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Analysis of the Altman Z-Score Model in Predicting Financial Distress and Impact on the Value of the Firm

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ABSTRACT
This study aims to examine the effect of financial distress on firm value in energy sector companies listed on the Indonesia Stock Exchange during 2022–2024. Financial distress is proxied by the Altman Z-Score, while firm value is measured using Tobin's Q. A quantitative approach was employed using secondary data obtained from annual financial statements. The sample was selected through purposive sampling, resulting in 196 observations after data adjusment. Data were analyzed using IBM SPSS Statistics 27 through descriptive statistics, classical assumption tests normality, multicollinearity, heteroscedasticity, autocorrelation, and multiple linear regression with liquidity, operating cash flow, and debt to equity ratio as control variables. The results reveal that the Altman Z-Score has a positive and significant effect on firm value, indicating that firms with stronger financial health tend to receive higher market valuations. In addition, operating cash flow has a positive significant effect on firm value, liquidity has a negative significant effect, while the debt-to-equity ratio does not significantly affect firm value. This study provides empirical evidence that the Altman Z-Score serves not only as an early warning indicator of bankruptcy risk but also as a relevant determinant of firm value in an emerging market with relatively low market efficiency. The findings offer practical implications for investors and corporate managers in assessing financial health to support investment decisions and corporate financial policies.

Keywords: Altman Z-Score, Financial Distress, Value of the Firm, Tobin's Q, Energy Sector.
JEL Code: G32, G33, Q40.

I. Introduction

The development of the Indonesian capital market in 2022–2024 will be influenced by various domestic and global factors, such as the post-COVID-19 economic recovery, uncertainty over long-term development policies, and changes in government, which increase market volatility and potentially cause stock prices to not fully reflect a company's fundamental value. The participation rate in the Indonesian capital market also remains relatively low compared to developed countries. In 2024, Indonesia's market capitalization-to-GDP ratio was recorded at 55.7% (CEIC, 2026), far below Hong Kong's 1,110.7% and the United States' 170%–200% (FRED, 2026). This situation indicates that the Indonesian capital market still faces significant gaps in market depth and information dissemination efficiency. As a result, investors tend to react less optimally to available financial information. Therefore, company value and profit are important indicators

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in making investment decisions and in assessing the condition of the Indonesian capital market more objectively.

Firm value reflects the market's perception of a company's prospects, stability, and efficiency in managing its assets, making it one of the main indicators for investors in assessing company quality. Information regarding operational efficiency, management effectiveness, and the ability to create long-term value is becoming increasingly important, particularly in the energy sector, which is characterized by high volatility and dependence on non-renewable natural resources (Farooq & Noor, 2021). Firm value is generally measured using Tobin's Q ratio, which is the comparison between the company's market value and the replacement value of its assets (Heling & Lastanti, 2024). This ratio is used to assess whether a company is undervalued or overvalued and also reflects the company's effectiveness in utilizing assets to generate economic value. The higher the Tobin's Q value, the more positive investors' assessment of the company's performance.

In Indonesia's energy sector, company values tended to fluctuate throughout the 2022–2024 period due to various external factors, such as changes in coal export policies, fluctuations in global oil prices, and unstable domestic energy demand dynamics resulting from the economic recovery process (Raines et al., 2023). This situation caused the Tobin's Q ratios of various energy companies to become unstable and exhibit heterogeneous patterns across companies. Dependence on non-renewable natural resources, such as coal and oil, also increases the risk of operational sustainability in the energy sector as these resources experience declining reserves year after year (Almamy et al., 2016). Financial distress is a condition of financial pressure that can hinder a company's ability to meet its operational and financial obligations, making it a crucial factor in determining a company's value (Alfriansyach & Arsjah, 2026). Analysis of this condition is relevant because it can provide investors with signals regarding a company's stability and influence market assessments of its value. One commonly used method to predict financial distress risk is the Altman Z-Score model, which is considered effective in identifying potential bankruptcy in various industries and economic conditions, including in developing countries (Hamzah & Annisa, 2022). However, in markets with limited efficiency, such as Indonesia, information about financial distress is not always directly reflected in stock prices, potentially leading to mispricing. Therefore, empirical research is needed to examine the effect of financial distress on company value in the energy sector (ElBannan, 2021).

