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BANKRUPTCY PREDICTION IN INDONESIA COMPANIES USING ALTMAN AND SPRINGATE BEFORE AND DURING THE PANDEMIC

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ABSTRACT

This research aims to determine differences in bankruptcy prediction conditions using the Altman Z-Score and Springate methods before and during the COVID-19 pandemic in property companies listed on the Indonesia Stock Exchange for the 2018-2021 period. The sample used in this research was 27 property companies. Samples were obtained using the purposive sampling method. This research uses a descriptive analysis method and a different analysis test using a paired sample t test. The research results show that the Altman Z Score method does not show any differences in the condition of company bankruptcy before the pandemic and during the pandemic. However, Springate shows quite large differences in prediction results. The prediction results are an early warning so that investors/creditors are more careful in making investment decisions.

ABSTRAK

Penelitian ini bertujuan untuk mengetahui perbedaan kondisi prediksi kebangkrutan dengan menggunakan metode Altman Z-Score dan Springate sebelum dan pada masa pandemi COVID-19 pada perusahaan property yang terdaftar di Bursa Efek Indonesia periode 2018-2021. Sampel yang digunakan dalam penelitian ini sebanyak 27 perusahaan properti. Sampel diperoleh dengan menggunakan metode purposive sampling. Penelitian ini menggunakan metode analisis deskriptif dan analisis uji beda dengan menggunakan paired sample t-test. Hasil penelitian menunjukkan bahwa metode Altman Z Score tidak menunjukkan perbedaan kondisi kebangkrutan perusahaan masa sebelum pandemi dan pada masa pandemi. Namun, Springate menunjukkan perbedaan hasil prediksi yang cukup besar. Hasil prediksi tersebut merupakan peringatan dini agar investor/kreditur lebih berhati-hati dalam pengambilan keputusan investasi.

INTRODUCTION

The risk of default is a big risk and spreads widely. Companies in America, use the default predictor proposed by the Z score model because the modeling approach is expected to predict failure well and is a company's attempt to act to avoid financial difficulties or bankruptcy (Qiu et al., 2020). Among the different credit scoring systems, the Altman Z-score model for predicting bankruptcy, developed by Altman (1968) has gained popularity among financial analysts in recent decades. The Z-score model can be used to predict the probability that a company will go bankrupt, or will default, within two years (Fung, 2014). Increasing the proportion of liquidity, and market value of companies, reducing current liabilities and the accumulation of debt, and rationally using the company's assets are conducive to maintaining the companies in a good financial situation.

The impact of the COVID-19 pandemic has reduced economic activity and at the same time changed the economic system in many countries, including Indonesia. Since the implementation of the lockdown policy people's income has dropped dramatically, in addition to that, many companies have experienced huge losses, resulting in many company employees being laid off due to falling income figures (Rohmah, 2020). Financial difficulties are the inability to pay financial obligations, both long-term and short-term obligations, which can lead to the bankruptcy of a company (Munawarah et al., 2019). Companies must prepare a plan to carry out various analyzes to prevent bankruptcy, as well as carry out any strategies needed to prevent corporate bankruptcy. The Covid-19 pandemic which lasted more than 2 years has put pressure on businesses in the property industry sector.

This study discusses the potential for bankruptcy by using a comparison of the Altman Z-score model and the Springate model. This study uses property companies because property companies have experienced very rapid economic development as evidenced by the increasing number of companies listed on the IDX, apart from that during the COVID-19 pandemic, property companies experienced a significant decline as a result of reduced purchasing power, people are more concerned with food consumption. compared to buying a house so that the property industry becomes sluggish, due to a decrease in sales figures it will be predicted to experience bankruptcy.

The difference between this research and previous research is that the company previously conducted an analysis of bankruptcy in property companies and financial reports listed on the Indonesia Stock Exchange were taken during the COVID-19 pandemic using only one method. This study uses 2 periods before and after the pandemic and uses 2 bankruptcy prediction methods.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Agency Theory

