

# **FINANCIAL RATIOS' SIGNIFICANCE IN PREDICTING FINANCIAL DISTRESS: A LITERATURE REVIEW**

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## **Abstract**

When a company is unable to meet its financial obligations on time, it is said to be in financial distress, which may result into company's bankruptcy. In order to avoid filing for bankruptcy, it is crucial to anticipate financial difficulty. In the early studies on predicting financial distress, financial ratios are used as determinants of financial distress. In research on financial distress, many authors employed various sets of ratios to create models that could predict financial difficulty. Since not all research have consistently employed financial ratios to create models for predicting financial distress, an attempt is made in this study to review those that have. Financial ratios are regarded as major and significant predictors of financial distress, and they aid investors in making investment decisions, as proven by the literature.

**Keywords:** Bankruptcy Prediction, Financial Distress, Financial Ratios, Ratio Analysis.

## **1. Introduction**

The "inability of a corporation to satisfy its financial commitments as they mature" is a definition of financial distress (Beaver, 1966). Financial trouble comes in two flavours: debt restructuring and default on debt repayment. Debt restructuring is a method that management uses to reduce the risk of default when faced with financial hardship (Andrade & Kaplan, 1998). When businesses struggle to make their financial commitments, financial distress issues occur (Khaliq et al, 2014; Roslan, 2014; Bae, 2012). As a result, creditors could file a lawsuit that results in the company's bankruptcy. Financial difficulties may result in a company's bankruptcy, which could cause the economy to suffer and have a number of other negative economic effects, such as a loss of tax revenue to the government from these businesses. Before going bankrupt, a company must go through a set of circumstances such as low cash flows can have an impact on cash inflows since businesses frequently break their obligations to their lenders (Purnanandam, 2008). In order to prevent a bankruptcy crisis, it is vital to recognise certain events which can be used as alerts. In order to predict financial distress or bankruptcy, several research have been undertaken using a variety of methodologies, including multiple discriminant analysis (1960–1970), logistic regression and probit models (1980–1990), artificial neural networks (ANN), and survival analysis (1990–2000). Following 2000, these methods were frequently employed in numerous studies to create models that may forecast financial difficulty or bankruptcy. Additionally, a wide range of studies are examined to determine the variables utilised in various studies to occasionally predict financial distress or bankruptcy. Financial ratios were utilised as determinants of financial distress in the majority of investigations, including pioneer studies like Beaver (1966) and Altman (1968). Numerous studies are occasionally conducted in the fields of financial distress forecasting and bankruptcy prediction. Financial ratios were utilised as determinants of financial distress in the early studies in this field. The idea of financial distress and the financial ratios utilised as variables in the creation of financial distress prediction models are examined in great detail in this study. In this study, the examined literature is classified into two categories: studies that pioneered the use of financial ratios as indicators of financial distress or bankruptcy, and studies that demonstrated the value of financial ratios as such indicators.

