FINANCIAL DISTRESS ANALYSIS IN BANKING: WICH METHODS IS THE MOST ACCURATE?

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ABSTRACT
This study aims to analyze financial distress from several methods, Altman, Zmijewski, Grover, Springate, Ohlson, and CA-Score. The object of this research is banks that have been listed on the Indonesia Stock Exchange. The period in this research is from 2016 to 2020. This type of research is quantitative research with a descriptive approach. This research uses secondary data from banks' financial statements. The sampling technique used the purposive sampling method and uses the calculation of the financial ratios of each method, while hypothesis testing uses the accuracy level and error type with Microsoft Excel. This study shows that the Altman method has an accuracy rate of 9.09%, the Zmijewski method has an accuracy rate of 9.09%, the Grover method has an accuracy rate of 90.91%, the Springate method has an accuracy rate of 0%, the Ohlson method and CA-Score has the same accuracy level of 100%. The Ohlson and CA-Score method shows the most accurate method in predicting bankruptcy in banking companies. This research implies that the various existing method is expected to determine the most accurate method that can be applied in predicting financial distress in banking.

Keywords: Banking; Bankruptcy; Financial Distress,

INTRODUCTION

Financial statements can provide an overview of the economic condition of a company and can be used as a basis for making economic decisions. The company's activities and performance are influenced by economic conditions that are always changing. The company's financial statements are very valuable information for internal and external parties of the company. If the company's financial condition is in good condition, then the company's survival can be maintained so that in general it has a positive influence. Corporate bankruptcy can occur if the company experiences a situation where the financial condition is unstable and experiences a continuous decline (Idawati, 2020).

A company is said to be in bankruptcy if the company is unable to run its business. Based on the Bankruptcy Law no. 4 of 1998, a company is declared bankrupt based on an authorized court decision or based on its application if it has two or more creditors and the company is unable to pay at least one debt that has matured (Effendi, 2018). Financial distress is a prediction that aims to determine financial stability by looking at the health of the company or financial institution.

One of the financial institutions that have the potential to cause financial distress is banking, which is the economic root of a country and has a very large influence. Efforts that can be made to prevent financial distress,andovercome and minimize the occurrence of bankruptcy, companies and financial institutions can monitor financial conditions by analyzing financial statements. Financial statements can be used as a source of information regarding the company's financial position, and management performance, and can be used as a reference in making decisions. Detection of bankruptcy from the start to obtain an indication of whether or not bankruptcy occurs so that management can make improvements and anticipate that bankruptcy does not occur in the company (Komarudin et al., 2019).

The year 2020 is a challenge for the world and domestically due to the emergence of the COVID-19 pandemic that spreads in various countries including Indonesia. The spread of COVID-19 in Indonesia has an impact on economic growth. PSBB, which is the government's policy to prevent the spread of the COVID-19 pandemic, has resulted in limited mobility of people and goods, as well as reducing domestic demand for production and investment activities. The performance of exports and imports declined which resulted in a decline in global demand, therefore, the activities of companies also declined. Performance pressures that occur in the

business world have an impact on the household group, which has the most impact, especially the lower middle sector.

The company seeks to rationalize costs by reducing labor reductions that affect household performance activities. This problem causes non-performing loans. The increase in non-performing loans was due to a decline in the real sector's ability to pay amidst the limited credit growth during the COVID-19 pandemic. Another impact is the decline in profitability in banking. A non-performing loan is a condition that states that the debtor cannot pay its obligations to the bank, namely the obligation to pay the installments that have been promised from the start, resulting in non-performing loans to the bank.

Financial distress analysis using the Altman, Zmijewski, Grover, Springate, Ohlson, and CA-Score methods aims to predict financial difficulties that may cause bankruptcies in banks and to see which method is the most accurate. This is done as an initial analysis, of where banking conditions, especially during the COVID-19 pandemic occurred. Currently, the company's internal parties are still using individual financial ratios and then interpreting each of these ratios, this certainly does not describe the actual condition of the company. Meanwhile, for investors or external parties, these methods are indispensable for making decisions on whether to invest in the company or not.

This study refers to research (Komarudin et al., 2019), which uses data from mining companies listed on the IDX from 2012-2016. The results showed that the Altman method was more accurate in predicting corporate bankruptcy with an accuracy rate of 66.67%. Then followed by the Grover method at 64.10%, the Zmijewski method at 61.54%, and the Springate method at 48.72%. And in the last order, the Ohlson method which has the lowest accuracy level is 25.64%. The difference between previous studies and current research lies in the independent variables studied. In previous studies, there were five variables used, namely the Grover, Altman, Springate, Zmijewski, and Ohlson methods. The similarity between previous research and current research lies in the dependent variable used, namely financial distress and there are the same independent variables.

