COMPARATIVE ANALYSIS OF BANKRUPTCY PREDICTION METHODS OF ALTMAN, SPRINGATE, AND ZMIJEWSKI

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Abstract

Key word :
*Altman; Springate;
Zmijewski;
Bankruptcy*

This study aims to determine the results of the bankruptcy prediction calculation score, to find out whether there are differences in bankruptcy prediction and to find out which bankruptcy prediction model is the most accurate in predicting bankruptcy altman, springate and zmijewski methods. This type of research uses quantitative research with a comparative approach. This study uses the population of real estate and property companies listed on the IDX in 2019-2021 on the www.idx.com website. Sampling was carried out by purposive sampling so that a sample of 80 companies was obtained. Data analysis techniques in this study used the Normality Test and the Kruskall Wallis Test using SPSS 26 and the Accuracy Level Test. The results of the Kruskal Wallis Test illustrate that there is a significant difference between the three methods used with significant values of 0.005 or < 0.05. The results of this study revealed that the Zmijewski Model is the most accurate bankruptcy prediction model in predicting the bankruptcy of real estate and property companies with a total accuracy rate of 86.67% and an error rate of 13.33%.

INTRODUCTION

Real estate and property companies are companies that have an important role. Engaged in the development and economy of a country, such as housing, apartments, offices, bridges and others. This sector is considered important because it is one of the potential sources of state revenue because it has the ability to attract and move economic activity, affect the development of the financial sector and its impact on economic growth and employment (www.fiskal.kemenkeu.go.id). This shows that the increasing number of companies in the real estate and property sector indicates the growing economy of Indonesia(Milleniasari, 2022).

Market optimism was disrupted, along with the outbreak of the new delta variant in the middle of the year, this certainly dealt a big blow in various sectors, especially the property and real estate sectors(Ramadanty & Khomsiyah, 2022). As a result, almost all countries experienced economic stagnation so that many companies experienced a decline in financial performance (Ulin Nuha & Purnomo, 2021) accompanied by declining retail sales due to uncertainty over the Covid-19 pandemic and recession could accelerate the decline in the property sector (Colliiers, 2020) .

The relationship between bankruptcy and signal theory is about bankruptcy prediction analysis (Tuvadaratragool, 2013). The results of bankruptcy predictions show that the analyzed company does not have the possibility of bankruptcy, so the company will receive positive signals useful to interested parties (Endang, 2019) . However, if the bankruptcy prediction output shows that the analyzed company has a possibility of bankruptcy then the related company receives negative signals that can harm interested parties (R. Sari et al., 2022). Analysis of bankruptcy prediction models using the Altman, Springate and Zmijewski models is expected to provide a signal to companies when company performance declines (Prakoso et al., 2022) so that in decision making.

By conducting an analysis of potential bankruptcy. on the company. real estate. and property. that. Registered. On the Indonesia Stock Exchange, the company can then make decisions to prepare and improve in the future and have bright prospects in the future. Therefore, based on the description above, researchers are interested in conducting research. with the title "Comparative Analysis of Bankruptcy Prediction Method Altman, Springate, and Zmijewsky (Empirical Study on Real Estate and Property Companies Listed on the Indonesia Stock Exchange for the Period 2019 to 2021).

LITERATURE REVIEW

Financial statements are very crucial statistics for every company .which contains news in a structured manner related to the financial position used in explaining company performance (IAI, 2015) This is in line with opinion (Kasmir, 2014) Disclose financial statements show. Financial situation. Company now or a certain time (balance sheet) as well as a certain period (for the income statement). Therefore, in decision making every business requires a financial statement (Banjarnahor & Devi, 2018)

Bankruptcy

Menurut Rudianto dalam Anon n.d.-b (2022) Financial bankruptcy The company is defined as the insufficiency of the company in paying financial liquidity on time, thus causing the company's debt problems and becoming a risk of bankruptcy. A company is considered bankrupt where the condition of the company is bankrupt or inadequate to fulfill its obligations because the company faces a shortage and insufficient funds to operate or continue its activities to achieve economic goals that the company wants to achieve but cannot achieve. The

company's ongoing financial problems will jeopardize the company's long-term position.

Bankruptcy Prediction Model
Altman (Z-Score)

A finance professor named Edward Altman at one of the US universities, developed the Altman Z-Score procedure published in the period 1968(Bacia et al., 2021). The Altman Z-score method can be used to predict bankruptcy and see the company's financial situation in the future using financial matrices, namely to facilitate decision making related to the prediction of bankruptcy of a company(Pangkey et al., 2018).

