CHAPTER II
REVIEW OF LITERATURE

This chapter deals with the theoretical framework and empirical studies relating to the causes of industrial sickness, bankruptcy prediction models and the relative restructuring and rehabilitation models. Financial literature has devoted significant attention to issues of measuring, avoiding, and consequences of financial distress based on data from developed nations. While the first section deals with the literature on the causes for industrial sickness, Section two reviews the literature on bankruptcy Laws, section three reviews parts disbess prediction models prevalent and developed by various academicians and consultants around the world and its relevancy to Indian environment. Section four deals with the restructuring literature for distressed firms and the last section summarizes the chapter.

2.1 LITERATURE ON THE CAUSES FOR INDUSTRIAL SICKNESS

The problem of industrial sickness has become a worldwide phenomenon and even advanced countries like America, United Kingdom, Germany and Japan are affected by it though at varying degrees. A business core aim is to generate profit and by extension, maximization of wealth. In the course of operations, however, a firm might experience financial problems caused by both internal and external environmental factors. Wruck (1990) defines financial distress as a situation where a firm's operating cash-flows are not sufficient to satisfy current obligations (such as trade credits or interest expenses), and the
firm is forced to take corrective action. The term financial distress is used to refer
bankruptcy in corporate sector in western countries. The same has been addressed as
industrial sickness in India, but the time taken for declaring a company as industrially sick
is too long and it impairs the probability of restructuring (Ananth 1993). Altman (1983)
distinguishes stock-based insolvency from flow-based insolvency to show different levels
of distress. The former occurs when a firm has negative net-worth, causing the value of its
assets to be less than the value of its debts. Flow-based insolvency occurs when a firm's
cash flows are insufficient to cover contractually required payments. Several tools are
available to detect evidence of business failure, but they may not find the cause of failure.
Emphasis must be placed on finding and correcting the causes. The definition of sickness
plays a critical role in identifying the causes and remedial action. Researchers and
practitioners alike have voiced their dissatisfaction over the definition of sickness proffered
by the Government of India. For example Yadav (1986) points out that the criterion of
50 per cent erosion of peak networth is too much for a unit to be declared as sick and
is responsible for delaying the rehabilitation actions. According to him, the rehabilitation
actions should start before the erosion of peak networth crosses the 10-15 per cent
limit. A similar view was observed by Dholakia (1989) that the criterion of recurring cash
losses used by the government and financial institutions to identify sick units results in such
delays, and when the units are identified, they would be terminally sick. A better indicator
of sickness, would be the firm's relative position in the industry on a comprehensive set of
empirically tested criteria, which can be constantly monitored for an early warning of
incipient sickness. There are several reasons for financial distress and industrial sickness.
The causes vary from faulty investment decision to changes in economic and social
environment. The causes of sickness vary from country to country and one period to
another period.
Studies have shown that causes of industrial sickness include faulty investment decision (Hegde, 1982) and wrong business decision on location, product-mix, and cost overrun (Kaveri, V.S. 1983). Sickness also results from exogenous factors such as technological changes (Agarwal, 1979); product obsolesce (Rajagopal, 1989); increased competition (Ramasamy, 1981); and government policies (Sharma, 1983). The general economic climate and government policy are reported to be the cause for large scale commercial bankruptcies in Canada (Fisher and Martel, 2000). In addition to these causes, studies have pointed that poor or failure of management is an important reason for sickness (Singh, 1979). Poor implementation usually results in cost and time overruns in projects and causes sickness (Korgaonar, 1988). Cost overruns have become a common phenomenon, particularly in the case of the public sector projects.

The Reserve Bank of India survey (1979) reports that other most prevalent causes for sickness are market recession, faulty initial planning and technical defects, power shortage, raw material shortage, and labour problems. Studies have also mentioned a few other causes such as dishonesty of entrepreneurs (Charavarthy, 1983); dissensions among partners (Dwivedi, 1983); disturbed industrial relations (Mukherjee, 1983); surplus work force (Ananth, 1982); under utilization of production capacity (Morris, 1982); lack of modernization (Slatter, 1984); and conservative bureaucratic style (Garry Purrel, 1989). Mismanagement in the Indian companies is identified by the researchers as a major cause for industrial sickness (Agarwal 1977). Majority of the Indian studies and surveys conducted by the private and government agencies centered round the cause of sickness than prediction. Some of these studies have been discussed here.
Bidani and Mitra (1981) have identified that when there is a default on interest payments and erosion of net worth by more than 50 percent, then it could be the initial indicators of serious imminent failure. Khandwallah (1981) mentioned that revival efforts initiated early, when the unit is performing well below its potential, yields better results than when the unit is officially sick.

