VILNIUS TECH
Vilnius Gediminas Technical University

Business: Theory and Practice
ISSN 1648-0627 / eISSN 1822-4202
2023 Volume 24 Issue 2: 405–415
https://doi.org/10.3846/btp.2023.18123

THE EFFECT ANALYSIS OF EARNING MANAGEMENT AND FAMILY CONTROL ON THE Z-SCORE MODEL OF FINANCIAL DISTRESS PREDICTION

Rahmawati HAJI-SESEANG*, Abdul Hamid HABBE, Syarifuddin RASYID, Nirwana NIRWANA

Accounting Department, Hasanuddin University, Makassar, Indonesia

Received 22 November 2022, accepted 30 May 2023

Abstract. The validity of the use of financial statements as a source of information for detecting financial distress is questionable because of the opportunistic behaviour of the company's management. This study aims to analyse the effect of accrual earnings management, real earnings management, and family control on the Z-score financial distress prediction. Using the sample that includes 372 firm years of observations for the 2017 to 2019 periods listed on the Indonesia Stock Exchange, this study found that accrual earnings management, real earnings management, and family control variables affect the Z-score financial distress prediction and cause a higher probability for the company to be in the category of better financial condition. The novelty of this study lies in earnings management and family control as factors that affect the category of assessment and the probability of assessing the company's financial condition as a better company. Empirical evidence from this study is important for investors and company creditors, as input to consider these factors in using the company's financial distress prediction model. For standard setters, the results of this study can be used as input for establishing corporate governance design rules to improve the quality of financial information.

Keywords: accrual earning management, real earning management, family control, financial distress, financial statement, Z-score model prediction.

JEL Classification: M41, G17, G33.

Introduction

Currently, the validity of using financial statements as a source of information to predict and detect financial distress is questionable. This is because these methods are not aware of the possibility of earnings manipulation which may change the basic picture of accounting and its implications for investor decision models. These methods tend to be biased depending on the accounting method used by the company (Utami et al., 2020).

One of the prediction models that is often used is the Z-score model which was coined by Altman in 1968 and has been revised several times. Although the Altman Z-score model was developed more than 50 years ago and many alternative bankruptcy prediction models exist, the Z-score model continues to be used around the world as a primary or supporting tool for the prediction and analysis of bankruptcy or financial distress both in research and in practice (Altman et al., 2017).

One of the main characteristics of the Z-score is the use of financial reporting as a source of information to measure whether the company is in financial distress or not. The literature review conducted by Černius and Birškytė (2020) revealed that accounting information is very important in making various types of managerial decisions. The choice of certain accounting policy methods can cause the information presented to be inaccurate and not useful for decision making. Specifically, Z-score values are obtained using key accounting numbers along with stock market information. Thus, accounting attributes play an important role in formulating the Z-score value. The Z-score depends on accounting numbers, so any changes in accounting records can cause distortions in the Z-score (Cho et al., 2012).

Although the Altman Z-score prediction model is a model that is often used by researchers, investors, and creditors to analyze the potential for bankruptcy of issuers, the prediction accuracy using this model varies. The

*Corresponding author. E-mail: *rahmawatihs@unhas.ac.id*

results of Roomi et al. (2015), Matturungan et al. (2017), Pangkey et al. (2018), Primasari (2018), Novita (2018), Al-Manaseer and Al-Oshaibat (2018), Elia et al. (2021) find that the Altman Z-score method is accurate in predicting potential bankruptcy company. However, different results from Tinoco and Wilson (2013), Almamy et al. (2016), Meiliawati and Isharijadi (2017), and Fachrudin (2020) showed a significant decrease in the prediction accuracy of the model than the original study.

The various prediction results are due to the method used is not able to accurately capture the real condition of the company. Cho et al. (2012) stated that any change in accounting attributes becomes an important factor for the accuracy and predictability of Z-scores. These changes are due to the company's earnings management actions. In addition, according to Serrano-Cinca et al. (2019), indicators for detecting accounting anomalies should be considered when developing new models to predict bankruptcy. This is due to companies with unfavorable financial conditions, using earnings management as a tool to obscure their true financial position to avoid continuing special treatment status and to reduce the risk of delisting in the year before the special treatment status was established and also in the next year (Chen et al., 2010).

An increase in the prediction accuracy of the Z-score can be obtained by formulating a measurement model that comprehensively considers the factors that affect the Z-score value. Cho et al. (2012) found that considering earnings management factor can improve the results of bankruptcy prediction using the Altman Z-score model. It means that the adjusted Z-score that considers earnings management factors produces better bankruptcy predictions. The results of Utami et al. (2020) research for the case of manufacturing companies in Indonesia found that adjustments involving the earnings management model can increase the accuracy of the Z score model bankruptcy prediction by 5.5%. The accrual earnings management variable improves the performance of the bankruptcy prediction model, and the increase in model accuracy is basically due to the reduction of type-I error (du Jardin et al., 2019). However, different results were found by Manab et al. (2015) because the unadjusted model can predict better than the adjusted model (a model that includes earnings management factors in financial figures to predict bankruptcy).

The unadjusted model is more accurate than the adjusted model because it does not take into account the overall form or approach of earnings management by the company (Manab et al., 2015). Previous research by Zang (2012) and Zhu et al. (2015) provide evidence of the use of multiple approaches in earnings management reporting. There are two earnings management approaches, namely: Accrual Earning Management (AEM) and Real Earning Management (REM) (Roychowdhury, 2006; Cohen et al., 2008; Al-Haddad & Whittington, 2019). Therefore, the proposed adjusted model should consider both forms of earnings management. Research results of Almamy et al. (2016), Lin et al. (2016), and Li et al. (2021) show that including the indicator variable for REM greatly increases the explanatory power of the Z-score factors for firm survival/default.

