



Analysis of Financial Distress Levels With The Methods of Altman Z-Score, Grover, Springate and Zmijewski

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ABSTRACT

Purpose – This study is to determine the level of accuracy of the Altman Z-Score, Grover, Springate and Zmijewski methods are able to predict bankruptcy in Consumer Goods Companies. **Methodology/approach** – The research method used Altman Z Score, Grover, Springate and Zmijewski. The sample used in this study is 70 consumer goods companies listed on the Indonesia Stock Exchange (IDX). The method used in this study is a quantitative approach by utilizing secondary data sourced from the company's financial statements. **Findings** – It was found that the Altman Z-Score model predicted 16 companies (22.85%) to go bankrupt. Although it is quite accurate with a correct classification rate of 77.15%, this model has a tendency to over-predict healthy companies. Grover's model shows similar results to Altman's, predicting 15 companies (21.5%) as bankrupt and an accuracy rate of 78.5%. This model is slightly more selective than the Altman Z-Score model. The Springate model has the highest bankruptcy prediction rate, which is 26 companies (37.15%), with the lowest accuracy of 62.85%. The model is the most aggressive and has the lowest level of accuracy compared to the other three models. Zmijewski's model predicts only 8 companies (11.5%) as bankrupt, and results in the highest accuracy of 88.5%. Thus, this model is the most accurate and selective in identifying bankruptcy. Overall, all four models can be used to predict bankruptcy, but with different degrees of accuracy and precision. The Zmijewski model proved to be most appropriate in the context of a still running and healthy company.

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INTRODUCTION

A business's financial performance reflects its financial condition, evaluated over a specific period of time using financial analysis methods. Financial statement analysis is a process that analyzes relationships and trends to determine the financial performance and operational results of a company or business entity, as well as its components (Aini, 2021). The results of financial statement analysis can reveal a company's strengths and weaknesses, while also illustrating its managerial capabilities (Bernardi et al., 2018). It also serves as an indicator of a company's financial performance over a specific period (Villiers & Sharma, 2017). One such analysis method is Altman, which uses a multivariate approach and multivariate discriminant analysis (MDA). Multivariate analysis is the combination of two or more ratios in a single equation. The Altman method has undergone significant development as a performance measurement tool not only for manufacturing companies but also for service and trading

companies. Along with the development of financial prediction models, Jackson (2021) modified Altman's approach by simplifying it. Grover focused on improving predictive power by using the Return on Assets (ROA) ratio to total assets and eliminating the equity market value variable, which is considered impractical in certain contexts. The core of Grover's approach is the use of the ROA ratio as the primary proxy for measuring a company's efficiency in managing all its assets in relation to net profit generation. However, Grover's approach has limitations due to its reliance on profitability ratios such as ROA, making it less suitable for small businesses or industries with high intangible assets and unique cost structures, such as the service sector (Priharthini & Sari, 2013). On the other hand, Mulyati & Ilyasa (2020) used stepwise discriminant analysis to select four key financial ratios from 19 initial variables to distinguish companies in the safe zone from bankruptcy. These four ratios include: (1) the working capital to total assets ratio, which measures the company's net liquidity; (2) the EBIT to total assets profitability ratio, which reflects asset productivity; (3) the ratio of profit before tax to current liabilities, which assesses the company's ability to meet short-term obligations; (4) the asset turnover ratio, which indicates the efficiency of asset use. Despite its effectiveness, the Springate model, like other traditional accounting models, often ignores non-financial factors and specific industry dynamics that can have a significant impact on the survival of a business in the modern era (Pramesti & Yuningsih, 2023).