Natarajan (1985) has made a study on the symptoms of corporate sickness, and lists seven symptoms: (1) negative working capital, (2) irregularity in meeting debt servicing obligations, (3) cumulative losses resulting in an erosion of capital, (4) under-utilisation of installed capacity, (5) excessive and continuous dependence upon external funds, (6) stoppage of production for a long period, and (7) frequent interruptions in sales. The western cases also identified similar symptoms. The most frequently mentioned symptoms are: cash losses and non-payment of dividends for four years (Olivetti, Turner, 1986), high cost, low margins, and inability to Cope with competition (ICL, Marwood, 1985), poor quality of goods and poor service (Woolworth, Rose, 1989), obsolete plant and machinery, and demoralized people (Dunlop, Radford 1989), decline in market share (Asahi Breweries, Makajo Kono 1989), declining profits, low margins, and price cuts, and credit incentives to effect sales (MFI Seabright 1985), low productivity and poor industrial relations at a distribution centre Bamber Lausbury, 1988, and decline in sales and drop in capacity utilisation Muller (1985). Thus, there can be several indicators, some of them are non-financial in nature.

Change in demand for the product, change in methods of production, Competition from other units, etc. may affect the prospects of a company. It is inevitable in the industries where technological developments take place at a fast pace, older units are
placed at a great disadvantage. Recession in economy may make units non viable; drastic changes in industrial and trade policies tend to make certain units unable to face competition. Slow progress in some of the sectors may shrink the market for those dependent on them. These factors contributing to sickness are termed as external causes since these are outside the control of an individual enterprise. Under this category the extraneous factors like natural calamities, law and order situation, wars and multiplicity of labour unions may also be included. Internal factors include lack of adequate planning, wrong choice of location, inefficient method of production, underestimating the requirements of inputs such as power, raw material and trained manpower etc., cost overruns due to delayed implementation of projects, misconception and mismanagement of production, labour, marketing and finance and an overall lack of professionalism. Among the internal factors, there could be a conscious and deliberate intention to lynch an enterprise by its management. If the management resorts to poor resource management, siphons away funds or draws heavily upon the business resources for their personal advantage through transfer pricing, the enterprises would logically turn into 'sick' ones, Pasricha and Singh (1991) have analysed 223 sick industrial units and identified poor management as the most significant factor for the cause of industrial sickness. Other major causes of sickness in industries are obsolete technology, absence of professional marketing strategy, market recession, strained industrial relations, shortage of inputs, lack of quality consciousness and inadequate equity base. This type of sickness is an induced one by the management. Some of the causes are interlinked. Cost overrun leads to inadequate working capital, diversion of funds, low capacity utilisation, and poor sales, etc. Inability to pay workers' dues on time may lead to labour unrest. While it may be possible to single out one particular cause as the main reason for sickness of a unit, it may not be assumed that it was the sole cause.
Dolakia (1989) has criticized that the definitions given for sickness in the Sick Industrial Companies Act of 1985 was in a way responsible for the companies to get it to sickness or distress and at the stage of point of no return our legal system start working only to see that the corporations become dormant and the duty of BIFR is to put the last nails on the coffin. Studies by Kaveri (1980), Srivatsava and Yadav (1986), Vinod kumar (1987) Yadav (1986) and Kortikar (1993) suggest that empirically validated predictive models can be built to monitor corporate sickness. It is obvious that financial institutions will have to play a major role in detecting and preventing sickness at the earliest possible stage.

2.2 LITERATURE ON BANKRUPTCY LAWS

Corporate bankruptcy laws in many countries have seen major changes over the past century. Despite these changes, there are enormous differences between the bankruptcy laws of different countries. The legal structure in some countries aims to protect the interest of lenders and suppliers of goods. Whereas in other counties, the focus is more towards protecting the existing venture, its management and employees. In recent years, the legal rules for bankruptcy, reorganization and restructuring processes have been reassessed. In the United States, the proposals have been made to change the 1978 bankruptcy code to eliminate the chapter 11 reorganization entirely. Issues of legal reforms have been analysed by Bebshuk (1988) Bradley (1992) Roe (1983). These reform proposals have been criticized by Altman (1993) Bhandari and Weiss (1993) Warren (1992) and Whitman (1993). The central role played by law and regulatory institutions in the development of financial markets in general and in corporate finance in particular has received considerable attention. King and Levine (1993) and Demirguc-Kunt and Maksimovic (1998) find a positive relationship between the quality of laws and
the growth of industrial firms across a wide cross-section of countries. La Porta, Lopez-de-Silanes, Shelifer and Vishny (1997, 1999) have emphasized considerable variation in the protection offered to creditors and minority shareholders across various countries and found a significant association between the legal origins of a country and the quality of investor protection. Their findings show that common law countries (English) provide the best investor protection whereas civil law origin (French, German, and Scandinavian) countries provide the least investor protection. Additionally, they find a significant relationship between legal origins and various corporate governance issues, such as dividend payout and corporate ownership around the world. However as for as India is concerned, it is more towards rehabilitation and restructuring than winding up. Recently Bankruptcy Law has been enacted so as to facilitate speedy action. The legal framework in India, compared to the other developed countries has been dealt in detail in chapter 3.

