

PalArch's Journal of Archaeology of Egypt / Egyptology

Corporate Financial Distress Prediction – A Review Paper

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Shashikanta Baisag Dr. PramodKumar Patjoshi: Corporate Financial Distress Prediction – A Review Paper -- Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(9). ISSN 1567-214x

Keywords: Financial Distress, Financial Management, Bankruptcy, Non-Performing Assets, Z score.

ABSTRACT

Financial Distress is the stage before bankruptcy. Financial distress is the late stage of corporate decline where firm faces lack of liquidity. Financial distress prediction has been the area of research of many researchers. There are various financial distress predictions models have been researched so far. Therefore, this study is intended to review the literatures on corporate financial distress prediction, factors influencing financial distress as well as principles of financial management for avoiding financial distress situation. This paper classified the literatures under the two broad categories namely “Financial Distress Prediction” and “Principles of Financial Management to avoid financial distress situation”. The findings of the literature review under this paper suggest that Altman Z-score model has been widely used for predicting corporate financial distress. The findings also suggests that some of the key principles to be kept in mind to avoid financial distress situation include optimum level of debt in the financial structure of firms; continuous monitoring of certain key financial ratios namely cash flow to total debt, the net income to total assets, total debt to total assets; following good management practices; preventing bank asset quality deterioration and monitoring of Non-Performing Assets (NPAs) of banks.

1. Introduction

Financial Distress is the stage before bankruptcy. Financial distress is the late stage of corporate decline where firm faces lack of liquidity. Financial distress is typically demonstrated by a firm's inability to repay its debt. This situation is anticipated in case high leverage, low per-unit profit level, longer gestation period or revenue is sensitive to performance of economy. The impact of leverage on return on investment of a firm depends on business conditions/environment. Higher leverage results increase in return on investment in favorable business environment and have adverse effects on return on investment during unfavorable business conditions (Dr. Sporta Ph.D., Simiyu, Ngumi, Ngugi 2017). Predicting financial distress is important in order to protect the interest of the stakeholders including investors, lenders and employees in general. The financial distress prediction model can provide an early warning to help the corporate managers to initiate remedial measures well in advance in order to avoid financial distress situation. This paper is an attempt to review literatures on financial distress prediction including international financial distress prediction studies and principles of financial management to avoid financial distress situations.

2. Review Methodology

As part of this literature review, various literatures on corporate financial distress prediction, factors influencing financial distress as well as principles of financial management for avoiding financial distress situation, were categorized and studied. The literatures were classified under the two broad categories namely "Financial Distress Prediction" and "Principles of Financial Management to avoid financial distress situation" for the study. The reviews include the published literature on financial distress prediction in different journals, internet academic sites like Research Gate. A total of twenty-eight articles related to financial distress prediction are referred for the review.

3. Review of Literature on Financial Distress Prediction

Financial distress prediction has been the interest of many researchers since long time. Beaver (1966) in his study 'Financial Ratios as Predictors of Failure' analyzed the ability of financial ratios to predict financial distress situation through an analysis by using a set of 30 financial ratios. He has considered a sample of 79 firms and their financial data for a period of 1954 to 1964 for the analysis. The study found that all ratios do not have the equal capability to predict financial distress situation. The financial ratios that have demonstrated higher capability to predict financial distress include namely cash flow to total debt, the net income to total assets, and total debt