Agency theory is a theory that explains the relationship between company owners (shareholders) and management. Management is an agent appointed by the shareholders (principal). Agency theory often emerges when shareholders employ other parties. An agency theory relationship is a contract in which one or more (principal) orders another person (agent) to perform a service on behalf of the principal. If both parties have the same goal of maximizing the value of the company, then it is certain that the agent will act in a manner that is in accordance with the way that is in accordance with the interests of the principal. Agency theory focuses on the costs of monitoring and maintaining relationships between various parties. Agency theory is a trade-off that arises from any agency relationship, including the relationship in the employment contract between shareholders and company managers. Therefore, in an agency relationship, each party will bear agency costs, not only the principal but also the agent. According to Silaban & Purba (2020), to reduce agency problems, it is necessary to have an independent party who can become an intermediary party to handle the conflict, better known as an independent auditor. The auditor is considered as an independent party between agents who serve as providers of financial statement information and stakeholders who serve as users of information to reduce information

asymmetry. Agency theory is used because aspects of bankruptcy can be caused by information asymmetry between principals and agents, this disharmony can lead to continuous problems that can eventually lead to bankruptcy.

Financial Distress

Financial distress is the company's inability to fulfill its obligations, especially short-term and long-term obligations, short-term including liquidity obligations and also including solvency obligations according to Yulian et al. (2020). According to Sari et al. (2019), financial distress is a condition before a company experiences bankruptcy in its financial condition where in this phase there is a problem of shortage of cash. In addition, Hutauruk et al. (2021) stated that financial distress is a condition before bankruptcy term which is first preceded by a cash shortage stage.

Bankruptcy

Bankruptcy is a condition where the company is unable to pay off its obligations. This condition usually does not appear suddenly in a company, early indications of bankruptcy of a company can usually be recognized in advance if the financial statements are analyzed in detail in a certain way. Discovered by AlAzhar (2015) explains that bankruptcy is a condition in which a company is no longer able to pay its obligations. According to Law No. 4 of 1998 concerning bankruptcy states that bankruptcy is a condition that can be declared bankrupt by a court decision. This statement is clarified by Law No. 37 of 2004 article 2 paragraph 1 concerning bankruptcy and postponement of debt payment obligations. Financial ratios can be used as an indication of bankruptcy in a company (Herdyanto & Yudawisastra, 2019).

Metode *Altman Z-Score*

According to Adriyansyah et al. (2022) Altman Z-Score is a technique used to predict bankruptcy in a company where bankruptcy conditions can be known in as much detail as possible. The Altman Z-Score method is also often used to measure a company's financial performance because it is easier to use and has an accuracy level of up to 95% (Sari et al., 2020). The Altman Z-Score method is divided into three models. The first model is the original model (Z-Score) where the original model can only be used for public companies because it requires the market value of equity. (Azlina, 2020). In the second model, Altman revised the Z-Score to become a Z Score or often referred to as Altman revision. This model is shown to non-public companies, using a way of formulating financial ratios by eliminating the value of equity because companies in the non-public sector did not have a market price for their equity in 1983. In the third model in 1995 Altman introduced a new variant, namely the Z-Score by replacing the model so that it can be applied to all sectors of the company, the model is called the Z "Score. To predict the condition of a company's financial difficulties, it can be measured using the Altman Z-Score method.

Springate Model

The Springate model was developed by Gordon L.V. Springate in 1978 (Husein & Pambekti, 2014). The precision of the models of Altman, Springate, Zmijewski, and Grover for predicting financial distress. This model is the development of the Altman model which uses multiple discriminant Analysis commonly called MDA. This model can be used to predict bankruptcy with an accuracy of up to 92.5%. Springate uses MDA to select 4 ratios out of 19 popular financial ratios that best distinguish between true and false sound businesses.

The first problem formulation is to test the difference in prediction results between the Altman Z-Score model and the Springate model. The test uses descriptive quantitative techniques so it is not hypothesized. The next problem formulation is whether there are differences in bankruptcy predictions

using the Altman Z-Score model or the Springate model before and during the COVID-19 pandemic by testing the different paired sample t-test which is described in the following hypothesis.

The first problem formulation is to test the difference in prediction results between the Altman Z-Score model and the Springate model. The test uses descriptive quantitative techniques so it is not hypothesized. The next problem formulation is whether there are differences in bankruptcy predictions using the Altman Z-Score model or the Springate model before and during the COVID-19 pandemic by testing the different paired sample t-test which is described in the following hypothesis.

Statistically, there are significant differences in the level of financial distress in the property sector before COVID-19 and after COVID-19 using the Altman Z-score. Based on the results of this study, the COVID-19 pandemic has an impact on property sector companies that can lead companies to the threat of bankruptcy (Bella, 2022) dan (Islami & Canggih, 2023). On the other hand, other research results show that there is no difference in the level of bankruptcy before or during the Covid-19 pandemic. This is because the company was able to adapt by implementing strategies that were appropriate to the conditions of the Covid-19 pandemic (Susiana & Puwanti, 2021).