Another factor that should also be considered to increase the explanatory power of the Z-score model is the characteristics of the firms in the country concerned (Grice & Ingram, 2001) and Çolak (2021). The Z-score ratios and coefficients are derived from US manufacturing companies listed on the New York Stock Exchange between 1946 and 1965. Although the Altman Z-score model serves as the foundation for almost all ranking methodologies, other companies have developed since then and are widely used in the literature for companies in various countries. This brings the question of whether the same ratio can be applied in default analysis for businesses in distinct countries or sectors (Grice & Ingram, 2001) and Çolak (2021).

Companies from other countries, particularly those in emerging markets, behave differently from US companies, so the original Altman ratios and Z-score coefficients may not adequately capture the typical characteristics of firms in this economy. Kovacova et al. (2019) also confirmed that each country has different explanatory variables for developing bankruptcy prediction models. As suggested by Tian and Yu (2017) that the predictive power of financial indicators may deteriorate under different market structures, therefore new models should be proposed which can improve the interpretation of updated accounting information and provide a better fit to market conditions. This opinion is supported by Altman et al. (2017) who state that the accuracy of financial distress classification can be further improved (above 0.90) by using country-specific estimates that incorporate additional variables. The effectiveness of the financial distress prediction model depends on the unique characteristics of each country, the technique, and the variables applied to develop this model. Each way of predicting financial distress has advantages and disadvantages (Kovacova et al., 2019) and Zizi et al. (2021).

One of the different characteristics of companies in Indonesia is the competition in the family business world. Most companies in Indonesia have an ownership structure with a concentrated tendency so that the founders can also sit on the board of directors or commissioners. A family company is a company in which several family members are involved, both in share ownership and managerial (Miller et al., 2007), and/or the presence of family members who serve on the board of directors. A party being affiliated with a company means that the party has a business and family relationship with the controlling shareholder, other members of the board of directors, and commissioners as well as with the company itself.

The existence of stronger control over management provides incentives for controlling shareholders to interfere in all managerial and operational activities of the company, thereby triggering the exploitation of the welfare of non-controlling shareholders and causing information asymmetry between controlling and non-controlling

shareholders. Information asymmetry occurs when the controlling shareholder has access to the company's private information through its control over management who are directly involved in the company's operations. According to Byun et al. (2011) and Villalonga and Amit (2006) the level of information asymmetry increases with the concentration of ownership, and the increase in information asymmetry occurs along with an increase in informed trading involving informed traders such as controlling shareholders and other parties who have connections with management.

The controlling shareholder, namely the family, will have the ability to control the management to take actions following their interests and to expropriate the welfare of non-controlling shareholders. Agency theory predicts that family firms have lower accounting practices than non-family firms because family firms are concentrated ownership which allows majority shareholders to dominate the board of directors, thereby exacerbating conflicts of interest between majority and minority shareholders (Anderson & Reeb, 2003).

However, a different opinion was expressed by Boonlert-U-Thai and Sen (2019) who provide empirical evidence that Compared to other organizations, founding family businesses had stronger earnings persistence and accrual quality. This indicates that the role of management who is also the owner of the company has an interest in a long-term perspective to protect the company which will then be passed on to the next generation so that management is not concerned with short-term personal interests that can lead to poor financial reporting quality. This can be an indication that the earnings management behavior of family companies is not opportunistic so the impact on information asymmetry is also small. Virgiawan and Diyanty (2015) also show that family-controlled companies are not proven to have a higher level of information asymmetry than companies controlled other than families.

The argument that shows differences in views from the results of previous studies is interesting to study further about the impact of earning management and family control (FC) to the Z-score financial distress prediction and the probability of the occurrence of information asymmetry in the form of a higher tendency or probability in the presentation of information or figures in the financial statements indicating that the company's financial condition is better or healthier.

This study is very useful because there has been no previous research that has comprehensively examined the effect of earnings management and family control factors on the Z-score and its effect on the probability of a company being categorized as a company with better financial conditions. This study is important to obtain input to increase the prediction accuracy of the Z-score. For investors and creditors, it can be used as input in using the company's financial distress prediction method to manage their risk profile more effectively. For standard setters and capital market managers, it can be used as input for establishing corporate governance design rules to improve the quality of decision-making related to values or figures in financial statements.

1. Literature review and hypothesis development

1.1. Theoretical basis

An agency relationship as a form of relationship in which the principal delegates the authority to make decisions to the agent to carry out services on behalf of the principal (Jensen & Meckling, 1976). The basic principle of agency theory asserts that there exists a functioning relationship, or "nexus of contract", between the party who grants authority (principal), in this case the investor, and the party who receives authority (agent), in this case the management (Mukhtaruddin et al., 2018). The problem that arises as a result of this corporate ownership system is that agents do not always make decisions that aim to fulfilled the best interests of the principal (Jensen & Meckling, 1976). Agency theory explains that the information asymmetry between managers and stakeholders is high. So that with the existence of information asymmetry, it will further increase the opportunity for managers to practice EM (Pasko et al., 2021).

The assumption is individuals act to maximize their own interests, which leads agents to use information asymmetry to hide some facts from the principal. When there is information asymmetry and a conflict of interest between the principle and the agent, the agent is more likely to give the principal false information, particularly if that information is connected to the agent's performance evaluation. This prompts employees to consider how they may utilize these accounting figures to further their own interests (Ajina & Habib, 2017). One form of action of the agent is called earnings management. Earnings management is considered a process used by managers to modulate results.

In addition, due to the stronger involvement of the family, the potential for differences in interests that cause agency conflicts to arise will also be greater. The multiple roles of family members in the business foster singular conflicts with family members outside the business or ownership group (Villalonga et al., 2015). The existence of stronger control over management provides incentives for controlling shareholders to interfere in all managerial and operational activities of the company, thereby triggering the exploitation of the welfare of non-controlling shareholders and causing information asymmetry between controlling and non-controlling shareholders.

The Signalling Theory explains why a corporation submits or gives outside parties access to information about its financial results. Due to the information gap between corporate management and outside parties, there is a strong incentive to share financial statement information with them (Bergh et al., 2014). For this reason, what the company can do is give signals to outsiders through the company's financial statements in which there is credible or trustworthy company financial information and will

provide information about the prospects for the company's sustainability in the future.

