INTERNATIONAL JOURNAL OF SOCIOLOGY, POLICY AND LAW (IJOSPL)
Vol. 4 No 1 Feb 2023 e-ISSN: **2774-2245**

The Effect Of Altman, Grover And Zmijewski Models In Predicting The Financial Distress Of Coal Companies Listed On The Indonesia Stock Exchange

Melina[1] ,Abigail Giantabita Kalinggo[2]
Accounting Study Program, Universitas Pelita Harapan, Indonesia
Email : Melina.kosashih@uph.edu

Abstract
This research aims to analyze whether Altman, Grover, and Zmijewski models have a significant effect on predicting the financial distress of coal companies listed on the Indonesia Stock Exchange from 2017 to 2021. The Independent variables used in this research are the Altman, Grover and, Zmijewski models and the dependent variable is financial distress, which is classified as a dummy variable. This research uses descriptive research under a quantitative approach using secondary data based on the audited financial statement of coal companies listed Indonesia Stock Exchange from 2017 to 2021. Using a purposive sampling technique, 18 coal companies were selected, as resulting in a total of 90 observations. The data analysis method used in this research is logistic regression analysis processed through SPSS 26. The result of this research shows that the Altman, Grover, and Zmijewski models do not have a significant effect partially in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange from 2017 to 2021. However, Altman, Grover, and Zmijewski models have a significant effect simultaneously in predicting the financial distress of coal companies on the Indonesia Stock Exchange from 2017 to 2021.

Keywords: *Altman model, Grover model, Zmijewski model, Financial Distress*

I. INTRODUCTION

The financial health of coal mining companies is also one of the business sectors that is quite interesting to research because Indonesia is one of the richest countries in natural resources and minerals, and one of them is coal. Coal is a fossil fuel that has an essential role as a power plant. Besides functioning as a power plant, coal can also be used as fuel to produce steel and cement (Piscestalia & Priyadi, 2019) Indonesia is the world's fourth largest coal exporter. Indonesia's largest coal produced is Kalimantan, with 549 million tons mined (Kompas, 2020).

A country's economic growth also greatly affects a company's economic health. If a country experiences an economic crisis, then companies in that country are also likely to experience financial distress. Indonesia's economic growth in 2020 of -2.06 was the lowest in 2017-2021 (see Figure 1.1). Indonesia's GDP plummeted compared to 2019, which grew by 5.02%. This is the worst since the 1998 crisis, which decline by -13.16%. This is a result of COVID-19's unfavorable effects. that is felt throughout the global economy, including in Indonesia (CNN Indonesia, 2021).

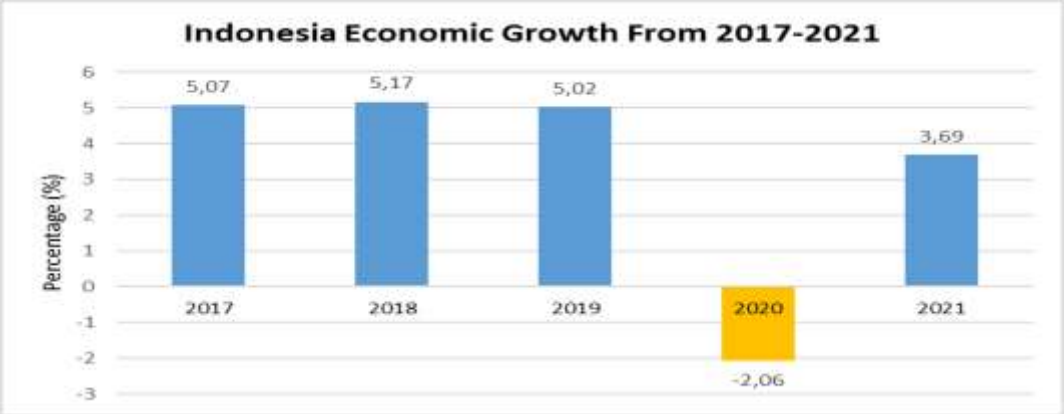

Figure 1 Indonesia Economic Growth Rate 2017-2021

Source: The World Bank (2022)

This situation makes competition between companies in one country and another more intense. Such intense competition makes the company's management improve and adjust to the current state of the economy. Because of this situation, Indonesian enterprises must enhance their management basics. Because if the company cannot adapt, then the company could go into bankruptcy. This also applies to mining companies, especially coal sub-sectors in Indonesia.

Indonesia Coal Price Chart from 2017-2021 (see Figure 1.2) continuously decreased from 2018 to 2020. The data showed that the reference coal price fluctuated wildly throughout 2020. The Reference Coal Price in September 2020 was the lowest from 2017 to 2021, which is 48.42 USD per ton. The Covid-19 epidemic was the reason behind the reference coal price in September 2020 was the lowest and the global market's high coal stocks due to the demand decline in several coal importing countries. In addition, the decline in Indonesia coal prices was also triggered by the policies of China and India, which prioritized using domestically produced coal (Liputan6, 2020).

