

Analysis of Altman Springate, Zmijewski and Grover Methods as Predictors of Financial Distress

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Abstract

This study aims to identify and analyze financial distress in Coal Mining Sector Companies using the Altman Modified Z-Score, Springate, Zmijewski, and Grover methods and to determine the most accurate financial distress prediction method in predicting Coal Mining Sector companies. This study uses the type of data, namely descriptive quantitative data, using secondary data obtained through literature studies, journals, literature. The sampling technique used in this study was purposive sampling with a total sample of 5 companies in the coal mining sector. The object of this research is PT. Indika Energy Tbk, PT. Dian Swastatica Sentosa, PT Bumi Resources Tbk, PT. Natural Resources Indonesia Tbk, PT. Samindo Resources Tbk. The results show the financial distress analysis for the coal mining sector for the 2018-2020 period that the Grover method is the most accurate method compared to other methods, with an accuracy rate of 100% and an error rate of 0%. The four prediction methods when used together are able to predict mining sector companies.

Keywords: Altman Z-Score, Springate, Zmijewski, Grover

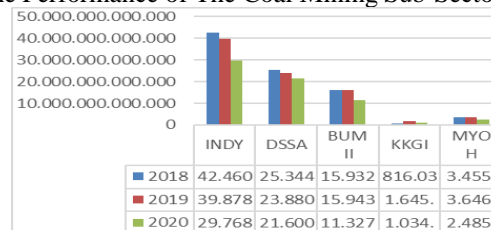
Introduction

In 1997/1998 the Asian crisis led to the depreciation of the Thai currency, Bath. The crisis resulted in several countries in Asia experiencing currency fluctuations. Indonesia is one of the countries that has experienced the most severe exchange rate fluctuations, entrepreneurs have difficulty importing raw materials to meet foreign obligations that are due. An economic crisis is when the economic condition of a person, region, country or world experiences a drastic decline. Inflation causes stock prices to fluctuate, property prices drop, and GDP (gross domestic product) declines have a huge impact from both the government and the public. (Harahap, 2013).

Since March 2020, Indonesia has been one of the countries affected by the corona virus and is also known as Covid 19. Covid-19 has not only had an adverse impact on the health sector, but has had an impact on the economic sector because it affects business activity during restrictions on community activities, p. This affects the consumption and behavior patterns of society. When it comes to economic problems, there are several economic sectors that are experiencing drastic changes, including aviation, tourism, trade, hotels or services, manufacturing, mining, etc.

Triyono (2005) revealed that a company's financial security is a major factor in preventing difficult conditions and crises where decisions need to be made to choose the accuracy of capital in a crisis context, including the strength of the shares it owns. This shows that when bank interest rates are high, equity is the choice. economy for business actors to survive. Liquidity, solvency and profitability are still very important to ensure the company's financial position or asset security as a basis for measuring the company's financial performance.

Graphic 1. The Performance of The Coal Mining Sub-Sector In 2018 - 2020



Source: www.idx.com

In the graph above it can be seen that the coal mining sub-sector in 2018 to 2020 experienced fluctuating income or fluctuations. INDY (PT Indika Energy Tbk), BUMII (PT Bumi Resources Tbk), and DSSA (PT. Dian Swastatika Sentosa Tbk) experienced a decrease in revenue for 3 consecutive periods. Whereas MYOH (PT. Samindo Resources Tbk) and KKGI (PT Resource Alam Indonesia Tbk) in 2018-2019 experienced an increase in revenue, but in 2020 the two companies experienced a decrease in income. The movement in income fluctuations was caused by conditions and situations due to the Covid-19 pandemic. This condition gives a signal that there is a decline in the company's financial performance. If this condition is left for a long time, it will potentially lead to financial distress. Every company needs anticipation and potential financial distress as early as possible in order to avoid the risk of bankruptcy for the company, so companies must analyze the possibility of bankruptcy as soon as possible.

