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Prediction of Financial Distress in Manufacturing Companies: Evidence from Indonesia

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Abstract
Research aims: This study aims to examine the effect of liquidity ratios, activity ratios, leverage ratios, and sales growth as predictors of financial distress before the bankruptcy stage.
Design/Methodology/Approach: The samples of this study included manufacturing companies listed on the Indonesia Stock Exchange (IDX) for the period 2016 to 2019. The samples were selected using the purposive sampling method, and 334 sample companies were obtained. Then, the data analysis employed logistic regression.
Research findings: The results revealed that all financial ratios investigated in this study significantly affected financial distress. In addition, while the liquidity ratio, activity ratio, and sales growth had a significant negative effect, the leverage ratio had a significant positive impact on financial distress.
Practical and Theoretical contribution/Originality: Currently, most research on bankruptcy has concentrated on bankrupt companies, which are the final phase of the financial distress stage. Meanwhile, the current study attempts to address the gap by researching financial distress prediction before the bankruptcy stage. Practitioner/Policy implications: The results of this study are expected to help stakeholders to take corrective action early to prevent financial distress to the bankruptcy stage.
Research limitation: The study only used a negative profit period of two years, at the stage of severe liquidity, and utilized four years of data in one industry sector.
Keywords: Activity; Financial distress; Leverage; Liquidity; Sales growth

Introduction

Financial distress is a comprehensive concept involving many situations that simply refer to companies facing financial problems (Geng et al., 2015). A company is said to be in financial distress if it meets operational, investment, and financing difficulties and cannot pay off its obligations at maturity (Adeyemi, 2011). Financial distress also decreases the company's financial position before the company experiences bankruptcy or liquidation (Platt & Platt, 2002). Lau (1987), using a multinomial logit, noted that the financial distress process of a healthy company starts with stable finances, reducing or eliminating dividends, being unable to pay principal and interest on debt, applying for protection based on bankruptcy laws, and finally, bankruptcy and liquidation processes. In other words, bankruptcy is the final stage of financial distress when the company has no way out of its financial problems (Volkov et al., 2017),

which often requires a legal declaration involving the courts (Habib et al., 2018).

Related to that, financial ratios are a way companies can analyze whether the company's financial condition is healthy or not. By analyzing financial ratios, companies can predict problems that can put the company in financial trouble or bankruptcy. The initial literature on financial distress was conducted by Beaver (1966), who identified 30 financial ratios and concluded that all the ratios studied had significant explanatory power. Another initial study (Altman, 1968) examined five main financial variables: liquidity, cumulative profit, profitability, leverage, and asset turnover ratio. Altman concluded that all ratios had predictive power on bankruptcy except the turnover ratio.

Altman's research, showing that the liquidity ratio is a predictor of bankruptcy, is consistent with a study conducted on the PEFINDO25 index on the Indonesia Stock Exchange (IDX), revealing that the liquidity variable negatively affected financial distress (Rettobjaan, 2020). The study results are different from the findings obtained by Balasubramanian et al. (2019) on 96 companies in India and several studies on the Indonesia Stock Exchange conducted by Gunawan et al. (2020) and Aisyah et al. (2017), uncovering that the liquidity variable did not significantly affect financial distress. Different results were also demonstrated by Finishtya (2019), Dillak and Fitri (2019) on 38 property and real estate companies for five years, suggesting a positive influence of the liquidity variable on financial distress. Moreover, Maulida et al. (2018) found a significant negative effect of the activity ratio on financial distress in their research on manufacturing companies on the IDX. The same results were shown by Finishtya (2019) and Agustini and Wirawati (2019) in retail companies. However, different findings were exposed by Nurhayati et al. (2017) and Rettobjaan (2020) on companies in the PEFINDO25 index and Aisyah et al. (2017) in companies in the textile and garment sector for five years, where the activity ratio displayed insignificant results. On the other hand, Balasubramanian et al. (2019) and Rettobjaan (2020) disclosed that leverage had a positive effect on financial distress, but it is inconsistent with several other studies showing a negative impact (Gunawan et al., 2020; Kristanti et al., 2016) and not significant effect (Dillak & Fitri, 2019; Aisyah et al., 2017). Furthermore, ElBannan (2021), who researched 11 countries in the Middle East and North Africa for 11 years from 2005 to 2015, stated that the growth variable negatively impacted financial distress. Nevertheless, the study results are not supported by Dillak and Fitri (2019) and Gunawan et al. (2020) in research conducted in Indonesia, indicating no significant effect between growth and financial distress.