This study uses banking objects and financial distress analysis methods which are more varied because previous studies only used several analytical methods. In addition, taking objects in banking is due to the impact on banking financial performance and the potential for financial distress due to the COVID-19 pandemic, where the banking sector is the root of the Indonesian economy. In addition, the researchers also added several methods from previous research with banking objects including the Grover method, Ohlson method, and the CA-Score method to produce more varied research variables and use financial ratio calculations according to the formulas of each method and measure the accuracy level with a accuracy level. and type errors.

Based on the existing gap research, there is potential for financial distress in banking as a result of the increase in Non-performing loans from year to year, especially in 2020 due to the COVID-19 pandemic which resulted in a decline in bank financial performance. As well as in previous studies, financial distress analysis used several methods, and these several methods resulted in different levels of accuracy. So researchers are motivated to conduct research by combining several methods of predicting financial distress that is more varied.

LITERATURE REVIEW

Financial Distress

Financial distress is a condition where a company is categorized as facing a financial crisis that is declining in fulfilling its responsibilities to creditors. When a company can no longer bear the burden of obligations that should be paid to operate its business, the company can be said to be facing Financial Distress. This condition occurs because the company is not able to pay bills on time. (Edi & Tania, 2018)

Financial distress analysis method
Altman Analysis Method

The Altman method uses Multiple Discriminant Analysis which was first introduced by Edward I. Altman. Multiple Discriminant Analysis is a statistical technique that identifies several types of financial ratios that are considered to have the most important value in influencing an

event, then develop it into a method to make it easier to conclude an event (Novietta&Minan, 2017).

The Altman Z-Score method has been revised and modified three times, namely the First Altman method, the Revised Altman method, and the Modified Altman method. In this study, the Modified Altman method was used which this method can be applied to all companies. The modified Altman Z –Score method is as follows:

$Z = 6,56X1 + 3,26X2 + 6,72X3 + 1,05X4$

Description:

Z" = bankruptcy index

X1= working capital / total assets

X2 = retained earnings / total assets

X3 = earnings before interest and taxes / total assets

X4 = book value equity / book value debt

The results of the calculation of the Altman method obtained the Z-Score value which is divided into three categories as follows:

a. A The company is categorized as not experiencing bankruptcy if the Z value > 2.60.
b. The company cannot be determined whether it is bankrupt or not if the value is 1.10 < Z < 2.60.
c. The company is categorized as bankrupt if the Z value < 1.10

Research conducted by (Komarudin et al., 2019) analysis financial distress using the Altman method can be used to predict bankruptcy in mining companies in Indonesia the Altman method is the best compared to the Springate, Zmijewski, Grover, and Ohlson methods. However, research (Mandaluran et al., 2019) showed different results. Financial distress analysis using the Altman method has a standard deviation of 1.186 which means it has a lower accuracy value than the Springate method. It can be concluded that this method is weak compared to Springate. (Hariyani&Sujianto, 2018) in their research, the analysis of bankruptcy in Islamic banks for the 2010-2014 period shows that the Altman method has the lowest accuracy rate of 0%. It can be concluded that the Altman method is a weak method used to predict bankruptcy in Islamic banks compared to the Zmijewski and Springate methods.

H1: Financial distress analysis using the Altman method is accurate to predict bankruptcy in banking companies.

Zmijewski Analysis Method

The expansion of the study in bankruptcy prediction conducted by Zmijewski (1983) is to add financial ratios as a means of detecting the company's financial failure. Zmijewski conducted a study that re-examined twenty years of previous research in the field of bankruptcy. Financial ratios were selected from the financial ratios of previous research and samples were taken from 75 companies that went bankrupt, as well as 3573 healthy companies from 1972 to 1978 (Primasari, 2018)

This method produces the following formula:

$X = -4,3 - 4,5X1 + 5,7X2 - 0,004X3$

Description:

X1 = ROA (return on assets)

X2 = leverage (debt ratio)

X3 = liquidity (current ratio)

Table 1. Zmijewski Method Cut-Off Value

Cut Off Value	Prediction
X < 0	Not Bankrupt
X > 0	Bankrupt

Source: Yuliana (2018)

Research conducted (Utari& Akbar, 2020) on predictive analysis of financial distress in Islamic banking in Indonesia for the 2016-2018 period stated that the results of research using the Zmijewski method showed predictions with the highest accuracy level. This is evidenced by the results of the fourteen samples of companies, ten of which show a healthy condition and four

companies experience a gray area, where this condition states that it cannot be determined whether the company is bankrupt or not. However, research (Effendi, 2018) showed different results. Analysis of financial distress using the Zmijewski method shows the results of five samples, only one is predicted to experience bankruptcy. In other words, the Zmijewski method is a weak method used to predict bankruptcy compared to the Springate, Foster, and Grover methods. It can be concluded that the Zmijewski method is the weakest method used to predict bankruptcy compared to the Altman method and the Springate method.

