Financial Distress Prediction: A Literature Review Approach

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Abstract:
A company is in financial distress when it's not able to meet or has difficulty in paying of the financial obligations to its lenders, by reason of high fixed cost, illiquid assets and decreased revenue. Such type of distress may lead to operational distress as increasing cost of borrowing take a toll on the operations of the company as well. This may ultimate end up in the firm being insolvent. Financial distress probability becomes higher with high business risk and high debt. In this paper I try to compilation of attempt of all the researchers which they tried to make the financial distress prediction model using various variables like financial ratios, market variables and also different analytical tools. The paper has compilation of some literature review related to financial distress prediction so the future researchers find some important literature in one paper.
Key words: Financial Distress, Insolvency, Financial Distress Prediction Model, Literature Review

Introduction:

Financial distress refers that condition when the firm or an individual fails to pay its fixed financial obligations. In simple words, the firms are unable to pay its fixed charges to its creditors, loan, and debt etc. There are many factors that lead the situation towards distress like, high fixed cost, a large degree of liquidated assets or revenue sensitivities to economic downturns, poor budgeting is also responsible for financial distress overspending to high of a debt load and lawsuit or loss of employment can also arise financial distress. In early stage the meaning of financial distress differs from this era. On that time the term financial distress means company is going to become insolvent. But in the 21st century the meaning has fully changed in this time the insolvency process go from many steps and not every distressed firm become insolvent.

The firms who is ignoring the signs of financial distress before it gets out of control can be devastating and reach to that situation where distress can no longer be remedial because the creditors obligation have grown too high and cannot be repaid. In this case bankruptcy may be the only option.

A lot of factors affected the degree of higher business risk such as, general economic condition and intensity of competition, factors related demand and supply in the market, extent of diversification, degree of operating leverage and the proportion of fixed and variable cost, the age and maturity of the firm. Because matured firms are generally stable they have less cost with higher profit means they have less operating charges and gets the advantage of economies of scale. And similar in case of well diversified firms' case they get advantage of economies of scale with economies of scope.

The companies or individuals not facing the situation of financial distress overnight or immediately the symptoms are showing at least few year before they take a lot of time when they cannot pay its bills, debt and other obligations by their due dates. It's an early sign that company has facing financial problem and are likely experiencing financial distress. There are many other multiple warning signs that could indicate a company is experiencing financial distress, poor profits, and unhealthy conditions of company unproductive employees leads towards distress and generally have lower moral and higher stress by the increased chances of bankruptcy. Financially distressed firm may find difficulty to secure new financing and the market value of firms falls significantly. Customers and suppliers both are change their terms and policies and may be cancelling it.

The financial statement and other determinants like; various ratios analysis of the firm can help the investor to find out its current and future position in the market. Combination of these when analyse properly can act as a good predictors of financial distress. So that these indicators warn the firm and the risk are increases more when the firm has only few customers like two or three.

Prediction of financial distress is very important to secure the firm from bankruptcy with the help of these warning signals company can save itself. If the management is capable to identify the symptoms on time they can save the firm, there are many firms which are comeback after the facing the situation of financial distress.

The empirical findings of a study predicting corporate failure as exhibits by bankruptcy are discussed in this paper. In this field of research, there have been a number of earlier investigations; the most significant published contributions are Beaver [1966; 1968a; 1968b], Altman [1968; 1973], Altman and Lorris [1976], Altman and Mc Gough [1974], Altman, Haled man, and Narayanan [1977], Deakin [1972], Libby [1975], Blum [1974], Edmister [1972], Wilcox [1973], Moyer [1977], and Lev [1971] are all from 1970s. Two unpublished articles by White and Turnbull [1975a; 1975b] and one by Santomero and Vinso [1977] are of particular relevance since they appear to be first studies to construct probabilistic estimates of failure rationally and systematically.

Many researchers have conducted research into the signs and symptoms of financial distress, and forecasting of future financial distress based on variety of variables. There are various models to predict the corporate financial distress is also available, probably the predetermined contributors of research. This paper contains a number of studies related to different aspects of corporate financial distress are discussed:

S.N.	Name of author	Title of research	Year	Description
1.	J. Ramser and L.	A Demonstration of	1931	They were the pioneers in the development of

