Predicting Financial Distress; Springate, Zmijewski, and GroverMethod

Anandha Sartika Putri [1], Rico Elhando Badri [2], Edi Pranyoto [3], Susanti [4], Winda Rika Lestari[5]
[1,2,3,4,5,]*Department of Management, IIB Darmajaya, Jl. Z.A. Pagar Alam No. 93, Bandar Lampung, Lampung, Indonesia*
anandhasartika@darmajaya.ac.id ; ricoelhando@darmajaya.ac.id ; edipranyoto@darmajaya.ac.id ;
susanti@darmajaya.ac.idwindarikalestari@darmajaya.ac.id

Abstract: The purpose of this study was to further investigate the best method for predicting financial distress. There were three methods to be used in this research including the Springate method, the Zmijewski method, and the Grover method. This study focuses on the goods and listed consumer industrial sector companies on the IDX during the 2014-2018 period. This study proved that the Springate method had the highest level of sensitivity in predicting financial distress. Also besides, this study also found that the Zmijewski method had the greatest accuracy and the smallest error level compared to other methods.

Keywords: Financial Distress method, Springate method, Zmijewski method, Grover method

1. INTRODUCTION

Globalization is a phase of change experienced by people in various parts of the world. Entering the era of globalization as it now means that we have entered the era of free trade, where every business actor or company is required to increase its competitive advantage to continue to exist in the global market. This also has an impact on business competition between multinational companies that is getting tougher, this will require every existing company to improve its company, starting from the products produced to planning and controlling companies (Hantono,2019)

Every company aims to generate high profits so that the company can survive for a long time. On the other hand, from this objective, there are still some things that are feared to happen in the future, especially companies that cannot survive (go bankrupt) due to financial conditions. Many companies have operated for a certain period of time in bankruptcy due to financial problems. Financial distress (financial distress) is referred to as the company's inability to pay the company's debt, both long-term and short-term liabilities, which led to the company's bankruptcy.

The risk of bankruptcy for a company can be measured through financial reports, namely by analyzing the financial statements that have been issued by the company concerned (Sarigih and Dewi, 2019). The analysis of bankruptcy is carried out to obtain early warnings of bankruptcy (signs of bankruptcy) because the earlier the signs of bankruptcy are known, the better for management. Thus the company can make improvements so that the possibility of bankruptcy does not occur and the company can anticipate and make strategies to deal with the risk of company bankruptcy (Ananda, 2019). The potential for company bankruptcy can be detected early by using the help of an early warning system model. This model can be used as a tool to predict the potential for bankruptcy, which can then be made to improve the condition before it reaches a critical condition (Parquida and Azizah, 2019).

To overcome and minimize financial distress and avoid bankruptcy, various bankruptcy analysis tools have been found, including the Springate method (s-score), the Zmijewski method (x-score), and the Grover method (g-score). The reason these three analysis tools are widely used is that the three analytical tools are relatively easy to use and also have a fairly high level of accuracy in predicting the bankruptcy of a company, but in each financial distress prediction method there are advantages and disadvantages of each so that the level of sensitivity and level the accuracy of each method for predicting bankruptcy is also different.

There are differences in the results of previous research in predicting the financial distress of a company, such as in Hariyani and Sujianto (2017) research comparing the Altman method, the Springate method, and the Zmijewski method in predicting financial distress. This study shows that the Springate (s-score) method is the most accurate model for predicting the bankruptcy of Islamic banks in Indonesia. Priambodo (2017) compared the altman method, the Springate method, the Grover method, and the Zmijewski method in predicting financial distress and found the same results, namely the Springate method is a prediction method with the highest level of accuracy so it is suitable to be applied to mining companies listed on the Indonesia Stock Exchange (IDX). It is different from Hastuti (2015) who found that based on the calculation of the level of accuracy, the most accurate prediction method in predicting financial distress is the Grover method. Research conducted by Munawarah et al. (2019) explains that the Zmijewski method is the most accurate method of predicting financial distress. The inconsistencies in the results of previous studies motivated researchers to conduct further research on the level of accuracy of the Springate method, the Zmijewski method, and the Grover method in predicting financial distress.

2. LITERATURE REVIEW

a. Bankruptcy Theory

According to Martin (1998), bankruptcy is a company's failure in carrying out company operations to generate profits. Bankruptcy is also often called company liquidation or company closure or insolvency. Venkataramana et al. (2012) stated bankruptcy is a situation where liabilities exceed assets in a company, generally, it occurs due to lack of capital, not maintaining sufficient cash, sources are not utilized properly, management of activities is inefficient, sales decline, and the market situation deteriorates. The bankruptcy of a company is usually characterized by ongoing financial difficulties to finance operating activities, difficulty in attracting loans from creditors and refinancing. Financial distress according to Sundjaja et al. (2010), is a situation where operating cash flow is insufficient to finance existing obligations such as paying business debt or paying interest and this forces the company to take corrective action.