### 2.3 LITERATURE ON BANKRUPTCY PREDICTION MODELS

The financial stability of companies is of concern to employees, investors, bankers and government and regulatory authorities alike. Indeed, the recent literature on global financial downturns includes the theory that balance sheet fundamentals may provide warning of an impending crisis (Krugman, 1999). Prediction of financial distress or Bankruptcy has always been an area of interest for the academicians and researchers for a long time. Statistical prediction models are more generally better known as measures of financial distress. Three stages in the development of statistical financial distress models exist: 1. univariate analysis, 2. multivariate or multi-discriminate (MDA) analysis, and 3. logit analysis. Univariate analysis assumes that a single variable can be used for predictive purposes, Collins and Green (1982).
Beaver (1966) initiated the interest of academic world to the financial distress prediction models using univariate analysis methodology for classifying bankruptcy and non-bankruptcy firms. Beaver found that a number of indicators could discriminate between matched samples of failed and non failed firms for as long as five years prior to failure. He questioned the use of multivariate analysis. The Beaver study (1967) concluded that the cash flow to debt ratio was the best single ratio predictor. However, Beaver's study has been criticised for its dependence on a single ratio rather than addressing the numerous possible factors that together may indicate future corporate failure. As a result, an interest in multivariate discriminant analysis (MDA) models dominated the bankruptcy prediction literature.

Altman (1968) extended the work and used multivariate discriminant analysis to predict bankruptcy. Altman model was replicated by many others like D.Martin (1977) and Lavelle (1981) by expanding the period of study and changing or redefining the variables. Several authors have replicated the Altman model in different countries and reported the usefulness of financial ratios in predicting bankruptcy. Some of the important studies are by Altman and Lavalle (1981) in Canada, Taffler (1982) in U.K, Ko (1982) in Japan, M Hamer (1983) USA, Lincoln (1984) in Australia, Suominen (1988) in Finland, and Bhatia (1988) in India to mention a few. These models were also extended to examine the quality of existing loan accounts and also in deciding whether to extend the credit or loan to the borrowers. In order to overcome some of the limitations of discriminant models, subsequent studies in 1980s have used logistic analysis. Recent studies used logit or probit models to predict bankruptcy. Ohlson (1980) was one of the first users of logistic analysis and subsequently many others like CV Zavgren (1985),
Lo (1986), Barniv (1990), Maddala (1991), Dhumale (1998) have followed logistic analysis. Despite the impressive results obtained by these studies, several limitations in their theoretical underpinning and statistical developments have been recognized by studies such as Eisenbeis (1977), Scott (1981) and Zmijewski (1984), Barnes (1987). However, Ohlson’s (1980) claim that the use of logit essentially avoids all the problems discussed with respect to MDA has been challenged by many. Logit is not unconditionally better than MDA. This finding is supported in the literatures of Amemiya and Powell (1980), Amemiya (1981), Lo (1986), Malhotra (1983), and Kennedy (1991). Almost all of these traditional models have been either matched-pair multi-discriminate models or logit models. The detailed literature on financial distress prediction models developed by various authors in different countries have been done as a part of this study and the relevant study in this area by some Indian authors also referred in this context.

Beaver (1967) classified a company as failed when any of the following events occurred: bankruptcy, bond defaults, an overdrawn bank account, or nonpayment of a preferred stock dividend. Beaver presented a description of liquidity bankruptcy. Beaver was among the first to focus on the ability of financial ratios to predict corporate failure. His sample consisted of 79 failed firms. These 79 failed firms were matched to 79 non-failed firms on the basis of industry and size of assets. He studied 30 different ratios grouped into six categories: cash flow, net income, debt to total assets, liquid assets to total assets, liquid assets to current debt, and turnover ratios. The theory of ratio analysis employed by Beaver was a cash-flow model which served as a framework for explaining the results of the tests on ratios. The firm is viewed as a reservoir of liquid assets, which is supplied by inflows and drained by outflows. The solvency of the firm was defined in
erms of probability that the reservoir will be exhausted. From this concept of ratio analysis, following propositions were stated: (a) The larger the reservoir, the smaller the probability of failure. (b) The larger the net liquid asset flow from operations i.e. cash-flow, the smaller the probability of failure (c) The larger the amount of debt held, the greater the probability of failure (d) The larger the fund expenditure for operations, the greater the probability of failure. The data analysis proceeded in three steps namely comparison of mean values, a dichotomous classification test and analysis of likelihood ratios. A comparison of the mean ratios of failed and non-failed firms provided substantial evidence that the financial ratios of failed firms showed deterioration and were worse than that of non-failed firms, even five years prior to failure. Differences in ratio mean do not suggest directly the existence and extent of predictive power. To examine predictive power of ratios, the dichotomous classification test was made to predict the failure status of a firm, based solely upon a knowledge of the financial ratios. In this, each ratio is arranged separately in ascending order. In that case, each ratio has an optimal cut-off point which minimises the percentage of incorrect classification. If the value of the ratio falls below cut-off point, the ratio assigns the firm to the failed group and vice-versa. After each firm has been classified, the observed prediction is compared with expected classification and percentage of error is ascertained. Dichotomous test indicated that the most successful predictor was cash flow to total debt ratio, followed by the net income to total assets ratio.

