Predicting Financial Distress and Bankruptcy of PT Sepatu Bata Tbk with Six Methods

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ABSTRACT

This study aims to estimate the financial difficulties that may be experienced by PT Sepatu Bata Tbk, compare six bankruptcy prediction methods, namely Altman, Springate, Zmijewski, Grover, Ohlson, and Taffler, and find the accuracy level of the predictive model. The research uses a quantitative approach by utilizing an independent sample t-test to detect comparisons between bankruptcy prediction methods from the company's secondary data. The results of the study show that the Altman method successfully detected the existence of financial distress of the company, namely in 2020, 2022, and 2023, while the rest of the time the company was still safe and entered the gray area, the Springate method predicts that for 12 years from 2012 to 2023 the company was trapped in the threat of bankruptcy due to financial distress, the Grover method found the fact that throughout the year from 2012 to 2023 the company experienced financial difficulties, Zmijewski's method proves that companies are experiencing financial distress only in 2023, Ohlson's method detects that companies are still in good health for 12 years from 2012 to 2023, and the Taffler model predicts that companies have experienced various conditions over the past 12 years and are only threatened with bankruptcy in 2020 and 2021. The Taffler method showed the highest accuracy rate of 83%, followed by the Altman and Zmijewski methods at 75%, Ohlson at 65%, and Springate and Grover both recorded an accuracy rate of 33%.

INTRODUCTION

PT Sepatu Bata Tbk officially closed its factory in the Purwakarta area, West Java, on April 30, 2024 (Nugroho, 2024; Ramli & Djumena, 2024). Corporate Secretary of PT Sepatu Bata Hatta Tutuko revealed that the company has been losing money for the past four years. Moreover, the emergence of the Covid-19 pandemic has created challenges for companies (Bloomberg Technoz, 2024). With this decision, the company cannot continue production at the Purwakarta factory (CNN Indonesia, 2024; Gading, 2024). This fact is certainly sad because Bata shoe products have been present in Indonesia for a long time. In fact, the company claims to have reached all corners of the world (Anggraini, 2020). Bata Management claims its international production makes the company have a wide range of facilities around the world to respond to the unique needs and desires of local customers. On its official website, the company says it has served one million customers every day, operates 27 production facilities in 20 countries, more than 5,000 retail stores in more than 90 countries, and employs more than 40,000 people (PT Sepatu Bata, 2024).

The closure of the factory in Purwakarta is clearly a signal that the company is not doing well. In other words, the company is experiencing financial distress. If this problem continues, it is possible that other factories will follow. If these bad conditions are not controlled, the worse impact is that the company is in danger of bankruptcy. Bankruptcy has many negative impacts on investors, creditors, employees, customers, and other stakeholders of the affected companies (Radovanovic & Haas, 2023).

As presented in Table 1, in the last nine years, the company's performance has indeed shown a less encouraging trend. The company's assets in 2015 still reached IDR 795.3 billion, but in 2023 it declined sharply to 585.7 billion or a decrease of 26%. On the revenue side, the same thing also happened, down 38 percent from IDR 1.028 billion to only IDR 641 in 2023. A worse trend occurred in net profit because it experienced a decline from IDR 129.5 billion to minus IDR 166 billion.

Tabel 1. Assets, Revenue, and Net Profit of the Company (Billion Rupiah)

Year	Assets	Revenue	Net Profit	Δ Assets	Δ Revenue	Δ Net Profit
2015	795.3	1028.9	129.5	-	-	-
2016	804.7	999.8	42.2	9.5	-29.0	-87.3
2017	855.7	974.5	53.7	50.9	-25.3	11.4
2018	881.8	992.7	67.9	26.1	18.2	14.3
2019	863.1	931.3	23.4	-18.6	-61.4	-44.5
2020	775.3	459.6	-177.8	-87.8	-471.7	-201.2
2021	652.7	438.5	-51.2	-122.6	-21.1	126.6
2022	724.1	643.5	-105.9	71.3	205.0	-54.7
2023	585.7	641.4	-166.0	-138.3	-2.1	-60.1