H2: Financial distress analysis using the Zmijewski method is accurate to predict bankruptcy in banking companies.

Grover Analysis Method

The Grover method is a method created by conducting a reassessment of the Altman Z-score method. Jeffrey S. Grover used a sample according to the Altman Z-score method in 1968 by adding 13 new financial ratios. The sample used was 70 companies with 35 companies that went bankrupt and 35 companies that did not go bankrupt from 1982 to 1996. (Primasari, 2018)

Grover's method is as follows:

Score = $1,650X_1 + 3,404X_3 - 0,016ROA + 0,057$

Description:

X_1 = working capital / total assets

X_3 = earnings before interest and taxes / total assets

ROA = net income / total assets

Table 2. Grover Method Cut-Off Value

Cut Off Value	Prediction
G ≥ 0,01	Not Bankrupt
G ≤ -0,02	Bankrupt

Source: Yuliana (2018)

(Nasri et al., 2020) analysis of financial distress using the Grover method to predict bankruptcy in property and real estate companies in Indonesia. Grover's method is the best method than the Foster and Ohlson method. The results of the Grover method stated an accuracy rate of 100%. (Rahmat, 2020) in his research on financial distress analysis in banks for the 2014-2018 period stated that the Grover method had the highest level of prediction accuracy with the results of all bank companies being sampled during the research period not experiencing financial distress. However, the research conducted by (Kason et al., 2020) showed different results. Financial distress analysis using the Grover method has a low accuracy rate of 72.86%, compared to the Springate and Altman Z-Score methods which each have an accuracy rate of 85.71% and 75.71%. The Grover method is weak compared to the Springate and Altman Z-Score methods.

H3: Financial distress analysis using Grover's method is accurate to predict bankruptcy in banking.

Springate Analysis Method

Brigham and Weston in Yuliana (2018) explained that Springate 1978 developed the Altman method using Multiple Discriminant Analysis (MDA). By following the procedure developed by Altman, Springate uses step-wise multiple discriminate analysis for four of the 19 popular financial ratios so that it can distinguish companies that are in the bankrupt zone or the safe zone. Initially, this method used 19 popular financial ratios, but after re-testing Springate finally chose 4 ratios that were used in determining the criteria for companies to be included in the category of healthy companies or companies that have the potential to go bankrupt. This method has the following formula:

Z = $1,03 A + 3,07 B + 0,66 C + 0,4 D$

Description:

A = working capital / total assets

B = net profit before interest and taxes / total assets

C = net profit before taxes / current liabilities

D = sales / total asset

Table3. Springate Method Cut-Off Value

Cut Off Value	Prediction
Z > 0,862	Not Bankrupt
Z < 0,862	Bankrupt

Source: Yuliana (2018)

Research (Kason et al., 2020) analysis of financial distress using the Springate method can be used to predict bankruptcy in mining companies in Indonesia. This Springate method is the best compared to the Ohlson and Grover methods. The results of the Springate stated an accuracy rate of 85.71%. (Marlinda&Yulia, 2020) in their research, an analysis of the potential for financial distress in Islamic commercial banks 2014-2018 shows that the Springate method can be used to predict bankruptcy with a accuracy level which shows that there are eleven samples of Islamic commercial bank companies, nine of which are declared in a healthy condition or not experiencing financial problems. bankruptcy and three Islamic commercial bank companies experienced financial distress.

However, research (Prasandri, 2018) showed different results. Analysis of financial distress using the Springate method shows a fairly high percentage of bankruptcies of 25% compared to the Zmijewski method which is only 18.75%. In other words, the Springate method is weak compared to the Zmijewski method.

H4: Financial distress analysis with the Springate method is accurate to predict bankruptcy in banking companies.

Ohlson Analysis Method

Brigham and Weston in Yuliana (2018) explain that the method developed by Ohlson has 9 variables consisting of several financial ratios. Ohlson in his research used a sample of 105 bankrupt companies and 2058 companies that were not bankrupt in the 1970-1976 period and obtained data from financial statements published for tax (10-K financial statements). The service used is Compustat. While Altman (1968) and Beaver (1966) used data sources from Moody's manual. The statistical method used by Ohlson is conditional logit, which Ohlson believes can cover the shortcomings of the MDA method used by Altman and Springate.