Altman (1968) used multiple discriminant analysis (MDA) technique that is designed to classify an observation into one of several prior groupings dependent upon the individual characteristics of the observation. The first step in applying MDA is to
determine prior grouping of the objects. Data deemed relevant is then collected on various characteristics of the objects in each group. The MDA technique derives a linear combination of all or some characteristics that best discriminate between the groups. The discriminant function is of the form: \[ Z = V_1 X_1 + V_2 X_2 + \ldots + V_n X_n \] (2.1) where, \( Z \) = Overall index and \( V_1, V_2, \ldots, V_n \) are discriminant coefficients and \( X_1, X_2, \ldots X_n \) are independent variables (ratios). The discriminant function thus transforms the values of the individual variables into a single discriminant score, \( Z \), which is then used to classify objects into various groups. Altman's model formulates only two groups of firms, viz., bankrupt and non-bankrupt. He used 33 bankrupt and 33 non-bankrupt manufacturing firms. The firms in bankrupt group were matched to those in non-bankrupt group based on the industry and size. Of a large number of financial variables, 22 financial ratios found to be significant indicators of corporate problems in the past studies, were considered as predictors of failure. He classified the ratios into five categories, viz., liquidity, profitability, leverage, solvency, and activity ratios. The following discriminant function did the best overall job in discriminating bankruptcy status of the sampled firms: \[ Z = 0.012 X_1 + 0.014 X_2 + 0.033 X_3 + 0.006 X_4 + 0.999 X_5 \] Where \( X_1 \) = Working capital/total assets, \( X_2 \) = Retained earnings/total assets, \( X_3 \) = Earnings before interest and taxes/total assets, \( X_4 \) = Market value equity/book value of total debt, \( X_5 \) = Sales/total assets. A cut-off point for the Z-Score was determined in such a way as to minimise the overlap between bankrupt and non-bankrupt firms. He concluded that Z-Score of 2.675 was the best cut-off point that maintained minimum misclassification. It may be worth noting that of these five ratios included in his model by Altman only working capital/total assets was among the six ratios mentioned by Beaver as performing better in classifying firms as failed or non-failed.
Altman, Haldeman and Narayanan (1977) in their study incorporated modifications in techniques which were suggested in several subsequent studies and developed a new model called “Zeta analysis” which is essentially the same as Z-Score model, but takes into account changes in financial reporting standards. Their sample consisted of 53 manufacturing and retailing bankrupt firms and 58 non-bankrupt ones. They tested a large number of variables that are classified into profitability, coverage and other earnings relative to leverage measures, liquidity, capitalization ratios, earnings variability, and a few miscellaneous measures. Multiple Discriminant analysis was used with both linear and quadratic structures. Their study resulted in new variables explaining corporate failure. These were: $X_1 = \text{Earnings before interest and taxes/total assets}$, $X_2 = \text{Stability of earnings measured by normalised measure of standard error of estimate around a ten-year trend in earnings}$, $X_3 = \text{Earnings before interest and taxes/total interest payment}$, $X_4 = \text{Retained earnings/total assets}$, $X_5 = \text{Current assets/current liabilities}$, $X_6 = \text{Equity/total capital}$, and $X_7 = \text{Size}$ measured by the firm’s total assets. Altman et.al., claimed that the newer Zeta model predicted better than his earlier model and suggested different discriminant models for public corporations, private corporations, and manufacturing sector to identify distress.

Deakin (1977) included 14 ratios used initially by Beaver and modified Altman’s sample selection procedure in which the non-failed firms were selected at random. His sample consisted of 32 failed and 32 non-failed firms. A discriminant function, which included all the 14 variable was developed for each of the five years prior to bankruptcy. The ratios used by Beaver and Deakin were factor analysed by Libby, resulting in a set of five ratios, which contained virtually all the predictive ability of the original set of 14
ratios. Deakin’s revised model contained these five ratios. A sample of 63 bankrupt and 80 non-bankrupt firms, selected at random, was used for the development of the revised model. He used both linear and quadratic methods. Deakin conducted two major empirical experiments. First, he adopted a method of analysis similar to Beaver’s study. By applying dichotomous classification test. Percentage error of each ratio was ascertained. In the second experiment, discriminant analysis technique was applied using the same sample and ratios. He concluded that discriminant analysis can be used to predict business failure, three years in advance, with a fairly high degree of accuracy.

