependent Variable: ZMI

Source: Primary Data SPSS Output, 2025

The table indicates that the coefficient of determination (R^2) for the two regression models is 0.818 and 1.000, respectively. In the first model, this means that leverage (DAR), profitability (ROA), and firm size (SIZE) together explain 81.8% of the variation in financial distress as measured by the Altman Z-score. The remaining 18.2% is influenced by factors not included in the study. In the second model, the R^2 value is 1.000, suggesting that the same three independent variables account for the entire variation in financial distress according to the Zmijewski method, leaving no room for external factors. This perfect explanatory power in the second model is unusual and may indicate that the variables chosen capture all observed variation, or that the model is highly sensitive to the dataset used.

F Test (Goodnes of Fit)

The F test is calculated to maintain independent variables simultaneously or concurrently with dependent variables. When the F value is less than 0.05, the variables are predicted to have an effect for simultaneous to the dependent. The F results for the regression model are as follows:

Table 13. F Test Result of Altman Z-score Model

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	125.372	3	41.791	82.141	<,001[b]
	Residual	27.982	55	.509		
	Total	153.355	58			

a. Dependent Variable: LAG_ALT
b. Predictors: (Constant), LAG_SIZE, LAG_DAR, LAG_ROA

Source: Primary Data SPSS Output, 2025

Table 14. F Test Result of Zmijewski Model

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	297.025	3	99.008	168074.999	<,001[b]
	Residual	.033	56	.001		
	Total	297.058	59			

a. Dependent Variable: ZMI
b. Predictors: (Constant), SIZE, ROA, DAR

Source: Primary Data SPSS Output, 2025

Based on the results of Altman's F test, the calculated F value is 82.141, with a significance level of less than 0.05 (<0.001). This means the independent variables DAR, ROA, and SIZE significantly and simultaneously affect Financial Difficulty as determined by Altman's Z Score. The Zmijewski regression model also reached the same conclusion based on the F-test results, which were less than 0.05 (<0.001) with calculated F value is 168074.999. So overall, both have the same condition where regression model is good already.

Hypothesis Test (t-test)

The results of the two regression models can be seen below:

Table 15. t Test Result of Altman Z-score Model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-5.032	1.419		-3.545	<,001		
	LAG_DAR	-1.997	.588	-.352	-3.399	.001	.309	3.238
	LAG_ROA	-8.186	.882	-.975	-9.282	<,001	.301	3.328
	LAG_SIZE	.866	.168	.340	5.144	<,001	.759	1.317

a. Dependent Variable: LAG_ALT

Source: Primary Data SPSS Output, 2025

Table 16. t Test Result of Zmijewskis Model.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-4.200	.078		-53.889	<,001		
	DAR	-4.512	.016	-.470	-288.526	<,001	.747	1.339
	ROA	5.683	.014	.681	420.428	<,001	.755	1.325
	SIZE	-.003	.003	-.002	-1.219	.228	.983	1.017

a. Dependent Variable: ZMI

Source: Primary Data SPSS Output, 2025

The two tables above allow for the following deductions to be made: (1) A result with a p-value of 0.001, or less than 0.05 which is the requirements to meet of the conclusion that there is relation between the variables, is obtained from the Altman Z-score regression model's DAR variable. This suggests that the DAR variable has a considerable influence on the dependent variable in the Altman Z-score regression model. The Zmijewski regression model also comes to the same conclusion, which DAR significantly contributes to ZMI with a p-value < 0.001, or less than 0.05. The direction of both variables in the regression model is the same as that of the dependent variable, which is negative. (2) With a combined p-value of less than 0.001, or less than 0.05, the second variable, ROA, in both regression models is considered to have a significant partial correlation. Here, ROA differs from DAR in that it produces a different direction of control, whereas DAR gives the same direction of control in both regression models. ROA generates a positive direction in the second regression model, whereas it is negative in the first. (3) SIZE was found to influence only the Altman Z-score regression model. With a p-value below 0.001, the variable demonstrates strong significance. The positive sign of the coefficient suggests that bigger companies generally achieve higher Altman scores, meaning they are less prone to distress. However, in the Zmijewski model, SIZE did not play a relevant role. Despite its negative coefficient, the effect is not significant as the p-value stands at 0.228, greater than 0.05.