Based on previous research from Marselina (2022) and Kassidy & Handoko (2022) using the Springate Method, shows that there are differences in the potential for financial distress before and during the COVID-19 pandemic. The bankruptcy model that has the highest level of accuracy is the Springate S-Score model (Aadilah & Hadi, 2022). These findings imply that the use of the profit before interest and tax ratio in the Springate model is better able to predict financial distress in the period before and during the pandemic compared to other models. On the other hand, based on research by Thoharoh et al. (2023), from 2016 to 2019, property companies were in the danger zone or had the potential to go bankrupt, but in the last 2 years, in 2020 and 2021, the company started to be in good condition or there was no potential for bankruptcy in the company resulting in there is no difference between the period before and during the pandemic.

H_1: There are differences in bankruptcy prediction based on the Altman Z-Score model for property companies before and during the COVID-19 pandemic.

H_2: There are differences in bankruptcy predictions based on the Springate model for property companies before and during the COVID-19 pandemic.

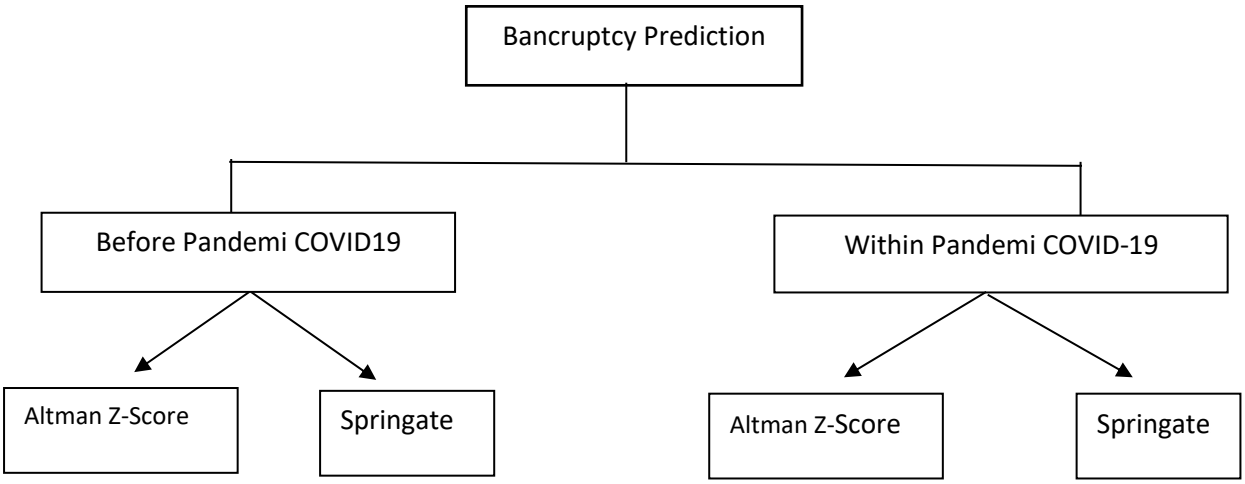

Figure 1. Hyphotesis Framework

RESEARCH METHOD

This research will use a quantitative approach. The sample used in this research is property companies listed on the Indonesia Stock Exchange (IDX) for the 2018-2021 period. The population of this study is all companies included in the property industry which are listed on the Indonesia Stock Exchange in the 2018-2021 period as many as 27 companies. The sampling technique in this study used a purposive sampling technique. The sample selection criteria used in this study are manufacturing companies in the property sub-sector that were listed on the Indonesia Stock Exchange in the period before the COVID-19 pandemic (2018, 2019) and during the COVID-19 pandemic (2020, 2021) which publish completed financial reports in rupiah. The total companies in the study according in these criteria are 27 companies

The ratio formula for Altman Z-Score.

$$Z = 6{,}56\ (X1) + 3{,}26\ (X2) + 6{,}72\ (X3) + 1{,}05\ (X4) \quad (1)$$

The formula notes as follow: X1 is working capital/total asset; X2 is retained earning/total assets; X3 is earnings before interest and tax/total assets; and X4 is book value of equity/book value of total debt. If the score is more than 2,6 indicate the company is health. If the Z score is less than 1,1, the company is indicated bankrupt. If the Z score between 1,1 ad 2,6 it is in grey area.