In addition to financial distress as the main independent variable, this study uses liquidity, cash flow from operations (CFO) measured by the natural logarithm/Ln, and debt to equity ratio (DER) as control variables to reduce potential bias in the relationship between the independent variables and firm value. Liquidity reflects a company's ability to meet short-term obligations and is often associated with the perception of the company's operational stability (Nurasya, 2023). CFO is used to represent a company's ability to generate cash flow from operational activities, which can reflect the company's earnings quality and financial condition, thus being an important signal for investors. Meanwhile, DER is used to control the influence of capital structure because high debt levels can increase the risk of financial distress and affect firm value. The Indonesian capital market is generally classified as a weak form efficient market, meaning it reflects more historical information than fundamental information in determining stock prices (Fama, 1970). This condition is evident in stock price movements that do not always align with the company's fundamental performance. One example is the case of Garuda Indonesia, which suffered significant losses in 2018, but saw its share price rise sharply in 2019 without adequate fundamental improvements. This phenomenon suggests that some investors are still influenced by short-term sentiment rather than objective financial analysis. As a result, information regarding financial distress is not always processed rationally by the market, so its impact on company value still requires further empirical evidence.

Previous research has shown that financial distress generally negatively impacts firm value because it increases perceived risk and uncertainty regarding a firm's ability to maintain long-term performance (Farooq & Noor, 2021). In more efficient markets, investors tend to respond quickly and consistently to information about financial distress, thus being immediately reflected in stock prices. Conversely, in less efficient markets, such as many developing countries, market responses to financial distress signals are often

delayed or do not fully reflect a firm's fundamental condition (ElBannan, 2021). This suggests that the impact of financial distress on firm value can vary across markets, warranting further study in the context of the Indonesian capital market.

Based on the previous description, this study aims to analyze the role of financial distress as a predictor of firm value in energy sector companies in Indonesia, which operate in a weak form of efficient market. In markets with low efficiency, stock prices tend to reflect only historical information, while fundamental information, including financial risk, is not fully reflected in firm value. The Altman Z-Score is used as an objective indicator to assess the level of financial risk, which theoretically can influence firm value, as measured by Tobin's Q. However, low market efficiency, limited investor participation, and the tendency for investor behavior to be influenced by sentiment mean that the relationship between financial distress and firm value may differ from that in more developed capital markets. This situation is especially relevant in the energy sector, which is characterized by declining sustainability due to dependence on non-renewable natural resources and high commodity price volatility. Therefore, this study examines the effect of financial distress on firm value and evaluates the ability of the Altman Z-Score to explain firm value for energy sector companies in Indonesia during the 2022–2024 period.

II. Literature Review and Hypothesis Development

2.1. Agency Theory

Agency theory explains how the relationship between the principal as a shareholder and the agent as the company's management. In this relationship, management is given the authority to manage the company in order to achieve the shareholder goal, which is to improve welfare through increasing the company's value (Jensen & Meckling, 2019). However, in practice, there are often conflicts of interest because management has personal goals that are not always in line with the interests of shareholders. This conflict arises due to information asymmetry, which is a condition when management has more complete information than investors or shareholders (Nafisah et al., 2023).

Agency theory explains that conflicts between principals and agents can affect a company's financial decisions, including investment decisions, capital structure, and operational policies. Management that is unable to manage the company effectively has the potential to increase the risk of financial distress due to inefficient use of resources. On the other hand, good financial management can improve company performance and increase company value in the eyes of investors. In the context of this study, financial distress reflects a condition when a company experiences financial stress that can magnify agency conflicts because management tends to make high-risk decisions to maintain the company's performance .(Bobby & Jonnardi, 2023)

In energy sector companies, agency conflicts become increasingly complex because this sector requires long-term investment and has high operational risks due to fluctuations in energy commodity prices. High levels of leverage in energy companies can increase the potential for financial distress if they are not balanced with profitability and adequate cash flow. Therefore, the use of the Altman Z-Score model is important to measure the level of financial health of a company as a basis for decision-making for investors and company management (Panai et al., 2023).

2.2. Signaling Theory

Signal theory explains that the party that has more information will signal to the other party to reduce information uncertainty. In the context of a company, management acts as a party that has internal information about the company and conveys this information to investors through financial statements, company policies, and other disclosures (Putra & Gantino, 2021).