O = -1.32 – 0,407 LOG TAGNP + 6,03 TLTA – 1,43 WCTA +0,0757 CLCA – 2,37EQNEG – 1,83 NITA + 0,285CFOTL – 1,72NNEG – 0,521DELTANI

Description :

LOG TAGNP	= Log (total asset / GNP price-level index)
TLTA	= Total Liabilities / Total Asset
WCTA	= working capital / total assets
CLCA	= Current Liabilities / Current Assets
EQNEG	= 1 if Total Liabilities >Total Assets ;Otherwise
NITA	= Net Income / Total Assets
CFOTL	= Cash Flow From Operations / Total Liabilities
NINEG	= 1 if Net Income Negative; 0 Otherwise
DELTANI	= (Nlt – Nlt-1) / (Nlt + Nlt-1)

Table4. OhlsonMethod Cut-Off Value

Cut Off Value	Prediction
O < 0,862	Not Bankrupt
O > 0,862	Bankrupt

Source: Yuliana (2018)

Based on research (Nur &Wulandari, 2014) analysis of financial distress using the Ohlson method can be used to predict bankruptcy in retail companies in Indonesia. Ohlson's method is the best compared to the Ca-Score, Fulmer, and Zavgrenmethods. The results of the three methods are that the Ohlson method has the highest accuracy rate of 83.33%, while the CA-Score has an accuracy rate of 30% and Fulmer and Zavgrenhave an accuracy rate of 0.00%. In other words, Ohlson's method is the right and best method used in predicting bankruptcy.

However, research (Komarudin et al., 2019) showed different results. Financial distress analysis using the Ohlson method has a lower accuracy rate of 25.64%. In other words, the Ohlson method is the weakest method for predicting bankruptcy than the Springate, Altman, Grover, and Zmijewski methods. It can be concluded that the Ohlson method is the weakest in analyzing bank health compared to the Zmijewski method and the Springate method.

H5: Financial distress analysis using Ohlson's method is accurate to predict bankruptcy in banking companies.

CA-Score Analysis Method

The CA-Score analysis method was developed by Jean Legault from the University of Quebec Montreal Canada using multivariant analysis. This method has a prediction accuracy rate of 83%. The formula is as follows:

CA-Score = 4,591X1 + 4,508X2 + 0,3936X3 − 2,7616

Description:

CA-Score	= bankruptcy index
X1	= shareholder investment (1) / assets (1)
X2	= EBT + financial expenses (1) / assets (1)
X3	= sales (2) / assets (2)
1	= overview of the previous period
2	= overview of the previous two periods

From the results of the calculation of the Springate method, the CA-Score value is divided into two categories as follows. If the CA-Score value is < -0.3 then the company is included in the non-bankrupt category. If the CA-Score value > -0.3 then the company is included in the bankrupt category.

Research conducted by (Kartikasari&Hariyani, 2019) regarding the accuracy of predicting financial distress in retail companies in Indonesia. The results of this study indicate the accuracy level in predicting bankruptcy with the CA-Score method of 30%, while the Ohlson method has a accuracy level in predicting bankruptcy of 83.33%. And Moel Fulmer and Zavgren's method with an accuracy rate of 0.00%.

H6: Financial distress analysis using the CA-Score method is accurate to predict bankruptcy in banking companies.

METHODS

The type of research used is quantitative research. The object used in this study is a banking company listed on the Indonesia Stock Exchange for the 2016-2020 period. The population in this study are banks listed on the Indonesia Stock Exchange for the 2016-2020 period. The number of banks on the Indonesia Stock Exchange is forty-three. The sampling technique used in this study was purposive sampling.

The samples used in the analysis of financial distress to predict bankruptcies in banks are eleven (11) which are presented in table 5. This figure is obtained from the total banking population on the Indonesia Stock Exchange, which is forty-three (43) minus the companies which in special criteria are declared not to publish financial statements during the study period, which are one (1) and banking companies that do not experience a decline. stock prices or stock price movements have been stagnant for two consecutive years, amounting to thirty-one (31), so eleven (11) banking companies were used as research samples.

Techniques of data analysis in this study by going through several stages. First, calculating financial distress based on data from the financial statements of banking companies obtained from the Indonesia Stock Exchange website (www.IDX.xo.id) using the Altman, Zmijewski, Grover, Springate, Ohlson, and CA-Score methods to predict bankruptcy. Second, descriptive statistics are used to determine the application and value of each financial ratio of the financial distress analysis method. The measurement used in this study is the calculation of financial ratios from the financial distress analysis method.