1.2. Empirical overview and hypothesis development

The results of previous studies indicate that earnings management can correct the distortions resulting from the use of an unadjusted bankruptcy prediction model. Cho et al. (2012), which compared the Altman Z-score model adjusted for the unadjusted model to test the level of bias in the Z-score calculation, found that there is a significant upward bias in income increasing type of earnings management which reduces the possibility of bankruptcy. On the other hand, in the case of income decreasing, the probability of bankruptcy is overstated. Utami et al. (2020) research show that the adjustment of earnings management in the adjusted Z-score model shows a decrease in type 1 error and type 2 error in the Z-score model. du Jardin et al. (2019) also show that when AEM is measured and used with other financial variables, the model is more accurate than one that relies solely on pure financial data and shows that the increase in model accuracy is primarily due to a reduction in type 1 error.

The results of these studies indicate that AEM is a factor that can affect the Z-score and affect the probability of assessing the company's bankruptcy.

H1a: Accrual Earnings Management affects the Z-score financial distress prediction.

H1b: Accrual Earnings Management causes a higher probability for the company to be in the category of better or healthier financial condition.

REM activities start from normal operational practices, which occur because managers who wish to deceive and even mislead stakeholders who want to know the performance and condition of the company. Techniques that can be used in REM include sales manipulation, overproduction, and discretionary expense reduction (Roychowdhury, 2006).

Roychowdhury (2006) provides empirical evidence that companies perform REM to avoid reporting losses. The results of Namazi et al. (2019) clearly demonstrate the relationship between abnormal operational cash flow costs, discretionary abnormal production costs, discretionary abnormal costs, and the likelihood of bankruptcy for each having a positive, negative, and insignificant effect. Lin et al. (2016) show that without taking into account the effect of REM on the prediction of default, the probability of survival is overestimated for firms with aggressive REM and underestimated for firms with lower REM. Li et al. (2021) showed that REM was chosen as a strong predictor of the main difficulty through the LASSO (Least Absolute Shrinkage and Selection Operator) variable selection technique. These results indicate that REM is a factor that can affect the Z-score and affect the probability of assessing the company's bankruptcy.

H2a: Real Earnings Management affects the Z-score financial distress prediction.

H2b: Real Earnings Management causes a higher probability for the company to be in the category of better or healthier financial condition.

In a family business, the controlling owner usually has sufficient power to ensure that the company pursues its interests and goals (Anderson & Reeb, 2003). The existence of stronger control over management provides incentives for controlling shareholders to interfere in all managerial and operational activities of the company, thereby triggering the exploitation of the welfare of non-controlling shareholders and causing information asymmetry between controlling and non-controlling shareholders.

Information asymmetry occurs when the controlling shareholder has access to the company's private information through its control over management who are directly involved in the company's operations. According to Byun et al. (2011) and Villalonga and Amit (2006), the level of information asymmetry increases with the concentration of ownership, and occurs along with an increase in informed trading involving informed traders such as controlling shareholders and other parties who have connections with management. Gómez-Mejía et al. (2007) confirmed that family firms have a contingent view of risk. They tend to fall into performance hazards and accept underperforming to keep control of the company, despite the risk's potential to exacerbate insolvency and the loss of socio-emotional wealth.

H3a: Family Control affects the Z-score financial distress prediction.

H3b: Family Control causes a higher probability for the company to be in the category of better or healthier financial condition.

2. Research method

2.1. Sampling and variable measurement

This research is causality research. The population in this study are publicly listed manufacturing companies on The Indonesia Stock Exchange (IDX) from 2017 to 2019. Consideration of using company financial report data from 2017 to 2019 for reasons of updating data. In 2020 and 2021, extraordinary conditions occurred, namely the Covid-19 pandemic, which hit the world including in Indonesia. These conditions have had a significant effect on the financial performance of companies in Indonesia (Tahu & Yuesti, 2021). So that the financial distress prediction model formed is not biased due to the influence of pandemic factors, and the model can be generalized to normal conditions in the future, data for 2020 and 2021 are not used.

The sampling technique used in this study is purposive sampling with the type of judgment sampling where the sample companies are taken based on criteria as follows:

1. The company is classified as a manufacturing industry.
2. No delisting from 2017 to 2019.
3. The financial report date ends December 31 and issues an annual report for the period 2017–2019 which has been published either through the IDX website or the company's website.
4. Have complete data in accordance with the research objectives.

The data used is panel data in the form of company annual report data obtained from the IDX website and the company website.

This study examines the effect of independent variables: AEM, REM and FC on the dependent variable: Z-score financial distress prediction. The measurement of each variable as follows:

a) Accrual Earnings Management (AEM)

AEM is proxied by Discretionary Accruals using The Modified Jones model. This model can detect earnings management better than other models (Dechow et al., 1995). The calculation model is as follows:

$$TACC_{it} = EBXT_{it} - OCF_{it}; \quad (1)$$

$$TACC_{it}/TA_{i,t-1} = \alpha_1(1/TA_{i,t-1}) + \alpha_2(\Delta REV_{it})/TA_{i,t-1}) + \alpha_3(PPE_{it}/TA_{i,t}). \quad (2)$$

NDACC can be calculated by re-entering the coefficients

$$NDACC_{it} = \alpha_1(1/TA_{i,t-1}) + \alpha_2((\Delta REV_{it} - \Delta REC_{it})/TA_{i,t-1}) + \alpha_3(PPE_{it}/TA_{i,t-1}); \quad (3)$$

$$DACC_{it} = (TACC_{it}/TA_{i,t-1}) - NDACC_{it}. \quad (4)$$

Information:

$TACC_{it}$: Total Accrual of company i in period t;

$NDACC_{it}$: Non-Discretionary Accruals of a company i in period t;

$DACC_{it}$: Discretionary Accruals of a company i in period t;

$EBXT_{it}$: Earning Before Tax of a company i in period t;

OCF_{it}: Operating Cash Flow of a company i in period t;

$TA_{i,t-1}$: Total Assets of a company i in period t–1;

REV_{it}: Revenue of a company i in period t;

REC_{it}: Receivables (net) of a company i in period t;

PPE_{it}: Property, Plant and Equipment (gross) of a company i in period t.

b) Real Earning Management (REM)

Measurement of REM refers to the measurement developed by Roychowdhury (2006). In this study, the measurement of each proxy uses residual.