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The signals provided by the company can be in the form of positive or negative information. Information about the company's financial condition is one of the main signals used by investors in making investment decisions. A company with good financial conditions will give a positive signal to the market thereby increasing investor confidence and driving an increase in the company's value. On the other hand, companies that experience financial distress will give negative signals that can reduce investor perception of the company's prospects.

In this study, the Altman Z-Score was used as an indicator of a company's financial health signals. A high Z-Score indicates the company is in a healthy financial condition and has a low risk of bankruptcy. On the other hand, a low Z-Score value indicates an increased risk of financial distress that can affect the decline in the company's value (Putri et al., 2024). Therefore, signal theory is the basis for explaining the relationship between financial distress and the value of the firm.

2.3. Financial Distress

Financial distress is a condition when a company experiences financial difficulties so that it is unable to fulfill its operational and financial obligations in a timely manner. According to Altman et al. (2017), financial distress is a stage of declining financial condition before a company goes bankrupt. This condition is characterized by declining profitability, weak liquidity, increasing debt, and declining company's ability to generate cash flow. According to the opinion of Fitria & Syahrenny (2022), financial distress is an important concern for investors because it reflects increasing investment risk. Companies that experience distress generally experience a decline in stock prices due to a decline in investor confidence in the company's ability to maintain its business continuity. In addition, financial distress can also cause companies to lose investment opportunities and have difficulty obtaining funding from external parties. In the financial context, financial distress is generally measured using a financial ratio-based bankruptcy prediction model, one of which is the Altman Z-Score. The model is considered to be able to provide a comprehensive overview of the company's financial health. In the energy sector, the risk of financial distress tends to be higher because companies are strongly influenced by global commodity price volatility and changes in energy policies.

2.4. Model Altman Z-Score

The Altman Z-Score model is one of the most widely used methods to predict a company's financial distress. This model combines several financial ratios such as liquidity, profitability, leverage, and company activity to measure the level of financial health of a company. According to Altman et al., (2017), the results of the Z-Score calculation are classified into safe zones, grey zones, and distress zones so that they can be used as a tool to evaluate the company's bankruptcy risk. Along with the development of the industry, the Altman Z-Score model has been widely used in various sectors, including the energy sector, because it is considered to have a good level of accuracy in detecting potential financial distress of companies. According to the opinion of Hermuningsih et al. (2022) shows that the Altman Z-Score model is effectively used to predict financial distress through the measurement of profitability, liquidity, solvency, and company activity ratios. The Altman Z-Score model is able to provide a comprehensive picture of the company's financial health so that it can assist investors and management in decision-making (Panai et al., 2023). In this study, the Altman Z-Score was used to measure financial distress in energy sector companies listed on the Indonesia Stock Exchange for the 2022–2024 period. This study also used control variables in the form of liquidity, operating cash flow, and debt to equity ratio (DER) to minimize estimation bias in measuring the influence of financial distress on the value of the firm proxied using Tobin's Q.

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2.5. Value of the Firm

In a modern financial perspective, the value of the firm is understood as the present value of the expected cash flow in the future, so it becomes an important indicator for investors and creditors in assessing the company's prospects (Hermuningsih et al., 2022). The value of the company in this study was measured using Tobin's Q because it was able to integrate market information and the fundamental condition of the company in one measure. According to Pujiono et al. (2023) a Tobin's Q value greater than one indicates that the company has good growth prospects and investment opportunities, while a value below one indicates that the company is considered less productive by the market.

Tobin's Q measurement is done through a comparison between the market value of equity and the total assets of a company so that this method is simpler and easier to apply in empirical research. Tobin's Q is also considered to be able to reflect investors' perception of the company's ability to create long-term value. Nurasya (2023) argue that Tobin's Q is effectively used to measure the value of the firm because it is able to describe the market's response to the company's financial condition. In the perspective of signal theory, the value of a company reflected through Tobin's Q shows how the market responds to the information and signals that the company provides. Information about a company's financial condition, profitability, and sustainability can affect investors' perception of the company's value. Research by Friske et al. (2023) explains that signals conveyed by companies can provide a positive or negative response from the market depending on the quality and credibility of the information conveyed. Therefore, the value of the firm is not only influenced by the company's financial performance, but also by how the market assesses the company's future prospects and stability (Sonnya & Wardhani, 2026).