	Foster	ratio Analysis		quantitative analyses of financial measures for bankruptcy prediction. They studied eleven various financial ratios for 173 companies having securities; the state of those were registered sick. The less profitable business and the business that consistently failed have lower values compared to the firm than a better success rate.
2.	Fitzpatrick	A Comparison of Ratios of Successful Industrial Enterprises with Those of Failed Firms	1932	Four years after the Wall and Dunning Index, the first financial ratio research study with a focused only on bankruptcy and insolvency prediction was published. The study compared the ratios of successful industrial enterprises with those of failing businesses to see how they differed. Thirteens accounting ratios were examined as a predictor of insolvency for a matched pair of twenty companies over the period 1920–1929. According to the study, the two groups of firms' ratios had been consistently different for at least three years prior to failure. All ratios were shown to be somewhat predictive of failure, according to the study, but net profit to net worth, net worth to debt, and net worth to fixed assets were the best ones.
2.	William H. Beaver	Alternative Accounting Measures as Predictors of Failure	1966	His Contribution to empirical findings on failure prediction is particularly impressive for the study's accounting data; exhibit the capacity to forecast failure five years before the failure. A positive change were discovered the predictive capacity, some of those weren't effectively predicted to prior arguments. Despite Beaver's study was questioned for its quality of work, which used to univariate approach, but actually, his research, provided the foundation for the other people's multivariate efforts.
3.	Altman E.I.	Financial ratios, discriminant analysis and the prediction of corporate bankruptcy	1968	In order to show bankruptcy of the sample of 33 publicly traded manufacturing bankrupt companies between 1946 and 1965, the study used multiple discriminate analyses and compared them with 33 non-sick companies' selected using random sampling. Out of the twenty two ratios initially considered, he chose five as his crucial ratios. The results of the MDA study produced the equation of Z score, which accurately predicted the financial health of bankrupt corporations 94% of the time and the financial health of non-bankrupt companies 97% of the time. Because of the accuracy of the prediction, Prof. Altman's Z score model has become of essential importance.
4.	Edward B. Deakin	A Discriminant Analysis of Predictors of Business Failure	1972	He studied 32 failed firms between 1964 to1970. In his opinion, failure is based on to be bankrupt, liquidated or insolvent business. He compared failed and non- failed firms from financial data of industry using paired sample observation. By using paired sample, he was unable to develop linear discriminant function. Then he randomly took the sample of 32 non-failed businesses. The first three years previous to failure disclosed that the miss-classification is less than 5% of the original sample. Although the failure rates is increased to 21% in fourth and 17% in fifth year. He said that these were very high for decision making purpose.
5.	Altman et.al	Financial Ratios and the Probabilistic	1978	The study Built a second-generation model with a lot of changes over the previous Z score approach. The

		Prediction of Bankruptcy		new study made improvements to the way discriminant statistical techniques had been used. On sample firms comprised of manufacturers and retail, the new model, termed ZETA, was effective in classifying bankrupt enterprises up to five years prior to failure. According to the study, whenever it comes to expected cost criteria that include prediction and explicit cost of error estimations, the model performs better than alternative bankruptcy identification techniques.
6.	Ohalson	Financial Ratios and the Probabilistic Prediction of Bankruptcy	1980	Study performed a study on financial ratios and probabilistic bankruptcy prediction; the so-called conditional logit model's maximum likelihood estimation methodology had been used. The study used a sample of 105 bankrupt companies selected from US stock exchanges and 2058 non-bankrupt companies, and it analyzed nine independent predictor variables, including asset size. For the logit model, three sets of estimates were calculated using the predictors for bankruptcy within a year, two years, and within a year or two.
7.	Taffler	Empirical Models for the Monitoring of UK Corporations	1984	One of the pioneers to effectively apply MDA to the discrimination of failed and successful organisations in the UK is widely recognised. The Taffler version of the UK Z-score, which has endured and become the most well-known and recognisable insolvency prediction model in the UK over the past three decades, has stood the test of time. Taffler's Z-score actually had two competing versions, the first coming in 1976 with five variables and the second appearing in 1977 with four variables, as is clear from the early literature. It wasn't until recently in Agarwal & Taffler that the coefficients of the alternative four-variable model commonly known as the UK Z score model were made public (2007).
8.	Appiah O.K. et.al	Predicting corporate failure: Some empirical evidences from the UK	2009	They made an attempt to determine the significance of Altman Z- score model in predicting corporate failure among private medium sized manufacturing firms of UK. The study covered financial information pertaining to a sample of failed and non failed manufacturing firms during the period 1994-2004. They used multiple discriminate analyses to develop the Z- score. The findings emerged from the study supported the notion that net-profit margin is superior to the gross profit margin in discriminating failed companies from non-failed companies
9.	Demyanyk Y. and Hasan L.	Financial Crisis and Bank Failure: a review of prediction Methods	2009	The article summarises empirical economics and operations research publications aimed at explaining, predicting, and mitigating financial crises and bank failures in the United States and other nations. The study examines the financial and economic dynamics surrounding the United States' subprime mortgage crisis, as well as a thorough examination of intelligence approaches used in the operations research field to predict bank failures. We propose that operations research approaches be used more widely in financial crisis analysis.
10.	Gupta et al.	Employment Of Zeta Model On The Listed Textile Companies Of Punjab	2013	It was looked into if the Altman Z Score model applied to the listed textile companies operating in the Indian state of Punjab. The study looked at 13 publicly listed companies' financial statements over a 12-year period (1999-2010). The outcome showed