Blum (1974) developed a Failing Company Model to assess the probability of business failure. His sample contained 115 failed and equal numbers of non-failed firms. Non-failed firms were matched to failed firms on industry, annual sales, number of employees and fiscal year. He used 12 variables in his model. Blum included ratio trends and variance as predictors. He considered the use of failure prediction models in the decision of whether to allow a merger to meet the requirements of the failing company doctrine in antitrust regulations.

Edmister’s (1972) sample consisted of 21 small business administration’s loan applicants who were defaulted on payment, and 21 non-defaulters. He tested 19 ratios, and a seven variable-Discriminant Function was developed. Consideration was given to (1) the level of ratios compared to industry averages, (2) three-year trends, (3) five-year averages of ratios, and (4) combined effect of industry relative trend and industry relative level. The last is the conditional nature of ratio analysis that was not previously examined in empirical research. For example, a ratio may be below the industry average but have a mitigating upward trend. The interaction effect of level and trend may be significantly
related to the event being studied. A test of this relationship would entail the handling of interaction effect between two variables in a linear model such as multiple discriminant analysis. The test may portray more accurately the actual ratio-analytic process. This technique is possible only if the interaction effects are adequately specified. Thus, the four combinations of trend and level were tested for each of the relative ratio. He examined a subset of 152 combination variables and concluded that linear combination of these 7 variables produce better results. Of the seven variables, quick ratio, and inventory/sales were tested by Beaver also but were not included in a set of the six variables that he considered as good for group separation.

Taffler’s (1974) study consisted of 61 non-failed and 23 bankrupt firms. He tested 50 financial ratios, using principal component analysis, which helped to avoid multi collinearity problem. A stepwise linear discriminant analysis produced a model consisting of the following five ratios: \(X_1 = \text{Earning before interest and tax/opening total assets,} \) \(X_2 = \text{Total liabilities/net capital employed,} \) \(X_3 = \text{Quick assets/total assets,} \) \(X_4 = \text{Working capital/net worth, and} \) \(X_5 = \text{Stockturn.} \) The first two variables contributed most to the model. He developed three classes of discriminant variables: conventional ratios, 4 year-trend measures, and funds statement variables. He found that the funds statement variables were too volatile for meaningful analysis and the trend measures added very little to the discriminant model. Of these five variables, quick assets/total assets ratio was also tested by Beaver, but was not included in his set of six good performing ratios.

Taffler and Tisshaw (1977) developed a ‘Z model’ for the prediction of company’s insolvency and the evaluation of credit worthiness by banks, investment houses and credit controllers. The sample contained 46 failed and 46 non-failed manufacturing firms. The
firms in non-failed group were matched on the basis of industry and size to the failed group firms. Using stepwise linear discriminant analysis he developed a model using the following four ratios $X_1 = \text{Profit before tax/average current liabilities}$, $X_2 = \text{Current assets/total liabilities}$, $X_3 = \text{Current liabilities/total assets}$, and $X_4 = \text{No-credit interval}$, (Current assets minus current liabilities to operating cost excluding depreciation).

Taffler (1980) developed a separate model, for distribution enterprises as the characteristics of such firms differ significantly from those of manufacturing firms. His sample contained 22 failed and 49 distinct healthy firms. Final linear discriminant model contained the following variables $X_1 = \text{Cash flow/total liabilities}$, $X_2 = \text{Debt/quick assets}$, $X_3 = \text{Current liabilities/total assets}$, and $X_4 = \text{No-credit interval}$. The ratios are interpreted to measure profitability, debt position, financial risk, and liquidity. He demonstrated the operational utility of his model by applying the model to the data three years subsequent to its development. However, only no-credit interval ratio was included in his set of good predictive variables. Taffler described a new development of Z-Score approach to forecast the actual likelihood of a company failing in the next year, given an at-risk-profile, termed as ‘risk index’ or ‘Z-score’. This consists of linear additive weighted composite of three factors: how low the throughout the whole performance spectrum.

Wilcox’s “Gambler’s Ruin” Model (1971) noted the similarities of the four propositions stated in Beaver’s 1966 article to the classical gambler’s ruin problem, in the probability theory. Company’s Z score is, the number of years at risk, and the trend in Z score, measured along five point scale. His study also described transformation of model to measure performance of a company in probability theory. In the model the firm is
the gambler and bankruptcy occurs when its net worth falls to zero. He calls his model the “Gambler’s Ruin” approach. The liquidation values for assets and debts are defined by Wilcox as the ‘net liquidation value’ or ‘adjusted cash position’ of the firm is the liquidation value of assets less the liquidation value of debts. The liquidation value changes from year to year by inflows and outflows. The financial state of the firm can either improve, or remain the same, or worsen from one period to another. Wilcox assumes that the change in financial state takes place always by a fixed amount, labeled as ‘size of the bet’. The length of period to the time of failure being determined by the size of the firm’s net liquidation value in combination with the size of probabilities of inflows and outflows of liquid resources. The idea underlying this approach is analogous to the concept of reserve strength. However this has not been widely accepted.