2.6. Efficient Market Hypothesis

According to ElBannan (2021), an efficient capital market is a condition when all available information can be quickly and accurately reflected in stock prices. Under these conditions, the stock price will move following new information that cannot be predicted in advance (random walk). Fama classifies EMH into three forms, namely weak form, semi-strong form, and strong form efficiency, based on the type of information reflected in the market price. This concept explains that investors will use all available information to assess the company's prospects and risks, including information about financial distress.

In emerging markets such as Indonesia, the level of market efficiency tends to be lower than that of developed markets due to information asymmetry, retail investor dominance, and high market volatility, especially in the energy sector which is affected by fluctuations in global commodity prices (ElBannan, 2021). This condition can cause mispricing, which is a condition when the stock price does not fully reflect the company's fundamental conditions, including the risk of financial distress (Farooq & Noor, 2021). Research by Friske et al. (2023) also shows that the market still responds differently to company information depending on the quality and credibility of the information conveyed. In this study, efficient capital market theory is used to explain how information about financial distress measured using the Altman Z-Score can affect the value of the firm that is proxied using Tobin's Q. If the market responds to information efficiently, companies with a high risk of financial distress tend to experience a decline in company value due to decreased investor confidence in the company's future prospects.

2.7. Hypothesis

Based on the background description, problem formulation, objectives, benefits, theoretical review, and conceptual framework, the following research hypothesis is proposed:

H1: Altman Z-Score influences firm value, as proxied by Tobin's Q.

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This research hypothesis is based on signaling theory and agency theory. According to signaling theory, a higher Z-Score indicates better financial health and a lower risk of bankruptcy, which is rationally appreciated by investors and reflected in an increase in the company's stock value (Spence, 1978). Meanwhile, based on agency theory, the effectiveness of agency cost control mechanisms is influenced by capital structure and the level of distress risk; in low distress conditions, this indicates a tendency for increased firm value for shareholders (Jensen & Meckling, 2019). In this study, financial distress is operationalized through a higher Z-Score, indicating a lower risk of distress. The hypothesis of this study is supported by the existence of a positive correlation between the Z-Score and the company's value (Tobin's Q), the higher the Z-Score, the smaller the possibility of financial distress, and the higher the company's value as reflected in Tobin's Q. The expression of a positive effect on this hypothesis means that an increase in the Z-Score, which indicates a decrease in the risk of financial distress, will be followed by an increase in the company's value as measured by Tobin's Q.

III. Research Method

This study uses a quantitative approach with a type of causality research that aims to examine the influence of financial distress on the value of the firm in energy sector companies listed on the Indonesia Stock Exchange for the period 2022–2024. The quantitative approach is used because this study utilizes numerical data analyzed using statistical techniques to test the relationship between variables empirically. According to Creswell & Poth (2018), quantitative research is used to test theories through variable measurement and statistical analysis. Causality research is used to determine the causal relationship between independent variables and dependent variables in research (Pujiono et al., 2023). The data used is secondary data in the form of annual financial statements of energy sector companies obtained through the official website of the Indonesia Stock Exchange and the official website of each company. The research population consists of all energy sector companies listed on the Indonesia Stock Exchange for the period 2022–2024. The sampling technique uses purposive sampling with the criteria Energy sector companies listed on the Indonesia Stock Exchange (IDX) and companies not consecutively listed on the Indonesia Stock Exchange (IDX) during the 2022-2024 period. Based on these criteria, 80 companies were obtained with a total of 240 observation data. Purposive sampling is a sample determination technique based on certain considerations according to the research objectives (Sugiyono, 2022). The use of secondary data in accounting research is considered effective because it provides objective and verifiable historical data.

The dependent variable in this study is the value of the firm which is proxied using Tobin's Q, while the independent variable is financial distress which is proxied using the Altman Z-Score. In addition, this study uses control variables in the form of liquidity, operating cash flow, and debt to equity ratio to minimize research bias. The use of Tobin's Q is considered to be able to reflect the market's perception of the company's value more comprehensively because it involves market elements and the company's total assets. Meanwhile, the Altman Z-Score model is used because it has a good level of accuracy in predicting the company's financial distress conditions (Ghozali, 2018). The inclusion of liquidity, operating cash flow, and debt to equity ratio as control variables is intended to isolate the effect of financial distress on firm value and reduce the potential influence of other financial characteristics that may affect market valuation. Liquidity is controlled because a company's ability to meet short-term obligations reflects financial flexibility and operational stability, which can influence investors' perceptions of firm value. Operating cash flow is included because it represents the company's ability to generate cash from its core business activities and serves as an important indicator of earnings quality and financial sustainability. Meanwhile, debt to equity ratio is controlled because capital structure decisions may affect both the risk of financial distress and market assessments of firm value. Therefore, the use of these control variables helps ensure that the relationship between financial distress and firm value can be examined more accurately.