Altman score measurement:

$X1$ = Working Capital / Total Asset

$X2$ = Retained Earning / Total Asset

$X3$ = EBIT / Total Asset

$X4$ = Market Value of Equity/ Book Value of Total Debt

$X5$ = Sales / Total Asset

Z-Score = 1,2 (X1) 1,4 (X2) 3,3 + (X3) 0,6 + 1,0 (X4) +(X5)

Sourses : (Nurdyastuti & Iskandar, 2019)

The classification in the Altman Z-Score method with characteristics include:

Value.>.2.90 companies that are in the healthy zone

The value of 1.81 < Z-Score < 2.99 has not been found to be bankrupt or not (gray area).

A value of < 1.81 is at risk of bankruptcy.
Metode Springate (S-Score)

This model is an analytical model that assesses bankruptcy risk, this model was introduced by an economist in (1978), made using the Altman method, after retesting, Springate determined four ratios used to determine characteristics in the healthy or bankrupt category. Quoting Periods and Parquids in (Periode 2022). Springate has an accuracy of 92.5% with the use of 40 company samples in bankruptcy predictions.

S-Score = 1,03 (X1) + 3,07 (X2) + 0,66 (X3) + 0,4 (X4)

Excerpt from (Haryo Prakoso et al., 2022):

$X1$ = Working Capital / Total Asset

$X2$ = Net Profit Before Interest and Taxes / Total Asset

$X3$ = Net Profit Beore Taxex / Current Debt

$X4$ = Sales / Total Asset

The provisions for the s-score value are as follows:

If the > value of 0.862 means that the company is categorized as a healthy company.

If the < value is 0.862, the company tends to go bankrupt (unhealthy).

Zmijewsky model (X-Score)

The X-Score model is a bankruptcy predictor model produced by Zmijeski in the period 1984 (M. P. Sari et al., 2019). X-score uses the company's financial ratios of ROA, Reverage and liquidity to develop its model (Sunaryo Putri, 2018). So the zmijewski model has three financial ratios considered good in the predictor.

formula model x score :

X- Score= -4,3 - 4,5 (X1) + 5,7 (X2 -0,004 (X3)

Excerpt from (Evi Dwi Prihanthini & M.Ratna Sari, 2013) The description x-score :
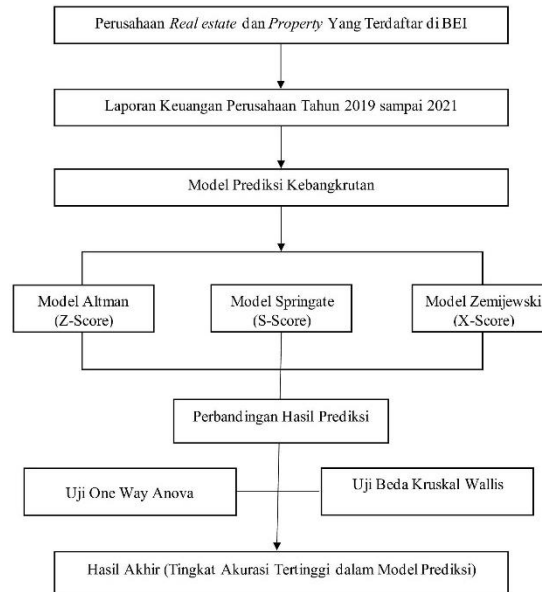
$X1$ = Net Income / Total Assets (ROA)

$X2$ = Total Debt / Total Assets (Leverage)

$X3$ = Current Assets / Current Debt (Likuiditas)

Results of predictor values in the zmijewski model:
The score obtained exceeds zero, it is very likely that the company will go bankrupt.

CONCEPTUAL FRAMEWORK

Figure 1. Conceptual Framework

RESEARCH METHOD

The type of research used in this study is quantitative which is comparative. According to (Sugiyono, 2013) said that quantitative research method is a research method based on the philosophy of concrete data, is factual and empirical. While comparative research is a study that compares the existence of one or more variables in two or more samples at different points in time(Sugiyono, 2013).

Based on the explanation above, it can be concluded that the researcher wants to compare bankruptcy predictors where, the bankruptcy methods of companies to be compared are the Altman method (Z-Score), Springate (S-Score), and Zemijewski (X-Score). The population in this study includes real estate and property sector companies listed on the Indonesia Stock Exchange for the period 2019 to 2021.

The population in this study includes real estate and property sector companies listed on the Indonesia Stock Exchange for the period 2019 to 2021 with a total of 80 companies. The use of this study is purposive sampling of 45 companies.

RESULT AND DISCUSSION
Altman Method Bankruptcy Prediction Calculation

Using the Altman method analysis in 2019 there were 16 companies that had the potential to experience bankruptcy. Then there are 6 companies that fall into the gray area category, which means that the company is experiencing financial problems but not serious ones that have not occurred in bankruptcy. Furthermore, in the healthy category with a value of >2.90, there are 23 companies. In 2020, there were 18 companies that had the potential to go bankrupt. Then there are 8 companies that are included in the gray area category, which means that the

company is experiencing financial problems but not serious that has not occurred in bankruptcy. Furthermore, in the healthy category with a value of >2.90, there are 19 companies. Throughout 2021 there are companies that have the potential to experience bankruptcy 19, then companies that are included in the gray area category there are 6 companies which means that the company is experiencing financial problems but not serious which has not occurred bankruptcy. Furthermore, in the healthy category with a value of >2.90, there are 23 companies.