Financial distress is a condition in which a company's operating cash flow is insufficient to meet its current obligations (for example, credit or interest expense), so this forces the company to take corrective action. Every company has a risk of financial distress, especially if the economic conditions and situation in the country where the company operates is experiencing an economic crisis. So the company must minimize and anticipate the occurrence of bankruptcy in the company by supervising the financial condition of the company using

financial report analysis. (Zainul Arifin, 2018). Financial Distress can be anticipated earlier by using the early warning system method. There are several prediction methods that have been developed to help interested parties make decisions. These methods are Altman (1968), Springate (1978), Zmijewski (1984), and Grover (2001).

Previous research related to the author's work was carried out by Elly Rahmawati, Suprihatmi Sri Wardiningsih, Setyaningsih Sri Utami (2018) with the title "Financial Distress Analysis Using the Grover Model, Altman Z-Score, Springate, and Zmijewski in Telecommunications Companies" conclusions drawn from research These are: the conclusions drawn from the research The highest level of accuracy (100%) is owned by the Grover model with an error rate (0%), the accuracy of the Altman model (87.5%) with an error rate (12.5%), the accuracy of the model Springate (81.25%) with an error rate (18.75%), while the accuracy of the Zmijewski model (87.5%) with an error rate (12.5%).

Altman discriminant analysis is a statistical method that can be used to predict the bankruptcy of a company. Altman combines several ratios and statistical methods to create predictive models. According to (Assaji & Machmuddah, 2017) Altman is a very well-known term called the Z-score, a discriminant used to predict the bankruptcy of a company.

Springate score is a way to estimate the feasibility of a company by combining indicators of financial ratios with different weights. Therefore the Springate method can be used to predict the probability that a company will go bankrupt (Rahayu et al., 2016). In 1987 Springate formulated a financial distress prediction model in which the face of the S-Score consisted of 19 popular financial ratios. After going through the Springate test, choosing 4 ratios that are trusted to distinguish between companies that will go bankrupt and those that will not go bankrupt.

Zmijewski in his research (Hartanti, 2018) formulated the results of his research which is used to predict potential bankruptcy which is called the Zmijewski Score, which uses the multiple discriminate analysis (MDA) ratio model.

According to research (Primasari, 2017) the Grover model is a model made by reassessing the altman z-score model. Jeffrey S. Grover proposed a sample according to the altman Z-score model in 1968 by adding 13 new financial ratios. The sample used was 70 companies with 35 bankrupt companies and 35 non-bankrupt companies in 1982 to 1996.

Method

The type of data used in this research is quantitative research. The data source in this study uses annual reports on coal mining sub-sector companies listed on the IDX in the 2018-2020 period as many as 24 companies. The sample selection in this study was carried out using a purposive sampling technique, so that the samples obtained were 5 coal mining sub-sector companies listed on the IDX.

Results and Discussion

To calculate the Modified Altman Method Z-Score using the equation $Z''=6.56 X_1+3.26 X_2+6.72 X_3+1.05X_4$ with cut off $Z'' = <1.1$ companies are included in the Financial Distress category, $1.1 < Z'' < 2.6$ the company is included in the Gray Area category, and $Z'' > 2.6$, the company is included in the Non Financial Distress category.

Table 1. Z-Score Method Analysis

No	Nama Perusahaan	Periode	Z- Score		Rata-rata
			Nilai	kategori	
1	Indika Energy Tbk	2018	3.793	non distress	3,2
		2019	3.244	non distress	
		2020	2.717	non distress	
2	Dian Swastatika Sentosa Tbk	2018	2.470	grey area	2,54
		2019	2.281	grey area	
		2020	3.340	non distress	
3	Bumi Resources Tbk	2018	7.070	non distress	4,7
		2019	7.061	non distress	
		2020	7.074	non distress	
4	Samindo Resources Tbk	2018	12.966	non distress	13,7
		2019	12.401	non distress	
		2020	15.790	non distress	
5	Resource Alam Indonesia Tbk	2018	5.882	non distress	6,9
		2019	6.577	non distress	
		2020	8.323	non distress	

Based on the calculation results (Table 1) of the Modified Altman Z-Score analysis method, as many as three companies in 2018-2020 did not experience financial difficulties (non-financial distress). There was one company that experienced financial distress in 2020 and experienced a gray area of the company in 2018-2019.