1. Abnormal Cash Flow Operation

$$CFO_{it} / A_{it-1} = \alpha_0 + \alpha_1(1/ A_{it-1}) + \beta_1(S_{it} /A_{it-1}) + \beta_2 (\Delta S_{it} /A_{it-1}) + \varepsilon_t. \quad (5)$$

2. Abnormal Production Costs

$$PROD_{it}/A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \beta_1(S_{it}/A_{it-1}) + \beta_2(\Delta S_{it}/A_{it-1}) + \beta_3(\Delta S_{it-1}/A_{it-1}) + \varepsilon_t, \quad (6)$$

3. Abnormal Discretionary Expenses

$$DISC_{it} /A_{t-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \beta_1(\Delta S_{it} /A_{it-1}) + \varepsilon_t. \quad (7)$$

Information:

CFO_{it} : Operating Cash Flow of Company i in year t;

$PROD_{it}$: Cost of Goods Sold plus changes in Inventory of company i in year t;

$DISC_{it}$: Research and Development Expenses plus Advertising Expenses plus Sales, Administration, and General Costs of company i in year t;

A_{it-1}: Total Assets of a company i at the end of year t–1;

S_{it}: Sales of company in year t;

ΔS_{it}: Change in Company Sales in year t minus Sales in year t–1;

ΔS_{it-1}: Changes in Sales of company i in year t minus year t–1;

α, β: Regression Coefficient;

ε_t: Error.

To calculate the value of REM, the value of the standardized variable CFO is multiplied by the value –1, the standardized variables PROD is multiplied by 1, and the standardized variables DISC is multiplied by –1, then added up (Li et al., 2020).

c) Family Control (FC)

FC uses the Family Affiliation of Chief Executive Officer proxy as used by Anderson and Reeb (2003). The measurement uses a dummy variable using a value of 1 if the CEO has a family affiliation and 0 if not.

d) Z-Score Financial Distress Prediction

To measure this variable, the researcher first determines the category of the financial condition of each company using the Altman Z-Score model with the following formula:

$$Z\ score = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5. \quad (8)$$

Information:

X_1: Working Capital/Total Assets;

X_2: Retained Earnings/Total Assets;

X_3: Earnings Before Interest and Tax/Total Assets;

X_4: Market Value of Equity/Total Assets;

X_5: Revenue/Total Assets.

The cutoff values for determining the criteria are: If the Z value <1.81: the category of the company is experiencing financial difficulties; if the Z value is between 1.81 to 3: the grey area category; and if the Z value >3: the healthy category. Furthermore, the measurement of this variable uses a value of 1 if the company is in the category of experiencing financial difficulties, a value of 2 if the company is in the grey area category, and a value of 3 if the company is in the healthy category.

2.2. Data analysis method

To prove the hypothesis, this study uses a multinomial logit regression analysis method with the consideration that the model is suitable for use if the dependent variable

is a non-metric variable and has more than two categories while the independent variable is a metric and/or non-metric variable (Widarjono, 2020). The multinomial logit model is used to model the effect of independent variables on the probability of categorizing companies into three categories, namely companies experiencing financial distress (category 1), grey area (category 2), and healthy (category 3).

1) In the multinomial logit regression model, the evaluation of the results carried out includes (Widarjono, 2020):
2) Assessment of goodness of fit model.
3) Test the significance of the effect of all independent variables simultaneously on the dependent variable (overall model fit).

Test the significance of the effect of the independent variable on the dependent variable individually (significance test).

Next, the researchers analyse the model that was formed. Because the dependent variable has 3 categories, the researcher sets the basis for comparison (base/reference category) in category 3, namely the category of a healthy company. Thus, there are 2 models formed, namely:

Model 1: Probability of category 1 against category 3

$$\ln\left(\frac{P1}{P3}\right) = \beta_{01} + \beta_{11}X_{11} + \beta_{21}X_{21} + \beta_{31}X_{31}. \quad (9)$$

Model 2: Probability of category 2 against category 3

$$\ln\left(\frac{P2}{P3}\right) = \beta_{02} + \beta_{12}X_{12} + \beta_{22}X_{22} + \beta_{32}X_{32}. \quad (10)$$

Furthermore, the analysis of the significance of the independent variable was carried out through the Wald Test.

3. Results

3.1. Data quality test results

Based on the criteria used, the selected sample is 124 companies for 3 years, so the total data to be observed is 372. The data in Table 1 shows that, from 372 observations, the number of observations that fall into the category of financial distress firm group is 38.7%, gray the firm group area is 23.4% and the healthy firm group is 37.9%. Data on companies whose CEOs have family affiliations are as much as 19.9% and 80.1% do not have family affiliations.

Table 1. Descriptive statistics of variable (source: Processed data, 2022)

Information		Total	Percentage
Financial Distress Prediction	Financial Distress Firm Group	144	38.7%
	Grey Area Firm Group	87	23.4%
	Healthy Firm Group	141	37.9%
Affiliation of CEO	CEO doesn't have a family affiliation	298	80.1%
	CEO has a family affiliation	74	19.9%

Statistics-2 Log Likelihood is used to determine if the independent variable is added to the model and whether it significantly improves model fit. The overall model testing aims to test whether the use of independent variables in the study can make the model better (Widarjono, 2020) in explaining the choice of company categories to become companies experiencing financial distress, grey area, and healthy.

Based on the information from Table 2, we show that entering the independent variable into the model will produce a better model than the model that only includes the intercept. This is evidenced by the decrease in the value of –2log likelihood by only entering the intercept giving a value of 799,732, while by including the independent variable the value of –2 log-likelihood decreases to 709.901 or a decrease in chi-square of 54,747 with a significance of p = 0.000. So that the model with independent variables is better for predicting companies into the specified category.