Source: PT Sepatu Bata Tbk

The data clearly provides information that the company is indeed facing financial problems. The poor financial condition can of course threaten the company's overall performance. With this fact, it is necessary to conduct a detailed study of the company's financial performance, especially to find out the real financial condition. In fact, it is necessary to analyze in more detail using various bankruptcy prediction models (BPM). By using multiple bankruptcy prediction models, the analysis will be more perfect. This study is here to try to detect financial performance based on six bankruptcy prediction models, namely the Altman (Z-Score), Springate (S-Score), Grover (G-Score), Zmijewski (X-Score), Ohlson (O-Score), and Taffler (T-Score) models.

This research is important because it provides a deeper understanding of PT Sepatu Bata Tbk's financial condition and the risks of financial distress that it may face. By using a variety of prediction models, the study not only provides a more accurate analysis but also provides insight into which models are best suited to apply to companies in the non-primary consumer goods sector. In addition, the results of this study can be the basis for company management and other stakeholders to make strategic decisions to improve the company's financial health and prevent bankruptcy. Financial distress theory is essential for understanding a company's financial health (Gottardo & Moisello, 2018). Research shows that financial stress can be a determinant, mediator, and moderator of various factors that affect a company, such as revenue management, company size, and profitability (Chrisantha & Suhartono, 2022; Valcu, 2022).

Financial distress is a condition in which companies face difficulties with creditors (Huang & Yen, 2019; Makatita, 2016). This condition tends to bring with it certain costs, including direct costs, such as legal and accounting fees, as well as indirect costs that can come from market reactions to companies that may not honor their commitments to securities holders (Gaughan, 2017). Understanding financial difficulties is very important because if problems continue to cause difficulties for the company, it can even cause severe financial problems (Widhiadnyana & Ratnadi, 2019). Financial difficulties not only impact individual companies, but also the economy as a whole (Agostini & Agostini, 2018; Rawal, Bhimavarapu, Sidhu, & Rastogi, 2023). Financial difficulties occur when financial institutions are expected to experience difficulties in honoring their commitments (Menne, 2023). The cost of financial hardship includes not only the cost of bankruptcy, but also the loss of value that may occur as a result of the perception that bankruptcy may be imminent even if it is ultimately avoidable (Berk, Harford,

DeMarzo, Stangeland, & Marosi, 2019). Companies can experience financial difficulties because they are trapped in large amounts of debt and are unable to solve them. Financial difficulties begin when a company is unable to meet scheduled payments or when cash flow projections indicate that it will soon be unable to do so (Brigham & Houston, 2019).

The theory of financial hardship is essential for understanding the financial health of businesses in companies (Mokoginta & Agung, 2022). Research has shown that financial difficulties can be the determinant, mediator, and moderator of various factors that affect companies, such as profit management, risk management characteristics, and capital structure (Budi & Dillak, 2022). Financial difficulties serve as an early warning sign before bankruptcy, impacting decisions related to capital structure, liquidity, inflation, and the size of the company in the company (Rawal et al., 2023). Not many researchers have researched the financial difficulties of PT Sepatu Batu (Tbk) and the threat of bankruptcy. There are only a few who have studied it. Among them is Sazly & Al Rasyid (2024) who researched the financial pressure of PT Sepatu Batu but only using one model, namely Springate (S-Score). Using data for the 2019-2023 period, they were limited to calculating Springate's score. They found the fact that Springate's score declined during that period, but did not conclude whether the company's condition was really experiencing financial problems or not.