Discussion

Leverage on Financial Distress

Leverage appears to increase the risk of financial distress, which aligns with the first hypothesis (H1) and is supported by the Altman Z-score regression model. According to this model, companies with higher leverage are more likely to encounter financial difficulties, as indicated by the t-test results. Interestingly, the unstandardized coefficients B for DAR shows a negative value, suggesting that for every unit increase in leverage, the Altman Z-score declines, further highlighting the higher likelihood of distress. From the perspective of signaling theory, high leverage sends a negative signal to investors, as it reflects heavy dependence on external financing and increased bankruptcy risk. As a result, hypothesis H1 is accepted and the null hypothesis is rejected under the Altman Z-score framework. The Zmijewski model, however, presents a different story. Here, the unstandardized coefficients B is also generally negative, but in this case, a lower Zmijewski score corresponds to a reduced probability of financial distress. This contradictory pattern means that H1 is rejected for this model, indicating that while leverage has a significant role, its effect appears negative in this context. Interpreted through signaling theory, this finding implies that debt may not always be perceived as a negative signal; in certain situations, it can also reflect a firm's ability to access and utilize external resources for sustaining operations. Overall, these results illustrate that the relationship between leverage and financial distress can vary depending on the model used. The Altman model reinforces the conventional view that taking on more debt increases risk, whereas the Zmijewski model suggests the opposite, showing just how differently financial distress can be interpreted.

Profitability on Financial Distress

The results of both the Zmijewski and Altman Z-score regression models show that profitability (ROA) has a significant effect on financial distress, with p-values <0.001. Interestingly, in both models, greater profitability is associated with an increase in financial distress risk. In the Altman Z-score model, a higher ROA reduces the Z-score, which implies a higher likelihood of distress. Similarly, in the Zmijewski model, a higher ROA increases the Zmijewski score, which also indicates greater financial vulnerability. This finding is somewhat paradoxical, as profitability is typically expected to reduce the risk of distress. From the perspective of signaling theory, profitability should act as a positive signal to investors about the firm's ability to generate earnings and maintain stability. However, in this industry context, high profitability might instead be interpreted by the market as unsustainable or as a short-term signal that masks underlying structural weaknesses, thereby creating doubts and raising the perceived risk of distress. In both regression models, H0 is generally accepted while H2 is rejected, suggesting that although profitability significantly influences financial distress, the signal it conveys in the textile and garment industry may not always align with traditional expectations.

Firm Size on Financial Distress

The p-values in the two regression models allow for the drawing of different conclusions. A positive connection with Altman Z-score is indicated by the first model's p-value, which is less than 0.05 (<0.001). As a result, the Altman Z-score will rise with every unit increase in SIZE, increasing the probability that the company won't experience financial difficulties. In other words, the larger the company's assets, the more likely it is that it will have a sound financial position for years to come. Interpreted through signaling theory, larger firms send a stronger positive signal of stability, diversification, and greater access to external financing, thereby reducing investors' perceptions of bankruptcy risk. Consequently, the Altman Z-score model's H3, which claims that a company's size greatly lessens financial trouble, is approved. Nevertheless, Zmijewski's second regression model yielded a p-value of 0.228, which is noticeably higher than 0.05. SIZE is therefore thought to have no bearing on the financial distress hypothesis. This inconsistency indicates that the signal of firm size is not always interpreted as meaningful in all contexts, suggesting that market perceptions of size can vary depending on the distress measurement applied. Overall, there is again inconsistency in the results of the two regression models about the connection between financial stress and company size.

5. Conclusions

In this study, financial distress was examined from two different angles, using the Altman Z-score and the Zmijewski model. To dig deeper into what drives financial distress, three key factors were analyzed: leverage (DAR), profitability (ROA), and firm size (SIZE). The results reveal some intriguing contrasts between the two models. Starting with leverage, the Altman Z-score clearly shows that higher leverage increases the risk of financial distress, which aligns with the first hypothesis and fits the conventional view that taking on more debt can make a company more vulnerable. Yet, the Zmijewski model tells a different story: in this case, higher leverage seems to reduce the probability of distress, hinting at the complexities of how debt interacts with a company's finances depending on the method of measurement. Profitability, in contrast, shows a paradoxical pattern across both models. The findings reveal that companies with higher profitability tend to face greater financial distress, as higher ROA is associated with lower Altman Z-scores and higher Zmijewski values. This contradicts the conventional expectation that strong earnings act as a buffer against financial problems. Firm size, however, produces mixed results. According to the Altman Z-score, larger firms appear more resilient and better able to weather financial challenges, but the Zmijewski model finds no meaningful effect of size, suggesting that in some contexts, being bigger does not necessarily provide a safety net. Overall, these findings highlight that the story of financial distress is heavily dependent on the lens through which it is viewed. The Altman Z-score tends to support the traditional perspective, that high leverage raises risk and larger firms are safer, while the Zmijewski model presents a more nuanced picture, particularly in terms of leverage and firm size, reminding us that financial realities can look very different depending on the analytical approach.

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