The third stage is the comparison of the accuracy level and the type of error used to conclude which method is the most suitable to be applied (Yuliana, 2018). The accuracy level and type of error for each method is calculated as follows:

Accuracy Level $= \dfrac{\text{Total of correct predictions}}{\text{Total sample}} \times 100\%$

Error Type I $= \dfrac{\text{Total of Error Type I}}{\text{Total Sample}} \times 100\%$

Table5. Company Research Sample List

No	Code	Company name
1	SDRA	Bank Woori Saudara Indonesia 1906 Tbk
2	PNBS	Bank Panin Dubai Syariah Tbk
3	NISP	Bank OCBC NISP Tbk
4	BNII	Bank Maybank Indonesia Tbk
5	BMRI	Bank Mandiri Indonesia Tbk
6	BMAS	Bank Maspion Indonesia Tbk
7	BKSW	Bank QNB Indonesia Tbk
8	BJBR	Bank daerah Pembangunan Jawa Barat Tbk
9	BEKS	Bank Pembangunan Daerah Banten Tbk
10	BBYB	Bank Yudha Bhakti Tbk
11	BABP	Bank MNC International Tbk

Source: Data Processed by Researchers, 2021

RESULTS

Calculation Results of Financial Distress Analysis Method
Altman Method

The results of the calculation of the Altman method obtained the Z-Score value which is divided into three categories as follows:

a. The company is categorized as not experiencing bankruptcy if the Z value > 2.60.
b. b. The company cannot be determined whether it is bankrupt or not if the value is 1.10 < Z < 2.60.
c. c. The company is categorized as bankrupt if the Z value < 1.10

Based on table 6, there are four samples of companies that are expected to experience bankruptcy in the future, six samples of compa nies in a gray area condition, which cannot be determined whether the company is in a state of bankruptcy, and one sample of companies that are predicted to have no potential for bankruptcy.

Table6. Altman Method Calculation Results

No	Company Code	Year Score					Average	Prediction Status
		2016	2017	2018	2019	2020		
1	SDRA	1,489	1,690	1,700	1,373	1,425	1,535	GA
2	PNBS	1,013	5,824	6,598	7,570	11,087	6,418	TB
3	NISP	1,595	1,634	1,558	1,600	1,499	1,577	GA
4	BNII	1,234	1,263	1,346	1,426	1,475	1,349	GA
5	BMRI	2,129	2,323	2,387	2,404	1,958	2,240	GA
6	BMAS	1,427	1,360	1,206	1,131	0,808	1,186	GA
7	BKSW	0,530	0,381	1,000	1,039	0,720	0,734	B
8	BJBR	1,274	1,114	1,037	1,042	1,012	1,096	B
9	BEKS	(0,250)	(0,109)	(0,323)	(0,037)	(1,231)	(0,390)	B
10	BBYB	1,536	1,181	0,705	1,004	1,110	1,107	GA
11	BABP	0,863	(0,341)	0,364	0,201	0,089	0,235	B

Source: Data processed by researchers, 2021
Description:
B   = Bankrupt
GA   = Grey Area (tidakdapatditentukan)
TB   = NotBankrupt

Zmijewski Method

The results of the calculation of the Zmijewski method obtained the X-Score value which is divided into two categories as follows:

a. A If the X-Score is negative ($X < 0$), then the company is classified as not bankrupt or healthy.
b. If the X-Score is positive ($X > 0$), the company can be classified as unhealthy or tend to lead to bankruptcy.

Table7. ZmijewskiMethod Calculation Results

No	Company Code	Year Score					Average	Prediction Status
		2016	2017	2018	2019	2020		
1	SDRA	0,223	0,037	0,053	0,264	0,243	0,164	B
2	PNBS	(3,649)	(3,418)	(3,796)	(4,079)	(4,070)	(3,802)	TB
3	NISP	0,532	0,524	0,525	0,449	0,525	0,511	B
4	BNII	0,683	0,664	0,532	0,444	0,466	0,558	B
5	BMRI	0,156	0,109	0,064	0,033	0,230	0,118	B
6	BMAS	0,183	0,250	0,325	0,435	0,642	0,367	B
7	BKSW	0,702	0,617	0,092	0,233	0,218	0,372	B
8	BJBR	0,492	0,547	0,571	0,526	0,603	0,548	B
9	BEKS	0,805	0,854	1,027	1,086	0,201	0,795	B
10	BBYB	0,435	0,612	0,777	0,329	0,204	0,471	B
11	BABP	0,580	1,017	0,621	0,549	0,633	0,68	B

Source: Data processed by researchers, 2021

Based on table 7 above, there are ten samples of companies that are predicted to experience bankruptcy in the future and one sample that is predicted to be in good health or has no potential for bankruptcy.