The inconsistent research results, therefore, became the impetus for this research. This research was conducted on companies in the manufacturing sector on the Indonesia Stock Exchange for several reasons. First, the capital structure of companies in Indonesia is dominated by debt (Aisyah et al., 2017), where debt is a predictor of bankruptcy (Kristanti et al., 2016). Meanwhile, according to the Minister of Industry, the manufacturing industry contributes the largest to Indonesia's Gross Domestic Product (GDP), which is 17.34% (Maulana, 2021), making this industry a strategic sector that must be managed healthily. Second, the latest data showed that some manufacturing companies in Indonesia were delisted from the IDX every year, primarily due to deficient performance. In 2014-2016, 20 companies were delisted from the IDX, and eight were

manufacturing companies. For several reasons, one was insufficient capital and high debt and interest expenses (Maulida et al., 2018). In addition, the newest data revealed that from 2017 to 2019, 18 companies were delisted, respectively (Chekdollarmu, 2021), most of which were due to poor financial performance and business sustainability capabilities. Five of those 18 companies were manufacturing companies engaged in various sectors. Third, in several years, several manufacturing companies in Indonesia have shown negative profits for two consecutive years, indicating financial distress (Maulida et al., 2018).

Furthermore, financial distress is not a single event. Still, it is a process consisting of several heterogeneous sequences and stages of difficulty that bring the company step by step to the final phase, namely bankruptcy (Fitzpatrick, 1934), either medium or severe bankruptcy (Sun et al., 2014). Meanwhile, Farooq et al. (2018) stated that financial difficulties would go through a three-stage process, starting with a reduction in operating profit (profit reduction), mild liquidity, and moving through severe liquidity until it ends in legal bankruptcy.

Currently, most research is concentrated on bankrupt companies, which are in the final phase of the financial distress stage, and not in the pre-bankruptcy stage. Some researchers also used the Altman Z-score method as a bankruptcy proxy (Masduki et al., 2019; Setyawan et al., 2018; ElBannan, 2021; Kristanti et al., 2016; Finishtya, 2019; Dillak & Fitri, 2019; Jaafar et al., 2018; B. Gunawan et al., 2016), and other researchers employed bankruptcy declarations from the judiciary (Mselmi et al., 2017) and bankruptcy statements, liquidated, dissolved or inactive due to bankruptcy (Charalambakis & Garrett, 2019). For that reason, the research to be conducted attempts to close the gap by examining the pre-bankruptcy stage. At this stage, the company starts to show signs of financial distress but has not yet arrived at a bankruptcy statement and is still actively operating.

Further, theoretically, this research is expected to predict financial distress, especially in the pre-bankruptcy stage. Research at this stage is vital since this stage can be an early signal of bankruptcy. When various stages have different criteria, intensity, and handling strategies, at a practical level, understanding this stage before bankruptcy will help stakeholders to take appropriate early corrective action in stages to prevent further financial difficulties. Therefore, this study aims to analyze the effect of liquidity ratios, activity ratios, leverage ratios, and sales growth on financial distress before the bankruptcy stage.

Literature Review and Hypotheses Development

Several econometric techniques have been used to predict financial distress for public companies. Beaver (1966) used univariate analysis to investigate the ability of accounting information to predict bankruptcy by comparing it with benchmark ratios to distinguish failing firms from non-failing firms, while Altman (1968) employed discriminant analysis to determine the Z-score in predicting bankruptcy. Also, Beaver (1966) examined the

predictive ability of financial ratios in detecting business failure using univariate analysis by identifying 30 financial ratios consisting of six groups of ratios: cash flow ratios, net income ratios, debt to total assets ratios, liquid assets to total assets ratios, the ratio of liquid assets to current liabilities, and the turnover ratio. One ratio was also selected from each group for detailed analysis: cash flow to total debt, income to total assets, total debt to total assets, working capital to total assets, current assets to current liabilities, and turnover ratio. Beaver then concluded that each of the six ratios had significant explanatory power. In another initial study, Altman (1968) applied multiple discriminant analysis (MDA) to a sample of 33 bankrupt companies and 33 non-bankrupt companies to identify the best discriminant function to predict financial distress. Altman examined five main variables: (1) liquidity was measured by working capital (current assets minus current liabilities) to total assets; (2) the measure of cumulative profit (retained earnings to total assets); (3) profitability: income before interest and taxes on total assets; (4) leverage ratio: market value of equity to total liabilities; (5) total asset turnover ratio: sales to total assets. Using a multivariate estimation approach, multiple discriminant analysis (MDA), Altman denoted that all ratios had predictive power except the turnover ratio.