## **2. Pioneer Studies Used Financial Ratios As Predictors Of Financial Distress**

The prediction of financial distress or bankruptcy is a well-researched subject, and numerous studies have been conducted by researchers to create the models for the financial distress prediction. From the 1930s through the middle of the 1960s, there was a body of earlier literature on predicting company failure. The use of financial measurements to forecast the possibility of company failure was the main area of study during this time. Most of these studies were uni-variate in style. Failure was described by Beaver (1966) as "a firm's inability to satisfy its financial commitments as they mature." When any of the following occur, a company is considered to have failed operationally: bankruptcy, bond default, overdraft, or non-payment of preferred stock dividend. One of the earliest contributions to anticipate company failure was Beaver's study. Beaver (1966) established the uni-variate model and used the financial indicators to determine if the company was successful or not. Companies who defaulted on their financial commitments and preferential dividend payments are referred to as failed enterprises. Failed businesses were paired with successful businesses in the same sector and size. Using the five years of data previous to failure, Beaver examined thirty financial measures broken down into six categories: net income ratios, debt to total asset, current assets to total asset, current assets to current liabilities, turnover ratios, and cash flow ratios. The multivariate model, developed by Altman in 1968 in response to the beaver's uni-variate approach, has established itself as the most accurate method for evaluating the financial condition of the companies. By filling the gap between conventional ratio analysis and statistical techniques, Altman (1968) attempted to address the limitations of Beaver's (1966) uni-variate model. Using data from 66 manufacturing companies (33 bankrupt and 33 non-bankrupt), Altman (1968) established the model to forecast bankruptcy based on multiple discriminant analysis. This resulted in a single discriminant score that can be used to categorise a company as bankrupt or non-bankrupt. Twenty-two ratios categorized into 5 areas (leverage, activity, profitability, solvency, and efficiency ratios) and matched with non-failed enterprises for the same time period were used to create a bankruptcy prediction model. Finally, five ratios were shown to be relevant in predicting failure, including working capital to total assets, retained earnings to total assets, earnings before interest and taxes (EBIT) to total assets, market value of equity to total liabilities, and sales to total assets ratios. The Z-score methodology, which created a single score known as the "Z-score," is used to categorise a corporation into a failed or non-failed group using the chosen five ratios. It was found that the Z-score model has stronger prediction potential before two years after bankruptcy. After Altman's model (1968) was created, which employed multiple discriminant analysis to create a model for predicting financial difficulty or bankruptcy, Ohlson (1980) created the logistic regression model of bankruptcy prediction to get around the drawbacks of multiple discriminant analysis. Ohlson (1980) created the logistic model of bankruptcy prediction using information from a sample of 105 bankrupt and 2058 non-bankrupt US companies. It was determined that the logistic model solved the problem of normality and other issues with multiple discriminant analysis. It further stated that size is the most significant element among a number of others that affect the probability of failure, including financial structure, performance, and liquidity. Other methods of bankruptcy prediction, such as probit analysis, Artificial Neural Networks (ANN), and Survival Analysis, were also utilised in various research after the creation of Ohlson's logistic model of bankruptcy prediction. Zmijewski (1984) developed the financial distress prediction model using a sample of 40 bankrupt and 800 non-bankrupt enterprises in the US and probit analysis. The final model included three financial ratios: current assets to current liabilities, total debt to total assets, and net income to total assets ratio. Artificial Neural Networks (ANN) and multiple discriminant analysis were contrasted by Odom and Sharda (1990) using the financial ratios from Altman's model (1968). (MDA). According to reported results, ANN is better than MDA. Survival Analysis was used by Chen et al. (1993) to examine the financial difficulties in the Canadian oil and gas industry. Failed firms are those who filed for protection but didn't make their debt and preference dividend payments on time. The age and size of the enterprises were also examined along with the financial measures, which were divided into three categories: liquidity ratios, leverage ratios, and cash flow-based ratios. It was shown that survival analysis offers the likelihood that a firm would

survive under challenging circumstances, and that a key factor influencing that likelihood is the firm's financial structure. The creation of numerous distress prediction models utilising various methodologies was the main focus of the aforementioned ground-breaking investigations. The majority of these research were conducted in the US, and financial ratios were acknowledged as significant indicators of financial distress.

### **3. Studies Indicating Financial Ratios' Usefulness As Indicators Of Financial Distress**

There is a plenty of literature on predicting bankruptcy or financial trouble. Different ratios have been employed as indicators of financial distress in a number of research in this sector. A variety of ratios covering profitability, liquidity, solvency, efficiency, and cash flows were utilised by different studies. Working capital to total assets, fixed assets to total assets, cash to total assets, reserves and surplus to total assets, sales to total assets, net worth to total assets, net worth to fixed assets, and current ratio are eight ratios that can be used as indicators of financial distress, according to the Bureau of Business Research (1930). Fitzpatrick