Another research is from Efendi, Tato, & Ni'mah (2022) who wrote a research article entitled Analysis of Bankruptcy Prediction Using the Altman Z-Score Method: A Case Study on PT Sepatu Bata Tbk. As the title of the research suggests, they only used one bankruptcy prediction model, namely Altman Z-Score. The results of their research prove that in the period from 2017 to 2021, the company is still in a safe condition, not threatened with bankruptcy. Similar research comes from Ariks & Mulyanto (2021) who also used the Altman method. In its research report entitled Financial Performance Analysis with the Altman Z-Score Method at PT Sepatu Bata Tbk, both prove that in the period from 2017 to 2021, only in 2020 and 2021 did the company experience financial difficulties. The results of their research reinforce the findings of Maharani & Oselbi (2022) which proves that in 2020 this company has the potential to experience bankruptcy according to their analysis using the Altman Z-Score prediction model.

Nida, Widuri, & Arida (2024) have also researched financial distress, but compared PT Sepatu Bata (Tbk) and PT Primarindo Asia Infrastruktur Tbk by utilizing data for the 2017-2021 period. They have proven that PT Sepatu Bata Tbk's financial condition is still in a safe condition during this time span, both with the Grover and Ohlson model approaches.

To find out the real facts, the researcher packaged the following hypothesis:

1. There are significant differences between Altman and Springate's methods (AS)
2. There is a real difference between Altman's method and Grover's (AG)
3. There is a significant difference between Altman and Zmijewski's methods (AZ)
4. There are noticeable differences between Altman and Ohlson (AO) models
5. There are significant differences between the Altman and Taffler (AT) models
6. There is a real difference between the Springate and Grover (SG) models
7. There are significant differences between the Springate and Zmijewski (SZ) models
8. There is a significant difference between the Springate and Ohlson (AO) methods
9. There is a noticeable difference between the Springate and Taffler (ST) models
10. There is a significant difference between the Grover and Zmijewski (GZ) models
11. There is a significant difference between the Grover and Ohlson (GO) models
12. There are significant differences between the Grover and Taffler (GT) models
13. There is a significant difference between the Zmijewski and Ohlson (ZO) models
14. There is a real difference between the Zmijewski and Taffler (ZT) methods
15. There are significant differences between the Ohlson and Taffler (OT) models

RESEARCH METHOD

This study uses a quantitative method with a descriptive and comparative approach. PT Sepatu Bata Tbk's financial data is compiled from the annual financial statements for the period 2012 to 2023 or for 12 years. To determine the factual financial condition of the company, the study utilizes six bankruptcy prediction models, namely Altman Z-Score, Springate (S-Score), Grover (G-Score), Zmijewski (X-Score), Ohlson (O-Score), and Taffler (T-Score). Then, the researcher compared the results of the analysis of each model. The next step in the research is to develop an independent sample test analysis. This test must meet an important requirement, namely normal distributed data. If the data is not normally distributed, the alternative analysis is to use the Mann Whitney U differential test. Watts, Lane, Bonifay, Steinley, & Meyer, 2020).

Some studies have found that each bankruptcy prediction model has sometimes the same level of accuracy and other studies show varying accuracy (Ashraf, G.S. Félix, & Serrasqueiro, 2019; Keasey & Watson, 2019). Because of this, there is no most accurate method of estimating a company's bankruptcy. The use of several bankruptcy prediction methods will provide more varied and useful information for the company.

The formula and criteria of each company bankruptcy prediction model are as follows:

Altman Z-Score: $Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5$

X1 = Working Capital / Total Assets
X2 = Retained Earnings / Total Assets
X3 = Earnings Before Interest and Taxes / Total Assets
X4 = Market Value of Equity / Book Value of Total Liabilities
X5 = Sales / Total Assets

Criterion:

$Z < 1.1$	:	Companies in unsafe zones
$1.1 < Z < 2.6$	:	Venture into the gray area
$Z > 2.6$	:	Business in the safe zone

Springate Model: $S = 1.03A + 3.07B + 0.66C + 0.4D$

A = Working Capital / Total Assets
B = Net Profit Before Interest and Taxes / Total Assets
C = Net Profit Before Taxes / Current Liabilities
D = Sales / Total Assets

Criterion:
$S > 0.862$: The business is in the safe zone
$S \leq 0.862$: Unhealthy business, likely to go bankrupt