The data analysis technique in this study uses descriptive statistical analysis, classical assumption test, and multiple linear regression analysis with the help of a statistical data SPSS 27. Descriptive statistical analysis

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is used to provide an overview of the characteristics of research data which include the minimum, maximum, average, and standard deviation values of each research variable (Sugiyono, 2022). Furthermore, the classical assumption test is carried out through normality, multicollinearity, heteroscedasticity, and autocorrelation tests to ensure that the regression model. Multiple linear regression analysis was used to test the influence of the Altman Z-Score on the value of the firm proxied using Tobin's Q. Hypothesis testing was carried out through a determination coefficient (R^2) test, a simultaneous test (F test), and a partial test (t test) with a significance level of 5%. Multiple linear regression analysis is used to determine the influence of one or more independent variables on dependent variables simultaneously or partially (Ghozali, 2018).

IV. Results and Discussion

4.1. Analysis Result

a. Description Analysis Result

Tabel 1. Descriptive Analysis Result

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Tobin's Q	240	.392	622872.959	10987.20351	45487.663824
Z Score	240	-115.580	254.214	9.96298	34.201175
Z Score Categories	240	1	3	2.50	.803
Liquidity	240	.002	40.191	2.72108	4.576956
Operating Cash Flow	240	16.375	37.044	26.58672	3.106476
DER	240	-2.865	8.791	.66930	1.078398
Valid N (listwise)	240				

Based on Table 1, in the initial data condition with 240 observations, the Tobin's Q variable has a minimum value of 0.392 and a very high maximum value of 622872.959 with an average of 10987.20351. This very wide range between the minimum and maximum values indicates the presence of extreme data distribution and the possibility of outliers. A similar thing also occurs in the variables of liquidity, operating cash flow, debt to equity ratio, and value of the firm, which have very different minimum and maximum values and affect the data distribution.

Tabel 2. Descriptive Analysis Result

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Tobin's Q	196	-.936	12.032	5.49439	4.296084
Z Score	196	-32.955	254.214	13.20107	31.477521
Z Score Categories	196	1	3	2.55	.773
Liquidity	196	.014	40.191	2.74426	4.277067
Operating Cash Flow	196	3.000	3.458	3.27296	.087342
DER	196	-.457	8.791	.69943	1.076404
Valid N (listwise)	196				

Based on the data in table 2, the results of descriptive statistical analysis show that this study uses 196 observational data. The LOG variable Tobin's Q has an average value of 5.49439 with a standard deviation of 4.296084 which shows that the company's value in the energy sector tends to be stable. The Z-Score variable has an average of 13.20107 which indicates that most companies are in a healthy financial condition, although the standard deviation of 31.477521 indicates a difference in financial condition between companies. The liquidity variable has an average of 2.74426 which shows that the company's ability to meet short-term obligations is relatively good. Furthermore, the operating cash flow LN variable has an average of 3.27296 with

a relatively homogeneous data spread, while the DER variable has an average of 0.69943 which shows that most companies use their own capital more than debt in their funding structure. Overall, the results of descriptive statistics show that energy sector companies have relatively stable financial conditions during the study period.

b. Normality Test

Tabel 3. Result Normailty Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		196
Normal Parametersa,b	Mean	.0000000
	Std. Deviation	3.20031420
Most Extreme Differences	Absolute	.059
	Positive	.059
	Negative	-.045
Test Statistic		.059
Asymp. Sig. (2-tailed)		.097[c]

Based on the results of the normality test in table 3, the value of Asymp. Sig. (2-tailed) was recorded at 0.097, which met the criteria for the normality test with a sig value of > 0.05. The results of the normality test show that the data is distributed normally, so it can be declared suitable for use in the next stage of analysis.

c. Autocorrelation Test

Tabel 4. Result Autocorrelation Test

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.554[a]	.307	.293	2.84643	1.815
a. Predictors: (Constant), DER, OCF, Liquidity, Z Score					
b. Dependent Variable: Tobin's Q					