Moreover, financial distress reflects a financial situation where the company experiences a liquidity shortage, reducing its ability to pay its financial obligations on the due date (Almamy et al., 2016). Mselmi et al. (2017) defined a company's financial distress as a condition in which the company's cash flows are not sufficient to meet the payments required by the contract. In other words, a company is in financial distress if it meets one of the following criteria: having operating losses for at least two consecutive years, having a current ratio of less than 1.0 at the end of the single fiscal year, or having negative retained earnings at the end of a single fiscal year (Poston et al., 2011). In addition, (Ross et al. (2013) concluded previous research that financial distress includes the following four conditions: (1) business failure, in which the company cannot pay its debts after liquidation; (2) legal bankruptcy, i.e., the company or its creditors file a lawsuit to the court and are declared bankrupt; (3) technical bankruptcy is when the company cannot repay the principal and interest at the time agreed in the contract; (4) bankruptcy accounting, namely the negative net-book wealth of the company. Besides, some other researchers utilized concepts such as failure, insolvency, default, and bankruptcy interchangeably with financial distress, even though they are actually different in their formal usage (Yirgu, 2017).

Not only receive significant attention from academics, but financial distress also attracted the attention of various other parties, such as the government, investors, creditors, and other stakeholders (Alifiah, 2014). Financial distress is a serious concern for managers as it causes a loss of market share due to the company's inability to compete in market competition when competitors can carry out aggressive strategies aimed at attracting customers through price wars; it causes companies under pressure to get out of market competition and has a significant impact on job security and personal reputation of managers when it results in company bankruptcy (Altman & Hotchkiss, 2005). Therefore, financial distress prediction is essential for lenders, bank regulators, equity investors, bondholders and participants in the credit default swap market, and other parties affected by financial distress. These stakeholders are interested in any information that

can help to know the company's condition, and financial statement information is one of the most important (Beaver, 1966). In addition, ratio analysis, as an essential part of financial statements, is a simple method to evaluate a company's financial strengths or weaknesses since it can explain the relationship between items from financial statements (Bhandari & Iyer, 2013).

Previously, Mselmi et al. (2017) investigated financial distress in France using the logit model and the ANN model. The study was conducted in 2010–2013 using 41 financial ratios. It showed the six most potent factors in predicting financial distress: liquidity ratio, net income on current assets, net income on total debt, solvency ratio, debt to equity ratio, and long-term liabilities to total assets and size. In the Middle East and North Africa Region (NEMA) research, El-ansari and Bassam (2019) mainly concluded that macroeconomic variables and accounting ratios provided financial distress prediction models that could be very good. Equivalent results were obtained from Geng et al. (2015) in their study to determine the most suitable model to predict financial distress in China for the period 2001–2008 using 31 financial indicators (financial ratios), which concluded that financial ratios played an essential role in predicting financial distress.

Early bankruptcy research also focused on predicting dichotomous variables, consisting of non-bankrupt and bankrupt firms (Altman, 1968; Beaver, 1966). The study was widely criticized because, first, there is a possibility that companies predicted to go bankrupt will experience a reduction so that they will not go bankrupt in the end (Poston et al., 2011). Therefore, Balcaen and Ooghe (2004) argued that post-bankruptcy prediction models, even with high accuracy, can give misleading results when applied to other companies that are not bankrupt and only experience financial distress. Second, bankruptcy is a stage of difficulty. Fitzpatrick (1934) explained that the failure of a business does not occur quickly and unexpectedly like an accident but goes through several stages of difficulty, where bankruptcy is the final stage of the company's difficulties. At each stage, there are varying intensities. If difficulties at a particular stage are not resolved, they will continue to the next stage, and when it reaches the next stage, the recovery process becomes more difficult to minimize the possibility of the company becoming healthy again. Since each stage has a different intensity and risk, predictions of financial difficulties based on multiple stages of difficulty will be more accurate than post-bankruptcy predictions with single criteria (Farooq et al., 2018).