Setiadi (2011) states bankruptcy can be classified into two parts, namely:

1. Economic Failure (financial distress) is a situation where a company has lost money to cover the costs of the company itself. This means that the company's profit rate is not more than its capital cost and the present value of its cash flow does not exceed or is lower than its liabilities.
2. Financial Failure (financial distress) is defined asinsolvency that distinguishes based on cash flow and the basis of shares. Insolvency itself is a condition where the liability of a company exceeds the number of its assets. According to Platt and Platt (2002), financial distress is defined as the stage of the decline in financial conditions that occur before the occurrence of bankruptcy or liquidation. The condition of financial distress is illustrated by the inability of the company or the unavailability of a fund to pay its obligations that are due. According to Brigham and Ehrhardt (2011) giving opinions

regarding the bankruptcy of a company are as follows: Financial distress begins when a firm is not able to do so.

According to Halim and Hanafi (2012), bankruptcy can actually be predicted by looking at several indicators, namely:

1. Current or future cash flow analysis to come.
2. Analysis of company strategy, namely analysis that focuses on competition faced by the company.
3. Cost structure relative to competitors.
4. Quality management.
5. Management's ability to control costs.

3. METHOD

This study used a descriptive method, namely collecting, classifying, analyzing, and interpreting the data obtained from the company so that it was able to provide an image with the real situation (Sugiyono, 2017). The data in this study used secondary data in the form of corporate financial reports obtained from the official website of the Indonesia Stock Exchange (IDX) and the company's official website. This study focused on goods and consumer industrial sector companies officially listed on the Indonesia Stock Exchange (IDX) during the 2014-2018 period.

This study was able to compare 3 financial distress methods, namely the Springate method, the Zmijewski method, and the Grover method and Financial distress to be measured using financial reports. a measure of financial distress was able tobe categorized as low, which means an entity is healthy; moderate which means the condition of an entity is in a state of financial distress; high-which means an entity is in a condition that leads to bankruptcy.Data processing in this study uses Eviews statistical software. Therefore, measurement and prediction of financial distress risk needed to be carried out regularly, so that an entity recognized the condition of its resistance to pressures that lead to bankruptcy (Kumalawati, 2018).

a. Springate Method (S-Score)

Springate formulated a bankruptcy prediction model in 1978. In its formulation, Springate used the Multiple Discriminant Analysis (MDA) method. Initially the S-Score consisted of 19 popular financial ratios, but after going through the first testing, Springate finally chose 4 ratios that were believed to be able to distinguish between companies that were bankrupt and those that were not. The Springate method according to Primasari (2017) can be calculated with the following formula:

$$\text{S-Score} = 1{,}03A + 3{,}07B + 0.66C + 0{,}4D$$

A = Working Capital to Total Asset
B = Net profit before interest and taxes / Total asset
C = Net profit before taxes / Current liabilities
D = Sales / Total asset
Provision:
If the S-score> 0.862, the company is predicted to be a potentially healthy company (not potentially bankrupt). Meanwhile, if the S-score <0.862, the company is predicted to be a company that has the potential to experience bankruptcy.

b. Zmijewski Method (X-Score)

Zmijewski's method uses several financial ratios in calculating financial distress predictions, some of which are Rate of Return, liquidity, leverage, turnover,fixed payment coverage, trends, firm size, andstock return volatility.

The Zmijewski method according to Primasari (2017) can be calculated with the following formula:

$$X\text{-}Score = -4{,}3 - 4{,}5X_1 + 5{,}7X_2 - 0{,}004X_3$$

X_1 = Net income / Total Asset

X_2 = Total Debt / Total Asset

X_3 = Current Asset / Current Liabilities

Provision:

Zmijewski (1984) states that a company is considered distress if the probability is greater than 0. In other words, its X value is 0. Therefore, the cut-off value that applies in this model is 0. The companies whose value is X is greater than or equal to 0 are predicted to experience financial distress in the future. On the other hand, companies whose X value is smaller than 0 are not predicted to experience financial distress.

c. Grover Method

The Grover method according to Primasari (2017) can be calculated with the following formula*:*

$$G\text{-}Score = 1{,}650X_1 + 3{,}404X_2 - 0{,}016X_3 + 0{,}057$$

X_1 = Working capital/total assets

X_2 = Earnings before interest and taxes/total assets

X_3 = Net income/total assets

Provision:

The Grover method categorizes companies as bankrupt with a score of less than or equal to -0.02 ($G \leq -0.02$) while the value for companies categorized as not bankrupt is more or equal to 0.01 ($G > 0.01$) . Companies that score between the upper and lower bounds are in the gray area.

d. Test the accuracy of the method in predicting financial distress

This test was used to calculate the correct estimate and the wrong estimate or to test the accuracy of the grouping of the dependent variable, namely the group of companies that experience financial distress and the group of companies that did not experience financial distress. The next was to compare the predicted results and the sample categories in all existing samples. The level of accuracy showed what percentage of the model correctly predicts the entire sample.

The steps taken in measuring the level of accuracy are as follows (Sari, 2019):

1. Calculating the value based on the bankruptcy prediction model.
2. The values obtained are then classified based on the cut-off pointof each model.
3. The results will find out what position the company is in.