Grover Model: $G = 1.650X1 + 3.404X2 - 0.016ROA + 0.057$

X1 = Working Capital / Total Assets
X2 = Earnings Before Interest and Taxes / Total Assets
ROA = Net Income / Total Assets

Criterion:
$G \leq -0.02$: The company goes bankrupt
$G \geq 0.01$: The company is not bankrupt

Zmijewski Model: $Z = -4.3 - 4.5X1 + 5.7X2 - 0.004X3$

X1 = Net Income / Total Assets
X2 = Total Liabilities / Total Assets

X3 = Current Assets / Current Liabilities

Criterion:
X > 0 : The company's business goes bankrupt
X ≤ 0 : Businesses don't go bankrupt

Ohlson Model: O = -1.32 - 0.407X1 + 6.03X2 - 1.43X3 + 0.0757X4 - 2.37X5 - 1.83X6 + 0.285X7 - 0.521X8 - 0.521X9
X1 = Log (Total Assets / GNP Price-Level Index)
X2 = Total Liabilities / Total Assets
X3 = Working Capital / Total Assets
X4 = Current Liabilities / Current Assets
X5 = Net Income / Total Assets
X6 = Funds from Operations / Total Liabilities
X7 = One if Total Liabilities > Total Assets, zero otherwise
X8 = Net Income - Previous Year's Net Income / (|Net Income| + |Previous Year's Net Income|)
X9 = Sales / Total Assets

Criterion:
O > 0.38 : the company is in an unhealthy condition
O < 0.38 : the company is in a healthy position

Taffler Model: T-Score = 0.53 X1 + 0.13 X2 + 0.18 X3 + 0.16 X4
X1 = Earning Before Tax / Current Liabilities
X2 = Current Asset / Current Liabilities
X3 = Current Liabilities / Total Assets
X4 = Sales / Total Assets

Criterion:
T < 0.2 : Threatened with bankruptcy
0,2 ≤ T ≤ 0,3 : Gray zone
T > 0.3 : Healthy finances

RESULTS AND DISCUSSION

Altman Model Analysis

Based on the results of the calculation adjusting Altman's formula as presented in Table 2, the score in 2012 was 5.288 which means higher than 2.6 so that the company's condition is still in the safe category. However, in 2013 and 2014 the conditions were different because the calculation values reached 2,327 and 1,888 respectively, which means that they are included in the gray area category. In 2015, 2016, 2017, 2018, and 2019, Altman's score was 4,941, 4,344, 4,318, 5,304, and 5,607, respectively, which means more than 2.6 so that the company is again in the group of healthy companies.

PT Sepatu Bata Tbk drastically changed in 2020, as Altman's calculated value resulted in a score of 0.512, less than 1.1. Thus, in 2020, the company entered a condition of financial distress and was threatened with bankruptcy. In 2021, Altman's calculation value was 1,831, so it entered the gray area. However, in 2022 and 2023, the company again entered a gloomy period as its scores decreased to -2,120 and -6,128, respectively, which means lower than 1.1. According to Altman's criteria, a score below 1.1 is in the unsafe zone group because it faces financial difficulties. Therefore, the management of PT Sepatu Bata Tbk must pay close attention to the conditions of the last three years, namely in 2020, 2021, and 2023.

Table 2. Results of Calculation and Analysis of Altman Model

Year	Score	Condition
2012	5.288	Safe
2013	2.327	Grey
2014	1.888	Grey
2015	4.941	Safe
2016	4.344	Safe
2017	4.318	Safe
2018	5.304	Safe
2019	5.607	Safe
2020	0.512	Bankrupt
2021	1.831	Grey
2022	-2.120	Bankrupt
2023	-6.128	Bankrupt

Source: Research data processing results (2024)

Springate Model Analysis

The results of the calculation of the Springate model, as listed in Table 3, show the same conclusion from 2012 to 2023. The results of the analysis ensure that the company's condition is in a slump because it is in the category of financial distress or threatened with bankruptcy. Based on the criteria from the Springate model, companies that have a score above 0.862 are in the safe zone. However, when a company has a Springate calculation value of less than or equal to 0.862, then it is included in the group of unhealthy companies.