Fitzpatrick (1934), an early author describing the company's transition to total bankruptcy, identified five stages of business downfall, each of which has a different identification and mitigation. The first stage is incubation, where the company begins to experience financial difficulties marked by a decrease in the ability to generate revenue or operating profit. In stage 2, financial embossment occurs when the company begins to have liquidity problems and cannot meet cash needs in the short term because the ability to generate income decreases. At this stage, mitigation steps that can be taken are to seek cash as soon as possible or extend short-term debt. The third stage is financial insolvency. This stage has a long-term dimension, which occurs when the company has difficulty getting funding to meet its long-term obligations, marked by negative retained earnings for several periods. Mitigation measures can be taken by changing funding policies and

issuing new debt or shares. If the abatement step is not successful, the company will face stage 4, total insolvency, which is the starting point for business failure, and ends at stage 5, i.e., confirmed insolvency, which is when the company is actually faced with business failure legally, namely the legal consequences of a bankruptcy statement.

Then, Farooq et al. (2018) proposed a three-stage process starting from profit reduction (PR) and mild liquidity (ML), leading to severe liquidity (SR) based on profitability and liquidity problems. The initial stage of PR is defined as a decrease in net income rather than a reduction in dividends. Because some companies do not or sometimes pay dividends, early identification of financial difficulties through dividend deductions does not apply. ML is characterized as the company's inability to pay its financial obligations through current-year profits while having a positive net worth. Meanwhile, SL is a negative net worth, where the company has more liabilities than its assets as it cannot meet its long-term obligations due to continuous losses. The stage of financial insolvency, as stated by Fitzpatik above, is in line with the stage of severe liquidity proposed by Farooq et al. (2018), namely the stage of severe difficulty in liquidity, where the company suffers consecutive losses for several years. If the creditors take legal action, the court can declare the company bankrupt at this stage. Referring to Fitzpatrik (1934) and Farooq's (2018) research, this study used the pre-bankruptcy stage with negative profits for two consecutive years as a proxy for financial distress. When the company experiences negative profits for two straight years, it is assumed that it is experiencing financial distress problems so that it cannot fulfill its long-term obligations but has not been declared bankrupt. According to Poston et al. (2011), this stage is the stage of impaired long-term earning power, which is the final stage before the company is declared bankrupt.

Liquidity Ratio and Financial Distress

The liquidity ratio is used to measure short-term solvency. In other words, it can also measure the company's ability to meet its current obligations as they fall due. Liquidity is crucial for companies because it can be converted into cash easily. The greater the company's ability to fund its operational activities by using its current assets to generate profits, the less likely it is to experience financial difficulties. Companies with liquidity difficulties will increase employee anxiety, ultimately reducing productivity. This performance decline can become a disaster when investors withdraw their investment capital, further reducing liquidity and ending in bankruptcy (Hossain et al., 2018). In companies with negative cash flows, the opportunity to invest in projects with positive NPVs prevents the company from generating operating income; conversely, companies with positive cash flows will be able to take advantage of good investment opportunities, resulting in positive cash flows and availability of these cash flows will reduce shocks that can result in financial distress for the company (Lee et al., 2016). Research conducted by Cultrera and Brédart (2016) on 7,152 small and medium-sized companies in Belgium concluded that the logit model could predict bankruptcy with an accuracy of 82.97 and 75.22%, respectively, and stated the liquidity ratio as a very good predictor. Meanwhile, a study conducted by Charalambakis and Garrett (2019) in Greece on 31,000 companies using a multi-period logit model showed a negative effect of liquidity on financial distress.

Related results were obtained from research by Balasubramanian et al. (2019) in India and several studies in Indonesia (Cinantya & Merkusiwati, 2015; Nurhayati et al., 2017; Widhiari & Merkusiwati, 2015). Thus, the proposed hypothesis is:

H_1: Liquidity ratio has a negative effect on financial distress.