Table 2. Model fitting information (source: processed data, 2022)

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	–2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	799.732			
Final	709.901	89.831	6	0.000

Furthermore, a test is carried out to see the significance of the regression results. The significance value of Goodness of Fit is greater than 0.05 which indicates that the existing model can predict the value of the observation or the model can be accepted because it matches the observation data.

Table 3 provides information on whether the model fits the data through the Pearson X^2 and Deviance X^2 tests. Both tests are not statistically significant so they fail to reject the null hypothesis. This means that the model can explain the data well (Widarjono, 2020). Meanwhile, to measure the proportion of data variation described by the model, using Pseudo R-Square.

Table 3. Goodness-of-Fit Test (source: processed data, 2022)

	Chi-Square	df	Sig.
Pearson	762.092	736	0.245
Deviance	709.901	736	0.749

Based on the information from Table 4, Nagelkerke's value shows that the variables AEM, REM, and FC in the multinomial logit model can explain the decision to categorize companies into companies experiencing financial distress, grey area, and healthy as much as 24.3%.

Table 4. Pseudo R-Square (source: processed data, 2022)

Cox and Snell	0.215
Nagelkerke	0.243
McFadden	0.112

3.2. Hypotheses test results

After obtaining a multinomial logistic regression model that is fit and does not require model modification, then hypothesis testing is carried out.

Table 5. Likelihood ratio test results (source: processed data, 2022)

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	–2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	709.901[a]	.000	0	.
AEM	722.487	12.585	2	0.002
REM	766.705	56.804	2	0.000
FC	727.865	17.964	2	0.000

The results of the Likelihood Ratio Test on Table 5, show the effect of each independent variable on the dependent variable. Variables that have a significant effect on the prediction of the company's financial distress are AEM (X_1) with a significance value of 0.002 < 0.05, REM (X_2) with a significance value of 0.000 < 0.05, and FC (X_3) with a significance value of 0.000 < 0.05. This shows that all the selected independent variables have a significant effect on the dependent variable.

The next stage is the formation of a multinomial logit regression model. The first model formed, based on the data in Table 6, shows the probability that a company is categorized as a company experiencing financial distress (category 1) compared to a healthy company (category 3) is:

$$\ln\left(\frac{P1}{P3}\right) = 0.675 - 4.431X_1 - 1.715X_2 - 0.178X_3. \quad (11)$$

Wald's test for each variable is:

– AEM (variable X_1)
– The test results show that AEM has a significant effect on financial distress predictions because the significance value of 0.003 is smaller than the 0.05 significance level. The negative coefficient (–4.431) indicates that if there is an increase in AEM, the probability of the company being categorized as a healthy company (category 3) is higher than being categorized as a company experiencing financial distress.
– REM (variable X_2)
– The test results show that REM has a significant effect on financial distress predictions because the significance value of 0.000 is smaller than the 0.05 significance level. The negative coefficient (–1.715) indicates that if there is an increase in REM, the probability of the company being categorized as a healthy company (3) is higher than being categorized as a company experiencing financial distress.
– FC (variable X_3)
– The test results show that FC is not significant because the sig value of 0.617 is greater than the 0.05 significance level.

Thus, based on the results of the model 1 test, the variables of AEM and REM have a significant effect on the probability that the company is categorized as a company that has better financial conditions

The second model formed, based on the data in Table 7, shows the probability that a company is categorized as a grey area company (category 2) compared to a healthy company (category 3) is:

$$\ln\left(\frac{P2}{P3}\right) = 0.657 + 0.574X_1 - 0.167X_2 - 1.283X_3. \quad (12)$$

Table 6. Test results parameter estimates model 1 (source: processed data, 2022)

Financial Distress Prediction		B	Std. Error	Wald	df	Sig.	Exp(B)
Financially Distress Company	Intercept	.675	.379	3.169	1	0.075	
	AEM	–4.431	1.494	8.797	1	0.003	0.012
	REM	–1.715	.285	36.252	1	0.000	0.180
	[FC=0]	–0.178	.356	0.250	1	0.617	0.837
	[FC=1]	0[b]	.	.	0	.	.

Table 7. Test results parameter estimates model 2 (source: processed data, 2022)

Financial Distress Prediction		B	Std. Error	Wald	df	Sig.	Exp(B)
Grey Area Company	Intercept	0.657	.315	4.346	1	0.037	
	AEM	0.574	1.100	0.272	1	0.602	1.775
	REM	–0.167	.175	0.913	1	0.339	0.846
	[FA_CEO=0]	–1.283	.328	15.312	1	0.000	0.277
	[FA_CEO=1]	0[b]	.	.	0	.	.

Wald's test for each variable is:

- AEM (Variable X_1)
- The test results show that AEM has no significant effect on the probability of companies in the grey area category compared to the healthy company category because the significance value of 0.602 is greater than the 0.05 significance level.
- REM (Variable X_2)
- The test results show that REM has no significant effect on the probability of companies in the grey area category compared to the healthy company category because the significance value of 0.339 is greater than the 0.05 significance level.
- FC (Variable X_3)
- The test results show that FC has a significant effect on the probability of companies in the grey area category compared to the healthy company category because the significance value of 0.000 is smaller than the 0.05 significance level. The negative coefficient (–1.283) indicates that the probability of being categorized as a healthy company is higher than being categorized as a company in the grey area if there is family control.

Thus, based on the results of model 2 test, only FC variable has a significant effect on the probability that the company is categorized as a company that has a better or healthier financial condition.

Conclusions and discussion

This study provides empirical evidence of the importance of considering the factors that affect the value or numbers presented in the financial statements. This is because the Z-score prediction model that uses financial statement data is very vulnerable to the possibility of earnings manipulation which could change the basic picture of accounting and its implications for investor decision models. This study has examined and proven that all the proposed hypotheses are supported.