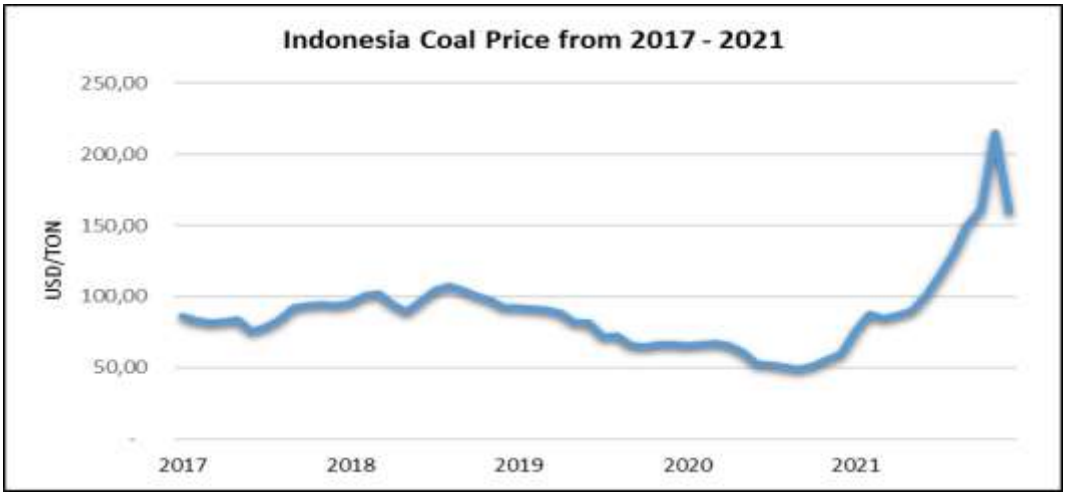

Figure 2 Indonesia Coal Price From 2017-2021

Source: Ministry of Energy and Mineral Resources (2022)

After experiencing a decline from 2018 to 2020, In November 2021, the Minister of Energy and Mineral Resources set the Reference Coal Price at the Highest Level of 215.01 USD Per Ton. which has been the highest from 2017-2021. This happened because the demand for coal in China continued to increase following the onset of winter and bad weather conditions, which caused disruptions to coal production and transportation in China's state coal-producing provinces. In addition to the high demand from China, other commodity factors, such as rising natural gas prices, influence global coal prices (Kompas, 2021).

Based on the description above, it can be said that the decline in the reference price of coal that occurred from 2018 to 2020 affected the profitability of the company. Because of the low price of coal, it cannot cover high production costs. If this keeps up happen, the business will undoubtedly experience financial distress, which could result in bankruptcy because the decline in coal prices in a few years will impact the company's

financial performance. So, predicting financial distress is a strategy to avoid a company going bankrupt. This is why the writer examines the financial distress of coal companies.

This research aims to provide explanation and understanding on: 1) To analyze whether the Altman model partially has a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange. 2) To analyze whether the Grover model partially has a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange. 3) To analyze whether the Zmijewski model partially has a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange. 4) To analyze whether Altman, Grover,and Zmijewski models simultaneously have a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange.

Furthermore, To avoid bankruptcy of a company, there are several financial distress model analysis that can be an early warning for the company, namely Altman, Zmijwski, Grover, Ohlson, Fulmer, Springate, Shumway Hazard model and these models have different accuracy based on the measurement used (Elviani et al. 2020). But in this research the writer only use Altman, Grover and Zmijewski models among several financial distress predictions model, due the large number of accounting researchers and academic using these models in predicting financial distress and all models have a high level of accuracy in predicting the financial distress, and all these models are also relatively easier to apply and analyze the financial distress (Wulandari & Fauzi, 2022) . So, it can be very useful. In addition, Previous researches have examined several models for predicting financial distress, but there were inconsistencies in the results. Edi & Tania (2018) claimed that Grover, Springate, Zmijwski and Altman models have a significant effect in predicting financial distress, the best model is Zmijewski. Primasari (2018) claimed that Grover doesn't have significant impact in predicting the financial distress. Elviani et al. (2020) Claimed that altman and springate can predict financial distress, but zmijewski can't predict financial distress. Seto & Trisnaningsih (2021) Claimed that the Altman, Springate, and Zmijewski models have a significant effect in predicting financial distress and the most appropriate is Altman.

Research conducted by Kason et al. (2020), The research entitled "Analisis Perbandingan Keakuratan Memprediksi Financial Distress dengan Menggunakan Model Grover, Springate, dan Altman Z-Score pada Perusahaan Pertambangan yang terdaftar di Bursa Efek Indonesia pada Tahun 2013-2017". This research used Grover, Springate and Altman to predict the financial distress of 14 Mining companies listed on the IDX from the 2013 to 2017 period. Kason et al. (2020) The result showed Grover, Springate, and Altman models has significant impact in predicting the financial distress for mining companies Listed on the Indonesia Stock Exchange. The similarities between the research conducted by Kason et al. (2020) and the research conducted by the writer are in the variable examined. Both researches use financial distress as the dependent variable. Altman and Grover models as similar independent variables. Besides that, the difference between the researches are the financial distress prediction models used, the research object, and the period of the research. The previous research used Altman, Grover, and Springate models in predicting the financial distress. While this research uses Altman, Grover, and Zmijewski models. Besides, the research object of the previous research focused on property companies, while this research focuses on Coal companies. Moreover, the previous research period was from 2013 to 2017, while this research period is from 2017 to 2021.