Based on the results of the autocorrelation test, it was known that the Durbin-Watson value increased to 1.815. With the critical limit dU = 1.8079 and 4-dU = 2.1921, the value of DW = 1.815 qualifies dU < DW < (4-dU) or 1.8079 < 1.815 < 2.1921, so it can be concluded that the regression model no longer shows any indication of autocorrelation and meets the assumption to proceed at the next stage of testing.

d. Multicollinearity Test

Tabel 5. Result Multicollinearity Test

Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Z Score	.947	1.056
	Liquidity	.965	1.036
	Operating Cash Flow	.989	1.011
	DER	.922	1.084
a. Dependent Variable: Tobin's Q			

Based on the test results, all independent variables showed a VIF value of < 10 and a Tolerance value of > 0.10. In detail, Z-Score has a VIF value of 1.056 (Tolerance 0.947), Liquidity has a VIF of 1.036 (Tolerance 0.965), Operating Cash Flow has a VIF of 1.011 (Tolerance 0.989), and DER has a VIF of 1.084 (Tolerance 0.922). Overall, these results show that there are no symptoms of multicollinearity in the regression model used.

e. Heteroscedasticity Test

Tabel 6 Result Heteroscedasticity Test

Correlations							
			Z Score	**Liquidity**	**Operating Cash Flow**	**DER**	**Unstandardized Residual**
Spearman's Rho	Z Score	Correlation Coefficients	1.000	.430**	.125	-.536**	-.004
		Sig. (2-tailed)	.	.000	.082	.000	.959
		N	196	196	196	196	196
	Liquidity	Correlation Coefficients	.430**	1.000	-.001	-.376**	.138
		Sig. (2-tailed)	.000	.	.986	.000	.054
		N	196	196	196	196	196
	Operating Cash Flow	Correlation Coefficients	.125	-.001	1.000	.071	.059
		Sig. (2-tailed)	.082	.986	.	.326	.414
		N	196	196	196	196	196
	DER	Correlation Coefficients	-.536**	-.376**	.071	1.000	-.061
		Sig. (2-tailed)	.000	.000	.326	.	.399
		N	196	196	196	196	196
	Unstandardized Residual	Correlation Coefficients	-.004	.138	.059	-.061	1.000
		Sig. (2-tailed)	.959	.054	.414	.399	.
		N	196	196	196	196	196

The results of the Spearman Rho test showed that all independent variables had a significance value of > 0.05, namely Z-Score (Sig. 0.959), Liquidity (Sig. 0.054), Operating Cash Flow (Sig. 0.414), and DER (Sig. 0.399), it can be concluded that the assumption of homocedasticity is fulfilled and the regression model is free from heteroscedasticity symptoms.

f. Hypothesis Test Result (F-Test)

Tabel 7. Result F Test

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1601.793	4	400.448	38.297	.000[b]
	Residual	1997.192	191	10.457		
	Total	3598.985	195			
a. Dependent Variable: Tobin's Q						

The results of the ANOVA test in the test showed an F-count value of 38.297 with a significance value of 0.000. The significance value of 0.000 < 0.05 and the F-calculated value (38.297) > F-table (2.42) obtained from df numerator = 4 and df denominator = 191, so that H0 is rejected and it can be concluded that

simultaneously the variables Z-Score, Liquidity, Operating Cash Flow, and DER have a significant effect on the company's value (Tobin's Q). The regression model built in this study was declared fit to be used.

g. Hypothesis Test Result (t-Test)

Tabel 8. Result t Test

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-94.100	8.737		-10.770	.000
	Z Score	.016	.008	.117	2.113	.036
	Liquidity	-.149	.055	-.148	-2.706	.007
	Operating Cash Flow	30.531	2.666	.621	11.451	.000
	DER	-.192	.224	-.048	-.857	.393
a. Dependent Variable: Tobin's Q						

Based on the results of the partial test (t-test), the Z-Score variable has a t-calculated value of 2.113 with a significance of 0.036 < 0.05 so that it has a positive and significant effect on the value of the firm. A regression coefficient of 0.016 indicates that an increase in the Z-Score will increase the value of the company. The liquidity variable obtained a t-calculated value of -2.706 with a significance of 0.007 < 0.05 so that it had a negative and significant effect on the value of the firm, which means that the increase in liquidity actually decreased the company's value by 0.149. The Operating Cash Flow variable has the largest t-calculated value of 11.451 with a significance of 0.000 < 0.05 so that it has a positive and significant effect on the value of the firm. The regression coefficient of 30.531 shows that operating cash flow is the most dominant variable in increasing the value of the company. Meanwhile, the Debt to Equity Ratio (DER) variable obtained a t-calculated value of -0.857 with a significance of 0.393 > 0.05 so that it is not Significant effect on the value of the firm in energy sector companies for the 2022–2024 period.