Gilbert, Menon, and Schwartz (1990) identified a model that distinguishes between financially distressed firms that survive and financially distressed firms that ultimately go bankrupt has been investigated. He found different explanatory financial variables for these two groups of firms. In addition, a sample firm may be classified into more than two categories (bankrupt or non bankrupt) and the classification probabilities can be estimated by the multinomial logit technique. For example, Poston, Harmon, and Gramlich (1994) assigned firms into one of three groups according to each firm’s financial condition, turnarounds, business failures, Much of the recent work is discussed in Altman and Saunders (1998) and Zavgren (1983). Studies that incorporate accountant opinions include Hopwood et al. (1989), Flagg et al. (1991). A further revision to the Altman Model for Non-Manufacturing units has also been introduced. Altman, Hartzell and
Peck (1995, 1997) have applied this enhanced Z" Score model to emerging markets corporates, specifically Mexican firms that had issued Eurobonds denominated in US dollars. The classification results are identical to the revised (Z' Score) four-variable model, \[ Z = 6.56 (X_1) + 3.26 (X_2) + 6.72 (X_3) + 1.05 (X_4). \] When the Z score is less than 1.10 it indicates distressed condition. Scott (1981) has presented a theoretical framework for solidity bankruptcy, in which bankruptcy is based on the value of stockholder's assets. This framework assumed that the firm would go bankrupt if the sum of the liquidation value of assets and the change in these assets were negative (Scott, 1981). Wilcox (1971, 1973, 1976), and Santomero and Vinso (1977) have applied this kind of theory to failure prediction.

Dimitras, Zanakis and Zopounidis (1996) have analysed various prediction method studies in different countries. They also classified the statistical tool adopted by different authors in their survey of business failures. The common alternatives of liquidation or reorganisation of bankrupt firms is prevalent in different nations.

Sunti Tirapet (1999) had looked into the financial distress prediction model in a different angle. He has taken a sample of 55 distressed and 341 non-distressed firm from the listed companies. The significance of the model is its ability to bridge a firm sensitivity to macro economic conditions and its financial characteristics in order to explore a firm's financial distress. Their findings indicate that macro economic conditions are critical indicators of potential financial crisis for a firm. He argued that the higher the firm sensitivity to inflation, the higher the firm exposure to financial distress.
Obeua S. Persons (1999) studied the financial statements and Audit reports of selected failed firm and compared the same with the results of Logistic models. The results indicated that auditors reports for previous year before the failure did not differentiate failed from surviving companies. On the other hand logistic regression models for the same data indicate that failed companies had lower profitability. He judged the predictive ability on the basis of variables relating to capital adequacy, asset quality, management quality, earning ability and liquidity.

Erkki K. Laitinen, Teija Laitinen (2000) attempted a Bankruptcy prediction model by testing the application of Taylor’s series expansion model. The cash to total assets, cash flow to total assets, and shareholder’s equity to total assets ratios operationalize the factors affecting the insolvency risk. The usefulness of Taylor’s model in bankruptcy prediction is evaluated by applying the logistic regression model. The classification accuracy in the test data for the first and second years before bankruptcy show that the classification accuracy of a simple financial ratio model can be increased using the second-order and interaction terms of these ratios. However, in the third year, for the test data, Taylor’s expansion is not able to increase the classification accuracy when compared with the first-order model. He has developed equations to describe Bankruptcy based on the four inferences. 1) The smaller the financial obligations (FO) are to mature, the smaller the probability of insolvency. 2) The larger the amount of cash (C), the smaller the probability of insolvency. 3) The larger the amount of net cash flow (CF), the smaller the probability of insolvency. 4) The better the possibilities of getting outside financing (POF), the smaller the probability of insolvency. A firm will go insolvent in the succeeding period if
C + CF + POF < FO, which means that financial obligations that will be coming to maturity will exceed the financing available to the firm. Insolvency risk, which is a function of three ratios: cash to total assets, cash flow to total assets, and shareholder’s equity to total assets. Because this function is also affected by Earning to Total Assets, the framework also has a link to the solidity bankruptcy. He has taken a sample of 200 bankrupt and equal numbers of non-bankrupt firms for this study. Logistic regression analysis was used as a main statistical tool for the prediction purpose. The results of the study were in conformity with that of Taylor’s expansion model.