The ratio formula for Springate.

$$S = 1{,}03X1 + 3{,}07X2 + 0{,}66X3 + 0{,}4X4 \quad (2)$$

The formula notes as follow: X1 is working capital/total asset; X2 is earning before interest and taxes/total asset; X3 is earning before taxes/current lialibilities; X4 is sales/total asset. If the Springate score is more than 0,862, it indicates the company in a good condition. If the score is less than 0,862 it is indicated that the company is bankrupt.

RESULT AND DISCUSSIONS

Altman Z-Score Result

The following is a company table showing the potential for bankruptcy in property companies using the Altman Z method. Pandemic conditions are represented in 2018 and 2019. Meanwhile, pandemic conditions are represented in 2020 and 2021.

Table 1. Bankruptcy Potential in Property Companies Using Altman Z-Score

No	Corporation Code	Years			
		2018	2019	2020	2021
1	APLN	Healthy	Healthy	Healthy	Grey Area
2	MTLA	Healthy	Healthy	Healthy	Healthy
3	ASRI	Grey Area	Healthy	Grey Area	Healthy
4	BAPA	Healthy	Healthy	Healthy	Healthy
5	GWSA	Healthy	Healthy	Healthy	Healthy
6	BCIP	Healthy	Healthy	Healthy	Healthy
7	BEST	Healthy	Healthy	Healthy	Healthy
8	BIKA	Healthy	Healthy	Grey Area	Healthy
9	BIPP	Grey Area	Bankrupt	Healthy	Healthy
10	BKDP	Bankrupt	Bankrupt	Bankrupt	Bankrupt
11	BKSL	Healthy	Healthy	Grey Area	Healthy

No	Corporation Code	Years			
		2018	2019	2020	2021
12	KOTA	Grey Area	Bankrupt	Bankrupt	Bankrupt
13	CITY	Healthy	Healthy	Healthy	Healthy
14	SMRA	Healthy	Healthy	Healthy	Healthy
15	CPRI	Healthy	Healthy	Healthy	Healthy
16	CTRA	Healthy	Healthy	Healthy	Healthy
17	DART	Grey Area	Bankrupt	Bankrupt	Bankrupt
18	JRPT	Healthy	Healthy	Healthy	Healthy
19	DMAS	Healthy	Healthy	Healthy	Healthy
20	DUTI	Healthy	Healthy	Healthy	Healthy
21	ELTY	Grey Area	Grey Area	Bankrupt	Bankrupt
22	EMDE	Healthy	Healthy	Healthy	Healthy
23	FMII	Healthy	Healthy	Healthy	Healthy
24	INDO	Healthy	Healthy	Healthy	Healthy
25	GAMA	Healthy	Healthy	Healthy	Healthy
26	GMTD	Healthy	Healthy	Healthy	Healthy
27	GPRA	Healthy	Healthy	Healthy	Healthy

There were 19 companies in a healthy condition during the pandemic out of a total of 27 companies (70%). Two companies experienced the potential to go bankrupt before the pandemic continued until the pandemic period. In the gray area, there are companies in the gray area before the pandemic and had the potential to go bankrupt during the pandemic, whereas there are 3 companies were originally in the gray area and changed their condition to become healthy during the pandemic. This phenomenon is strengthened by calculating scores.

The condition of the company in one year is calculated as 1 score. Based on table 2 below, the number of healthy company scores before the pandemic was 43, compared to 42 scores during the pandemic. So, there was a decrease in the healthy company score during the pandemic by only 1 score or 1.8% based on the total number of scores for each period. The score for bankrupt companies increased by 2 points during the pandemic (5,5%). The company's score in the gray area increased by 2 scores (3,7%) during the pandemic. Based on the results above, based on Altman Z Score calculations, most companies are in a healthy condition and can survive the pandemic. Only a small number of companies experienced potential bankruptcy during the pandemic and some were already experiencing potential bankruptcy before the pandemic.