Grover Method

The percentage of Islamic commercial banks in Indonesia in 2015-2020 indicated that they were experiencing financial distress was 77%. It is based on the rate of return on as The calculation results of the Grover method can be classified into two categories as follows:
a. The company is not bankrupt if it has a score of more than or equal to 0.01 (G 0.01)
b. The company is in a state of bankruptcy if it has a score less than or equal to -0.02 (G -0.02)

Based on table 8 above, there is one sample of companies that are predicted to experience bankruptcy in the future, and ten samples of companies that are predicted to be in good health or have no potential for bankruptcy.

Table8. GroverMethod Calculation Results

No	Company Code	Year Score					Average	Prediction Status
		2016	2017	2018	2019	2020		
1	SDRA	0,301	0,370	0,384	0,322	0,328	0,341	TB
2	PNBS	(0,004)	1,143	1,422	1,480	1,488	1,106	TB
3	NISP	0,375	0,392	0,378	0,382	0,351	0,376	TB
4	BNII	0,308	0,319	0,341	0,348	0,335	0,330	TB
5	BMRI	0,464	0,494	0,526	0,531	0,441	0,491	TB
6	BMAS	0,317	0,296	0,264	0,259	0,187	0,265	TB
7	BKSW	0,108	0,074	0,295	0,306	0,269	0,210	TB
8	BJBR	0,293	0,294	0,289	0,299	0,286	0,292	TB
9	BEKS	(0,203)	0,020	(0,025)	(0,099)	(0,027)	(0,067)	B
10	BBYB	0,316	0,222	0,082	0,202	0,215	0,207	TB
11	BABP	0,261	(0,136)	0,194	0,144	0,109	0,114	TB

Source: Data processed by researchers, 2021

Springate Method

The calculation results of the Springate method can be classified into two categories as follows:
a. The company is not bankrupt if it has a score of more than 0.862 or S > 0.862
b. The company is in a state of bankruptcy if it has a score of less than 0.0862 or S < 0.0862.

Based on table 9, the eleven companies sampled in this study are predicted to be in an unhealthy condition or are predicted to experience bankruptcy in the future.

Table9. SpringateMethod Calculation Results

No	Company Code	Year Score					Average	Prediction Status
		2016	2017	2018	2019	2020		
1	SDRA	0,217	0,265	0,279	0,224	0,227	0,242	B
2	PNBS	0,014	(0,473)	0,898	0,940	0,927	0,461	B
3	NISP	0,258	0,271	0,264	0,269	0,231	0,259	B
4	BNII	0,217	0,223	0,241	0,245	0,222	0,229	B
5	BMRI	0,317	0,346	0,372	0,375	0,294	0,341	B
6	BMAS	0,230	0,209	0,181	0,177	0,121	0,184	B
7	BKSW	0,003	(0,030)	0,177	0,180	0,131	0,092	B
8	BJBR	0,214	0,213	0,214	0,219	0,206	0,213	B
9	BEKS	(0,296)	(0,018)	(0,051)	(0,107)	(0,115)	(0,117)	B
10	BBYB	0,250	0,159	0,015	0,139	0,136	0,139	B
11	BABP	0,165	(0,227)	0,133	0,103	0,069	0,049	B

Source: Data processed by researchers, 2021

Ohlson Method

The calculation results of the Ohlson method can be classified into two categories as follows:

a. A The company is in a non-bankrupt condition if it has a score of less than 0.38 or O < 0.38.

b. The company is in a state of bankruptcy if it has a score of more than 0.862 or O > 0.38

Based on table 10 above, the eleven companies sampled in this study are predicted to be in good health or not experiencing bankruptcy.

