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Analysis of Financial Distress Potential Using the Altman Z-Score and Springate Methods in Predicting Company Bankruptcy

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ABSTRACT

This study aims to identify the potential for financial distress in oil and gas sub-sector companies listed on the Indonesia Stock Exchange using two prediction models, namely Altman Z-Score and Springate. This study also tests whether there is a significant difference between the two methods in detecting bankruptcy risk. The sampling method used is purposive sampling, with the population consisting of all oil and gas sub-sector companies listed on the IDX during the period 2011–2015, and six companies were obtained as samples that met the criteria. This study was motivated by the decline in national oil and gas reserves, technical-operational challenges, and global oil price volatility which have a significant impact on the financial stability of companies in this sector.

The data analysis methods used include the application of the Altman Z-Score and Springate models to calculate the financial distress score for each company, followed by a Paired Sample T-Test to determine significant differences between the two methods. The results of the study indicate that most companies show indications of being in a high-risk zone for financial distress, both based on the Altman Z-Score and Springate analyses. In addition, statistically significant differences were found between the prediction results of the two models, indicating differences in sensitivity in detecting bankruptcy risk. The implications of this study indicate the importance for oil and gas company management, investors, and regulators to use more than one analysis model in identifying and anticipating financial crises early in order to maintain the sustainability of the national energy industry.

INTRODUCTION

Indonesia is known as a country with abundant natural and biological resources. The diversity of these resources is spread across various strategic sectors, such as mining, agriculture, plantations, livestock, and fisheries. All of these sectors directly contribute significantly to national

economic development. The diversity of these sectors is not only the mainstay of domestic economic activity but also strengthens economic resilience at the local and national levels (Rachman, 2022). In this case, the mining sector, especially oil and gas (oil and gas), is one of the components that consistently shows a large contribution to the national income structure (Ashraf et al., 2019).

The oil and gas subsector has a strategic role in contributing to the country's foreign exchange, because its contribution is recorded as the second largest after the taxation sector. Data shows that this sector contributes around 30 percent of total state revenue, making it a major pillar in the national fiscal structure. However, behind this large contribution, there are various serious challenges that hinder the sustainability of this industry. Since 1995, Indonesia's upstream oil and gas sector has experienced a downward trend, both in terms of production volume and the discovery of new reserves. This phenomenon reflects a structural crisis that threatens the long-term prospects of national energy security (Younas et al., 2021).

The decline in national oil reserves has become a major concern, with estimates stating that available reserves are now below 10 billion barrels. This amount is considered far from sufficient to ensure the sustainability of energy supply in the long term. On the other hand, the slowdown in exploration activities indicates a lack of incentives and investment interest in this sector, which in turn exacerbates the weakness of new reserve discoveries (Shahwan, 2015). Efforts to re-operate old oil wells are also not free from major technical and financial challenges, which also add to the burden of production costs and risks (Ridwan et al., 2022). Overall, these dynamics indicate that the sustainability of the oil and gas industry is under significant structural pressure.

The conditions faced by the oil and gas sector are increasingly complex when faced with global oil price volatility. One crucial moment occurred when the United States Congress on December 15, 2015, lifted the ban on domestic crude oil exports, which resulted in a sudden spike in global supply and drastically depressed international oil prices (Ambarwati et al., 2017). As a result, oil and gas companies, including those operating in Indonesia, experienced great pressure in terms of profitability and liquidity because they were highly dependent on the stability of world oil prices (Fischer et al., 2018). This situation requires companies to reformulate their business strategies as a whole in order to survive in a situation full of uncertainty. Therefore, it is important for companies to have an early detection system for risky financial conditions.

Financial distress is one of the critical conditions that need to be watched out for in the oil and gas industry. Based on a literature review, financial distress can be interpreted as significant financial pressure experienced by a company, especially related to the inability to meet its short-term obligations (Muzanni & Yuliana, 2021). In the context of the oil and gas sector which is very vulnerable to external fluctuations, early identification of symptoms of financial distress is very important. Financial analysis through liquidity, solvency, and profitability ratios is a fundamental initial step in diagnosing potential bankruptcy risks (Febinda et al., 2023). For this reason, this study uses two predictive models that have been proven empirically valid, namely Altman Z-Score and Springate, in analyzing the conditions of oil and gas sub-sector companies listed on the Indonesia Stock Exchange (IDX) (Purwanti et al., 2024).