h. Multiple Linear Regression Analysis

Tabel 9. Result Multiple Linear Regression Analysis

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-94.100	8.737		-10.770	.000
	Z Score	.016	.008	.117	2.113	.036
	Liquidity	-.149	.055	-.148	-2.706	.007
	Operating Cash Flow	30.531	2.666	.621	11.451	.000
	DER	-.192	.224	-.048	-.857	.393
a. Dependent Variable: Tobin's Q						

Based on the results of the analysis presented in table 6, it can be seen that the dependent variable (value of the firm) proxied with Tobin's Q is influenced by the independent variables studied consisting of Z-Score, liquidity, operating cash flow, and Debt to Equity Ratio (DER). The results of the resulting multiple linear regression are further incorporated into the following equation:

$$Y = -94{,}100 + 0{,}16X_1 - 0{,}149X_2 + 30{,}531X_3 - 0{,}192X_4 + \varepsilon i$$

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Based on the results of multiple linear regression analysis, a constant value of -94.100 was obtained which shows that if all independent variables are zero, then the value of the firm will be -94.100. The Z-Score variable has a regression coefficient of 0.016 which has a positive value, thus indicating that the improvement of the company's financial health will increase the value of the firm. The liquidity variable proxied using the current ratio has a regression coefficient of -0.149 which shows that the increase in liquidity actually decreases the value of the firm. This indicates that the high current assets that are not optimally utilized can reduce the efficiency of the company in the eyes of investors. Furthermore, the operating cash flow variable has the largest regression coefficient of 30.531 and has a positive value, which shows that the company's ability to generate cash flow from operational activities has the strongest influence on the increase in the value of the firm. Meanwhile, the Debt to Equity Ratio (DER) variable has a regression coefficient of -0.192 which has a negative value, but is not significant with a significance value of 0.393. This shows that the company's leverage level has not been able to have a significant influence on the value of the firm in the energy sector company during the research period.

4.2. Discussion

a. The Influence of the Application of the Altman Z-Score Model in Predicting Financial Distress Conditions in Energy Sector Companies

The results of the study indicate that the Altman Z-Score values of energy sector companies listed on the Indonesia Stock Exchange during the 2022–2024 period exhibited significant variation. Before outlier removal, Z-Score values ranged from -115.580 to 254.214, with a mean of 9.963 and a standard deviation of 34.201, indicating extreme differences in financial condition between companies. After outlier removal, the data distribution became more stable, with a minimum value of -32.955 and a mean increase of 13.201, thus better representing the financial condition of energy sector companies. These results indicate that some companies are in financial distress, but some are also in very healthy financial condition.

Based on the Altman Z-Score classification, companies can be categorized into the safe zone (Z-Score > 2.99), the gray zone (1.81 ≤ Z-Score ≤ 2.99), and the distress zone (Z-Score < 1.81). The average Z-Score of 2.55 after outlier management indicates that energy sector companies are generally in the gray zone, or near-safe. This finding reflects the characteristics of the energy sector, which is heavily influenced by fluctuations in commodity prices and energy policies. The Z-Score is formed from a combination of the ratios of working capital to total assets, retained earnings to total assets, EBIT to total assets, market value of equity to total liabilities, and sales to total assets. Therefore, declining operational performance, high debt levels, or weak cash flow can lower the Z-Score and increase the risk of financial distress.