Lin Lin and Jenifer Piesse (2000) for predicting the financial distress in corporates in U.K they have used a new statistical tool of conditional probability analysis. Conditional probability analysis (CPA) primarily refers to the discrete choice group of models, of which logit and probit are the most common in studies of corporate distress. The main difference between MDA and CPA is that CPA appraises the probability of occurrence of a result, rather than producing a dichotomous analysis of failure or non failure as is the norm with basic discriminant techniques (Rees, 1990). Results show that the CPA model is both efficient and consistent, has high accuracy levels and avoids the biased sampling problems that have been identified in MDA studies. More recently Shumway (2002) has demonstrated a new generation hazard model for predicting bankruptcy more accurately.

L.C.Gupta (1979) was a pioneer in the field of distress and sickness prediction for Indian industries by using ratio analysis as a tool. He has developed a model for prediction of sickness. He took sample from a homogenous cotton textile industry. His
sample included 41 textile companies, of which 20 were sick and 21 non-sick. He studied 56 ratios, classified into broad categories. A simple non-parametric test for measuring the differentiating power of various financial ratios was used. To minimize the misclassification rate he recommended four profitability ratios of earning before depreciation interest and tax to sales, cash flow to sales, cash flow to total assets earning before interest and tax to total assets.

Kaveri (1978) analysed a sample consist of 20 sick, 49 irregular, and 40 good small scale units. He has applied the current ratio, stock turnover ratio, net worth to fixed assets and net worth to total liabilities ratios for prediction. He tested his model on hold out and random samples. This model could predict ‘good’, ‘irregular’, and ‘sick’ with 76 percent accuracy one year prior to the event.

Paranjape, Avinash (1980) tested a sample consist of 54 sick and non sick firms. He tested 16 financial ratios and found that the following four variables, discriminates better between sick and non sick. Raw materials consumed to sales, Inventory to current assets, Retained earnings to total assets, and Earning before interest and tax to total liabilities. He has claimed 90 percent accuracy one year prior to sickness.

Srivatsava and Yadav (1986) demonstrated a management information system and a discriminant model to predict sickness. They highlighted the power of financial variables in the prediction of financial distress. The variation in working capital and imbalances in bank borrowings are also very useful indicators of health of a unit. The uncontrolled swings can provide vital information to the banker and also to the management if they monitor it and
are keen to find reasons for it. However, such data can be obtained only from commercial banks of the units concerned or by other lending agencies.

National Council of Applied Economic Research (1979) used a sample of 81 sick and 81 non sick companies, tested 25 financial ratios, and constructed separate models for cement, cotton textile, jute and engineering industries. The model could predict sickness with overall ninety percent accuracy one year prior to sickness.

Industrial Credit and Investment corporation of India (ICICI) has developed a default prediction model which is mainly used for evaluating a firm before granting a loan. This discriminant function model with 'Z' scores classify firms into bad and good based on their profitability and future cash flows. The model used financial variables such as Net worth to Total assets, Retained earnings to Total assets, Working capital to total assets, Profit before interest and taxes to total debt plus net worth.

Jayatu Sen Choudhury (1999) has compared the Altman model (1968), the Standard and Poor model, and argued that ICICI model is superior in discriminating the firms into distress and non distress on the basis of their future earnings and their ability to service the interest commitments. Rasheed (1997) noted that the most statistically significant results in predicting bankruptcy have been produced by multivariate models.

Dutta and Shekar (1988), applied a new technique of artificial intelligence system for assessing financial health of a firm known as neural network method. This method can also be used to predict the trend in stock prices. Balasubramaniam (1990) Artificial intelligence system for assessing financial health and firm classification has been developed
in the recent times. A neural-network computing system has been offered as a solution to the classification of distress and non distress. In India it is yet to gain momentum though some private banks have started considering this tool to identify the impending sickness in corporates. Recent studies include those of Bell, et al. (1990), Hansen & Messier (1991), Chung & Tam (1992), Liang, et al. (1992), Tam & Kiang (1992), Coats & Fant (1993), Boritz, et al. (1995), and Etheridge & Siriam (1995 and 1997).

2.4 LITERATURE ON RESTRUCTURING OF DISTRESSED COMPANIES

In the context of liberalization and globalization of economy, introduction of new legislations and political changes, compel the corporate world to adapt to the new environment. Corporate restructuring has become an important means for achieving this objective. Since 1980, U.S. public companies with more than trillion dollars in assets have filed for chapter 11 bankruptcy or restructured their debt out of court. Over the same period nearly 400 companies have spun off businesses with a combined equity capitalization of more than $200 billion. Approximately 10 million employees have been laid off in the US under corporate down sizing programs. The “reach” of corporate restructuring is far greater than these statistics simply when one considers the web of relationships between restructured companies and their consumers, suppliers, and competitors. Through its impact on market values, restructuring impacts literally millions of investors, lenders, and shareholders who provide capital to these firms. The scope of corporate restructuring has also become increasingly global, as heightened competition in international product, capital, and labour markets put tremendous pressure on companies worldwide to increase their competitiveness and maximize their market value. Though this figure is relatively small for India, when compared to the above statistics, considering the
size of industries they are significant. In the last fifteen years nearly 4000 BIFR cases filed and of this only 600 cases have been recommended for restructuring, that is only 15 percent of cases were restructured and there is a vast scope to concentrate in this hitherto neglected area.