(1932) compared the ratios of unsuccessful and successful businesses, noting that unsuccessful businesses exhibited unfavourable ratios and that three ratios—net profit to net worth, net worth to fixed assets, and net worth to debt—could be used to distinguish between unsuccessful and successful businesses. Working capital to total assets is the most crucial indicator to evaluate the financial position of the company as it showed the deterioration of the financial health and declining trend even ten years prior to the year of financial distress, according to Smith and Winakor (1935), who examined 21 financial ratios of 29 distressed companies up to 10 years prior to the year in which financial distress occurred. Merwin (1942) examined a larger sample of 936 manufacturing companies and found that three financial ratios—net worth to total debt, net working capital to total assets, and current assets to current liabilities—were significant predictors of financial distress. These ratios can be used as alerts of financial distress four or five years prior to distress. The most important and sensitive indication of financial difficulty, according to the study, is the ratio of working capital to total assets. Compared to unprofitable businesses, profitable businesses displayed better working capital to assets and current ratios as well as lower debt to net worth ratios (Jackendoff, 1962). The cash flow to total debt ratio has stronger predictive value and can be used to distinguish between failed and non-failed enterprises, according to Beaver (1966), who noted that not all ratios are equally relevant in predicting financial difficulty. Even if two businesses may have equal financial ratios, size has been shown to be the most crucial factor influencing the likelihood of failure. Using five financial ratios—working capital to total assets, retained profits to total assets, earnings before interest and taxes (EBIT) to total assets, market value of equity to total liabilities, and sales to total assets—Altman (1968) constructed a model to predict bankruptcy. Using three financial ratios—net income to total assets, total debt to total assets, and current assets to current liabilities—Zmijewski (1984) developed a model for predicting financial trouble. The bulk of research conducted prior to 2000 employed financial ratios as indicators of financial distress, including Fitzpatrick (1932), Smith and Winakor (1935), Merwin (1942), Jackendoff (1962), Beaver (1966), Altman (1968), Ohlson (1980), and Zmijewski (1984). Several research have been undertaken to investigate the utility of financial ratios for forecasting financial difficulty in the post-2000 age, with studies focusing on the ability of financial metrics as predictors of financial distress. In order to anticipate failure and assess the level of correlation between market and financial information, Beaver (1968) employed the stock market prices as well as financial ratios (total debt to total assets, net income to total assets, and cash flow to total assets). According to the study, the median returns of failing enterprises were lower than the median returns of successful firms, and they were continuously lower the closest to the year of failure. It demonstrated the ongoing decline in failing companies' solvency situation, which led to decreased rewards for failed companies. The same findings were shown by an analysis of financial ratios, which showed that there is some correlation between market data and the financial data used to predict failure. The mean of the ratios for failed enterprises is lower than the means of the ratios for non-failed firms. It was shown that the debt to assets ratio had lower predictive power than the cash flow ratio and the net

income ratio. As a result, financial ratios have superior predictive potential. Further, financial ratios showed the lesser inaccuracy regarding the classification of failed enterprises. Gu and Gao (2000) developed a failure forecasting model for US hospitality enterprises using stepwise discriminant analysis and fourteen financial ratios. The model that distinguished between bankrupt and non-bankrupt enterprises the best contained five variables, including total liabilities to total assets, earnings before interest and taxes to current liabilities, gross profit margin, long term obligations to total assets, and sales to fixed assets. It was shown that profitable enterprises were less likely to go bankrupt than unprofitable firms, which had higher proportions of debt and short-term liabilities. According to Ganesalingam and Kumar (2001), it is possible to distinguish between failed and successful firms using metrics for liquidity, debt management, profitability, and market expectations. It was also noted that the mean financial ratios for unsuccessful businesses were lower than those of successful businesses. In the examination of the role of financial ratios in predicting financial distress, Low et al. (2001) found that non-distressed enterprises had mean financial ratio values that were higher than those of distressed companies, and that the cash position was the key variable to take into account. Financial ratios were shown to be adversely correlated with the likelihood of failure by Agarwal and Taffler (2007) and Bandyopadhyay (2006). Additionally, it was noted that safe companies had significantly superior financial ratios than unsuccessful ones, and that the safe companies' financial ratio standard deviations were also found to be smaller. According to certain studies, there are important financial parameters that can be used to distinguish between unsuccessful and successful organisations. Efficiency was used as a variable in the financial distress prediction model that Xu and Wang (2009) developed, and it was shown that adding efficiency as a predictor increased the model's predictive accuracy. Financial ratios like profit margin, return on assets, return on equity, profit per employee, current ratio, debt equity ratio, total assets growth rate, turnover growth, working capital to total assets, retained earnings to total assets, and earnings before interest and taxes to total assets were found to be significant which can be used to diagnose corporate failure in Andreica et al. (2010) and Thai et al. (2014) studies. Various ratios representing profitability (retained earnings to total assets, operating profit to fixed assets, and operating profit to total assets), liquidity (quick assets to current liabilities and current assets to total assets), leverage (long-term liabilities to total assets), and market structure (market value of equity to total liabilities) were used in another study (Gepp & Kumar, 2008). According to Karami et al. (2012), accounting indicators can be used to forecast financial distress and it will aid investors in making decisions, stop resource waste, and promote economic growth. According to Lin et al. (2012), the most crucial factors in separating bankrupt from non-bankrupt enterprises were profit-related variables, growth ratios, and staff efficiency ratios. Three financial ratios—net working capital to owner's equity, accounts receivable turnover ratio, and owner's equity to fixed assets ratio—were combined to create a financial distress prediction model by Zohra et al. (2015). They discovered that these ratios were significant predictors of financial distress. In his study of the ability of financial measures to foretell Italian local government financial distress, Cohen (2017) found that troubled governments paid high rates of interest and had higher operating costs than operating income. According to Oz and Yelkenci (2017), earning components such as changes in accounts receivables, inventory, and accounts payable, as well as depreciation and operating cash flows, had information content to represent recent economic events and can be utilised to predict financial crises. A few important predictors of financial hardship are cash flow ratios, such as cash flows to total assets, cash flows to total liabilities, cash flows to current liabilities, cash flows to current assets, and cash flows to capital employed (Murty & Misra, 2004). Lumbantobing R. (2020) studied the impact of financial ratios on the likelihood of financial distress in manufacturing companies listed on the Indonesia Stock Exchange. The association between financial ratios and financial distress during the period of 2015–2017 and the findings showed that the likelihood of financial trouble is not considerably impacted by activity ratios. The likelihood of financial hardship is significantly negatively impacted by liquidity ratios. Additionally, the likelihood of financial trouble is significantly positively impacted by debt ratios and earnings ratios. According to the research, the best criteria for predicting financial instability are debt and liquidity ratios. Previous studies show that the liquidity ratio's data is crucial for predicting financial trouble