H1: There is potential for financial distress in oil and gas sub-sector companies using the Altman Z-Score method.

The Altman Z-Score method is one of the most widely used bankruptcy prediction tools in corporate financial analysis. This model combines several financial ratios such as liquidity, profitability, leverage, and activity efficiency, which comprehensively reflect the financial health of the company (Ayubi et al., 2022; Susanti, 2016). In the context of oil and gas companies, this method is relevant because this sector is very vulnerable to commodity price fluctuations and operational cost pressures (Paulina & Ida, 2022). Therefore, the application of the Altman Z-Score can identify companies that are in a high-risk zone for financial distress (Hartati, 2022). Thus, this hypothesis

tests the extent to which the indicators in the Altman Z-Score are able to detect potential bankruptcy in the oil and gas subsector.

H2: There is potential for financial distress in oil and gas sub-sector companies using the Springate method.

The Springate model is an alternative tool developed to analyze bankruptcy risk based on a combination of certain financial ratios, such as profitability and efficiency ratios (Putri et al., 2022). Although not as popular as the Altman Z-Score, this model has been used in various studies and has proven to be reliable in detecting early signs of financial failure, including in the oil and gas sector which often faces specific challenges such as high capital costs and income volatility (Sakinah & Puji, 2021). Therefore, this hypothesis aims to test the ability of the Springate model to accurately predict potential financial distress (Ngangi & Soewignyo, 2022).

H3: There is a significant difference between the results of bankruptcy analysis using the Altman Z-Score method and the Springate method in the oil and gas sub-sector on the Indonesia Stock Exchange.

The differences in approach and ratio composition in the Altman Z-Score and Springate methods allow for differences in results in detecting financial distress (Jamal et al., 2024). Each model has its own sensitivity and specifications in measuring financial performance and bankruptcy risk (Hartati, 2022). In practice, the prediction results of these two models are often not completely consistent, especially in sectors with high-risk characteristics such as oil and gas. Therefore, it is important to test whether there is a statistically significant difference between these two methods in the context of oil and gas companies on the Indonesia Stock Exchange. This hypothesis will help determine which of the two models is more appropriate or whether they can complement each other in financial analysis.

Given the complexity of the problems affecting the national oil and gas sector, the need to understand and anticipate potential corporate financial crises is becoming increasingly urgent. Through the bankruptcy prediction model approach, it is hoped that companies can identify their financial weaknesses before entering the operational failure phase. In addition, the results of this study are also expected to provide real contributions to strategic decision-making by management, investors, regulators, and other stakeholders (Amri & Aryani, 2021). Thus, companies can design appropriate rescue strategies and the government can formulate policies that support the sustainability of the national energy industry. Ultimately, the stability of the oil and gas sector will have a positive impact on overall economic growth.

RESEARCH METHODOLOGY

Population and Research Sample

The population in this study includes all companies engaged in the mining sector, especially the oil and gas sub-sector, listed on the Indonesia Stock Exchange (IDX) during the period 2011 to 2015. This population was chosen because the oil and gas sector has characteristics that are highly influenced by global commodity price fluctuations and macroeconomic dynamics, making it prone to financial distress. The sample selection was carried out by purposive sampling, namely based on the suitability of the company's characteristics with certain criteria that have been determined by the researcher. These criteria include oil and gas sub-sector companies that are actively listed on the IDX during the observation year and have complete financial report data for analysis. Based on these criteria, the companies that meet the requirements are: 1) PT Ratu Prabu Energi Tbk, 2) PT Benakat Integra Tbk, 3) PT Elnusa Tbk, 4) PT Energi Mega Persada Tbk, 5) PT Medco Energi Internasional Tbk, and 6) PT Radiant Utama Interinsco Tbk.