Although various predictive models such as Altman, Grover, and Springate have been widely used, there is a significant research gap in their application contexts. Empirically, these classic models were developed and validated in the context of mature economies and capital markets in developed countries, as well as for large companies with stable financial structures (Altman, 1968). However, the financial condition of companies in developing countries like Indonesia, with its dynamic and volatile market characteristics, still needs to be re-examined (Farooq & Ahmad, 2023). Regarding practical research problems, the Indonesian consumer goods industry faces intense competitive pressures and slowing growth, which directly impacts the financial health of companies. Conventional financial models often fail to capture the specific dynamics of this sector, such as the intensity of brand competition, fluctuations in consumer demand, and unique operating cost structures, resulting in inaccurate predictive signals for managers and investors. Therefore, the novelty of this study is a tailored financial performance evaluation model that integrates core variables from the Altman and Springate models with sector-specific factors critical to the consumer goods industry, such as competition intensity and consumer demand elasticity. This hybrid approach is expected to provide a more robust and contextual diagnostic tool for assessing the performance and potential bankruptcy of companies in the Indonesian consumer goods sector, which has not been widely explored in previous studies. Companies in the consumer goods sector are quite attractive, as people will always need products from the consumer goods industry in their daily lives. A report on CNBCIndonesia.com, published by Yazir Muamar, stated that the growth of the consumer goods industry in Indonesia has continued to slow in recent years. This slowdown is due to increasingly intense competition between companies involving local brands and even imported products.

LITERATURE REVIEW

Stakeholder theory is a theory that emphasizes the importance of companies not only focusing on crucial shareholders, but also paying attention to the interests of all stakeholders, such as employees, customers, suppliers, the community, and the government. This theory was first introduced by Edward Freeman in his book *Strategic Management: A Stakeholder Approach* in 1984.

Financial Distress

A financial crisis, according to Amiram et al. (2017), is a situation in which a company has difficulty meeting its obligations, income is not sufficient to pay all costs, and suffers losses. There are two ways to show that a company is unable to pay its debts: asset-based bankruptcy and cash flow-based

bankruptcy. Flow-based bankruptcy occurs when operating cash flow is insufficient to cover current liabilities, capital-based bankruptcy occurs when a company has negative equity. A financial crisis is a phase of financial decline that precedes bankruptcy or liquidation, according to Plat & Plat in Rahmayanti & Hadromi (2017). The inability to meet commitments, especially short-term liabilities, liquidity, and solvency, is the first sign of a financial crisis.

Model Altman Z-Score

The Altman Z-Score model is one of the most well-known and widely used bankruptcy prediction methods, assessing the financial health of a company using five financial indicators Maheresmi et al. (2023),

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

The Altman Z-Score has limitations. This model is more suitable for large companies listed on the stock exchange, making it less relevant for small or unlisted companies. Additionally, in cross-industry applications, the ratio of sales to total assets is often omitted to increase the relevance of the analysis. Setiyawati et al. (2020) shows the effectiveness of the Altman Z-Score in predicting the bankruptcy of manufacturing companies in Indonesia. However, highlights the weaknesses of this model in the retail sector, where financial ratios tend to vary widely, emphasizing the importance of understanding the industry context before applying the Altman Z-Score model.

Model Grover

Grover used a sample that matched the Altman Z-Score Model, but with the addition of thirteen additional financial indicators. Of the 70 companies in the sample, 35 companies filed for bankruptcy while the remaining 35 companies remained solvent from 1982 to 1996. Here is a summary of the study's findings:

$$G - \text{Score} = 1.650(X_1) + 3.404(X_2) - 0.016(\text{ROA}) + 0.057$$

Putra and Rahma (2019) found that this model is more accurate than the Altman Z-Score in estimating the bankruptcy of technology companies. Criticism of this model comes from Maheresmi et al. (2023), who highlight that the complexity of the model can be an obstacle, especially for implementation in the MSME sector.

Model Springate

MDA is used in a ratio approach known as the Springate method. For the MDA technique to be effective, many financial ratios associated with corporate bankruptcy must be used. In order to identify the possibility of bankruptcy, Springate (1978) used MDA to select four ratios out of a total of 19 commonly used financial ratios in the literature that can most effectively distinguish between healthy and bankrupt companies. The Springate technique is: $S = 1.03X_1 + 3.07X_2 + 0.66X_3 + 0.4X_4$ Rudianto et al., (2024) stated that this model has high accuracy when estimating the bankruptcy of SMEs in the trade sector. However, Horváthová & Mokrišová (2018) highlights the inability of this model to consider external factors limiting its use in a more holistic analysis.