Table 3. Results of Springate Model Calculation and Analysis

Year	Score	Condition
2012	0.394	Bankrupt
2013	-0.242	Bankrupt
2014	-0.206	Bankrupt
2015	0.171	Bankrupt
2016	-0.242	Bankrupt
2017	-0.168	Bankrupt
2018	-0.108	Bankrupt
2019	-0.376	Bankrupt
2020	-2.041	Bankrupt
2021	-1.236	Bankrupt
2022	-1.590	Bankrupt
2023	-2.673	Bankrupt

Source: Research data processing results (2024)

In fact, from 2012 to 2023 the company always recorded a value below 0.862. Thus, the company is really experiencing financial difficulties. In fact, the grades in 2013, 2014, 2016, 2017, 2018, 2019, 2020, 2021, 2022, and 2023 have always been negative. Only in 2012 and 2015 did the company record a positive Springate score. This means that Springate's model conclusively detects that over the last 12 years from 2012 to 2023, companies have experienced financial problems that lead to bankruptcy.

Grover Model Analysis

Using Grover's prediction model, the results of the calculations also provide a conclusion that is not good for the company. The results of Grover's analysis inform that the company experienced financial

problems from 2012 to 2023. The criteria of the Grover model are very simple, namely if the score is below or equal to -0.02, the company faces financial distress problems. However, when the company records a Grover calculation score above or equal to 0.01, it is categorized as healthy or not facing financial difficulties. Based on these criteria, the company has been trapped in financial distress for the last 12 years from 2012 to 2023. This is because Grover's calculation score always shows a number below -0.02. Thus, convincingly Grover's model finds the fact that the company is entering a severe difficult time because it is facing a long period of financial distress.

Table 4. Results of Grover Model Calculation and Analysis

Year	Score	Condition
2012	-0.125	Bankrupt
2013	-0.775	Bankrupt
2014	-0.783	Bankrupt
2015	-0.332	Bankrupt
2016	-0.647	Bankrupt
2017	-0.538	Bankrupt
2018	-0.462	Bankrupt
2019	-0.664	Bankrupt
2020	-1.924	Bankrupt
2021	-1.374	Bankrupt
2022	-1.957	Bankrupt
2023	-3.221	Bankrupt

Source: Research data processing results (2024)

Zmijewski Model Analysis

The Zmijewski test model showed different results compared to the results of the analysis of the Altman, Springate, and Grover models. Based on the results of Zmijewski's calculations as contained in Table 5, the company was still relatively healthy from 2012 to 2022. However, in 2023 the conditions have changed, the company is facing financial distress. This conclusion is based on the Zmijewski model criteria which states that companies with a score of more than zero are considered bankrupt or problematic. However, companies that recorded scores below or equal to zero included the group of healthy companies.

The results of the calculation of the Zmijewski model show that in the period from 2012 to 2022, the company's score was always below zero or always recorded a negative value. Only in 2023 did the company achieve a positive score of 1,394 points. These results provide different information compared to other models, especially when compared to Altman, Springate, and Grover models.

Table 5. Results of Zmijewski Model Calculation and Analysis

Year	Score	Condition
2012	**-2.999**	Safe
2013	**-2.202**	Safe
2014	**-2.148**	Safe
2015	**-3.265**	Safe
2016	**-2.793**	Safe
2017	**-2.751**	Safe
2018	**-3.107**	Safe
2019	**-3.049**	Safe
2020	**-1.088**	Safe
2021	**-1.981**	Safe
2022	**-0.463**	Safe

2023	1.394	Bankrupt

Source: Research data processing results (2024)

Ohlson Model Analysis

The Ohlson test also shows different values and conclusions compared to other models. The results of the analysis of the Ohlson model are like the Zmijewski model, only different in 2023. The Ohlson model concludes that the company is still healthy in the last 12 years from 2012 to 2023. There are no other conditions. It is a little different from Zmijewski's model, which concludes that in 2023 the company is stuck in financial distress.