to total assets. However Altman (1968) extended the study conducted by Beaver and developed the first financial distress prediction model using Multiple Discriminant Analysis (MDA), known as Altman Z-score. Altman Z-score is estimated through five financial ratios by combining these ratios along with appropriate weightage termed as co-efficient. The five financial ratios used for estimating Altman Z-score includes working capital to total assets, retained earnings to total assets, EBIT to total assets, market value of equity to book value of total debt and sales to total assets. Later in 1983 and again in 2000, Altman revisited the Z-score and coined two models namely Model A: Z-score for manufacturing companies and Model B: Z-score for non-manufacturing companies. While, Aziz and Dar (2006) compared three categories of financial distress prediction models namely statistical models, artificially intelligent expert system models and theoretical models. The study found that artificially intelligent expert system models demonstrated better performance than other two categories of models. On the other hand Agarwal and Taffler (2008) in their study compared the predictive ability of market-based financial distress prediction models proposed by Hillegeist and Bharath and Shumway with Altman Z-score model, which is an accounting-based prediction model. The sample for the analysis consisted of all listed non-finance industry firms of UK on London Stock Exchange (LSE) during the period 1985-2001. The study found that predictive accuracy of market-based and accounting-based models are slightly different from each other. However, the accounting-based approach was found to produce significant economic benefit over the market-based approach.

Similarly Ciorogariu and Goumas (2011) in their research compared the predictive accuracy of two quantitative econometrical methods namely, Linear Discriminant Analysis (Altman Z-score) and Logistic Regression. The study found that the Linear Discriminant Analysis (Altman Z-score) model had highest prediction accuracy of 92.7%. Then again Dr. Arasu, Dr. Balaji, Dr. Kumar, Thamizhselvi (2013) in their study, conducted an empirical analysis on usefulness of Fulmer and Springate models for solvency prediction of financial firms. The researchers inferred that Fulmer and Springate model scores can be useful in case recent period financial information is used. While Gunathilaka (2014) in his study compared the financial distress prediction capability of Springate model of Solvency test and Altman's Z-score model in the context of insolvency of firms in Sri Lanka. The sample consisted of 82 firms listed on Colombo Stock Exchange across different sectors. The financial data of these samples of firms over a period of five years from 2008 to 2012 were collected for the analysis. The study found that Altman's Z-model showed a higher degree of financial distress prediction capability, at least one year prior to the distress. Correspondingly Geng, Bose and Xi Chen (2014) examined the role of financial indicators in predicting financial distress. 31 financial indicators were used for the analysis. The analysis was intended to understand the

effectiveness of the financial data pertaining to a longer period vis-à-vis the data pertaining to a shorter period. The researcher analysed a sample of 107 Chinese companies labelled as 'special treatment' by Shanghai Stock Exchange and the Shenzhen Stock Exchange from 2001 to 2008. The researchers found that out of 8 years, usage of financial data pertaining to 5-year time window demonstrated a satisfactory predictive performance. Conversely Shaukat and Affandi (2015) used Altman Z-score to assess the impact of financial distress on financial performance. The researchers used financial data of 15 companies from fuel and energy sector listed on Karachi Stock Exchange over a period of 2007 to 2012. The study found that, there is a positive relationship between financial distress (Z score) and financial performance. Although Madonna and Cestari (2015) conducted a comparative analysis of predictive accuracy of three bankruptcy prediction models namely Altman's Z'-score (1993), Alberici's Z-score (1975), and Bottani, Cipriani and Serao's discriminant function (2004). The sample consisted of 100 bankrupt firms failed during 2012 to 2014 and 100 healthy firms as on 2014 in Italy. The researchers inferred that Altman's Z-score model is better in predicting the signs of financial distress and suitable for large-scale investigations.

However Parvin, Nitu and Rehman (2016) predicted the financial health of banking industry in Bangladesh using Altman's Z score model. The researchers used the financial data of all 6 state-owned banks and randomly chosen 6 private commercial banks including local, foreign and Islamic commercial banks of Bangladesh over a period of 5 years (2010-2014). Based on the analysis, the researchers found that state owned banks had better financial health than their counter parts in private sector. The trend for the private banks is consistent over the years but not improving. Private banks should give more emphasis on their asset liability management. Likewise Bansal and Singu (2017) examined the financial distress situation of automobile firms in India through application of Altman's Z-score model. The researchers classified the automobile firms into four categories namely passenger car, commercial vehicles, motorcycle/mopeds and scooters & 3-wheelers manufacturers. The data required for estimation of Altman's Z score were collected from firms from their annual accounts under each category over the period of ten years (2007 to 2017). The researchers found that Z score model can predict financial distress situation early which will be helpful in taking measures to avoid bankruptcy. Based on the estimated Z-score, the researchers concluded that the automobile industry had shown signs of financial distress since 2007-2008.