Table10. Ohlson Method Calculation Results

No	Company Code	Year Score					Average	Prediction Status
		2016	2017	2018	2019	2020		
1	**SDRA**	**(3,528)**	**(3,871)**	**(3,909)**	**(3,633)**	**(3,752)**	**(3,739)**	**TB**
2	PNBS	(9,584)	(13,382)	(11,138)	(11,491)	(11,097)	(11,338)	TB
3	NISP	(3,976)	(4,066)	(4,078)	(4,155)	(4,029)	(4,061)	TB
4	BNII	(3,967)	(3,866)	(4,092)	(4,062)	(3,954)	(3,988)	TB
5	BMRI	(5,141)	(5,422)	(5,468)	(5,505)	(5,143)	(5,336)	TB
6	BMAS	(5,920)	(5,723)	(5,667)	(5,566)	(5,484)	(5,672)	TB
7	BKSW	(5,682)	(4,968)	(3,064)	(3,336)	(5,916)	(4,593)	TB
8	BJBR	(3,749)	(3,811)	(3,861)	(3,870)	(3,839)	(3,826)	TB
9	BEKS	(4,249)	(3,621)	(3,905)	(3,836)	(5,073)	(4,137)	TB
10	BBYB	(8,442)	(7,716)	(10,326)	(7,727)	(8,542)	(8,551)	TB
11	BABP	(2,955)	(4,795)	(2,099)	(2,528)	(2,488)	(2,973)	TB

Source: Data processed by researchers, 2021

Ca-Score Method

The results of the calculation of the Ca-Score method can be classified into two categories as follows:

a. A company is said to be bankrupt if it has a score of less than -0.3 or a CA-Score < -0.3

b. A company is said to be bankrupt if it has a score of more than -0.3 or a CA-Score > -0.3.

Based on table 11 above, the eleven companies that were sampled in this study were predicted to be in good health or not experiencing bankruptcy

Table11. CA-Score Method Calculation Results

No	Company Code	Year Score					Average	Prediction Status
		2016	2017	2018	2019	2020		
1	SDRA	(2,484)	(2,438)	(2,457)	(2,489)	(2,485)	(2,471)	TB
2	PNBS	(2,438)	(3,014)	(2,463)	(2,499)	(2,511)	(2,585)	TB
3	NISP	(2,463)	(2,480)	(2,483)	(2,479)	(2,488)	(2,479)	TB
4	BNII	(2,436)	(2,472)	(2,461)	(2,491)	(2,483)	(2,469)	TB
5	BMRI	(2,511)	(2,505)	(2,487)	(2,499)	(2,546)	(2,509)	TB

6	BMAS	(2,379)	(2,406)	(2,451)	(2,486)	(2,465)	(2,437)	TB
7	BKSW	(2,652)	(2,621)	(2,465)	(2,499)	(2,594)	(2,566)	TB
8	BJBR	(2,381)	(2,442)	(2,441)	(2,445)	(2,424)	(2,427)	TB
9	BEKS	(2,449)	(2,237)	(2,559)	(2,579)	(2,578)	(2,480)	TB
10	BBYB	(2,287)	(2,404)	(2,559)	(2,389)	(2,413)	(2,410)	TB
11	BABP	(2,469)	(2,759)	(2,048)	(2,450)	(2,401)	(2,425)	TB

Source: Data processed by researchers, 2021

Research Hypothesis Testing Results
Calculation of Accuracy Level and Error Type

The calculation of the accuracy level and type of error is carried out after the calculation results are obtained from each method consisting of the Altman, Zmijewski, Grover, Springate, Ohlson, and CA-Score methods.

Altman Method

Based on the analysis of calculations performed on 11 companies (table 12), it shows that the Altman method has an accuracy rate of 9.09% and the error type is 90.91%, meaning that the Altman's method has a low accuracy level. This shows that H1 is rejected.

Tabel12. Calculation of Accuracy Level and Error Type I Altman Method

Description	Prediction			Total
	Bankrupt	Grey Area	Not Bankrupt	
Altman Method Calculation	4	6	1	11
Real companies are not bankrupt				11
Accuracy Level	9,09%			
Error Type	36,36%			
Grey Area	54,55%			

Source: Data processed by researchers, 2021

Based on the analysis of calculations performed on 11 companies (table 12), it shows that the Altman method has an accuracy rate of 9.09% and the error type is 90.91%, meaning that the Altman method has a low accuracy level. This shows that H1 is rejected.

Zmijewski Method

Table13. Calculation of Accuracy Level and Error Type I Zmijewski Method

Description	Prediction		Total
	Bankrupt	Not Bankrupt	
Zmijewski Method Calculation	10	1	11
Real companies are not bankrupt			11
Accuracy Level	9,09%		
Error Type	90,91%		

Source: Data processed by researchers, 2021

The analysis of calculations carried out on 11 companies shows that the Zmijewski method has an accuracy rate of 9.09% and the error type is 90.91% the same as the Altman method, meaning that the Zmijewski method has a low accuracy level. This indicates that H2 is rejected or cannot be accepted.