Research conducted by Elviani et al. (2020), The research entitled "Accuracy of Altman, Ohlson, Springate and Zmejewski Models in Bankruptcy Predicting Trade Sector Compenies". This research used the Springate, Zmijewski and Grover models to predict the financial distress of 53 Trade sector listed on the IDX from the 2012 to 2017 period. Elviani et al. (2020) The result shows Altman and Springate can be used to predict the bankruptcy. while ohlson and Zmijewski can't be used to predict bankruptcy of trading sector companies in Indonesia. And Springate model is the most appropriate and accurate model. The similarities between the research conducted by Elviani et al. (2020) and the research conducted by the writer are in the variable examined. Both of the researches are using financial distress as the dependent variable Altman and Zmijewski models as the similar independent variables. Besides that, the difference between the researches are the financial distress prediction models used, the research object, and the period of the research. The previous research used Altman, Springate, Zmijewski, and Ohlson models in predicting the financial distress. While this research uses Altman, Grover, and Zmijewski models. Besides, the research object of the previous research focused on trade companies, While this research focuses on Coal companies. Moreover, the previous research period was from 2012 to 2017, while this research period is from 2017 to 2021.

Research conducted by Primasari (2018), The research entitled "Analisis Altman Z-Score, Grover Score, Springate, dan Zmijewski sebagai Signaling Financial Distress". This research used the Altman, Grover, Springer Zmijewski models to predict the financial distress of 29 Consumer Goods companies listed on the IDX from the 2012 to 2015 period. Primasari (2018) The result showed that Altman, Springate and Zmijewski can predict financial distress, only Grover G-Score have insignificant value and cannot be used to predict financial distress. The similarities between the research conducted by Primasari (2018) and the research conducted by the writer are in the variable examined. Both researches use financial distress as the dependent variable Altman,

Zmijewski, and Grover models as the similar independent variables. While this research uses Altman, Grover, and Zmijewski models. Besides that, the difference between the researches is the research object of the previous research focused on Consumer Goods companies, While this research focuses on Coal companies. Moreover, the previous research period was from 2012 to 2015, while the period of this research is from 2017 to 2021.

Research conducted by Seto & Trisnaningsih (2021), The research entitled "Penggunaan Model Altman Z-Score, Springate, Zmijewski dan Grover dalam Memprediksi Financial Distress". This research used the Altman model, Springer and Zmijewski, to predict the financial distress of 25 retail trading companies on the Indonesia Stock Exchange from 2015 to 2019. Seto & Trisnaningsih (2021) result showed that Altman, Springate and Zmijewski models have a significant effect in predicting companies that experience financial distress and do not experience financial distress, but Grover model has no significant effect. The similarities between the research conducted by Seto & Trisnaningsih (2021) and the research conducted by the writer are in the variable examined. Both researches use financial distress as the dependent variable. Altman, Zmijewski, and Grover models as similar independent variables. While this research uses Altman, Grover, and Zmijewski models. Besides that, the difference between the researches are the financial distress of the research object and the research period. the research object of the previous research focused on retail trading companies, while this research focuses on Coal companies. Moreover, the previous research period was from 2015 to 2019, while this research period is from 2017 to 2021.

Research conducted by Edi & Tania (2018), The research entitled "Ketepatan Model Altman, Springate, Zmijewski, dan Grover Dalam Memprediksi Financial Distress". This research used Altman, Grover, Springer, and Zmijewski to predict the financial distress of 1.321 firms collected from the Indonesia Stock Exchange from 2012 to 2016. (Edi & Tania, 2018) the result showed that Altman, Springate, Zmijewski, and Grover models have a significant impact and can be applied to predict the condition of financial distress because it has the highest level of coefficient determination compared to other models. The similarities between the research conducted by (Edi & Tania, 2018) and the research conducted by the writer are in the variable examined. Both researches use financial distress as the dependent variable Altman, Zmijewski, and Grover models as similar independent variables. While this research uses Altman, Grover, and Zmijewski models. Besides that, the difference between the researches are the financial distress of the research object and the research period. the research object of the previous research focused on all companies listed on the Indonesia stock exchange, while this research focuses on Coal companies. Moreover, the previous research period was from 2012 to 2016, while this research period is from 2017 to 2021.

Hypothesis Development

Altman Model toward Financial Distress

the Altman was developed in 1968 by Edward I. Altman. Altman used a sample of 66 companies for 20 years from 1946 to 1965. The study took five ratios out of 22 considered best to be used as variables in this method. There are three Altman models. The first Model of Altman is for manufacturing companies because the first model is not suitable for small, non-manufacturing, or private companies. Altman developed two advanced Z-Score models: revision and modification models for private and non-manufacturing companies. Altman has three formula for three types of company, so it can be said that the Altman is the best financial distress prediction model. The statement is supported by research done by Seto & Trisnaningsih (2021), claims that the Altman model can be used to anticipate when a company would be in financial distress. The Altman Model is the best suitable prediction model.