B. Data Analysis Techniques

This study uses three main techniques in analyzing data, namely the Altman Z-Score method, the Springate method, and the Paired Sample T statistical test. The Altman Z-Score and Springate

methods are used to predict the potential for financial distress in companies based on financial ratios generated from the annual financial statements of (Febriani & Iswoyo, 2021). After the scores from the two models are obtained, the next step is to make a comparison through the Paired Sample T Test to determine whether there is a significant difference between the two methods in assessing bankruptcy risk. This analysis technique was chosen because it is able to provide a clear picture of the accuracy and consistency of predictions from each model. Thus, this study not only measures the potential for financial distress, but also assesses the validity and differences between the analysis methods used.

Altman Z-Score

Altman Z-Score is a method developed by Edward I. Altman in 1968 to predict corporate bankruptcy using five key financial ratios (Chua & Rustam, 2023). This model sets certain cut-off values, namely 2.99 and 1.81, to classify the level of bankruptcy risk of a company. If a company's Z-score is more than 2.99, then the company is considered to be in a healthy financial condition and is unlikely to go bankrupt. Conversely, if the Z-score is below 1.81, the company is predicted to be in financial distress and has a high potential for bankruptcy (Arnita & Ida, 2024). Meanwhile, companies with scores between 1.81 and 2.99 are categorized as being in the grey area, namely an unstable financial condition and requiring further attention.

Altman Z-Score Method Equation:

$$Z = 1{,}2\ X_1 + 1{,}4X_2 + 3{,}3X_3 + 0{,}6X_4 + 1{,}0X_5$$

Variable Interpretation:

- X_1 = Working Capital / Total Assets. Measures liquidity and efficiency of short-term asset usage. High values indicate the company is quite liquid and able to meet short-term obligations (with a coefficient of 1.2).
- X_2 = Retained Earnings / Total Assets. Describes the accumulation of retained earnings to total assets, which indicates the age and independence of the company's funding. A high value indicates that the company is not too dependent on external financing. (with a coefficient of 1.4).
- X_3 = Earnings Before Interest and Taxes (EBIT) / Total Assets. Measures profitability relative to assets (with a coefficient of 3.3). The highest weight (3.3) indicates that profitability is the most important factor in assessing bankruptcy risk.
- X_4 = Market Value of Equity / Book Value of Total Liabilities. Reflects the company's market value compared to total liabilities. Shows how much equity cushions debt (with a coefficient of 0.6)
- X_5 = Sales / Total Assets. Measures the efficiency of asset usage in generating sales. Is an indicator of productivity (with a coefficient of 1.0).

Interpretation of Z Value:

- Z > 2.99 → Safe zone: The company is considered healthy and has little chance of going bankrupt.
- 1.81 < Z < 2.99 → Grey zone: The company is in an uncertain condition, further analysis is needed.
- Z < 1.81 → Bankruptcy zone (distress zone): The company is at high risk of bankruptcy.

The Altman Z-Score equation provides a comprehensive statistical tool to assess a company's financial condition based on a combination of liquidity, profitability, leverage, and operational efficiency. The higher the Z-score, the better the company's financial position against the risk of bankruptcy.

Springate Method

The Springate method is a development of the Altman model introduced by Gordon LV Springate in 1978, which uses four main financial ratios in its calculations (Adaria et al., 2022). This model has a threshold value of 0.862 which determines whether a company is healthy or at risk of bankruptcy. If a company's Springate score is below 0.862, the company is predicted to experience financial distress or bankruptcy (Hu et al., 2023). Unlike Altman who considers five ratios, Springate simplifies the model without reducing accuracy, so it is often used as an alternative method in bankruptcy research (Yunis & Hasnawati, 2023). This model is considered relevant for use in assessing oil and gas companies, which often face the challenges of high production costs and fluctuations in world oil prices (Jamal et al., 2024; Ngangi & Soewignyo, 2022).

Springate Z-Score Method Equiation:

$$Z = 1{,}03X_1 + 3{,}07X_2 + 0{,}66X_3 + 0{,}4X_4$$

Variable Interpretation:
Each variable in this model represents an important financial ratio that reflects the company's financial condition:

1. X_1 = Working Capital / Total Assets. X1 Measures the company's short-term liquidity. The higher X_1, the greater the company's ability to pay current liabilities from available assets (with a coefficient of 1.03)
2. X_2 = Net Profit Before Interest and Tax / Total Assets. X_2 measures profitability and efficiency of asset use. The most influential factor in the Springate model (with a coefficient of 3.07).
3. X_3 = Net Profit Before Tax / Current Liabilities. X_3 measures the ability of profit to current liabilities (short-term solvency) (with a coefficient of 0.66).
4. X_4 = Sales / Total Assets. X_4 measures the company's effectiveness in using assets to generate sales (total asset turnover) (with the highest coefficient of o.4).