Activity Ratio and Financial Distress

This ratio determines how efficiently the company utilizes its assets to generate cash and income. The more efficiently the company operates its assets in its operational activities, the greater the profit. A high activity ratio indicates that the company uses its assets better, increasing sales. The company's ability to generate sales from existing assets will then increase the company's sustainability capability (Parker et al., 2002). The greater the level of sales resulting from the optimization of its assets, the greater the potential profit obtained by the company so that the possibility of financial distress can be avoided. Increased efficiency will lead to improved services and products and better consumer pricing, increasing profitability. It makes it easier for external funds to enter, thereby increasing the security and financial health of the company, expanding the capital buffer, and ultimately absorbing risk (Berger et al., 1993).

Conversely, when the company is not efficient in the use of assets, the company requires more assets to get the same sales output. Then, it encourages companies to increase their total assets. The increase in the need for assets encourages the need for external funding, which requires additional capital costs, thereby increasing risk (Brigham & Houston, 2016). It indicates that increasing the activity ratio reduces the occurrence of financial distress (Agustini & Wirawati, 2019; Maulida et al., 2018; Nurhayati et al., 2017). Hence, the proposed hypothesis is:

H_2: Activity ratio has a negative effect on financial distress.

Leverage Ratio and Financial Distress

Leverage measures how much the company's assets are financed by debt. Using high debt will also result in a high cost of debt. If it is not accompanied by an increase in performance that generates profits to cover the high cost of debt, it will increase the possibility of financial distress. Mselmi et al. (2017) stated that a high debt ratio indicates that the company is aggressively utilizing debt financing to grow its operations. If the rate of return is lower than the cost of borrowed funds, the probability of default will be higher. If the company has much debt, coupled with a reduced ability to generate income with insufficient cash flow from operations, it will bring the company into severe liquidity problems and thereby encourage financial distress (Razia et al., 2019). An increase in the cost of debt will then potentially reduce the profit level to a negative. An increase in debt will also increase the company's risk. This increased risk is the cause of the decline in stakeholder confidence in the company; for example, creditors and companies with high

leverage are considered at risk of default, so creditors avoid providing funding to the company. After that, the difficulty in finding financing resulted in the company being increasingly under pressure, which resulted in financial distress (Brigham & Houston, 2016). Balasubramanian et al. (2019), on 96 industrial and financial reconstruction companies in India, showed a positive effect of long-term debt on financial distress. Several studies in Indonesia support it, stating that leverage has a positive impact on financial distress (Agustini & Wirawati, 2019; Maulida et al., 2018; Nurhayati et al., 2017).

H_3: *Leverage ratio has a positive effect on financial distress.*

Sales Growth Ratio and Financial Distress

Financial distress research conducted in Middle Eastern and North African countries during the period 2006-2015 using investment-based proxies (asset growth) as a growth proxy revealed that an increase in investment level and the book value of assets would worsen the company's financial distress due to the rise in the company's risk failure because the company was facing over investment. However, using a price-based proxy (market-to-book ratio) as a growth proxy showed that growth was a significant negative predictor of financial distress because an increase in equity value would reduce the possibility of the company being depressed (ElBannan, 2021). (Mokhova & Zinecker, 2013) also explained that concerning the company's life cycle, companies in the growth phase will try to gain a competitive advantage and improve their internal operations, characterized by sales growth, not leave the market. Sales growth indicates that the company's high performance will reduce information asymmetry, which results in a decrease in the cost of equity capital and a lower debt ratio than in the initial stage (Lemmon & Zender, 2010), so it can reduce financial distress. In his research, Timmermans (2014) found that high growth is vital in predicting corporate bankruptcy in the recalibrated model. A study in Indonesia also gives the same result that the higher sales growth, which is a ratio that reflects the company's ability to increase sales from period to period, the lower the possibility of experiencing financial distress (Widhiari & Merkusiwati, 2015). The higher level of sales growth also reflects the success of sales from time to time, which can be seen through the net income obtained so that it can avoid financial distress conditions. The research was conducted using sales growth proxy as a growth proxy, so the hypothesis proposed is:

H_4: *Sales growth has a negative effect on financial distress.*

Research Method

Population and Sample

This quantitative research type used secondary data. The population in this study was manufacturing companies listed on the Indonesia Stock Exchange for four years, from 2016 to 2019. Then, sampling was carried out based on a non-probability approach. The

method used was purposive sampling, with the following criteria: the still actively operating company that presented its financial statements in rupiah currency and published its complete financial statements successively. In this case, companies that earned negative net income for two consecutive years were categorized as companies experiencing financial distress or falling into category 1. Those that made a positive net income for two successive years were deemed as having a health state or belonging to category 0. In addition, financial report data were downloaded through the official IDX website. Then, the sample selection process resulted in 334 research samples. A summary of the research sample selection process can be seen in Table 1.