(Altman, Haldeman & Narayanan, 1977; Paranowo, 2010). A liquidity ratio is found to be very important in predicting financial trouble, according to a study by Altman, Haldeman, and Narayanan, (1977). Additionally, companies with better liquidity will have more money to pay all of their debts on schedule (Keige, 1991). Leverage ratios are also important for predicting financial distress, according to earlier studies (Paranowo, 2010; Keige, 1991). According to the report, using a lot of leverage may result in bankruptcy. Leverage ratios measured by debt service coverage are a significant predictor of financial distress (Paranowo, 2010). Hence, monitoring the company's financial health can be done through financial ratios. If the financial ratios show that there is an issue with the company's finances, quick action can be made. It keeps the company on track to produce better results and prevent the financial hardship that causes insolvency (Jaafar et al., 2021).

#### **4. Conclusion**

Financial ratios were acknowledged as significant predictors of financial distress in Pioneer research, the bulk of which were conducted in the US and focused on the creation of several distress prediction models using different approaches. Financial ratios for safe companies were much better than those for failed companies, and standard deviations of the financial ratios were also found to be lower in the case of safe companies, according to the literature reviewed above, which also showed that the mean of financial ratios for failed companies was lower than that for non-failed companies (Ganesalingam & Kumar, 2001). (Agarwal and Taffler, 2007; Bandyopadhyay, 2006). According to certain studies, there are important financial parameters that can be used to distinguish between unsuccessful and successful organisations. Financial ratios like profit margin, return on assets, return on equity, profit per employee, current ratio, debt equity ratio, total assets growth rate, turnover growth, working capital to total assets, retained earnings to total assets, and earnings before interest and taxes to total assets were found to be significant which can be used to diagnose corporate failure in Andreica et al. (2010) and Thai et al. (2014) studies. Current asset to current liability ratio has been found to be a successful predictor of bankruptcy by Kiragu (1993) and Ohlson (1980). According to Oberholzer (2010), Return on Equity is a reliable indication of financial trouble. In 53 distinct research, Hossari and Rahman (2005) analysed the various ratios that were employed as predictors of financial trouble or bankruptcy. Five ratios, namely net income to total assets, total outside liabilities to total assets, working capital to total assets, earnings before interest and taxes (EBIT) to total assets, and current ratio, were found to be the most important ratios that were used in 25% of these studies to predict financial distress. All the ratios used were ranked based on their usage in these studies. Profitability, liquidity, and scale, according to Binti et al. (2010), are the key indicators of financial distress. According to Lin et al. (2012), the most crucial factors in separating bankrupt from non-bankrupt enterprises were profit-related variables, growth ratios, and staff efficiency ratios. Conclusion: Accounting indicators continue to be used often to forecast financial trouble and provide early warning signs concerning financial difficulty. On the grounds that financial ratios are past-focused and may not be useful for predicting the future, Hillegeist et al. (2004) challenged the use of financial ratios as predictors in financial crisis prediction models. Karami et al., (2012) reported financial ratios or accounting indicators can be used to predict financial difficulty, which aids investors in making decisions despite of the criticism made by Hillegeist et al. (2004).

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