Interpretation of Equation:
This model produces a Z score as an indicator of bankruptcy potential:

- Z > 0.862 → The company is considered healthy (not bankrupt).
- Z < 0.862 → The company is in the distress zone (at risk of bankruptcy).

Each coefficient (1.03; 3.07; 0.66; 0.4) is the weight of each financial variable, determined based on its contribution to the separation (discriminating power) between bankrupt and non-bankrupt companies. Springate Z-Score is a simple but quite effective financial diagnostic tool, especially for manufacturing companies. This model relies on profitability and asset efficiency ratios as the main indicators of bankruptcy. By using this equation, analysts can assess whether a company is at risk of facing serious financial problems or not.

Paired Sample T Test

To test the hypothesis regarding the difference in analysis results between the Altman Z-Score and Springate methods, the Paired Sample T statistical test is used. This test is used when two measurements are made on the same object, in this case the bankruptcy score results from two different methods for each company. The purpose of this test is to determine whether there is a significant difference between the two methods in predicting financial distress. The null hypothesis (H_o) states that there is no significant difference between the analysis results of the Altman and Springate methods, while the alternative hypothesis (H_a) states that there is a significant difference. The results of this test will provide a strong statistical basis in assessing the consistency and effectiveness of the bankruptcy prediction methods used in this study.

RESULTS AND DISCUSSION

Altman Z-Score Method Calculation Results

Assessing a company's financial health is an important aspect in analyzing potential bankruptcy, especially in strategic sectors such as oil and gas. One commonly used analysis tool is the Altman Z-Score method, which combines a number of financial ratios to predict the possibility of financial distress. Table 1 presents the results of the Z-Score calculation for six companies in the oil and gas sub-sector during the period 2011 to 2015. The six companies include PT Ratu Prabu Energi Tbk (ARTI), PT Benakat Integra Tbk (BIPI), PT Elnusa Tbk (ELSA), PT Energi Mega Persada Tbk (ENRG), PT Medco Energi Internasional Tbk (MEDC), and PT Radiant Utama Interinsco Tbk (RUIS). Analysis of the Z-Score value of each company provides an overview of whether the company is in a safe condition, vulnerable, or experiencing potential bankruptcy.

Table 1. Results of Altman Z-Score Method Calculation

Code	Year	X1	X2	X3	X4	X5	Z
MEANING	2011	0.09	0.18	0.02	0.02	0.21	**0.64**
	2012	0.07	0.16	0.05	0.02	0.31	**0.80**
	2013	0.22	0.10	0.11	0.02	0.26	**1.04**
	2014	0.14	0.07	0.05	0.02	0.20	**0.65**
	2015	0.25	0.05	0.03	0.01	0.09	**0.54**
BIPI	2011	0.01	-0.04	-0.06	1.92	0.09	**1.00**
	2012	0.15	-0.03	0.08	1.52	0.08	**1.38**
	2013	-0.10	-0.01	0.14	0.11	0.14	**0.52**
	2014	-0.09	0.00	0.02	0.10	0.18	**0.20**
	2015	-0.08	0.00	-0.07	0.09	0.01	**-0.28**
ELSA	2011	0.11	0.17	-0.04	0.91	1.07	**1.87**
	2012	0.15	0.20	0.03	0.52	1.11	**1.99**
	2013	0.21	0.25	0.05	0.51	0.94	**2.04**
	2014	0.20	0.33	0.09	0.53	0.99	**2.32**
	2015	0.14	0.34	0.10	0.51	0.86	**2.14**
ENRG	2011	-0.09	0.12	0.04	0.49	0.12	**0.62**
	2012	-0.11	0.09	0.01	0.40	0.32	**0.59**
	2013	-0.09	0.01	0.01	0.32	0.35	**0.48**
	2014	-0.13	0.01	0.01	0.34	0.37	**0.45**
	2015	-0.21	0.32	0.00	0.35	0.41	**0.81**
MEDC	2011	0.19	0.25	0.09	0.03	0.31	**1.18**
	2012	0.28	0.25	0.10	0.02	0.25	**1.28**
	2013	0.16	0.26	0.10	0.02	0.65	**1.54**
	2014	0.10	0.24	0.06	0.02	0.66	**1.33**
	2015	0.18	0.22	0.03	0.01	0.76	**1.39**
RUIS	2011	0.03	0.09	0.06	0.31	1.18	**1.74**
	2012	0.04	0.11	0.11	0.26	1.36	**2.07**
	2013	0.06	0.12	0.13	0.24	1.41	**2.23**
	2014	-0.02	0.16	0.12	0.25	1.45	**2.20**
	2015	-0.08	0.21	0.14	0.32	1.46	**2.32**