Furthermore, the aim of this research is to examine whether The Altman model partially has a significant effect in predicting the financial distress of coal companies. And to reach this objective, the following hypothesis has been formulated as follows:

H_1: Altman model partially has a significant effect in predicting the financial distress of coal companies Listed on the Indonesia Stock Exchange.

Grover Model toward Financial Distress

Laksmana & Darmawati (2019) tated that the Grover model was redesigned and re-evaluating the Altman model. Following the Altman model, Jeffrey S. Grover added 13 new financial ratios using samples. 70 companies made up the sample, including 35 bankrupt and 35 healthy companies between 1982 and 1996 . The formulas has the cut off value if less than -0.02, means that the company is predicted to experience the financial distress and if the cut off value is greater than 0.01, means that the company is not experience financial distress.This statement is supported by researches done by (Agus & Irfani, 2020, p.249) Kason et al. (2020) and Edi & Tania (2018) stated the Grover model significantly predicts financial distress.

Furthermore, this research aims to examine whether The Grover model partially has a significant effect in predicting the financial distress of coal companies. To reach this objective, the following hypothesis has been formulated as follows:

H_2: Grover model partially has a significant effect in predicting the financial distress of coal companies Listed on the Indonesia Stock Exchange.

Zmijewski toward Financial Distress

Elviani et al. (2020) stated that in 1984, Zmijewski employed ratio analysis to analyze a company's performance, leverage, and liquidity for his prediction model. Zmijewski used an 840 company sample, with 40 companies going bankrupt and 800 remaining solvents. annual industrial file provided the source for this information. Data was gathered between 1972 and 1978. The statistical method employed is logit regression, the same as Ohlson's. This statement is supported by researches done by Seto & Trisnaningsih (2021) claim that the Zmijewski model significantly predicts companies that experience financial distress and do not experience financial distress.

Furthermore, this research aims to examine whether The Zmijwski model partially has a significant effect in predicting the financial distress of coal companies. To reach this objective, the following hypothesis has been formulated as follows:

H_3: Zmijewski model partially has a significant effect in predicting the financial distress of coal companies Listed on the Indonesia Stock Exchange.

Altman, Grover, and Zmijewski Models toward Predict Financial Distress

The first step toward a company's bankruptcy is financial distress, and various models are developed to anticipate this.But the writer chose three models to predict financial distress: Altman, Grover, and Zmijewski. Previous researches have analyzed all three models to predict financial distress from different companies and years, but the results of previous researches are inconsistent. Some researches say that the Altman is the most accurate model in predicting the financial distress. Some researchers say that all models can be used and have a simultaneously significant effect in predicting the financial distress conditions in company. But there are, some researchers say that only Zmijewski model partially can predict financial distress conditions in a company.

Therefore, this research aims to examine whether Altman, Grover, and Zmijewski models simultaneously have a significant effect in predicting the financial distress of coal companies. To reach this objective, the following hypothesis has been formulated as follows:

H_4: Altman, Grover, and Zmijewski models simultaneously have a significant effect in predicting the financial distress of coal companies Listed on the Indonesia Stock Exchange

Research Model

Based on the description above, the variables used in the research model can be seen in the figure below:

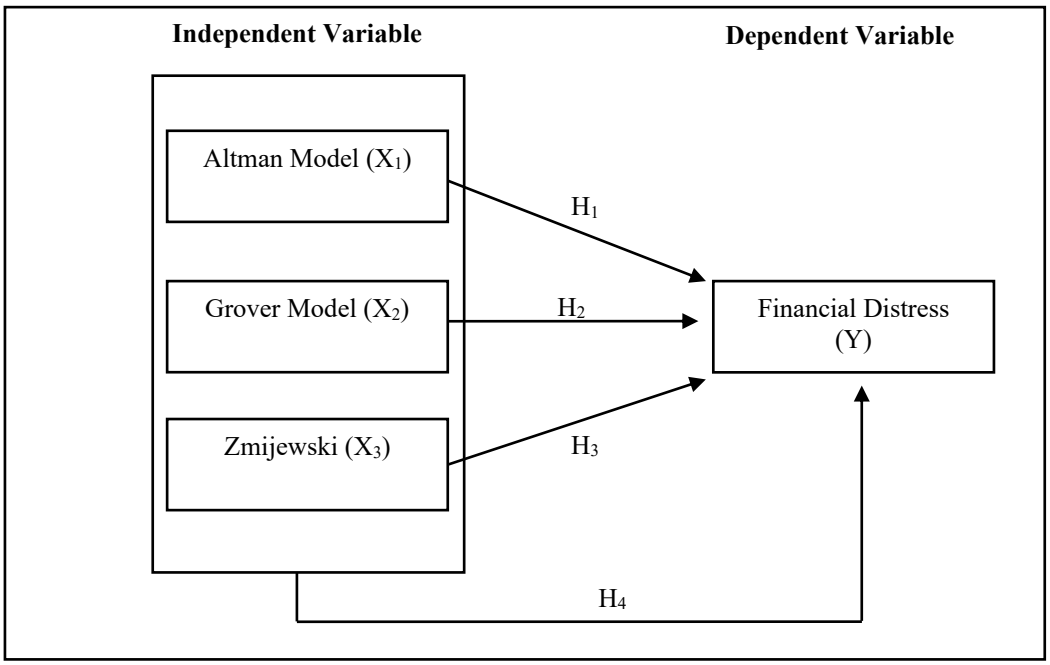

Figure 3. Research model
Source: Processed Data (2022)