This study provides empirical evidence that AEM has a significant effect on the prediction of the company's financial distress. Agency theory, which assumes that individuals act to maximize themselves, causes agents to take advantage of their information asymmetry to hide some information that the principal does not know. This spurs agents to think about how these accounting numbers can be used as a means to maximize their interests (Ajina & Habib, 2017). This result is consistent with Zhang et al. (2008) and Tanusaputra and Eriandani (2021) that the use of aggressive earnings management is a moral hazard act where information asymmetry can cause top managers or majority shareholders to deceive others about the company's financial health. Cho et al. (2012) also show that the Z-score depends on the accounting numbers, so any changes in the accounting records can cause distortions in the Z-score.

The results of the Wald Test show that with the presence of AEM, the probability of a company being categorized as a healthy company is higher than being categorized as a company experiencing financial distress. With AEM, the probability of a company being categorized as a healthy company is higher than being categorized as a company experiencing financial distress. There is a tendency from the results of this study to show distortion of the Z-Score measurement model if it does not consider the AEM factor in the existing measurement model. This is in line with the research results of Utami et al. (2020) which propose that for the case of manufacturing companies in Indonesia, the adjustment of the Z-Score model by involving the AEM model can increase the accuracy of the Z score model bankruptcy prediction by 5.5%. Serrano-Cinca et al. (2019) also state that indicators for detecting accounting anomalies should be considered when developing new models to predict bankruptcy. These results show that the AEM variable can improve the performance of the bankruptcy prediction model (du Jardin et al., 2019). However, different results were found by Manab et al. (2015) because the unadjusted model (a model that does not include earnings management factors in the financial figure to predict bankruptcy) can predict better than the adjusted model.

This study also provides empirical evidence that REM has a significant effect on the prediction of the company's financial distress. REM are management actions that deviate from normal business practices carried out with the main objective of achieving profit targets. Manipulation of real activities such as giving price discounts, decreasing discretionary expenses, and producing large quantities. Tabassum et al. (2015) also state that the opportunistic behavior of companies to manipulate company earning through real activities aims to show good performance in the current period. Of course, good performance at this time will correlate with the prediction of the company's financial condition which is reflected in the company's Z-score. However, the results of this study are different from those of Namazi et al. (2019) which shows that REM and the probability of bankruptcy have no significant effect.

The results of the Wald test also show that with REM, the probability of a company being categorized as a healthy company is higher than being categorized as a company experiencing financial distress. In other words, there is a tendency for companies to be reported with better financial conditions, indicating a distortion of the Z-Score measurement model if it does not consider the REM factor in the existing Z-score measurement model. In other words, including the REM factor in the Z-score measurement model will increase the prediction accuracy. Almamy et al. (2016) shows that REM when combined with the original Z-score variable is highly significant in predicting the health of UK firms. Lin et al. (2016) also show that including the indicator variable for REM greatly increases the explanatory power of the Z-score factors for firm survival/default. Li et al. (2021) also showed that REM was chosen as a predictor of a company's financial distress through the LASSO (Least Absolute Shrinkage and Selection Operator) variable selection technique.

Next, this study also provides empirical evidence that FC has a significant effect on the prediction of the company's financial distress. These results indicate that when family members occupy management positions and control the board, families are more likely to take personal benefits and take actions that benefit the family's controlling shareholders at the expense of shareholders' interests. Management's position as an agent encourages them to think about how these accounting numbers can be used as a means to maximize their interests (Ajina & Habib, 2017). The findings of Anderson and Reeb (2003) research also show that family firms have lower accounting practices than non-family firms because family firms are concentrated ownership which allows majority shareholders to dominate the board of directors, thereby exacerbating conflicts of interest between shareholders. majority and minority.

The results of the Wald test also show that with the presence of FC, the probability of a company being categorized as a healthy company is higher than being categorized as a company in the grey area. There is a tendency for companies to be reported with better financial conditions, indicating a distortion of the Z-Score measurement model if it does not consider the FC factor in the existing Z-score measurement model. This result is in line with Byun et al. (2011) and Villalonga and Amit (2006), which show that the level of information asymmetry increases with the concentration of ownership, and the increase in information asymmetry occurs along with an increase in informed trading involving informed traders such as controlling shareholders and other parties who have connections with management.

Implications

This study has limitations because it is only considering the impact of the management's opportunistic behaviour on the Z-score prediction model. Future research could consider its impact on other predictive models that use financial statement data as a source of information, such as the Springate (S-score), Fulmer (H-score), Taffler (Z-Taffler), Grover (G-score), and Zmijewski (Z-Score) models.

This study is important for investors and creditors as an input to consider the factors of opportunistic behaviour of family management and control, in using the company's financial distress prediction model. Choosing the right financial distress prediction model is useful for managing their risk profile more effectively. For standard setters and capital market managers, the results of this study can be used as input for establishing corporate governance design rules to improve the quality of decision-making related to values or figures in financial statements. For further research, the results of this study can be used as a reference for formulating a company's financial distress measurement model by involving the three factors which in this study were empirically proven to affect the Z-Score value.

References

Ajina, A., & Habib, A. (2017). Examining the relationship between earning management and market liquidity. *Research in International Business and Finance*, *42*, 1164–1172. https://doi.org/10.1016/j.ribaf.2017.07.054

Al-Haddad, L., & Whittington, M. (2019). The impact of corporate governance mechanisms on real and accrual earnings management practices: Evidence from Jordan. *Corporate Governance*, *19*(6), 1167–1186. https://doi.org/10.1108/CG-05-2018-0183

Al-Manaseer, S., & Al-Oshaibat, S. (2018). Validity of Altman Z-Score model to predict financial failure: Evidence from Jordan. *International Journal of Economics and Finance*, *10*(8), 181–189. https://doi.org/10.5539/ijef.v10n8p181

Almamy, J., Aston, J., & Ngwa, L. N. (2016). An evaluation of Altman's Z-score using cash flow ratio to predict corporate failure amid the recent financial crisis: Evidence from the UK. *Journal of Corporate Finance*, *36*, 278–285. https://doi.org/10.1016/j.jcorpfin.2015.12.009