Tablel 2. Prediction Recapituation Using the Altman Z-Score Model

	Altman Z - Score	
	Before pandemic (2018 – 2019)	During Pandemic (2020-2021)
Total Healthy Score	43	42
Total Grely Arela Scorel	6	4
Total Bancruptcy scorel	5	8
Total	54	54
% Total Healthy scorel	79,6%	78%

Table 3. Bankruptcy Potential in Property Companies Springate Method Period 2018-2021

No	Codel	Prediction Category			
		2018	2019	2020	2021
1	APLN	Healthy	Healthy	Healthy	Healthy
2	MTLA	Healthy	Healthy	Healthy	Healthy
3	ASRI	Healthy	Healthy	Bankrupt	Healthy
4	BAPA	Healthy	Healthy	Healthy	Healthy
5	GWSA	Healthy	Bankrupt	Bankrupt	Healthy
6	BCIP	Healthy	Healthy	Bankrupt	Healthy
7	BELST	Healthy	Healthy	Bankrupt	Bankrupt
8	BIKA	Healthy	Healthy	Bankrupt	Bankrupt
9	BIPP	Bankrupt	Healthy	Healthy	Healthy
10	BKDP	Bankrupt	Bankrupt	Bankrupt	Bankrupt
11	BKSL	Healthy	Bankrupt	Bankrupt	Healthy
12	KOTA	Healthy	Bankrupt	Bankrupt	Bankrupt
13	CITY	Healthy	Healthy	Healthy	Healthy
14	SMRA	Healthy	Healthy	Healthy	Healthy
15	CPRI	Bankrupt	Bankrupt	Bankrupt	Bankrupt
16	CTRA	Healthy	Healthy	Healthy	Healthy
17	DART	Healthy	Healthy	Healthy	Bankrupt
18	JRPT	Healthy	Healthy	Healthy	Healthy
19	DMAS	Healthy	Healthy	Healthy	Healthy
20	DUTI	Healthy	Healthy	Healthy	Healthy
21	ELLTY	Healthy	Bankrupt	Bankrupt	Bankrupt
22	ELMDEL	Healthy	Healthy	Bankrupt	Bankrupt
23	FMII	Healthy	Healthy	Healthy	Bankrupt
24	INDO	Healthy	Healthy	Healthy	Healthy
25	GAMA	Healthy	Healthy	Bankrupt	Bankrupt
26	GMTD	Healthy	Healthy	Healthy	Healthy
27	GPRA	Healthy	Healthy	Healthy	Healthy

Table 3 shows predictions about the potential for bankruptcy in property companies using the Springgate method. Pandemic conditions are represented in 2018 and 2019. While pandemic conditions are represented in 2020 and 2021. Companies that have the potential to remain healthy during the pandemic are 13 companies out of a total of 27 companies. There are 10 companies experiencing potential bankruptcy, of which 5 companies have been categorized as bankrupt since before the pandemic. From table 3, it is found that there are more companies experiencing the potential for bankruptcy during the pandemic using the Springgate method compared to using the Altman Z method.

Table 4. Predictions Recap Using the Springate Model

Prediksi	Springate	
	Before pandemic	During pandemic
Total Healthy Score	45	32
Total Grey Area Score	-	-
Total Bancruptcy score	9	22
Total	54	54
% Total Healthy score	83%	59%

Table 7. Paired Test Test Altman Z's Method Before and During Covid

Test Statistics[a]			
Altman Z's		**Springate**	
Z	-0,573[b]	Z	-4,542[b]
Asymp. Sig. (2-tailed)	0,567	Asymp. Sig. (2-tailed)	0,000

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

These results are also reinforced by table 4 below which summarizes the number of scores of healthy and bankrupt companies using the Springate Model before and during the Pandemic. The total score of healthy companies using the Springate model during the pandemic decreased by 13 scores or 24% when compared to the total score per period. The number of companies that went bankrupt during the pandemic was 13 companies (22%). The results answer the first problem formulation that when compared with the Altman Z method, the number of companies that went bankrupt during the pandemic was higher using the Springate method than using the Altman Z method**.**

Different test analysis using paired sample t-test

Table 7 shows a different test using SPSS 26, the results of the paired sample test before and during the pandemic using the Altman Z Score method. The results of the analysis yield a value of 0,567 which indicates that the hypothesis is rejected because the significant value exceeds 0,005, which means that there is no significant difference in bankruptcy forecasting between before and during the COVID-19 pandemic using the Altman Z-Score method. These results reject the first hypothesis that there are differences in bankruptcy prediction based on the Altman Z-Score model for property companies before and during the COVID-19 pandemic. These results accept the second hypothesis that there are differences in bankruptcy predictions based on the Springate model for property companies before and during the COVID-19 pandemic.