The level of accuracy and type error for each method are calculated as follows:

Accuracy Level = (Number of correct predictions / Number of Samples) x 100%

Type Error = (Number of incorrect predictions / Number of samples) x 100%

4. RESULTS AND DISCUSSION

The results of calculations found that it had been determined in the three financial distress prediction methods as follows:

Table 1. The Result Prediction

Method	Result Prediction		Total
	Health Areas of	Financial Distress	
Springate	11	10	21
Zmijewski	21	0	21
Grover	18	3	21

The Springate model used more than one financial ratio related to company bankruptcy to form a good model. To determine which ratios were able to detect the possibility of bankruptcy. This method assessedthe bankruptcy of a company based on the company's ability to manage working capital to get the number of assets owned by the company.In addition to this method, it also assessed how the company recognized net profit from total assets owned by the company. The Springate method also assessed the company's ability to manage net income to cover the current debt owed by the company and assessed bankruptcy by looking at the sales generated by comparing the total assets owned by the company. Based on the calculation of predictions using the Springate method, the result presented that 21 companies were assessed bankruptcy predictions, 10 companies experienced financial distress and 11 companies did not experience financial distress. Based on the provisions of the Springate prediction method, if the results of the calculation were> 0.862, the company would be declared healthy, and if the results of the calculation were<0.862, the company would be declared unhealthy or had the potential for financial distress. Companies that were declared unhealthy or had the potential to experience financial distress were the company codes ALTO, INDF, KICI, KAEF, MBTO, MERK, MRAT, RMBA, ROTI, and SKBM.

The second method used Zmijewski method, this method added financial ratios as a means of detecting corporate financial failures. In the Zmijewski method, the financial ratios used profitability ratios to assess the company's ability to generate company profits, liquidity ratios to assess the company's ability to cover the amount of debt held and the company's ability to utilize current assets to cover the current debt owed by the company. Zmijewski's model used financial ratios that measure the company's performance, financial performance and liquidity to develop its model.Based on the calculation of predictions using the Zmijewski method, the result present that all sample companies had results less than the value stipulated in the Zmijewski prediction method, the company was able to be declared healthy if the results of the calculation were<0, and vice versa the company was able tobe declared unhealthy if the results of the calculation were> 0. In other words, the calculation result of the Zmijewski method showed that all companies were declared healthy during the study period. The result of this study indicated that there was no company to be declared unhealthy or was able to go bankrupt if it was predicted using the Zmijewski method.

Grover with the G-Score method developed and redesigned the Altman financial distress method using a sample according to the Altman Z-Score method in 1968 by adding 13 new financial ratios (Prihantini and Sari, 2013). The advantage of the Grover method stated that it used the ratio of working capital to total assets where this ratio showed the liquidity of total assets and working capital.Based on the provisions of the Grover prediction method, the company was able to be declared unhealthy if the calculation result was<-0.02, and vice versa, the company was able tobe declared healthy or has the potential for financial distress if the calculation result was> 0.01. The results of calculations on the Grover method in the consumer goods and industrial sector

companies during the 2014-2018 period, there were 3 potential companies to have financial distress in different periods.In this method, the predicted companies werein an unhealthy condition or had the potential for financial distress, which were proven only in one of the research periods. Predicted companies were the company code ALTO in 2018, MBTO in 2018, and RMBA in 2014.

The following was the level of accuracy and error in evaluating financial distress from the three models used:

Table 2. The level of Accuracy and Level of Error in Financial Distress Methods

Method	Level of Accuracy	Level of Error
Springate Method	52,38%	47,62%
Zmijewski Method	100%	0%
Grover Method	85,71%	14,29%

In terms of the level of accuracy, the Zmijewski Method had the highest level of accuracy and the smallest error rate, with an accuracy of 100%, and an error rate of 0%. The Grover method was considered more accurate than the Springrate method, this was able to be seen from the value of the accuracy level of the Grover method more than the accuracy of the Springate method. The Grover method had an accuracy value of 85.71%, this value was greater than the accuracy value of the Springate method which was only 52.38%. Furthermore, the Grover method was better than the Springate method. It was able to be seen from the smaller error rateof 14.29%. Meanwhile, the error rate for the Springate method was quite large at 47.62%.

Thus, it concluded that the highest sensitivity method for predicting financial distress was the springrate method.In this case, it had succeeded in detecting more companies that were categorized as experiencing financial distress, namely 10 companies. On the other hand, in terms of the level of accuracy and error level of the three financial distress prediction methods, it stated that the Zmijewski method was the best method with the highest level of accuracy and the lowest error rate compared to the Springate method and the Grover method.

This research was in line with the research conducted by Fadrul and Ridawati (2020) provedan accurate prediction method to predict the potential for financial distress is theZmijewski method.

5. CONCLUSIONS

The purpose of this study was to further investigate the best method for predicting financial distress. There were 3 used methods in this research,namely the Springate method, the Zmijewski method, and the Grover method. This study found that the Springate method had the highest level of sensitivity in predicting financial distress, Springate method proves 10 companies experienced financial distress, Grover method 3 companies and Zmijewskishowed that all companies were declared healthy during the study period. In addition, this study also found that the Zmijewski method had the greatest accuracy and the smallest error level compared to other methods, and the Zmijewski Method has a perfect accuracy.

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