On the other hand Darmawan and Supriyanto (2018) applied Altman Z-score to analyze the effect of financial ratios on financial distress. The researchers considered 119 mining companies listed on the Indonesian Stock Exchange (BEI) as sample. The period of the analysis considered was 2011-2014. The study found that the ratios namely net working capital to

total assets, retained earnings to total assets, book value of equity to total liabilities and EBIT to total assets have positive effect on financial distress. However Al-Manaseer (2018) studied the usefulness of Altman Z Score model in predicting financial distress. He has taken a sample of 21 insurance companies listed on Amman Stock Exchange over the period of 2011-2016. Based on the study, the researcher inferred that the Altman Z score model is not only useful in predicting insolvency of companies but also in maintaining and monitoring the companies' financial performance. The study recommended by using Altman Z score model for assessing the companies' financial distress situation. Similarly Fredrick and Osazemen(2018) investigated the effect of capital structure on corporate financial distress of manufacturing firms in Nigeria through applying panel corrected standard error (PCSE) techniques. The sample considered for the analysis was consisted of annual data during the period of 2010 to 2016 for 58 manufacturing firms listed in the Nigerian stock exchange. The researchers found that the capital structure affects corporate financial distress negatively. While Agarwal and Patni (2019) in their empirical analysis evaluated the significance of five bankruptcies prediction models namely Springate, Ohlson, Zmijewski, Grover and Altman. The researchers studied the data from the financial statements of five bankrupted or to be bankrupted companies over the period of last 10 years from the year in which bankruptcy occurs. The analysis was conducted in Indian context. The researchers inferred that; the five bankruptcy prediction models have different levels of accuracy in predicting the performance of the firms. Investors should give more attention to the Springate and Zmijewski models as they found to be the early predictor of bankruptcy. While in predicting the performance of the firms, the investors, and policy makers should not only rely on a single bankruptcy model to predict the performance of the firm. Conversely Ashraf (2019) compared the prediction accuracy of traditional distress prediction models for the firms which are at an early and advanced stage of distress in Pakistan, during 2001–2015. The researcher considered a sample of 422 companies for the analysis. The study found that Altman Z-score model and Porbit model are useful for predicting the financial distress of emerging markets.

4. Review of Literature on Principles of Financial Management as measure to avoid Financial Distress

Two of the major reasons of financial distress among corporates are mismanagement and poor governance. Hence principles of financial management play an important role in avoiding financial distress situations. Opler and Titiman,(1994) analyzed the risk of financial distress for highly leveraged firms in comparison to the less leveraged firms during industry downturn. They considered three factors namely growth in sales, returns on equity and operating income trends for assessing the firm's performance in

comparison to industry average. The study found that customer driven loss, competitor driven loss and manager driven loss are the three reasons of financial slowdown during industry downturn. In case of industry downturn, highly leveraged firms faces more risk than their counterparts with lower leverage. Similarly Platt and Platt in their research (2006) analyzed the factors those lead to future financial distress and bankruptcy. The researchers considered 276 financially distressed companies and 1127 non-financially distressed companies across 14 manufacturing industries in the sample for analysis. The study observed that financial distress was affected by the actions of the firm that results its inability to discharge its debt obligations. While Merika, Syriopoulos and Ntzannatou (2007) analyzed the relationship between firm's economic performance and leverage. The sample used for the analysis consisted of 103 listed firms in Athens stock exchange. The dependent variables used to assess firms' performance were sales growth, profitability growth and stock returns. The study observed that, highly leveraged firms maintain their economic performance during distressed industry scenario due to good management practices.