To calculate the Springate method using the S-Score equation model = $1.03 A + 3.07 B + 0.66 C + 0.4 D$ with a cut off $S < 0.861$ the company is included in the financial distress category, and $S > 0.861$, the company is included in the non-financial distress category.

Table 2. Springate Method Analysis

No	Nama Perusahaan	Periode	Springate		Rata-rata
			Nilai	kategori	
1	Indika Energy Tbk	2018	2.067	Non Distress	1,657
		2019	1.633	Non Distress	
		2020	1.271	Non Distress	
2	Dian Swastatika Sentosa Tbk	2018	0.980	Non Distress	0,848
		2019	0.786	Financial Distress	
		2020	0.778	Financial Distress	
3	Bumi Resources Tbk	2018	0.976	Non Distress	0,936
		2019	0.949	Non Distress	
		2020	0.884	Non Distress	
4	Samindo Resources Tbk	2018	4.353	Non Distress	4,146
		2019	3.688	Non Distress	
		2020	4.396	Non Distress	
5	Resource Alam Indonesia Tbk	2018	0.282	Financial Distress	0,512
		2019	0.781	Financial Distress	
		2020	0.475	Financial Distress	

Based on the results of the calculation of the financial distress method using the Springate method (Table 2.), it can be seen if the financial conditions of the 5 coal mining companies, there are three companies in 2018-2020 that are not experiencing financial difficulties (non-financial distress), namely Indika Energy Tbk, Bumi Resources Tbk, Samindo Resources Tbk. Dian Swastatika Sentosa Tbk did not experience

financial difficulties (non-financial distress) only in 2018. There was one company in 2018-2020 that experienced financial difficulties (financial distress), namely Resource Alam Indonesia Tbk. However, Dian Swastatika Sentosa Tbk experienced financial distress only in 2019-2020. This condition was caused by the Covid-19 pandemic.

To calculate the Zmijewski method using the equation model $X = -4.3 - 4.5 X_1 + 6.7 X_2 - 0.004 X_3$ with cut off $X < 0$ the company is included in the non-financial distress category. If $X > 0$ then, the company is included in the category of financial distress.

Table 3. Zmijewski Method Analysis

No	Nama Perusahaan	Periode	Zmijewski		Rata-rata
			nilai	kategori	
1	Indika Energy Tbk	2018	0.320	Financial Distress	0,457
		2019	0.451	Financial Distress	
		2020	0.600	Financial Distress	
2	Dian Swastatika Sentosa Tbk	2018	-0.757	Non Distress	-0,919
		2019	-0.638	Non Distress	
		2020	-1.363	Non Distress	
3	Bumi Resources Tbk	2018	-0.284	Non Distress	1,081
		2019	1.453	Financial Distress	
		2020	2.076	Financial Distress	
4	Samindo Resources Tbk	2018	-3.366	Non Distress	-3,501
		2019	-3.236	Non Distress	
		2020	-3.903	Non Distress	
5	Resource Alam Indonesia Tbk	2018	-2.972	Non Distress	-3,181
		2019	-3.083	Non Distress	
		2020	-3.490	Non Distress	

Based on the results of the calculation of the financial distress method using the Zmijewski method (Table 3), it can be seen that if the financial conditions of the 5 coal mining companies, there are three companies in 2018-2020 that are not experiencing financial difficulties (non-financial distress), namely Dian Swastatika Sentosa Tbk, Samindo Resources Tbk, Resource Alam Indonesia Tbk. Bumi Resources Tbk did not experience financial difficulties (non-financial distress) only in 2018. There was one company in 2018-2020 that experienced financial difficulties (financial distress), namely Indika Energy Tbk. However, Bumi Resources Tbk experienced financial distress only in 2019-2020.