Grover Method

Based on the analysis of calculations carried out on 11 companies, it shows that the Grover method has an accuracy rate of 90.91% and the error type is 9.09%, meaning that this Grover method has a fairly high accuracy level but cannot be said to be the most accurate financial distress analysis method. This indicates that H3 is rejected or cannot be accepted

Table14. Calculation of Accuracy Level and Error Type I Grover Method

Description	Prediction		Total
	Bankrupt	Not Bankrupt	
GroverMethod Calculation	1	10	11
Real Companies are Not Bankrupt			11
Accuracy Level		90,91%	
Error Type		9,09%	

Source: Data processed by researchers, 2021

Springate Method

Table 15. Calculation of Accuracy Level and Error Type I Springate Method

Description	Prediction		Total
	Bankrupt	Not Bankrupt	
SpringateMethod Calculation	11	0	11
Real Companies are not Bankrupt			11
Accuracy Level		0%	
Error Type		100%	

Source: Data processed by researchers, 2021

Based on the analysis of calculations performed on 11 companies, it shows that the Springate method has an accuracy rate of 0% and the error type is 100%, meaning that the Springate method has the lowest accuracy level. This indicates that H4 is rejected or cannot be accepted.

Ohlson Method

Table 16. Calculation of Accuracy Level and Error Type I Ohlson Method

Description	Prediction		Total
	Bankrupt	Not Bankrupt	
OhlsonMethod Calculation	0	11	11
Real Companies are not Bankrupt			11
Accuracy Level		100%	
Error Type		0%	

Source: Data processed by researchers, 2021

The analysis of calculations performed on 11 companies shows that the Ohlson method has an accuracy rate of 100% and an error type of 0%, meaning that the Ohlson method has the highest accuracy level. This shows that H5 is acceptable.

CA-Score Method

Table 17. Calculation of Accuracy Level and Error Type I CA-Score Method

Description	Prediction		Total
	Bankrupt	Not Bankrupt	
CA-ScoreMethod Calculation	0	11	11
Real Companies are not Bankrupt			11
Accuracy Level		100%	
Error Type		0%	

Source: Data processed by Researchers, 2021

Based on the analysis of calculations performed on 11 companies, it shows that the CA-Score method has an accuracy rate of 100% and an error type of 0%, meaning that the CA-Score method has the highest accuracy level. This shows that H6 isacceptable.

Based on the calculation of the accuracy level and the type of error of each method, it can be seen that the highest accuracy level and the type of error are the lowest. The most appropriate method used in analyzing financial distress is the method that has the highest accuracy level and the lowest type of error.

Table 18 shows that the most appropriate method for analyzing financial distress to predict bankruptcy in banking companies is the Ohlson method and the CA-Score method which has an accuracy rate of 100% and an error type of 0%.

Table 18. Summary of Comparison of Accuracy Levels and Error Types

Method	Accuracy Level	Error Type
Altman Method	9,09%	36,36%
Zmijewski Method	9,09%	90,91%
Grover Method	90,91%	9,09%
Springate Method	0%	100%
Ohlson Method	100%	0%
CA-Score Method	100%	0%

Source: Data processed by Researchers, 2021

Previous research that supports this is research from (Kartikasari&Hariyani, 2019) in the Accuracy of the Financial Distress Prediction Model in Indonesian Retail Companies. This study uses three variables as an analytical method, namely the Ohlson, Fulmer, CA-Score, and Zavgren methods. The results of this study indicate that the level of conformity in predicting financial distress is different in each method, the Ohlson method has a conformity level of 83.3%, the CA-Score method has a conformity level of 30%, the Fulmer and Zavgren methods have a conformity level of 0%. . This shows that the Ohlson method has the highest suitability value, so financial distress analysis can be used to predict bankruptcy. In research (Kartikasari&Hariyani, 2019) the CA-Score model is not the model with the highest accuracy level. However, in this research, the CA-Score has the highest accuracy value, which is 100%, so the CA-Score model can be used for financial distress analysis to predict bankruptcy.

CONCLUSION

This study analyzes the accuracy level and compares six analytical methods consisting of the Altman, Zmijewski, Grover, Springate, Ohlson, and CA-Score methods to predict the existence of financial distress in banking companies listed on the Indonesia Stock Exchange for the period 2016 to 2020. Based on the analysis results and the discussion in the previous section concluded that each Altman method has an accuracy rate of 9.09%, the Zmijewski method has an accuracy rate of 9.09%, the Grover method has an accuracy rate of 90.91%, the Springate method has an accuracy rate of 0%, the Ohlson method and CA-Score has the same accuracy level that is 100%. The Ohlson and CA-Score methods show the most accurate methods in predicting bankruptcy in banking companies.

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