II. METHOD

The research design used in this research is descriptive research under the quantitative approach to evaluate the research problem identified and develop relationships between the research variables. The Quantitative research method is a research method that uses numbers as a basis for generalizing a phenomenon. This research involves computing some financial ratios in the Altman, Grover, and Zmijewski formulas of coal companies listed on the IDX. This research also uses the SPSS program to help with the data analysis. The population in this research is 28 coal companies Listed on the Indonesia Stock Exchange from 2017-2021. This research gathered data from the audited financial statement of coal companies listed on the Indonesia Stock Exchange from 2017-2021. The audit financial statement used in this research is obtained from the Indonesia Stock Exchange's official website, IDN Financial official website and the respective companies.

III. RESULT AND DISCUSSION

Result

Data Analysis

Descriptive Statistics Process

Table 1 Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Altman	90	-5.76	15.66	4.4617	4.89885
Grover	90	-1.16	3.01	.7620	.82217
Zmijewski	90	-5.31	1.64	-2.0389	1.68893
Financial Distress	90	0	1	.07	.251
Valid N (listwise)	90				

Source: Processed Data (2022)

Table 1 presents the descriptive statistics of the independent and dependent variables of this research. The dependent variable is financial distress and the independent variable are Altman, Grover, and Zmijewski. The descriptive statics summaries of this research are as follows: Altman (X_1) with a total sample data (N) of 90 has a minimum value of -5.76, representing PT. Atlas Resources Tbk (ARII) in 2020 and maximum value of 15.66, representing PT. Harum Energy Tbk. (HRUM) in 2019. This variable has a value of mean of 4.4617 and the standard deviation of 4.89885. Grover (X_2) with a total sample data (N) of 90 has a minimum value of -1.16, representing PT. Atlas Resources Tbk (ARII) in 2020 and maximum value of 3.01, representing PT. Bayan Resources Tbk. (BYAN) in 2021. This variable has a value of mean of 0.7620 and the standard deviation of 0.82217. Zmijewski (X_3) with a total sample data (N) of 90 has a minimum value of -5.31, representing PT. Bayan Resources Tbk. (BYAN) in 2021 and maximum value of 1.64, representing PT. Bumi Resources Tbk. (BUMI) in 2020. This variable has a value of mean of -2.0389 and the standard deviation of 1.68893. Financial Distress (Y) is the dependent variable of this research that is classified as a dummy variable that only has two scores, either 0 or 1. Hence, the minimum value is 0 and the maximum value is 1. In addition, this variable has a value of mean of 0.07 and the standard deviation of 0.251

Multiple Linear Regression Analysis

Table 2 Logistic Regression Analysis

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Altman	.047	.336	.019	1	.889	1.048	.543	2.024
	Grover	-4.631	2.454	3.561	1	.059	.010	.000	1.196
	Zmijewski	-.207	.551	.141	1	.707	.813	.276	2.394
	Constant	-2.559	.873	8.599	1	.003	.077		

a. Variable(s) entered on step 1: Altman, Grover, Zmijewski.

Source: Processed Data (2022)

The purpose of this test is to determine the extent to which each independent variable that will be used in the regression model will affect the dependent variables. Binary logistic regression is used in this research. Regression analysis called binary logistic regression uses a dummy variable as the dependent variable.. Because the possible outcome is a dichotomous or binary variable of 0 or 1.The logistic regression equation for this research is as follows:

$$Ln\frac{P_i}{1-P_i} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

The definition of the values of the logistic regression coefficient in table 2 above is as follows:

1. The value of the variable logistic regression coefficient of the Altman model is 0.047. a positive sign on the value of the coefficient of the Altman model indicates that if the value of Altman (X1) rises by one unit, then the value of financial distress (Y) will increase by 0.047, assuming other variables remain constant.
2. The value of the variable logistic regression coefficient of the Grover model is -4.631. a negative sign on the value of the Coefficient of the Grover model indicates that if the value of Grover (X2) rises -4.631, then the value of financial distress (Y) will decrease by -4.631, assuming other variables remain constant.
3. The value of the variable logistic regression coefficient of the Zmijewski model is -0.207. a negative sign on the value of the coefficient of the Zmijewski model indicates that if the value of Zmijewski (X3) rises by one unit, then the value of financial distress (Y) will decrease by -0.207, assuming other variables remain constant.
4. The constant value of regression model is -2.559. a negative sign of the value of the coefficient of the constant value indicates financial distress (Y) will decrease by -2.559. if the Altman, Grover, and Zmijewski (X1, X2, X3) are zero.

Hypothesis Test

Partial Wald Test

The partial Wald test is used to see if the independent variables effect the dependent variable. there are two hypotheses used in this test, including null hypothesis and alternative hypothesis. If null hypothesis > 0.05, its mean null hypothesis is accepted, which means that the independent variables have no partial effect on the dependent variable and if null hypothesis < 0.05, its mean null hypothesis is rejected, which means that the independent variable have partial effect on the dependent variable.