Source: research data calculation results

PT Ratu Prabu Energi Tbk (ARTI) shows a Z-Score value that is consistently below the safe threshold (2.99) for five consecutive years. The highest Z-score was recorded in 2013 at 1.04, while the lowest was 0.54 in 2015. This indicates that ARTI is in the distress zone and is at risk of experiencing financial difficulties. Meanwhile, PT Benakat Integra Tbk (BIPI) experienced a fairly

drastic decline in its Z-Score, from 1.38 in 2012 to negative (-0.28) in 2015. This significant decline reflects the worsening financial condition of the company, even entering the red zone which indicates a high risk of bankruptcy.

In contrast to ARTI and BIPI, PT Elnusa Tbk (ELSA) shows a positive and stable trend. ELSA's Z-Score value increased from 1.87 in 2011 to a peak of 2.32 in 2014, and slightly decreased to 2.14 in 2015. Although it has not reached the safe threshold of 2.99, consistency above 2 indicates that ELSA is relatively healthier compared to other companies. In contrast, PT Energi Mega Persada Tbk (ENRG) shows stagnant financial performance and tends to be below the safe zone. ENRG's Z-Score value throughout the observation period never exceeded 1, with the lowest point in 2015 at 0.45. This indicates that ENRG is in a worrying financial condition on an ongoing basis.

PT Medco Energi Internasional Tbk (MEDC) has a Z-Score trend that shows improvement from year to year. Starting from 1.18 in 2011 and increasing to 1.54 in 2013, and relatively stable above 1.3 in the following years. Although it has not entered the safe zone (>2.99), this result shows the company's efforts to improve its financial condition. Meanwhile, PT Radiant Utama Interinsco Tbk (RUIS) showed the best financial performance among all samples. From 2012 to 2015, RUIS has consistently been in the Z-score range above 2, and reached 2.32 in 2015. This shows that the company is in the gray area zone that is close to safe, and has the potential to improve towards a more stable financial condition.

Based on the results of the Altman Z-Score method calculation, it can be concluded that there are quite striking differences in the financial conditions between oil and gas sub-sector companies. Several companies such as RUIS and ELSA show relatively healthy and stable financial performance, while ARTI and BIPI are in worrying financial conditions with very low Z-Score values. This analysis is important as a basis for evaluation for investors, company management, and other stakeholders in making strategic decisions. The Z-Score results can also be an early warning for companies to improve their financial and operational structures to avoid the risk of bankruptcy. Thus, continuous monitoring and management of financial risks are the main keys to maintaining business sustainability in this challenging energy sector.

Based on the results of the Altman Z-Score calculation, H1: There is potential for financial distress in oil and gas sub-sector companies using the Altman Z-Score method, supported by some oil and gas sub-sector companies.

Springate Method Calculation Results

The Springate method is one of the bankruptcy prediction models developed by Gordon LV Springate in 1978 based on discriminant analysis. This model uses four financial ratios combined to produce a Z-Score value, which is then used to classify the company's financial condition, whether it is healthy, vulnerable, or experiencing potential bankruptcy. Based on Table 2, the results of the Springate method calculation on six companies, namely ARTI, BIPI, ELSA, ENRG, MEDC, and RUIS during the period 2011 to 2015. The Z-Score value obtained will be analyzed to assess the financial performance and health level of the company during that period.