The conclusion of the Ohlson method is in accordance with the formulation criteria. The Ohlson model states that if the results of a company's calculation have a score above 0.38, the company is in danger of financial distress. However, if the company's score is below 0.38, the company is in good health, not experiencing the slightest financial disturbance. Ohlson's calculation results show that all scores are below 0.38 from 2012 to 2023.

Table 6. Results of Ohlson Model Calculation and Analysis

Year	Score	Condition
2012	**-1.216**	Safe
2013	**-0.87**	Safe
2014	**-0.591**	Safe
2015	**-1.586**	Safe
2016	**-1.812**	Safe
2017	**-1.652**	Safe
2018	**-1.997**	Safe
2019	**-2.235**	Safe
2020	**-2.536**	Safe
2021	**-3.021**	Safe
2022	**-1.451**	Safe
2023	**0.159**	Safe

Source: Research data processing results (2024)

Taffler Model Analysis

The last test in this study was using the Taffler model. The test results of this model gave different results compared to the Altman, Springate, Grover, Zmijewski, and Ohlson models. The results of the Taffler model test as stated in Table 7 show that there are variations in conclusions related to the company's financial condition. This conclusion is based on the criteria of the Taffler model which states that when the results of a company's calculation have a score below or equal to 0.2, the company experiences financial distress. If the score of the company's calculation results has a value between 0.2 and 0.3, then the company is included in the gray area category. Another criterion is that if the score is more than 0.3, the company is in the healthy category, not experiencing financial problems.

Table 7. Results of Taffler Model Calculation and Analysis

Year	Score	Condition
2012	0.851	Safe
2013	0.632	Safe
2014	0.649	Safe
2015	0.934	Safe
2016	0.746	Safe
2017	0.734	Safe

2018	0.857	Safe
2019	0.753	Safe
2020	-0.147	Bankrupt
2021	0.186	Bankrupt
2022	0.263	Grey
2023	0.278	Grey

Source: Research data processing results (2024)

Based on these criteria, the company entered the healthy area from 2012 to 2019 because the score of the calculation results was always above 0.3. However, in 2020 the situation changed because the calculation results showed that the company's score was -0.147, meaning lower than 0.2 so that the company entered the bankruptcy threat area. In 2021, the situation was similar because the score was 0.186 which means lower than 0.2 so that the company was trapped in financial distress. In 2022 and 2023, the company entered the gray zone because the score ranged from 0.2 to 0.3. However, companies must remain vigilant because gray areas tend to change in an unsafe direction. Moreover, the company had a bad record in 2020 and 2021 which was in a state of being trapped in the threat of bankruptcy.

Independent Sample Test

The study developed a follow-up analysis using an independent sample t-test. To see the degree of difference between the models, the research used a 95% confidence degree. Before conducting the test, because this independent sample test belongs to the group of parametric inferential statistics, it is necessary to test the normality of the data. If the data of the two samples are normally distributed, then the independent sample test is feasible to use.

Based on the results of the normality test contained in Table 8, all data are distributed normally. The conclusion of the normally distributed data can be seen from a significant value greater than 0.05 for all independent pair data, from the first pair to the 15th pair. This means that the t-test of an independent sample can be used to see the difference between the two variables in this study.