Table 3 Partial Wald Test

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Altman	.047	.336	.019	1	.889	1.048	.543	2.024
	Grover	-4.631	2.454	3.561	1	.059	.010	.000	1.196
	Zmijewski	-.207	.551	.141	1	.707	.813	.276	2.394
	Constant	-2.559	.873	8.599	1	.003	.077		

a. Variable(s) entered on step 1: Altman, Grover, Zmijewski.

Source: Processed Data (2022)

The result of Partial Wald Test from Table 3 above is as follows: The significant value of the Altman model is 0.889, which is greater than the cut off value of 0.05. So, it can be concluded that the Altman model has no significant effect in predicting the financial distress of coal companies Listed on the Indonesia Stock Exchange Partially. The significant value of the Grover model is 0.059, which is greater than the cut off value of 0.05. So, it can be concluded that the Grover model has no significant effect in predicting the financial distress of coal companies Listed on the Indonesia Stock Exchange Partially. The significant value of the Zmijewski model is 0.707, which is greater than the cut off value of 0.05. So, it can be concluded that the Zmijewski model has no significant effect in predicting the financial distress of coal companies Listed on the Indonesia Stock Exchange Partially.

Simultaneous G-Test

Omnibus tests of model coefficients are simultaneous statistical tests . This test will test whether independent variables simultaneously affect dependent variables. There are two hypotheses used in this test,

including null hypothesis and alternative hypothesis. If null hypothesis > 0.05, which means that independent variables simultaneously affect dependent variables. and if null hypothesis < 0.05, its mean null hypothesis is rejected, which means that independent variable do not simultaneously affect dependent variables. The criteria for decision making are based on the chi-square and significant values

Table 4 Simultaneous G-Test

		Chi-square	df	Sig.
Step 1	Step	22.862	3	.000
	Block	22.862	3	.000
	Model	22.862	3	.000

Source: Processed Data (2022)

Table 4 represent Simultaneous G-Test. The value in chi-square table is 7.815 (df =3). Its means that the chi-square of 22.862 is greater than chi-square table value of 7.815, and a significance rate of 0.000 < 0.05. it can be concluded that the Altman, Grover, and Zmijewski models simultaneously have a significant effect on the condition of financial distress in coal companies listed on the Indonesia Stock Exchange.

Coefficient of Determination (R Square)

R square test is used to find out how much variability the independent variables can explain the dependent variables.

Table 5 Coefficient of Determination (R Square)

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	21.225[a]	.224	.579

a. Estimation terminated at iteration number 8 because parameter estimates changed by less than .001.

Source: Processed Data (2022)

The results of the Table 4.13 shows that the Nagelkerke R Square is 0.579 or 57.9%. which means that only 57.9% of financial distress can be explained by Altman, Grover, and Zmijewski. Meanwhile, 42.1% of financial distress can be explained by other factors or other variables that the writer did not include in this research.

Discussion

The Effect of the Altman Model toward Predict Financial Distress

Based on the partial wald test result in Table 4.11, it is shown that the Altman Model has a significant value of 0.889, which is greater than the cut-off value of 0.05 (0.889 > 0.05). In conclusion, the first hypothesis (H1) of this research, which states that the Altman model partially has a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange, is rejected, which means that the Altman model partially has no significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange. The Altman model has three types of models based on the three companies. The first Model of Altman original for manufacturing companies, the second model of Altman revised for private companies, and the last model is Altman modified model for non-manufacturing companies. As this research object focuses on coal companies, this research uses Altman's modification for non-manufacturing. But according to IDX-IC, there is a coal company that classified into industrial sector, so the Altman formula used in this research cannot predict financial distress for all sample companies. This may explain why the Altman model cannot be used in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange.

Based on the signaling theory, Signals can be good or bad signals. The Altman will produce scores used to determine whether a company is in financial distress. When Altman generates results that show the company is in a healthy condition, it can send the stakeholders a good signal; however, when the Altman generates results that show the company is not a healthy condition, it can send the stakeholders a negative signal that will influence their decision-making. And based on the results of this research, the Altman can't be used partially as a sign for the stakeholders in predicting company financial distress, especially of coal companies listed on the Indonesia Stock Exchange.

The result of this research is in line with the previous research conducted by Jawabreh et al. (2017), which concluded that the Altman model cannot predict financial distress. On the other hand, it shows different results from the previous researches conducted by Elviani et al. (2020), Primasari (2018), and Seto & Trisnaningsih (2021). They claimed that the Altman model could predict financial distress in companies. Even Seto & Trisnaningsih (2021) also claimed that the Altman model in predicting the financial distress is the most accurate model. Different objects and observation years may be differences result between prior research and

this research. Besides that, there is different data analysis methods and the formula used. This research uses logistic regression analysis to see the relationship between the dependent and independent variables, while the three previous researches used multiple linear regression analysis. In addition, this research uses the Altman modification formula for the non-manufacture company in predicting the financial distress, while Elviani et al. (2020), Primasari (2018), and Seto & Trisnaningsih (2021) used the Altman original model for manufacturing company to predict financial distress.