Table 7 shows the results of the paired sample test before and during the pandemic using the Springate method show the test using SPSS 26, the results of the Altman Z-Score method of the paired sample test before and during the pandemic produce a value of 0,000, which means the hypothesis is accepted because it is less than 0.,005, which means there is a significant difference in bankruptcy forecasting between before and during the COVID-19 pandemic using the Springate method.

Table 9. Uji *Shapiro-Wilk dan Kolmogorov-Smirnov* Model *Altman Z-Score*, dan Model *Springate*, Property Company, Period 2018-2021

Test of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	**Df**	**Sig.**	**Statistic**	**Df**	**Sig.**
ALTMAN_Z	before covid	0,430	54	0,000	0,192	54	0,000
	after covid	0,503	54	0,000	0,125	54	0,000
SPRINGATE	before covid	0,382	54	0,000	0,251	54	0,000
	after covid	0,195	54	0,000	0,776	54	0,000

a. Lilliefors Significance Correction

Uji Wilcoxon Signed Ranks Test

Based on the table above, the results of sig < 0.05, the data is not normally distributed, so to test all data during 2018 -2021 on the differences in the predictions of the Altman Z-Score method and the Springate model before and during the COVID-19 period as a whole. Performed using the Wilcoxon test. The Wilcoxon Signed Ranks Test aims to test whether or not there are differences between the results of the bankruptcy prediction analysis of the Altman Z-Score model and the Springate model before and during the COVID-19 period as a whole.

During a pandemic, the company's performance decreased, which can be reflected in the condition of the company's performance. In the Altman Z-Score method, there was not much difference found in predicting bankruptcy before the pandemic and during the pandemic. before and during the pandemic. Based on the company recap table using the Altman Z-Score method, the percentage of companies that experienced Healthy conditions before the pandemic was 79,6%, while during the pandemic it was 78%. There was only a slight decrease in the percentage level of Healthy companies based on the Altman method. The difference test using the paired sample t-test performed on the Altman method also did not give significant results.

Based on table 4 of the recap of companies that experienced Healthy conditions using the Springate method, the percentage before and during the pandemic was 83%, during the pandemic there was a decrease in the percentage level of Healthy companies using the Springate method to 59%, so that more companies went bankrupt during the pandemic. The Springate method shows a greater difference in predictions between conditions before and after the pandemic when seen from the percentage of the number of Healthy companies before and after the pandemic. The different tests carried out on the Springate method also yielded significant results indicating that there were differences in conditions before and during the pandemic.

During the pandemic as a result, interest rates and inflation are getting higher and the level of investment is decreasing as a result, the health of many companies will experience a decline and will even lead to potential bankruptcy, one of the impacts is property companies which are very significantly affected, it is natural that the condition of companies, especially the property industry, declines after the pandemic. This is in accordance with what the Springate method predicts, different from the Altman Z Score method which indicates the company is relatif in a healthy condition both before and after the pandemic.

CONCLUSION

Altman Z Score show that most companies are in a healthy condition and can survive the pandemic. Only a small number of companies experienced potential bankruptcy during the pandemic and some were already experiencing potential bankruptcy before the pandemic. Meanwhile, if you use the Springate method, the number of bankrupt companies scored during the pandemic is higher than using the Altman Z method. This answers the first problem formulation that there is a difference in prediction results between the Altman Z-Score model and the Springate model. Based on the paired sample test, there is no significant difference in bankruptcy forecasting between before and during the COVID-19 pandemic using the Altman Z-Score method. These results reject the first hypothesis that there are differences in bankruptcy prediction based on the Altman Z-Score model for property companies before and during the COVID-19 pandemic. There are significant differences in bankruptcy predictions between before and during the COVID-19 pandemic using the Springate method. This accepts the second hypothesis that there are differences in bankruptcy predictions based on the Springate model for property companies before and during the COVID-19 pandemic. The prediction results are an early warning so that investors/creditors are more careful to evaluate company to be invested in and serve as supporting information as a consideration for making decisions regarding the companies to be funded. The assumption that must be

considered is that all of the bankruptcy analysis models only predict bankruptcy indication which affects the company, and do not predict all operating difficulties or liquidation of a company. Therefore, the results of this bankruptcy prediction calculation should not be considered as absolute results.

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