				that the model holds up well in the majority of cases, or about 86%. The study came to the conclusion that the Altman model was reliable as it generally predicted stability accurately.
11.	Gunathilaka	**Financial Distress Prediction: A Comparative Study of Solvency Test and Z-Score Models with Reference to Sri Lanka**	2014	The appropriateness of Z-score models in assessing corporate distress using financials disclosed by the firms was investigated in this study. The solvency test's ability to classify solvent and insolvent enterprises is examined and compared to Z-score models and the sample firms' real condition. According to the study, Altman's Z and Z" models are more accurate in forecasting financial distress. The Springate Z-score model shows a similar strength in discriminating the failed and non failed firms. However, the solvency test, which is not a parametric model to use in predictions, does not discriminate the solvent and insolvent firms meaningfully. The solvency test does not consider trading solvency, but solvency based on financial position.
12.	Ohlson J.A.	**Financial Ratios and the Probabilistic Prediction of Bankruptcy**	2014	This study defines that there are two conclusions which should be restated. First, the predictive power of any model depends upon when the information (financial report) is assumed to be available. Some previous studies have not been careful in this regard. Second, the predictive capabilities of linear transforms of a vector of ratios appear to be consistent across estimation processes (with a large sample). As a result, more than anything else, considerable improvement is likely to necessitate the addition of more predictors.
13.	Rajasekar T. et.al.	**An empirical enquiry on the financial performance of Navatna companies in India**	2014	This study measures the financial condition of Indian Navratna companies using Springate, Flumer and Legault models. According to this study, only 6 out of 14 Navratna companies had financially healthy during the period of study, while the other 8 companies were facing the situation of financial distress. As a result, it was advised that even if the government finances these organizations, but they still need to regularly review their financial condition. Good performance will help the business to sustain them with greater financial credibility.
14.	Bapat & Nagale	**Comparison of Bankruptcy Prediction Models: Evidence from India**	2014	The study compared performance of bankruptcy prediction models using multiple discriminant analysis, logistic regression and neural network for listed companies in India. Using financial statements, bankruptcy prediction models were developed throughout the three year years prior to bankruptcy. The sample covers the period from 1991 to 2013 and 72 bankrupt and 72 non- bankrupt companies. According to the results, neural networks have the highest classification accuracy for all the three years prior bankruptcy when compared to multiple discriminant analysis and logistic regression.
15.	Arshad et.al	**Prediction of business failure and fraudulent financial reporting: Evidences from Malaysia**	2015	The study examined whether ratio analysis, Banish M-score and Z-score collectively can assist in predicting business failure and fraudulent financial reporting. The results based on the business failure ratios and Z-score model accurately predict, that there is a 96 percent capability of detecting business failure; while the results based on the fraudulent

				financial reporting ratios and Banish model accurately predict, at 83.3 per cent, that there is potential in detecting fraudulent financial reporting. More crucially, the study's collective prediction model used in this study predicts, at 83.3 per cent, that business failure firms have the tendency to engage in fraudulent financial reporting.
16.	Bansal R. & Singu H.B.	**Financial distress prediction of Indian companies: future perspectives**	2017	The research discuss, the previous studies ignores the combined effect of financial ratios, market and macroeconomic variables for prediction of financial distress in Indian context in a comprehensive manner. So the future studies should help in identifying companies that are at risk of facing potential financial distress in future.
17.	Gupta S.K.	**Valuation of distresses companies**	2019	This study defines that the valuation of distressed firms is a complex topic due to many assumptions and methodologies of value measurement do not work, valuation is combination of science and art in general, but it is especially in the case of distressed companies. To arrive at the appropriate valuation, the optimal mix of assumptions, framework, approach, structure, methodology and methodologies should be applied judicially, which maintains balances between theoretical and practical areas.
18.	Mallinguh E. and Zoltan Z.	**Financial distress, prediction, & strategies by firms: A systematic review of literature**	2020	The study finds that in this context most of the studies are focused on developed nations and from emerging economies are mostly from Asia, they find that not a single study focused on the African continent or the middle East. They define that firms in these geographical areas face financial distress equally, so there has been an opportunity for future researchers.

Conclusion:

A large number of research projects have been conducted in the domain of financial distress prediction. Over the last few decades, a plethora of financial distress prediction models have been developed using different variables. The capacity of these models to predict the future varies, and as a result many researchers carried out comparison studies as well. Models that showed a high level of predictability in particular economic scenarios were not found that they give similar results in a different situation. Based on the literature review in this research, the Altman Z-score model has been extensively used to predict financial distress in companies. The prediction should be based on an evaluation of financial data covering a long time horizon, at least five years. Financial distress of the companies is significantly influenced by the overall financial health of the economy. It is observed that improvements to the business climate, the reduction of uncertainty, and steps to address deteriorating bank asset quality by strengthening the legal and institutional insolvency framework are useful in promoting the overall financial health of the economy.

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