ARTI Company showed fluctuations in Z-Score values over a five-year period. The years 2012 and 2013 recorded the highest Z-Scores of 1.08 and 1.07 respectively, indicating relatively better performance compared to other years. However, in 2014 and 2015 there was a significant decline with Z-Scores of 0.63 and 0.46 respectively, indicating increasing financial vulnerability. Meanwhile, BIPI reflects less stable and problematic financial conditions. During the period 2011 to 2015, BIPI's Z-Score was always below the safe threshold. In fact, in 2011 and 2015 the Z-Score was below zero (-0.26), which is a strong signal of potential bankruptcy. Although it increased in 2013 to reach 0.56, this was not enough to show significant improvement in the long term.

Table 2. Results of Springate Method Calculations

Code	Year	X1	X2	X3	X4	Z
MEANING	2011	0.09	0.12	0.12	0.21	**0.63**
	2012	0.07	0.22	0.28	0.31	**1.08**
	2013	0.22	0.13	0.52	0.26	**1.07**
	2014	0.14	0.11	0.11	0.20	**0.63**
	2015	0.25	0.04	0.07	0.09	**0.46**
BIPI	2011	0.01	-0.06	-0.19	0.09	**-0.26**
	2012	0.15	0.08	0.01	0.08	**0.43**
	2013	-0.10	0.14	0.28	0.14	**0.56**
	2014	-0.09	0.02	0.11	0.18	**0.12**
	2015	-0.08	-0.07	0.07	0.01	**-0.26**
ELSA	2011	0.11	-0.03	0.01	1.07	**0.46**
	2012	0.15	0.03	0.13	1.11	**0.77**
	2013	0.21	0.05	0.22	0.94	**0.91**
	2014	0.20	0.09	0.41	0.99	**1.16**
	2015	0.14	0.10	0.26	0.86	**0.96**
ENRG	2011	-0.09	0.04	0.01	0.12	**0.10**
	2012	-0.11	0.01	0.13	0.32	**0.13**
	2013	-0.09	0.01	0.22	0.35	**0.22**
	2014	-0.13	0.01	0.41	0.37	**0.30**
	2015	-0.21	0.00	0.26	0.41	**0.12**
MEDC	2011	0.19	0.09	-0.27	0.31	**0.40**
	2012	0.28	0.10	0.42	0.25	**0.97**
	2013	0.16	0.10	0.47	0.65	**1.04**
	2014	0.10	0.06	0.24	0.66	**0.71**
	2015	0.18	0.03	-0.28	0.76	**0.40**
RUIS	2011	0.03	0.06	0.17	1.18	**0.80**
	2012	0.04	0.11	0.08	1.36	**0.97**
	2013	0.06	0.13	0.09	1.41	**1.09**
	2014	-0.02	0.12	0.11	1.45	**1.00**
	2015	-0.08	0.14	0.11	1.46	**1.01**

Source: research data calculation results

For ELSA, financial performance tends to improve from year to year. Starting from a Z-Score of 0.46 in 2011, this value has consistently increased and reached 1.16 in 2014. Although it experienced a slight decline in 2015 to 0.96, ELSA remains in a relatively safe category and shows a fairly good growth trend. ENRG Company experienced a fairly low Z-Score value and stagnated for five years. With the highest value only reaching 0.30 in 2014, ENRG has consistently been in the vulnerable zone. The negative value on X1 (working capital to total assets) for five consecutive years also strengthens the signal of liquidity problems and inefficient capital structure.

MEDC Company shows a fairly sharp up and down trend. Although it recorded a high Z-Score in 2013 (1.04), the following two years the value dropped back to 0.40, the same as in 2011. This shows that the company faces significant fluctuations in its financial performance, which can be caused by external or managerial variables. Meanwhile, RUIS shows stable and positive performance. From 2011 to 2015, the Z-Score increased from 0.80 to 1.01, indicating a healthy growth trend. All RUIS Z-Score values for five years have always been close to or exceeded the safe threshold, making it one of the companies with the best financial condition in the group analyzed.