Altman, E. I., Iwanicz-Drozdowska, M., Laitinen, E. K., & Suvas, A. (2017). Financial distress prediction in an international context: A review and empirical analysis of Altman's Z-score model. *Journal of International Financial Management and Accounting*, *28*(2), 131–171. https://doi.org/10.1111/jifm.12053

Anderson, R. C., & Reeb, D. M. (2003). Founding-family ownership and firm performance: Evidence from the S&P 500. *Journal of Finance*, *58*(3), 1301–1327. https://doi.org/10.1111/1540-6261.00567

Bergh, D. D., Connelly, B. L., Ketchen, D. J., & Shannon, L. M. (2014). Signalling theory and equilibrium in strategic management research: An assessment and a research agenda. *Journal of Management Studies*, *51*(8), 1334–1360. https://doi.org/10.1111/joms.12097

Boonlert-U-Thai, K., & Sen, P. K. (2019). Family ownership and earnings quality of Thai firms. *Asian Review of Accounting*, *27*(1), 112–136. https://doi.org/10.1108/ARA-03-2018-0085

Byun, H. Y., Hwang, L. S., & Lee, W. J. (2011). How does ownership concentration exacerbate information asymmetry among equity investors? *Pacific-Basin Finance Journal*, *19*(5), 511–534. https://doi.org/10.1016/j.pacfin.2011.06.002

Chen, Y., Chen, C. H., & Huang, S. L. (2010). An appraisal of financially distressed companies' earnings management: Evidence from listed companies in China. *Pacific Accounting Review*, *22*(1), 22–41. https://doi.org/10.1108/01140581011034209

Cho, S., Fu, L., & Yu, Y. (2012). New risk analysis tools with accounting changes: Adjusted Z-score. *Journal of Credit Risk*, *8*(1), 89–108. https://doi.org/10.21314/JCR.2012.137

Cohen, D. A., Dey, A., & Lys, T. Z. (2008). Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley periods. *The Accounting Review*, *83*(3), 757–787. https://doi.org/10.2308/accr.2008.83.3.757

Çolak, M. S. (2021). A new multivariate approach for assessing corporate financial risk using balance sheets. *Borsa Istanbul Review*, *21*(3), 239–255. https://doi.org/10.1016/j.bir.2020.10.007

Černius, G., & Birškytė, L. (2020). Financial information and management decisions: Impact of accounting policy on financial indicators of the firm. *Business: Theory and Practice*, *21*(1), 48–57. https://doi.org/10.3846/btp.2020.9959

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. *The Accounting Review*, *70*(2), 193–225.

du Jardin, P., Veganzones, D., & Séverin, E. (2019). Forecasting corporate bankruptcy using accrual-based models. *Computational Economics*, *54*(1), 7–43. https://doi.org/10.1007/s10614-017-9681-9

Elia, J., Toros, E., Sawaya, C., & Balouza, M. (2021). Using Altman Z"-score to predict financial distress: Evidence from Lebanese alpha banks. *Management Studies and Economic Systems (MSES)*, *6*(1/2), 47–57. https://platform.almanhal.com/Files/2/239018

Fachrudin, K. A. (2020). The relationship between financial distress and financial health prediction model: A study in public manufacturing companies listed on Indonesia Stock Exchange (IDX). *Jurnal Akuntansi Dan Keuangan*, *22*(1), 18–27. https://doi.org/10.9744/jak.22.1.18-27

Gómez-Mejía, L. R., Haynes, K. T., Núñez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. (2007). Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills. *Administrative Science Quarterly*, *52*(1), 106–137. https://doi.org/10.2189/asqu.52.1.106

Grice, J. S., & Ingram, R. W. (2001). Test of the generalizability of Altman's bankruptcy predication model. *Journal of Business Research*, *54*(1), 53–61. https://doi.org/10.1016/S0148-2963(00)00126-0

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Kovacova, M., Kliestik, T., Valaskova, K., Durana, P., & Juhaszova, Z. (2019). Systematic review of variables applied in bankruptcy prediction models of Visegrad group countries. *OeconomiA Copernicana*, *10*(4), 743–772. https://doi.org/10.24136/oc.2019.034

Li, C., Lou, C., Luo, D., & Xing, K. (2021). Chinese corporate distress prediction using LASSO: The role of earnings management. *International Review of Financial Analysis*, *76*, 101776. https://doi.org/10.1016/j.irfa.2021.101776

Li, Y., Li, X., Xiang, E., & Geri Djajadikerta, H. (2020). Financial distress, internal control, and earnings management: Evidence from China. *Journal of Contemporary Accounting and Economics*, *16*(3), 100210. https://doi.org/10.1016/j.jcae.2020.100210

Lin, H. W. W., Lo, H. C., & Wu, R. S. (2016). Modeling default prediction with earnings management. *Pacific-Basin Finance Journal*, *40*, 306–322. https://doi.org/10.1016/j.pacfin.2016.01.005

Manab, N. A., Theng, N. Y., & Md-Rus, R. (2015). The determinants of credit risk in Malaysia. *Procedia – Social and Behavioral Sciences*, *172*, 301–308. https://doi.org/10.1016/j.sbspro.2015.01.368

Matturungan, N. H., Purwanto, B., & Irwanto, A. K. (2017). Manufacturing company bankruptcy prediction in Indonesia with Altman Z-Score model. *Jurnal Aplikasi Manajemen*, *15*(1), 18–24. https://doi.org/10.18202/jam23026332.15.1.03

Meiliawati, A., & Isharijadi, I. (2017). Analisis Perbandingan Model Springate Dan Altman Z Score Terhadap Potensi Financial Distress (Studi Kasus Pada Perusahaan Sektor Kosmetik Yang Terdaftar Di Bursa Efek Indonesia). *Assets: Jurnal Akuntansi Dan Pendidikan*, *5*(1), 15–24. https://doi.org/10.25273/jap.v5i1.1183

Miller, D., Le Breton-Miller, I., Lester, R. H., & Cannella, A. A. (2007). Are family firms really superior performers? *Journal of Corporate Finance*, *13*(5), 829–858. https://doi.org/10.1016/j.jcorpfin.2007.03.004

Mukhtaruddin, Pratama, H., & Meutia, I. (2018). Financial condition, growth, audit quality and going concern opinion: Study on manufacturing companies listed on Indonesia stock exchange. *Journal of Accounting, Business and Finance Research*, *2*(1), 16–25. https://doi.org/10.20448/2002.21.16.25

Namazi, M., Hajiha, Z., & Chenari, H. (2019). Modeling and identifying hierarchy of the effective measures of the earning management on the prediction of the bankruptcy. *Journal of Financial Management Strategy*, *6*(4), 1–29.