Springate Method Bankruptcy Prediction Calculation

The use of springate method analysis in 2019 there were 13 companies that had the potential to experience bankruptcy. Meanwhile, in the healthy category with a value of < 0.862, there are 32 companies. In 2020 there are 5 companies that have the potential to go bankrupt. Meanwhile, in the healthy category with a value of < 0.862, there are 40 companies. Throughout 2021, there were 12 companies that had the potential to go bankrupt. Meanwhile, in the healthy category with a value of < 0.862, there are 33 companies.

Calculation of Bankruptcy Prediction Zmijewski Method

The use of springate method analysis in 2019 there is 1 company that has the potential to experience bankruptcy. Meanwhile, in the healthy category with a value of < 0.862, there are 44 companies. In 2020, there are 8 companies that have the potential to go bankrupt. Meanwhile, in the healthy category with a value of < 0.862, there are 37 companies. Throughout 2021, there are 9 companies that have the potential to experience bankruptcy. Meanwhile, in the healthy category with a value of < 0.862, there are 36 companies.

Kruskal Wallis Requirement Test s

Normality Test

One-Sample Kolmogorov-Smirnov Test

		Altman	Springate	Zmijewski
N		135	135	135
Normal Parameters[a,b]	Mean	232.6698	91.6620	-1.8653
	Std. Deviation	2652.42972	1061.06120	3.21105
Most Extreme Differences	Absolute	.515	.526	.230
	Positive	.515	.526	.203
	Negative	-.465	-.464	-.230
Test Statistic		.515	.526	.230
Asymp. Sig. (2-tailed)		.000[c]	.000[c]	.000[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

The table above illustrates that based on the results of data normality tests on real estate and property companies, the Sig value of each shows a value of 0.000. Because the value is less than the significant value of the three methods < 0.05, the assumption of normality data is not met, so the hypothesis test used is the Kruskal Wallis Test.

Test the hypothesis

H1 : There are differences in the bankruptcy prediction models of Altman, Springate and Zmijewski in real estate and property companies listed on the Indonesia Stock Exchange

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Ranks

	Model Prediksi	N	Mean Rank
Score Prediksi	Altman	135	317.70
	Springate	135	202.23
	Zmijewski	135	89.07
	Total	405	

Test Statistics[a,b]

	Score Prediksi
Kruskal-Wallis H	257.521
Df	2
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: Model Prediksi

In testing the hypothesis of the Kruskal wallis test in this study indicated that the value of Asump.Sig was 0.000 < 0.05 With this score, it was explained that H1 was accepted and showed differences in bankruptcy prediction scores using the Altman, Springate and Zmijewski models which meant that there were differences in predicting bankruptcy with the Altman, Springate and Zmijewski models, real estate and property companies listed on the IDX. This is in line with last year's research that discussed bankruptcy predictions(H. E. Sari & Ariyani, 2022).

H2 : The Zmijewski model is the most accurate bankruptcy prediction model for predicting the bankruptcy of real estate and property companies listed on the IDX

Recapitulation of the entire model

Model	predictions			Accuration rate	Error rate
	false	true	Sample		
Altman	53	62	135	45.93%	39.26%
Springate	30	105	135	77.78%	22.22%
Zmijewski	18	117	135	86.67%	13.33%

The recapitulation of the results in table 4.10 illustrates that there is a difference in the level of accuracy between Altman, Springate and Zmijewski's decision prediction models in predicting bankruptcies in real estate and property sector companies. The Altman model has a correct predictability of 62 companies out of a total of 135 companies with an accuracy rate of 45.93% and an error rate of 39.26%. The Springate model has a total score rate of 77.78% with 105 correct predictions out of 135 companies, while the Zmijewski model has a total of 117 correct predictions from a total of 135 companies with a total accuracy of 86.67% and an error rate of 13.33%. The overall result of the measurement calculation shows that H1 is Accepted.

CONCLUSION

Based on the research conducted, the following conclusions can be drawn: There are significant differences between Altman Springate and Zmijewski's methods in predicting the bankruptcy of real estate and roperty companies listed on the Indonesia Stock Exchange for the 2019-2021 period. The most accurate method

for predicting the bankruptcy of real estate and property sector companies is the Zmijewski Method because it obtained the results of measuring the total score of 97.78% accuracy rate with correct predictions 44 out of 45 companies. The Altman Model has a correct predictability of 23 companies out of a total of 45 companies with an accuracy rate of 51.11% and an error rate of 35.56% and the Springate Model has a total of 41 correct predictions from a total of 45 companies with a total accuracy of 91.11%.

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