The dependent variable in this study was financial distress, whereas the independent variables were the ratio of liquidity, activity, leverage, and sales growth. Data were collected using documentation techniques from financial reports and annual reports of companies in the manufacturing sector listed on the Indonesia Stock Exchange. Data were then analyzed by descriptive statistical analysis and logistic regression analysis. Logistic regression is a model used if the response variable is qualitative (Hosmer & Lemeshow, 2005). The testing stages are: first, model suitability test using Hosmer and Lemeshow's goodness of fit test. If the value of this test obtains a value greater than 0.05, the regression model can predict the value of the observations so that the regression model can be used in this study. The second is assessing the overall model (overall model fit test). This test was employed to evaluate the overall model hypothesized to fit or not with the data used. This test compares the output value of block number = 0 (-2log of initial likelihood) with the value of block number = 1 (-2log of final likelihood). If there is a decrease in the value between block number = 0 and block number = 1, it indicates that the overall logistic regression model can predict the occurrence of financial difficulties. The last step is to test the hypothesis by using logistic regression. The hypothesis is accepted if the significance value (α) obtained is <5% and has a coefficient direction in accordance with the hypothesis.

Variable Measurement and Research Model

Financial distress

This research used the negative profit for two consecutive years as a proxy for financial distress. When the company experiences negative profits for two straight years, it is assumed that it is experiencing financial distress problems so that it cannot fulfill its long-term obligations but has not been declared bankrupt. This variable is a qualitative variable with a nominal scale, so it uses a dummy variable (Hosmer & Lemeshow, 2005) with two categories, 0 and 1. The variable is categorized as 0 if the company does not experience financial distress and gets a positive net profit for two consecutive years, and category 1 for companies experiencing financial distress if the company experiences negative net income for two consecutive years.

Liquidity

The liquidity ratio describes the company's ability to meet short-term obligations (debt). The current ratio was the proxy used (Balasubramanian et al., 2019; Nurhayati et al., 2017; Cultrera & Brédart, 2016).

$$\text{Current Ratio} = \text{CR} = \frac{\text{Current Assets}}{\text{Current Liabilities}} \dots\dots\dots\dots\dots\dots\dots (1)$$

Activity

The activity ratio was used to see how effectively the company utilizes its assets to generate cash and revenue from sales. The proxy used was Total Assets Turn Over or TATO (Agustini & Wirawati, 2019; Altman, 1968; Nurhayati et al., 2017).

$$\text{TATO} = \frac{\text{Total Sales}}{\text{Total Assets}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Leverage

The leverage ratio measures how many assets the company owns are funded by debt. The proxy used was the debt-to-asset ratio (DAR) (Charalambakis & Garrett, 2019; García & Herrero, 2021; Nurhayati et al., 2017).

$$\text{DAR} = \frac{\text{Total Liabilities}}{\text{Total Assets}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Sales growth

Sales growth is a benchmark to see the company's ability to increase sales from period to period. Sales growth was measured as follows (Jaafar et al., 2018; Dillak & Fitri, 2019).

$$\text{Sales Growth} = \text{SG} = \frac{\text{Sales (t)} - \text{Sales (t-1)}}{\text{Sales (t-1)}} \dots\dots\dots\dots (4)$$

The logistic regression model used in the study is as follows:
$$\text{Ln}\ \frac{p}{(1-p)} = \beta 0 + b1CR + b2TATO + b3DAR + b4SG \dots\dots (5)$$

Where: $\frac{p}{(1-p)}$: The probability of a company experiencing financial distress, with CR (Current Ratio) as a proxy for liquidity, TATO: (Total Assets Turn Over) as a proxy for Activity, DAR (Total Debt to Asset ratio) as a proxy for leverage, and SG as a proxy for sales growth.

Result and Discussion

Table 1 describes the sample selection process. The number of manufacturing companies from 2016 to 2019 was 648. After going through the screening process, as shown in Table 1, it produced 334 samples of companies for four years.