Model Zmijewski

Zmijewski (1983) strengthened the effectiveness of financial ratios as a tool to identify the financial failures of companies by conducting further studies on bankruptcy predictions. This approach utilizes ratio analysis to measure a company's performance, leverage, and liquidity. At the time, Zmijewski applied the analysis to 800 companies that survived and 40 companies that failed. The following equations are obtained using this method:

$$Z = -4.3 - 4.5X_1 + 5.7X_2 - 0.004X_3$$

Hery (2020) shows that the Zmijewski model is less effective for companies with diverse debt portfolios, which can affect the accuracy of predictions in more complex financial conditions. This approach utilizes ratio analysis to measure a company's performance, leverage, and liquidity. The following equations are obtained using this method: $Z = -4.3 - 4.5X_1 + 5$.

METHOD

Descriptive research by evaluating the available data and providing a description of the data collected. Secondary data, which can be easily accessed online, is used as additional reference data in quantitative research. Measuring financial distress in consumer sector companies listed on the Indonesia Stock Exchange (IDX) during 2019-2023, using four analysis methods: Altman Z-Score, Grover Model, Springate Model, and Zmijewski Model. The object of this research is Consumer Goods Companies listed on the IDX for the 2019-2023 period. Using a bankruptcy analysis approach, the researchers applied an analytical methodology to analyze quantitative data. Through the selection stages that have been carried out, as many as 70 companies were obtained as research samples. The data used consisted of annual financial statements for the period 2019 to 2023, with a total of 350 company observations.

RESULT AND DISCUSSION

The following are the results of the analysis of financial distress predictions using the Altman Grover, Springate, and Zmijewski methods in the Cosumen Goods company, for the period 2019-2023, as follows:

Table 1. Altman Model Result

Periode	Non Distress	Grey Area	Distress
2023	36	17	17
2022	36	17	17
2021	33	19	18
2020	30	22	18
2019	17	24	29

Source: Processed Data (2025)

Table 2. Grover Model Result

Periode	Non Distress	Grey Area	Distress
2023	52	0	18
2022	54	0	16
2021	57	0	13
2020	54	0	16
2019	56	0	14

Source: Processed Data (2025)

Table 3. Springate Model Result

Periode	Non Distress	Grey Area		Distress
2023	39	0		31
2022	44	0		26
2021	40	0		30
2020	39	0		31
2019	40	0		30

Source: Processed Data (2025)

Table 4. Zmijewski Model Result

Periode	Non Distress	Grey Area	Distress
2023	58	0	12
2022	58	0	12
2021	62	0	8
2020	63	0	7

2019	62	0	8
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Source: Processed Data (2025)

Table 5. Bankruptcy Prediction Recap of the Altman Z-Score, Grover, Springate and Zmijewski Models

Prediksi (N=70)	Altman Z-Score	Grover	Springate	Zmijewski
Bankruptcy	16	15	26	8
Not Bankruptcy	54	55	44	62
Total	70	70	70	70
% Accuracy	77.15%	78.5%	62.85%	88.5%
Error Type	22.85%	21.5%	37.15%	11.5%

Source: Processed Data (2025)

In table 1, it can be seen that the Altman Z-Score model uses the limitation that companies in grayscale areas are considered not bankrupt. Companies located in grayscale areas are assumed to operate normally. The Altman Z-Score model of the 70 companies studied predicted that there were 16 companies that would go bankrupt (22.85%) and 54 companies that were predicted not to go bankrupt (77.15%). In table 2, it can be seen that the Grover model is almost not much different from the approach used in the Altman Z-Score model, namely 15 companies predicted to be bankrupt (21.5%) and 55 companies predicted not to go bankrupt (78.5%) out of 70 companies studied. This result is very similar to the altman model, considering that Grover is a modification of the model with coefficient and ratio adjustments. In table 3, it can be seen that the Springate model predicts the highest bankruptcy, namely as many as 26 companies that will go bankrupt (37.15%) and only 44 companies are predicted not to go bankrupt. This suggests that these models tend to be more aggressive in identifying bankruptcy risks. This approach is not appropriate when used in conditions where the company is in a healthy state. In table 4, it can be seen that the Zmijewski model only predicts 8 companies to go bankrupt and 62 companies are predicted not to go bankrupt. This is the highest predictive rate for a company that does not go bankrupt because the company is still running until the time this study was conducted. In table 5 of the prediction model analysis carried out, it can be concluded that the Zmijewski model shows a high level of accuracy of 88.5%, followed by the grover model of 78.5%, the Altman Z-Score model of 77.15% and finally the Springate model of 62.85. This conclusion is based on the prediction of companies that are predicted not to go bankrupt because none of the companies in the sample experienced bankruptcy.