The Effect of Grover Model toward Predict Financial Distress

Based on the partial wald test result in Table 4.11, it is shown that the Grover Model has a significant value of 0.059. which is greater than the cut-off value of 0.05 (0.059 > 0.05). In conclusion, the first hypothesis (H2) of this research, which states that the Grover model partially has significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange is rejected, which means that the Grover model partially has no significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange. The Grover model focuses only on using profitability ratios. This cannot describe the overall financial condition of coal companies if only focused on profit generation. However, it should also focus on the leverage ratio and liquidity ratio. Because profit generation is not necessarily able to provide an overview of the possibility of a company experiencing financial difficulties. This may explain why the Grover model cannot be used in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange.

Based on the signaling theory, Signals can be good or bad signals. The Grover will produce scores to determine whether a company is in financial distress. When the Grover generates results that show the company is in healthy condition, it can send the stakeholders a good signal; however, when the Grover generates results that show the company is not healthy condition, it can send the stakeholders a negative signal that will influence their decision-making. And based on the results of this research, Grover can't be used partially as a sign for the stakeholders in predicting company financial distress, especially of coal companies listed on the Indonesia Stock Exchange.

The results of this research are in line with the previous research conducted by Primasari (2018), Seto & Trisnaningsih (2021), and Munwarah & Keumala Hayati (2019) . which concluded that Grover model cannot be used to predict financial distress in company. On the other hand, it shows different results from the previous research conducted by Edi & Tania (2018), Yunita (2020), and Kason et al. (2020). They claimed that the Grover model could predict financial distress in companies. Even Yunita (2020)claimed that the Grover model in predicting financial distress is the most accurate model. different objects and observation years may be differences result between prior research and this research.

The Effect of Zmijewski Model toward Financial Distress

Based on the partial wald test result in Table 4.11, it is shown that the Zmijewski Model has a significant value of 0.707. which is greater than the cut-off value of 0.05 (0.707 > 0.05). In conclusion, the third hypothesis (H3) of this research, which states that the Zmijewski model partially has significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange is rejected, which means that the Zmijewski model partially has no significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange. The Zmijewski model views the amount of debt as a score. The Zmijewski model will produce a higher score if a company has more debt, indicating financial distress in the score results. However, in this research, the company will experience financial distress by viewing in net losses that the company has rather than the debt problem. This may explain why the Zmijewski model cannot be used in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange.

Based on the signaling theory, Signals can be good or bad signals. The Zmijewski will produce scores to determine whether a company is in financial distress. When the Zmijewski generates results that show the company is in healthy condition, it can send the stakeholders a good signal; however, when the Zmijewski generates results that show the company is not in healthy condition, it can send the stakeholders a negative signal that will influence their decision-making. And based on the results of this research, the Zmijewski can't be used partially as a sign for the stakeholders in predicting company financial distress, especially of coal companies listed on the Indonesia Stock Exchange.

The results of this research align with the previous research conducted by Elviani et al. (2020) . This concluded that Zmijewski model cannot be used to predict financial distress in the company. On the other hand, it shows different results from the previous research conducted by Munwarah & Keumala Hayati (2019), Laksmana & Darmawati (2019), and Seto & Trisnaningsih (2021) . They claimed that the Zmijewski model could predict financial distress in companies. Even Munwarah & Keumala Hayati (2019) also claimed that the most accurate model in predicting the financial distress is Zmijewski model. different objects and observation years may be differences result between prior research and this research.

The Effect of Altman, Grover, and Zmijewski Models toward Predict Financial Distress

Based on the simultaneous hypothesis result table 4.12, the independent variables have a calculated chi-square value of 22.862 and a significant value of 0.000. the chi-square of 22.862 is greater than the chi-square table value of 7.815, with a significance rate of 0.000 < 0.05. it can be concluded that the Altman, Grover, and Zmijewski models simultaneously have a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange or it can be said that the Altman, Grover and Zmijewski can predict the financial distress of coal companies listed in Indonesia Stock Exchange simultaneously. In addition, the coefficient of determination (R Square) is 0.579. it means that the Altman, Grover and Zmijewski models can explain 57.9% of financial distress. In conclusion, the fourth hypothesis (H4) of this research, which states that Altman, Grover, and Zmijewski models simultaneously have significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange is accepted.

Based on the signaling theory, Signals can be good or bad signals. The Altman, Grover and Zmijewski will produce scores used to determine whether a company is in financial distress. When the Altman, Grover and Zmijewski generates results that show the company is in healthy condition, it can send the stakeholders a good signal; however, when the Altman, Grover and Zmijewski generates results that show the company is not healthy condition, it can send the stakeholders a negative signal that will influence their decision-making. And based on the results of this research the Altman, Grover and Zmijewski simultaneously can be used as a sign for the stakeholders and managers in predicting company financial distress, especially of coal companies listed on the Indonesia Stock Exchange. Furthermore, this research results align with the previous research done by Edi & Tania (2018) and Primasari (2018), who claimed that the three models could simultaneously predict financial distress

IV. CONCLUSION

The total samples of this research will be 90 data. And based on the data analysis and discussion in the previous chapter, the following conclusion can be drawn:

1. The first hypothesis is rejected. The Altman model partially doesn't have a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange from 2017-2021, as the significance value is 0.889, which is greater than the cut-off value of 0.05 (0.889>0.05).
2. The second hypothesis is rejected. The Grover model partially doesn't have a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange from 2017-2021, as the significance value is 0.059, which is greater than the cut-off value of 0.05 (0.059>0.05).
3. The third hypothesis is rejected. The Zmijewski model partially doesn't have a significant effect in predicting the financial distress of coal companies listed on the Indonesia Stock Exchange from 2017-2021, as the significance value is 0.707, which is greater than the cut-off value of 0.05 (0.707>0.05).
4. The fourth hypothesis is accepted. The Altman, Grover and Zmijewski models simultaneously significantly predict financial distress of coal companies listed on the Indonesia Stock Exchange from 2017-2021. Since the chi-square value of 22.862 and significant value of 0.000. the chi-square of 22.862 is greater than the chi-square table value of 7.815, with a significance rate of 0.000 < 0.05.

REFERENCES

Ghozali, I. (2018). *Aplikasi Analisis Mulivariate Dengan Program IBM SPSS 25* (9th Ed.). Badan Penerbit Universitas Diponegoro.

Altman, E., Hotchkiss, E., & Wang, W. (2019). Corporate Financial Distress, Restructuring, And Bankruptcy: Analyze Leveraged Finance, Distressed Debt, And Bankruptcy (4th, Illustrated Ed.). John Wiley & Sons.

Aprilia, D., & Isbanah, Y. (2019). Jurnal Ilmu Manajemen Volume 4 Nomor 2 – Jurusan Manajemen Fakultas Ekonomi Universitas Negeri Surabaya.

Edi, & Tania, M. (2018). Ketepatan Model Altman, Springate, Zmijewski, Dan Grover Dalam Memprediksi Financial Distress. Jurnal Reviu Akuntansi Dan Keuangan, 8(1), 79. Https://Doi.Org/10.22219/Jrak.V8i1.28

Elviani, S., Simbolon, R., Riana, Z., Khairani, F., Dewi, S. P., & Fauzi, F. (2020). The Accuracy Of The Altman, Ohlson, Springate And Zmejewski Models In Bankruptcy Predicting Trade Sector Companies In Indonesia. Budapest International Research And Critics Institute (BIRCI-Journal) : Humanities And Social

Sciences, 3(1), 334–347. Https://Doi.Org/10.33258/Birci.V3i1.777

Hernadianto, Yusmaniarti, & Fraternesi. (2020). Analisis Financial Distress Pada Perusahaan Jasa Subsektor Property Dan Realestate Yang Terdaftar Di Bursa Efek Indonesia Property. In Jurnal Sains Manajemen Dan Bisnis Indonesia (Vol. 10, Issue 1). Juni Hal. Www.Sahamok.Com

Kason, Angkasa, C., Gozali, Y., Wijaya, A. R., Firadus, T., & Hutahean. (2020). Analisis Perbandingan Keakuratan Memprediksi Financial Distress Dengan Menggunakan Model Grover, Springate Dan Altman Z-Score Pada Perusahaan Pertambangan Yang Terdaftar Di Bursa Efek Indonesia Pada Tahun 2013-2017. 4(3).

Mariani, D., & Suryani. (2018). Pengaruh Kinerja Keuanganterhadap Nilai Perusahaan Dengan Kinerja Sosial Dan Kinerja Lingkungan Sebagai Variabel Moderator(Studi Empiris Pada Perusahaan Pertambangan Dan Manufakturyang Terdaftar Di Bursa Efek Indonesia Tahun 2011 -2015). Jurnal Akuntansi Dan Keuangan, 07.

Ministry Of Energy And Mineral Resources. (2022). Grafik Harga Batu Bara Acuan. Kementerian Energi Dan Sumber Daya Mineral. Https://Www.Minerba.Esdm.Go.Id/Harga_Acuan

Munwarah, & Keumala Hayati. (2019). Accuracy Of Springate, Zmijewsky And Grover As Logistic Models In Finding Financial Difficulty Of Financing Companies. In Accounting Research Journal Of Sutaatmadja (Accruals).

Nenengsih. (2018). Model Prediksi Springate Sebagai Prediktor Delisting Terbaik Dibandingkan Model Zmijewski.

Piscestalia, N., & Priyadi, M. P. (2019). Maswar Patuh Priyadi Sekolah Tinggi Ilmu Ekonomi Indonesia (STIESIA) Surabaya. Www.Beritasatu.Com

Primasari, N. S. (2018). Analisis Altman Z-Score, Grover Score, Springate, Dan Zmijewski Sebagai Signaling Financial Distress (Studi Empiris Industri Barang-Barang Konsumsi Di Indonesia).

Wulandari, E., & Fauzi, I. (2022). Analisis Perbandingan Potensi Kebangkrutan Dengan Model Grover, Altman Z-Score, Springate Dan Zmijewski Pada Perusahaan Real Estate Dan Property Di Bursa Efek Indonesia. Investasi Dan Syariah (EKUITAS), 4(1), 117. Https://Doi.Org/10.47065/Ekuitas.V4i1.1743

Yunita, T. R. (2020). Kemampuan Teori Model Altman, Springate, Grover, Dan Zmijewski Dalam Memprediksi Financial Distress Perusahaan Transportasi