Table 1 Sample Selection

Criteria	Year				Total
	2016	2017	2018	2019	
IDX-listed manufacturing companies	144	156	166	82	648
Manufacturing companies that did not issue financial statements	(5)	(4)	(5)	(6)	(20)
Manufacturing companies that attached financial statements in foreign currencies	(29)	(30)	(31)	(32)	(122)
Outlier	(33)	(33)	(42)	(64)	(172)
Total	77	89	88	80	334

Furthermore, the samples were divided into two categories: companies that experienced financial distress and those that did not experience financial distress, as shown in Table 2.

Table 2 Total Sample of Financially Distressed and Non-Financial Distressed Companies

Category	Year				Total
	2016	2017	2018	2019	
Financial distress	8	11	10	4	33
Non-financial distress	69	78	78	76	301
Total	77	9	88	80	334

The descriptive statistical test results showed that (Table 3), on average, the companies in the samples had current assets exceeding their current liabilities (2.233) and could generate sales in a ratio above assets owned (1.01). The data above also indicated that, on average, the company's total debt was below its total assets (0.45), and sales growth occurred where there was an increase in sales in year n compared to the previous year (1.08).

Table 3 Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
Liquidity	0.152	9.621	2.25335	1.607113
Activity	0.123	3.668	1.01485	0.519591
Leverage	0.092	2.900	0.45063	0.255546
Sales growth	0.408	3.203	1.08084	0.211701
N=334				

The logistic regression and Hosmer and Lemeshow's goodness of fit test results are presented in Table 4. It was found that the variables CR, TATO, DAR, and SG were significant at 0.05. Thus, CR, TATO, DAR, and SG affected the probability of financial distress. Furthermore, Hosmer and Lemeshow's goodness of fit test results revealed a

significance value of 0.979, higher than 5%, so that the regression model could be used in this study.

Table 4 Logistics Regression Test Results

	B	Sig.
Liquidity	-2.321	0.002
Activity	-3.788	0.000
Leverage	7.057	0.001
Sales growth	-3.783	0.046
Hosmer and Lemeshow's Goodness of Fit Test results		
Chi-Square	Df	Sig.
2.078	8	0.979

Overall Test Results of Model Fit Test and Coefficient of Determination

Overall model fit testing was conducted to see a better model by comparing the block number = 0 (-2log initial likelihood) before including the independent variables in the logistic regression and with the block number = 1 (-2log final likelihood) after having the independent variables. If there is a decrease in value, it is concluded that the model used fits the data. In this study, assessing the coefficient of determination was conducted to see how much the contribution of the independent variables used in the study could explain the dependent variable. The higher the value of this coefficient, the better.

Table 5 -2log Likelihood and R Square

	-2log Likelihood
Initial test (Block Number = 0)	215.392
Final test (Block Number = 1)	86.146
Cox dan Snell R Square	0.321
Nagelkerke's R Square	0.675

The overall model fit test results by comparing the initial -2log Likelihood value (block number = 0) with the final -2log likelihood (block number = 1) showed a decrease in value (Table 5). It is where the initial -2log likelihood value (block number = 0) was 215.392, and the final -2log likelihood value (block number = 1) was 86.146. Thus, the logistic regression model above could be used to predict financial distress. In addition, the coefficient of determination using Nagelkerke's R Square uncovered a 0.675 or 67.5% value. It denotes that the independent variables could explain the dependent variable of 67.5, while the remaining 32.5% were explained by factors not included in the study's independent variables.

Discussion

The results showed that the liquidity coefficient was negative and significant. It indicates that the increase in liquidity would reduce the possibility/probability of financial distress, so hypothesis 1 was accepted. In this regard, the current ratio displays how much current assets are available to meet current liabilities. A high current ratio illustrates the company's ability to convert current assets into productive

assets that can provide maximum benefits to the company to reduce financial distress. This study's results are consistent with the research conducted by Lee et al. (2016), who explained that companies with liquidity had the potential to take advantage of good investment opportunities so that they were increasingly able to increase positive cash flow and reduce financial distress. Hossain et al. (2018) also stated that companies with low liquidity have the potential to reduce their production to encourage investors to withdraw their funds, which results in worsening liquidity and ends in bankruptcy. In the same vein, the same results were obtained by several other researchers (Altman, 1968; Balasubramanian et al., 2019; Cinantya & Merkusiwati, 2015; Jaafar et al., 2018; Mburu, 2018; Nurhayati et al., 2017; Widhiari & Merkusiwati, 2015; Charalambakis & Garrett, 2019).