DISCUSSION

The findings of this study illustrate the variation in performance of four financial distress prediction models when applied to consumer goods companies in Indonesia. These results align with previous research, which revealed that no single model consistently outperforms all other models (Farooq & Ahmad, 2023)). The study by (Farooq & Ahmad, 2023) emphasized that a model's effectiveness is strongly influenced by country-specific characteristics, industrial sector, and the company's financial structure. In this study, the Zmijewski model, which achieved the highest accuracy of 88.5%, indicates its suitability to the profile of consumer goods companies in Indonesia based on sample data, and is still considered healthy. Conversely, the Springate model achieved a lower accuracy of 62.85%, reinforcing the argument that models developed in different market contexts may not be fully transferable to economic environments with unique market dynamics. The summary of the results in Table 5 shows that each model provides different signals. The Altman Z-Score and Grover models, which share similar fundamentals, produced nearly consistent bankruptcy prediction results with accuracy rates of 77.15% and 78.50%, respectively. This suggests that Grover's modifications only provided marginal accuracy improvements in consumer goods companies. Conversely, the Springate model emerged as the most pessimistic, with a prediction of 37.15%, in stark contrast to the reality of none of the sample companies

actually going bankrupt. Springate's 37.15% error rate indicates a tendency towards overprediction. Conversely, the Zmijewski model, with a result of 11.50% in the distress category, demonstrates a high degree of selectivity and best reflects actual conditions, as reflected in its accuracy of 88.50%. When compared with other research findings, this study provides an interesting picture. Priharthini & Sari (2013) comparing these models to food and beverage companies in Indonesia, also found that model performance varied, with the Zmijewski model often depicting stability in non-bankrupt companies. However, Alaminos' (2020) study of European companies with mature capital markets found that the Altman Z-score model actually had stronger predictive power than the Zmijewski model. This disparity further reinforces Matenda et al. (2021) argument regarding the importance of the economic context. Therefore, the superiority of the Zmijewski model in this study does not necessarily make it the best model universally, but rather confirms that in the context of stable Indonesian consumer goods companies, the simpler and more selective Zmijewski model approach is more reliable in measuring corporate bankruptcy.

CONCLUSION

These empirical findings have implications for the hypothesis of the accuracy of bankruptcy prediction models in the Indonesian context. If the initial hypothesis stated that a leading model such as the Altman Z-score would show high accuracy, then this result actually rejects the hypothesis of over-prediction in the classification of healthy and bankrupt, indicating that this model may be less suitable for the financial structure and operational characteristics of companies in emerging markets such as Indonesia. On the other hand, a model that is more suitable for Indonesia which is supported by superior performance with the highest accuracy of 88.5% is the Zmijewski model. In addition, this model is simpler and less aggressive and is often more reliable in providing accurate results (Matenda et al., 2021). The results of this research provide a key contribution, namely an empirical warning that the performance of financial prediction models is not universal. Researchers cannot immediately adopt models that are successful in developed markets without first validating their contextual suitability for developing markets like Indonesia, due to the dependence on foreign policy. The variation in performance of the four models reveals that each captures a different aspect of financial health. The Zmijewski model and the failure of the Springate model provide a valuable basis for developing hybrid models or adjusting variable weights that better reflect local financial realities, as suggested by Pramesti & Yuniningsih, 2023. For future research, it is recommended not only to use financial data but also to include non-financial and macroeconomic elements to sharpen research results (Laitinen & Suvas, 2016). Additionally, it is highly recommended to explore longitudinal studies with more in-depth analysis of specific industrial sectors to understand the stability and variation of prediction models over time and between industrial fields.

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