Based on the results of the analysis using the Springate method, it can be concluded that of the six companies analyzed, RUIS and ELSA showed the most stable and healthy financial performance, while BIPI and ENRG tended to experience significant financial difficulties and

potentially face bankruptcy if structural improvements were not made. These results can be used as a basis for consideration by investors, creditors, and management in making strategic decisions related to the sustainability and mitigation of company risks.

Based on the results of the Springate Z-Score calculation, H2: There is potential for financial distress in oil and gas sub-sector companies using the Springate Z-Score method, supported by some oil and gas sub-sector companies.

Comparison of Altman and Springate Method Results

In the analysis of a company's financial health, bankruptcy prediction methods such as Altman Z-Score and Springate Z-Score are often used to quantitatively assess financial risk. Each method has its own approach in assessing the potential for bankruptcy based on a combination of certain financial ratios. Table 3 presents a comparison of the results of the classification of six companies (ARTI, BIPI, ELSA, ENRG, MEDC, and RUIS) based on the two methods, with the final categories being "Distress" (D) and "Non-Distress" (ND).

Table 3. Comparison of Altman and Springate Method Results

Code	Method	%		Final Category
		D	ND	
MEANING	Altman	100	0	*Distress*
	Springate	80	20	*Distress*
BIPI	Altman	100	0	*Distress*
	Springate	100	0	*Distress*
ELSA	Altman	100	0	*Distress*
	Springate	40	60	*Non-Distress*
ENRG	Altman	100	0	*Distress*
	Springate	100	0	*Distress*
MEDC	Altman	100	0	*Distress*
	Springate	60	40	*Distress*
RUIS	Altman	100	0	*Distress*
	Springate	20	80	*Non-Distress*

Source: processed data (2017)

Based on the Altman Z-Score method, all companies in the table are consistently categorized into Distress conditions (100%). This shows that the Altman model provides a very conservative assessment, tending to view companies at high risk of bankruptcy. This model may be more sensitive to indicators of losses or inefficiency in asset use, which makes it stricter in categorizing companies as high risk.

In contrast, the Springate Z-Score method shows more variable results. For example, firms ELSA and RUIS are categorized as Non-Distress by the Springate method, even though Altman rates both as Distressed. This suggests that Springate, which places the largest weight on profitability ratios (earnings before interest and taxes to total assets), may consider these firms' earnings performance to be sufficient to avoid bankruptcy classification. A similar trend is seen for MEDC, where 40% of the observation years are in the Non-Distress category.

These differences in results suggest that Springate's method may be more tolerant of short-term financial fluctuations or more consider earnings capability as a counterweight to financial risk. For example, RUIS, which has high sales to total assets (X_4) and stable profitability, is categorized as Non-Distress by Springate but is still considered Distressed by Altman. This suggests that the use of alternative models may provide a more balanced perspective in assessing a company's financial condition.

Overall, the comparison of the results between the Altman and Springate methods shows that no single model is completely superior, but each has advantages depending on the context of the analysis. Altman is more conservative and sensitive to structural financial vulnerabilities, while Springate provides greater opportunities for companies with maintained profit performance. Therefore, in making financial decisions, both methods should be used in a complementary manner to obtain a more comprehensive picture of the company's bankruptcy risk.

Results of the Third Hypothesis Test

To determine whether there is a significant difference between the bankruptcy prediction results using the Altman Z-Score and Springate Z-Score methods, a paired sample t-test was conducted. This test is used when two methods or treatments are tested on paired data in one group, in this case referring to the same year for each company (Maulidya & Filianti, 2020). The use of this test aims to compare the average values between the two approaches tested and determine whether the differences that appear are statistically significant or just happen by chance (Octavera & Syafel, 2022). Thus, the paired sample t-test is the right analytical tool in testing the consistency and differences of two predictive models that operate on the same financial data. This is important because the conclusions drawn from the bankruptcy prediction results will affect managerial and investment decisions.