Meanwhile, the negative and significant activity ratio coefficient indicates that the higher the ratio of sales to assets owned, the lower the probability of financial distress the company will experience. Hence, hypothesis 2 was accepted. It shows that the activity ratio can be a predictor of financial distress. The activity ratio used in this study was to see how effectively the company utilized its assets to generate revenue through sales. The more effective the company is in using its assets, the greater the level of sales. In addition, the high level of sales will increase the potential profit that will be obtained by the company and has the potential to raise cash so that the company can meet the burden of its obligations to reduce the occurrence of financial distress. The results of this study are in accordance with other studies by Agustini and Wirawati (2019), Maulida et al. (2018), and Nurhayati et al. (2017).

The study results also showed that the leverage coefficient was positive and significant, so hypothesis 3 was supported. It denotes that increasing leverage would increase the possibility of financial distress. The higher the value of the leverage ratio, the greater the cost of debt that must be paid, resulting in financial distress. In this case, the use of high debt, if not accompanied by an increase in profit-generating performance to cover the high cost of debt, will increase the possibility of financial distress (Mselmi et al., 2017). An increase in the cost of debt causes an increase in risk, thereby reducing creditor confidence so that creditors tend to avoid providing funding to the company, resulting in the company being increasingly under pressure, which brings about financial distress (Brigham & Houston, 2016). Related to the phenomenon of several manufacturing companies being delisted on the IDX due to insufficient capital and high debt and interest expenses, this study's results revealing the positive influence of leverage on financial distress should be a severe concern for managers and stakeholders in the company, especially in companies with high levels of financial distress in high leverage. The research sample also showed that some companies had an elevated level of leverage, namely 2.9, even though the average level of leverage in the sample was 0.45. The results of this study are supported by research (Nurhayati et al., 2017), which stated that debt is a predictor of bankruptcy, as well as several other studies (Agustini & Wirawati, 2019; Maulida et al., 2018; Charalambakis & Garrett, 2019; Mselmi et al., 2017).

On the other hand, the sales growth ratio uncovered a negative and significant coefficient, indicating that if the company experienced sales growth from the previous year, the lower the potential for financial distress that the company would experience, so hypothesis 4 was accepted. This high sales growth will reduce information asymmetry, which results in a decrease in the cost of equity capital and a lower debt ratio than in the initial stage (Lemmon & Zender, 2010). The results of this study are reinforced by a study (ElBannan, 2021), concluding that companies with growth opportunities were less likely to face financial distress. The same result was obtained by Widhiari and Merkusiwati (2015).

Conclusion

The results showed that in the 2016-2019 range, 33 samples of manufacturing companies experienced financial distress, while 301 companies did not experience financial distress. The results also revealed that all the ratios studied influenced financial distress. While the liquidity, activity, and sales growth variables had a negative effect, leverage positively affected financial distress.

Further, this research provides theoretical contributions and practical implications. Theoretically, previous research primarily focused on the final stage of financial distress, i.e., the bankruptcy phase. Therefore, this research was conducted at the pre-bankruptcy stage, which is the stage where financial distress signs have appeared but have not been declared bankrupt. Practically, because this financial distress research was carried out at the pre-bankruptcy stage, it is expected that it can help interested parties, especially the management ranks, in the early detection of bankruptcy. Hence, the management can take corrective action early and prevent financial distress to the stage of bankruptcy.

This research has several limitations. First, the financial distress proxy only used a negative profit period of two years. Second, this study was conducted only during the stage of financial distress, which has a long-term impact, which according to Farooq et al. (2018), is a stage of severe liquidity. Third, the data used in the study were only four years in and only in one sector, namely manufacturing. Thus, further research can be done by adding the negative profit period to three or four years and/or combining several negative profit periods jointly to capture variations in the company's financial distress. Also, it can research other stages of financial distress with short-term dimensions, such as the profit reduction stage (PR) and mild liquidity (ML), in different sectors and increase the research period.

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