Table 8. Normality Test Results

Pair	N	Mean	Std. Deviation	Monte Carlo Sig. (2-tailed)
AS	24	0.825	2.976	0.466
AG	24	0.638	3.070	0.363
AZ	24	0.153	3.453	0.312
AO	24	0.388	3.219	0.513
AT	24	1.452	2.625	0.243
SG	24	-0.88	0.928	0.221
SZ	24	-1.365	1.349	0.481
SO	24	-1.13	1.000	0.606
ST	24	-0.066	0.951	0.179
GZ	24	-1.552	1.240	0.609
GO	24	-1.317	0.900	0.613
GT	24	-0.253	1.063	0.666
ZO	24	-1.803	1.152	0.937
ZT	24	-0.738	1.65	0.205
OT	24	-0.503	1.264	0.262

Source: Research data processing results (2024)

Based on independent sample tests, as shown in Table 9, the comparison between Altman and Springate's methods (pair 1) for predicting bankruptcy shows significantly different results, meaning that H1 is accepted. This gives meaning that the two models produce different conclusions when used to

estimate a company's bankruptcy. Altman and Springate's methods used a combination of different financial ratios to predict bankruptcy. The results of the different tests significantly indicated that the combination of ratios used by each method had a different degree of accuracy in predicting bankruptcy in the data samples studied.

Table 9. Independent Sample Test Results

No	Pair	t	df	Sig. (2-tailed)
1	AS	2.863	12.603	0.014*
2	AG	3.230	12.401	0.007*
3	AZ	3.990	14.248	0.001*
4	AO	3.711	12.317	0.003*
5	AT	1.733	11.197	0.111
6	SG	0.986	21.899	0.335
7	SZ	2.774	19.639	0.012*
8	SO	2.339	21.787	0.029*
9	ST	-4.275	13.644	0.001*
10	GZ	2.046	18.899	0.055
11	GO	1.389	21.979	0.179
12	GT	-5.894	14.016	0.000*
13	ZO	-1.000	18.557	0.330
14	ZT	-6.350	12.297	0.000*
15	OT	-7.918	14.201	0.000*

*Source: Research data processing results (2024), * significantly different*

The paired sample test also showed significant results in the second pair (pair 2) between the Altman and Grover models so that H2 was accepted. This means that these two bankruptcy prediction models are able to provide different information and conclusions when used to estimate the financial condition of companies in this study.

In the third pair (pair 3) between Altman and Zmijewski's models, the t-test of the independent sample showed markedly different results, meaning that H3 was accepted. This means that the two models, namely Altman and Zmijewski, are able to provide different information and conclusions when used to predict the bankruptcy of companies in this research. Then, in the fourth pair (pair 4), the results also show a significant difference between the Altman and Ohlson models so that H4 is also accepted. This means that the two models can actually provide different conclusions in looking at and predicting the threat of corporate bankruptcy in this study.

No noticeable difference in results occurred in the fifth pair (pair 5) between Altman and Taffler's models, which means that H5 was rejected. With these results, the two models cannot provide different conclusions and information when used to predict the threat of corporate bankruptcy. A similar condition occurred in the sixth pair (pair 6) between the Springate and Grover models which showed no significant difference in test results, which meant that H6 was rejected. Thus, the Springate and Grover model tends to provide similar conclusions when used to predict the threat of corporate bankruptcy.

The comparison between Springate and Zmijewski in the seventh pair (pair 7) showed significantly different results, which means that H7 was accepted. This means that these two models are considered to be able to provide different conclusions when estimating company bankruptcy. In pair 8, between the Springate and Ohlson models, it turned out that the results gave a significant difference in effect so that H8 was accepted. This indicates that the Springate and Ohlson models may provide different information results when used to predict the bankruptcy of companies in this study.

In the ninth pair (pair 9), independent sample tests gave significantly different results between the Springate and Taffler models, meaning H9 was accepted. Thus, the two models can provide different

conclusions when used to predict bankruptcy. Between the Grover and Zmijewski models in the 10th pair, the results of the independent sample test did not provide a significant difference in signal, so H10 was rejected. Given these conditions, both models are likely to provide similar information when used to predict a company's bankruptcy.

The 11th pair (pair) between the Grover and Ohlson models responded to the independent sample test with insignificant results so H11 was rejected. This means that the two models will provide conclusions that are not much different when used to predict the bankruptcy of companies in this study. Independent sample tests of the 12th pair between the Grover and Taffler models gave significant results, meaning that H12 was accepted. This means that the two models, between Grover and Taffler, are able to infer different information when used to predict the likelihood of a company's bankruptcy.