Novita, D. (2018). Analisis Tingkat Akurasi Model Altman Z-Score, Indeks Kepailitan, Dan Indeks in05 Sebagai Prediktor Kebangkrutan Pada Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia Tahun 2011–2015. *Jurnal Ecogen*, *1*(1), 197–205. https://doi.org/10.24036/jmpe.v1i1.4739

Pangkey, P. C., Saerang, I. S., & Maramis, J. B. (2018). Analisis Prediksi Kebangkrutan Dengan Menggunakan Metode Altman Dan Metode Zmijewski Pada Perusahaan Bangkrut Yang Pernah Go Public Di Bursa Efek Indonesia. *Jurnal EMBA*, *6*(4), 3178–3187.

Pasko, O., Chen, F., Proskurina, N., Mao, R., Gryn, V., & Pushkar, I. (2021). Are corporate social responsibility active firms less involved in earnings management? Empirical evidence from China. *Business: Theory and Practice*, *22*(2), 504–516. https://doi.org/10.3846/btp.2021.14940

Primasari, N. S. (2018). Analisis Altman Z-Score, Grover Score, Springate dan Zmijewski sebagai Signaling Financial Distress (Studi Empiris Industri Barang-Barang Konsumsi di Indonesia). *Accounting and Management Journal*, *1*(1), 23–43. https://doi.org/10.33086/amj.v1i1.70

Roomi, M. S., Ahmad, W., Ramzan, M., & Zia-ur-Rehman, M. (2015). Bankruptcy prediction for non-financial firms of Pakistan. *International Journal of Accounting and Financial Reporting*, *5*(2), 26–37. https://doi.org/10.5296/ijafr.v5i2.7782

Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics*, *42*(3), 335–370. https://doi.org/10.1016/j.jacceco.2006.01.002

Serrano-Cinca, C., Gutiérrez-Nieto, B., & Bernate-Valbuena, M. (2019). The use of accounting anomalies indicators to predict business failure. *European Management Journal*, *37*(3), 353–375. https://doi.org/10.1016/j.emj.2018.10.006

Tabassum, N., Kaleem, A., & Nazir, M. S. (2015). Real earnings management and future performance. *Global Business Review*, *16*(1), 21–34. https://doi.org/10.1177/0972150914553505

Tahu, G. P., & Yuesti, A. (2021). Analyzing the effects of COVID-19 pandemic on the financial performance of Indonesian listed companies. *Academy of Accounting and Financial Studies Journal*, *25*(3S).

Tanusaputra, W. S., & Eriandani, R. (2021). Reputasi perusahaan keluarga: Accrual dan real earnings management. *Journal of Business and Banking*, *10*(2), 265–277. https://doi.org/10.14414/jbb.v10i2.2445

Tian, S., & Yu, Y. (2017). Financial ratios and bankruptcy predictions: An international evidence. *International Review of Economics and Finance*, *51*, 510–526. https://doi.org/10.1016/j.iref.2017.07.025

Tinoco, M. H., & Wilson, N. (2013). Financial distress and bankruptcy prediction among listed companies using accounting, market and macroeconomic variables. *International Review of Financial Analysis*, *30*, 394–419. https://doi.org/10.1016/j.irfa.2013.02.013

Utami, R., Siregar, H., & Syarifuddin, F. (2020). The analysis of bankruptcy prediction model with adjustment of earning management on textile and garment sub-sector in Indonesia Stock Exchange. *International Journal of Research and Review*, *7*(1), 208–218.

Villalonga, B., & Amit, R. (2006). How do family ownership, control and management affect firm value? *Journal of Financial Economics*, *80*(2), 385–417. https://doi.org/10.1016/j.jfineco.2004.12.005

Villalonga, B., Amit, R., Trujillo, M. A., & Guzmán, A. (2015). Governance of family firms. *Annual Review of Financial Economics*, *7*, 635–654. https://doi.org/10.1146/annurev-financial-110613-034357

Virgiawan, I. P. Y., & Diyanty, V. (2015). Pengaruh Konsentrasi Kepemilikan Keluarga Dan Internet Financial Reporting (IFR) Terhadap Asimetri Informasi. *Jurnal Akuntansi Dan Keuangan Indonesia*, *12*(2), 123–146. https://doi.org/10.21002/jaki.2015.08

Widarjono, A. (2020). *Analisis multivariat terapan* (2nd ed.). UPP STIM YKPN.

Zang, A. Y. (2012). Evidence on the trade-off between real activities manipulation and accrual-based earnings management. *Accounting Review*, *87*(2), 675–703. https://doi.org/10.2308/accr-10196

Zhang, X., Bartol, K. M., Smith, K. G., Pfarrer, M. D., & Khanin, D. M. (2008). Ceos on the edge: Earnings manipulation and stock-based incentive misalignment. *Academy of Management Journal*, *51*(2), 241–258. https://doi.org/10.5465/AMJ.2008.31767230

Zhu, T., Lu, M., Shan, Y., & Zhang, Y. (2015). Accrual-based and real activity earnings management at the back door: Evidence from Chinese reverse mergers. *Pacific-Basin Finance Journal*, *35*, 317–339. https://doi.org/10.1016/j.pacfin.2015.01.008

Zizi, Y., Jamali-Alaoui, A., El Goumi, B., Oudgou, M., & El Moudden, A. (2021). An optimal model of financial distress prediction: A comparative study between neural networks and logistic regression. *Risks*, *9*(11), 200. https://doi.org/10.3390/risks9110200