Table 4. Paired Samples Correlations Test Results

		N	Correlation	Sig.
Pair 1	Altman & Springate	30	,768	,000

Source: processed data (2017)

Table 4 shows that there is a correlation of 0.768 between the calculation results of the Altman and Springate methods, with a significance level of 0.000. The correlation value indicates a fairly strong relationship between the two methods in predicting corporate bankruptcy. Because the significance value is less than 0.05, the relationship between the Altman and Springate methods can be said to be statistically significant (Asmin, 2024). In other words, although the two methods use different formulas and indicators, both tend to produce similar assessment trends of the company's financial condition during the 2011–2015 period. However, it is important to note that this strong relationship does not necessarily indicate similarities in the final classification results, because each method emphasizes different financial aspects.

Although both methods show a strong relationship, the results of the bankruptcy prediction score calculations produced by both can still differ significantly. This can be explained by the different approaches in formulating the indicators of each method. The Altman method places more emphasis on liquidity, solvency, and activity ratios, while the Springate method tends to focus more on the profitability aspect (Fadia & Simon, 2024; Nurwahida & Margasari, 2024). The difference in indicator orientation affects the way each method captures the potential bankruptcy risk of a company. Therefore, although the two are correlated, the final classification results provided by each model can differ substantially.

Table 5 presents the results of the paired samples t-test between the Altman Z-Score and Springate Z-Score methods. Based on the table, the average difference value (mean difference) of 0.67610 between the Altman and Springate scores is obtained. The standard deviation of this difference is 0.47245, and the standard error of the mean is 0.08626. The range of the 95% confidence interval is between 0.49969 and 0.85251, which does not include the value of zero. This indicates that the difference between the two methods is statistically significant.

The resulting t-count value is 7.838 with a degree of freedom (df) of 29, much greater than the t-table value of 2.045 at a significance level of 0.05 (Supitriyani et al., 2022). In addition, the significance value (p-value) of 0.000 which is less than 0.05 confirms that the difference between

the two methods does not occur by chance. Thus, the null hypothesis (H_o) which states that there is no difference between the Altman and Springate methods is rejected. Conversely, the alternative hypothesis (H_1) is accepted, namely that there is a significant difference between the two methods in producing bankruptcy prediction scores. Thus, the test results support*H3: There is a significant difference between the results of bankruptcy analysis using the Altman Z-Score method and the Springate method in the oil and gas sub-sector on the Indonesia Stock Exchange.*These findings reinforce the importance of an in-depth evaluation of the financial analysis tools used in the context of bankruptcy prediction.

Table 5. Paired Samples Differences Test Results

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Altman-Springate	,67610	,47245	,08626	,49969	,85251	7,838	29	,000

Source: processed data (2017)

This means that there is a significant difference in bankruptcy assessment between the Altman and Springate methods in the sample of companies analyzed during the period 2011–2015. This difference shows that the results provided by a model cannot be used as the sole basis for making strategic decisions related to the company's financial performance. Therefore, it is very important for financial analysts to understand the characteristics and assumptions behind each prediction model before using it. In practice, a comparative approach can provide a more comprehensive view of the bankruptcy risks that a company may face. It is recommended that decision makers do not rely on just one model, but use several methods as complementary considerations (Kisman & Wuryandari, 2021).

CONCLUSION

Based on the analysis results using the Altman Z-Score method, there are significant variations in the financial conditions of oil and gas sub-sector companies in Indonesia during the period 2011–2015. Companies such as PT Radiant Utama Interinsco Tbk (RUIS) and PT Elnusa Tbk (ELSA) show relatively more stable financial performance and are approaching the safe zone, while PT Ratu Prabu Energi Tbk (ARTI) and PT Benakat Integra Tbk (BIPI) are in the distress zone with very low Z-Score values, indicating a high potential for bankruptcy. These results underline the importance of regular monitoring of financial indicators as a preventive measure in managing the risk of bankruptcy in the highly dynamic energy sector.

Meanwhile, the Springate method also provides a consistent picture with the Altman method in identifying the financial condition of each company. ARTI and BIPI show a tendency for deteriorating financial performance, especially at the end of the observation period, which strengthens the indication of serious financial risk. In contrast, companies such as RUIS and ELSA maintain relatively good performance, although they have not yet fully entered the very healthy category. These two methods can be used as complementary strategic tools in decision-making by management, investors, and other stakeholders, in order to increase the company's resilience to financial pressures and maintain business sustainability in the energy industry.

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