Independent sample tests showed insignificant results on the 13th pair between the Zmijewski and Ohlson models, meaning that H13 was rejected. With these results, both models will give the same conclusion when predicting bankruptcy. Different responses occurred in the 14th pair between the Zmijewski and Taffler models which showed markedly different results. This means that H14 is accepted and allows the two models to provide different information when used to predict bankruptcy. In the last pair, the 15th pair, independent sample tests showed markedly different results, meaning that H15 was accepted. Thus, the two models will be able to provide different information when used to estimate the bankruptcy of a company.

Prediction Accuracy Rate

The six bankruptcy prediction models can have different levels of accuracy, but they can also have similar or even exact same levels of accuracy. Of these six bankruptcy prediction models, the accuracy level can be compared based on the company's net profit indicators. As seen in Table 10, the highest level of accuracy in this study is the Taffler model with a value of 83%.

Table 10. Accuracy Level of Each Prediction Model

Year	Net Profit	Altman	Springate	Grover	Zmijewski	Ohlson	Taffler
2012	Safe	Safe	Bankrupt	Bankrupt	Safe	Safe	Safe
2013	Safe	Grey	Bankrupt	Bankrupt	Safe	Safe	Safe
2014	Safe	Grey	Bankrupt	Bankrupt	Safe	Safe	Safe
2015	Safe	Safe	Bankrupt	Bankrupt	Safe	Safe	Safe
2016	Safe	Safe	Bankrupt	Bankrupt	Safe	Safe	Safe
2017	Safe	Safe	Bankrupt	Bankrupt	Safe	Safe	Safe
2018	Safe	Safe	Bankrupt	Bankrupt	Safe	Safe	Safe
2019	Safe	Safe	Bankrupt	Bankrupt	Safe	Safe	Safe
2020	Bankrupt	Bankrupt	Bankrupt	Bankrupt	Safe	Safe	Bankrupt
2021	Bankrupt	Grey	Bankrupt	Bankrupt	Safe	Safe	Bankrupt
2022	Bankrupt	Bankrupt	Bankrupt	Bankrupt	Safe	Safe	Grey
2023	Bankrupt	Bankrupt	Bankrupt	Bankrupt	Bankrupt	Safe	Grey
Accuracy Level		75%	33%	33%	75%	67%	83%
Error Rate		25%	67%	67%	25%	33%	17%

Source: Research data processing results (2024)

Altman and Zmijewski are two models with the same level of accuracy, which is 75%. Following in the next order are the Springate and Grover models which also both have an accuracy rate of 33%.

CONCLUSION

Based on the results of data analysis, researchers can draw several conclusions. First, Altman's method successfully detected the company's financial distress, namely in 2020, 2022, and 2023, while the

rest of the time the company was still safe and entered the gray area. Second, the Springate method predicts that for 12 years from 2012 to 2023, companies will be trapped in the threat of bankruptcy due to financial distress. Third, the condition of the company based on the Grover method also shows a worrying condition because throughout the year from 2012 to 2023 the company experienced financial difficulties. Fourth, from the analysis of Zmijewski's method, the company experienced financial distress only in 2023, the rest of the year was still in the healthy category. Fifth, Ohlson's method detects that the company is still in good health for 12 years from 2012 to 2023. Sixth, the Taffler model predicts that the company has experienced various conditions over the past 12 years, namely still in the healthy category from 2012 to 2019, experiencing the threat of bankruptcy in 2020 and 2021, and in the gray area in 2022 and 2023. Seventh, the comparison of accuracy with the company's net profit base found that the Taffler method showed the highest accuracy rate of 83 percent, followed by Altman and Zmijewski's method at 75%, Ohlson at 65%, and Springate and Grover both recorded an accuracy rate of 33%.

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