This finding supports Altman et al. (2017), who stated that the Z-Score is an effective tool for detecting potential bankruptcy through composite financial indicators. Furthermore, Almamy et al. (2016) explained that the Z-Score's predictive ability becomes stronger when combined with company cash flow information. In the energy sector, sensitivity to changes in commodity prices leads to a decrease in revenue and operating profit, which can directly lower the Z-Score. Similarly, Habib et al. (2013) found that companies experiencing financial distress tend to have lower earnings quality, increasing the risk of financial distress. Thus, the Altman Z-Score in this study proved capable of providing a comprehensive picture of the financial distress of energy sector companies and can be used as an early warning system for management, investors, and regulators in identifying potential financial distress early.

b. The Influence of Z-Score on the Value of the Firm Proxied through Tobin's Q

The results of the hypothesis testing indicate that the Altman Z-Score has a positive and significant effect on firm value, as proxied by Tobin's Q. This result indicates that the better a company's financial condition, the higher the market value assigned to the company. A positive regression coefficient indicates that an increase in the Z-Score is followed by an increase in the Tobin's Q value, thus the research hypothesis

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stating that financial distress affects firm value is accepted. This finding indicates that investors consider the information contained in the Z-Score as a basis for assessing a company's prospects and sustainability.

This study's results align with those of Altman et al. (2017), who stated that companies with better financial health and lower bankruptcy risk tend to receive higher market valuations. Although the Z-Score was originally developed as a bankruptcy prediction tool, this indicator also reflects a company's fundamental quality through aspects of liquidity, profitability, leverage, and asset efficiency. Therefore, companies with high Z-Scores are perceived as having a better ability to create long-term value. This finding is also consistent with Dang et al. (2020) showed that the quality of financial performance has a significant influence on a company's market value. From a signaling theory perspective, sound financial condition is a positive signal that can boost investor confidence and drive increased company value (Friske et al., 2023). In the energy sector, which experiences high levels of uncertainty due to commodity price fluctuations and geopolitical dynamics, signals of financial health are a crucial factor in the investment decision-making process.

In addition to financial distress, this study found that operating cash flow has a positive and significant effect on company value. This finding indicates that energy sector investors pay close attention to a company's ability to generate cash from its operational activities. These results support the research of Almamy et al. (2016), which states that cash flow is an indicator of financial health that has high predictive power of company performance. Conversely, liquidity has a negative and significant effect on company value, indicating that excessively high liquidity levels can be perceived as suboptimal utilization of productive assets. Meanwhile, the debt-to-equity ratio did not show a significant effect on company value, indicating that capital structure was not a primary factor considered by investors when assessing energy sector companies during the study period.

The Adjusted R^2 value of 0.433 indicates that the research model is able to explain 43.3% of the variation in company value, while the remainder is influenced by other factors outside the model, such as corporate governance, dividend policy, market sentiment, and macroeconomic and geopolitical conditions. Overall, the research results confirm that the Altman Z-Score has a positive and significant influence on company value in energy sector companies listed on the Indonesia Stock Exchange for the 2022–2024 period. This finding indicates that a healthy financial condition not only reflects a company's financial resilience but also contributes to increasing investor confidence and the company's market value.

V. Conclusion

This study aims to examine the effect of financial distress, proxied by the Altman Z-Score, on firm value measured by Tobin's Q in energy sector companies listed on the Indonesia Stock Exchange during the 2022–2024 period. The results indicate that financial distress has a positive and significant effect on firm value. This finding suggests that companies with better financial health, reflected in higher Z-Score values, tend to receive higher market valuations from investors. In addition, operating cash flow has a positive and significant effect on firm value, liquidity has a negative and significant effect, while the debt to equity ratio does not significantly affect firm value. These findings contribute to the literature by providing empirical evidence that the Altman Z-Score is not only useful as an early warning tool for bankruptcy risk but also serves as an important indicator in explaining firm value within the context of an emerging capital market characterized by relatively low market efficiency. The study extends previous research by demonstrating that financial health information remains relevant in shaping investor perceptions, particularly in the energy sector, which is highly exposed to commodity price fluctuations and macroeconomic uncertainty.

From an investment perspective, the findings imply that investors should consider financial distress indicators, particularly the Altman Z-Score and operating cash flow, when evaluating investment opportunities in energy companies. For corporate management, maintaining financial stability, improving operational cash flow, and managing financial risk effectively are essential to enhancing market confidence and firm value. Furthermore, regulators and market participants may utilize financial distress indicators as part of an early warning mechanism to improve market transparency and support more informed investment

decisions. This study is limited to energy sector companies and employs financial distress as the primary explanatory variable. Therefore, future research is encouraged to incorporate additional determinants of firm value, such as corporate governance, dividend policy, sustainability performance, environmental, social, and governance (ESG) factors, and macroeconomic conditions. Future studies may also extend the observation period and compare multiple industrial sectors to provide a broader understanding of the relationship between financial distress and firm value in emerging markets.

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