On the other hand Bonfim (2008) conducted an empirical analysis of the causes of default in debt repayment by corporates, considering firm specific data along with macroeconomic information. The analysis used firm specific data of more than 30,000 firms. The study found that the probability of default in debt repayment is influenced by both firm-specific and macroeconomic variables. Whereas Satish (2011) in his paper 'Turnaround Strategy Using Altman Model as a Tool in Solar Water Heater Industry in Karnataka' analyzed the credit worthiness of 50 customers of M/s Nuetech by applying the Altman Z score model for a period of 3 years. The study showed an increasing trend of customers who were bankrupt from 20% to 24% and at the same time customers having healthy financial situation increased from 58% to 60%. The study also suggested that creditworthiness of the customers should be checked prior to providing credit sale facility.

Similarly Lindner and Jung (2014) in their study analyzed the implications of changes in financial vulnerabilities of India's non-financial corporate sector on Indian banks' loan performance over past 25 years. The researchers found that structural reforms, improvements to the business climate, reduced uncertainty, measures to address bank asset quality deterioration through enhancing the legal and institutional insolvency framework will be helpful for improve the overall financial health of the economy. Chin and West (2016) in their study "Predicting corporate turnaround of listed companies in South Africa" analyzed the data pertaining to the companies listed on both the JSE Securities Exchange ('JSE') and Alternative Exchange ('AltX') for the period 2007 to 2014. The researchers inferred that a key strategy for a successful turnaround is achievement of "efficiency" while downsizing. Although Ansari, Khandelwal and Prabhala (2016) in their paper "Financial Stress in Indian

Corporates” analyzed the financial stress in Indian corporates post 2008 global crisis. The study found that imbalanced financing patterns, with continued reliance on debt and lesser external equity, resulted increased risk for the corporates. Whereas Dr.Sporta, Simiyu and Ngumi (2017) determined the effect of financial leverage on financial performance through analysis of financial data between 2005 to 2015 of sample of 38 commercial banks in Kenya. The study inferred that leverage is a financial distress factor and hampers financial performance of commercial banks in Kenya. Companies’ management should ensure that financial decisions made by them are in consonance with shareholders’ wealth maximization objectives. The amount of debt finance in the financial mix of the firm should be at the optimal level to ensure adequate utilization of the firms’ assets and reduce the effect of financial distress on financial performance.

On the other hand Bawa, Goyal, Mitra and Basu (2018) conducted an analysis of Non-Performing Assets (NPAs) of Indian banks using a comprehensive framework of 31 financial ratios. He examined the financial data for 46 Indian scheduled commercial banks over eight years (2007 to 2014). The researchers inferred that Non-performing assets are important indicators of banks’ profitability and efficiency. Operational capability and intermediation costs are important factors to ascertain NPAs and should be monitored carefully.

5. Conclusion

Based on the literature review presented in this paper, it is found that Altman Z-score model has been widely used for financial distress prediction of companies. The financial ratios namely net working capital to total assets, retained earnings to total assets, book value of equity to total liabilities and EBIT to total assets have positive effect on financial distress. The prediction should be based on analysis of financial data pertaining to a longer period i.e. at least 5 years.

A firm should monitor the financial ratios namely cash flow to total debt, the $\frac{\text{net income}}{\text{total assets}}$, $\frac{\text{total debt}}{\text{total assets}}$ should be monitored closely. Also, the firm should maintain its debt at optimum level to ensure adequate utilization of its assets and reduce the risk of financial distress. Highly leveraged firms have higher risk of financial distress during industry downturns. However, these firms can maintain their economic performance during distressed industry scenario through good management practices. One of the key strategies for turnaround from financial distress situation is through achievement of efficiency while downsizing. In case of banks and non-banking finance companies, non-performing assets (NPAs) is an important indicator of profitability and efficiency and should be monitored carefully.

Overall financial health of the economy also plays an important role in financial distress of the firms. It is found that, structural reforms,

improvements to the business climate, reduced uncertainty, measures to address bank asset quality deterioration through enhancing the legal and institutional insolvency framework are helpful in improving overall financial health of economy.

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