Grover's method with equations:

$$G - Score = 1,650 X_1 + 3,404 X_2 + 0,016 ROA + 0,057$$

with a cut off $G < -0.02$ the company is included in the category of financial distress. $G > 0.01$, the company is included in the category of non-financial distress.

Table 4. Grover Method

NO	Nama Perusahaan	Periode	Grover		Rata-rata
			Nilai	Kategori	
1	Indika Energy Tbk	2018	1,131	Non Distress	0,937
		2019	0,919	Non Distress	
		2020	0,762	Non Distress	
2	Dian Swastatika Sentosa Tbk	2018	0,457	Non Distress	0,436
		2019	0,363	Non Distress	
		2020	0,489	Non Distress	
3	Bumi Resources Tbk	2018	1,246	Non Distress	0,188
		2019	1,21	Non Distress	
		2020	1,109	Non Distress	
4	Samindo Resources Tbk	2018	2,795	Non Distress	2,718
		2019	2,464	Non Distress	
		2020	2,897	Non Distress	
5	Resource Alam Indonesia Tbk	2018	0,18	Non Distress	0,299
		2019	0,4	Non Distress	
		2020	0,319	Non Distress	

Based on the results of the calculation of the financial distress method (Table 4) using the grover method, it can be seen if the financial conditions of 5 coal mining companies, there are 5 companies in 2018-2020 that are not experiencing financial difficulties (non-financial distress), namely Indika Energy Tbk, Dian Swastatika Sentosa Tbk, Bumi Resources Tbk, Samindo Resources Tbk, Resource Alam Indonesia Tbk.

Table 5. Recapitulation of Calculation Results

No	Nama Perusahaan	Altman Z-Score	Springate	Zmijewski	Grover
1	Indika Energy Tbk	3,2	1,657	0,457	0,937
2	Dian Swastatika Sentosa Tbk	2,54	0,848	-0,919	0,436
3	Bumi Resources Tbk	4,7	0,936	1,081	0,188
4	Samindo Resources Tbk	13,7	4,146	-3,501	2,718
5	Resource Alam Indonesia Tbk	6,9	0,512	-3,181	0,299
	Financial distress	0	2	1	0
	Grey	1	-	-	-
	Non financial distress	1	3	4	5

Based on the recapitulation of the calculation results of the 4 financial distress methods for the coal mining sub-sector for the 2018-2020 period, these four methods are very significant for predicting financial distress. This can be seen through the use of 4 methods, namely Altman Modification Z-Score, Springate, Zmijewski, and Grover.

Table 6. The 4 Financial Distress Methods

Prediksi	Tingkat Akurasi	Tingkat Error	Grey Area
Altman Z-Score	80%	0%	20%
Springate	60%	40%	-
Zmijewski	80%	20%	-
Grover	100%	0%	-

Based on the table results, it can be concluded that the Altman method (Z-Score) has an accuracy rate of 80%, the Springate method has an accuracy rate of 60%. The Zmijewski method has an accuracy rate of 80%, and the Grover method has an accuracy rate of 100%.

Conclusion

(1) Financial distress analysis for the coal mining sector for the 2018-2020 period using the Grover method is the first choice which has the highest accuracy rate (100%) and the lowest error rate (0%) compared to other methods. (2) Financial distress analysis for the coal mining sector for the 2018-2020 period using the Altman Z-Score Modification method is the second choice which has an accuracy rate of (80%) but has an alert category (20%) with an error rate (0%). (3) Financial distress analysis for the coal mining sector for the 2018-2020 period using the Zmijewski method is the third choice which has an accuracy rate of (80%) with an error rate (20%). (4) Financial distress analysis for the coal mining sector for the 2018-2020 period using the springate method is the last choice which has a lower accuracy rate of (60%) with an error rate (20%) compared to other methods. (5). In the analysis of financial distress using the Modified Altman Z-Score, Springate, Zmijewski, and Grover methods, there are differences in the results, of course with the level of accuracy, error rate and also the range of determining the category of financial distress.

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