The different restructuring measures taken by companies in reaction to a performance decline can be divided into five broad categories namely operational restructuring, asset restructuring, managerial restructuring, financial restructuring and mergers. Operational restructuring is normally performed through cost rationalization or reduction, employee layoff, integration of business units and closing of business units. Asset restructuring takes the form of sale of assets or subsidiaries or new acquisition. Financial restructuring is done through debt restructuring, dividend cut or fresh equity issue. Managerial restructuring is widely used either by changing the CEO and top management or correctly revamping the board. Merger is yet another widely used restructuring in which the company either merges with another large company in the same field or with a cash rich company, which can infuse capital. Lee *et al.*, (1998), Kang and Shivdasani, (1997), Lai and Sudarsanam (1997), Ofek (1993) have examined different categories of restructuring followed by companies in UK, Canada, Japan and US. These studies observe restructuring of assets is widely used in corporate restructuring followed by operational and financial restructuring. Among various methods of restructuring of assets, sale of assets or subsidiaries and acquisition are widely used the companies in these countries. Restructuring of distressed firms by way of take over, or merger and acquisition with a healthy firm have been analysed as a part of this study. In contrast to the general belief, Hogarty (1970), Sherer (1980), drawn a conclusion that mergers do

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not increase profitability. However for a sick company mergers and acquisition mode of restructuring proves to be successful in Indian context. Section 72(A) of Income Tax Act in India has provided that when a healthy firm acquires a sick firm, the accumulated losses of the distressed firm can be written off against the profits of the healthy firm. This results in substantial tax savings for a healthy firm. It is a common form of restructuring of sick firms. Restructuring involves turnaround of financially distressed or sick firms by rectifying organizational and managerial shortcomings. According to Mathew (1996) restructuring is a set of articulated actions taken by firm to restore competitiveness that has eroded substantially. These measures are taken in response to changes in the firm environment, competition and technology. Stewart and Glassman (1999) based on review of 300 financial restructuring found that in vace majority of cases, corporate restructuring have led to sustained increases in both market values and operating performance. Several other studies also point out value creation through restructuring activities Schipper and Smith (1983) and Hite and Owers (1983) document that spin-off transaction on an average increase aggregate shareholder wealth. Robbin and Pearce (1992) identify two types of restructuring strategies (a) efficiency driven with belt tightening and streamlining of operation and (b) competitive strategy oriented with changes in technology, products or markets. Chatterjee, Dhillon, and. Ramirez (1996) analyzed the choices in restructuring methods and hypothesized that a firm's initial attempt to restructuring depends on the degree of firm's leverage, the severity of the liquidity problem, the creditors coordination crisis, and the magnitude of the firm economic distress. Some of the commonly used restructuring strategies are sale of obsolete assets or unprofitable division (Marshall, 1988) and tying up with another cash rich company (Reid, 1988). Khandwala (1992) made an analysis of 65 published turnaround cases and found domain initiative, cost reduction and top management changes are same of the universal activities in the restructuring process.
Edith Hotchkiss (1994) emphasizes that continuation of existing management affects the successful restructuring and a change in management will increase the probability of a positive net worth. Restructuring is used to mean the process of developing a financial structure that will provide a basis for revival.

SUMMARY

This chapter reviewed the literature on financial distress and the prediction models advocated by various authors. On the Causes of industrial sickness, studies have broadly classified the causes as internal and external to firm. External causes are macro economic changes, liberalisation, internal and external competition, technology development and tight financial market conditions. Bankruptcy or sickness prediction models were pioneered by Baver’s (1966) univariate test and Altman’s (1968) multivariate discriminant analysis. These articles highlight the ability of financial variables in predicting sickness in a corporate. Since then, the prediction of corporate failure has been a topic of much relevant and interest. Recent studies have extended this line of research in three areas, definition of bankruptcy or sickness as used in India, statistical techniques, and a greater variety of explanatory variables. Ohlson (1980) used logit and probit analysis to estimate the probability of bankruptcy. The estimation bias resulting from over sampling, such as weights based on prior probabilities in the optimal cut off point, are discussed in Zmijewaski (1984). The problems of pooling data due to small number of samples are addressed in Zavgren (1983).

The aforementioned studies imply a definite potential of ratios as predictors of bankruptcy. In general, ratios measuring profitability, liquidity, and solvency prevailed as the most significant indicators. The order of their importance varies since almost every study cited a different ratio as being the effective indication of impending problems.
Table 2.1

FINANCIAL RATIOS FOUND TO BE USEFUL IN SOME PREVIOUS BANKRUPTCY PREDICTION STUDIES

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1. Cash/Current Liabilities</td>
<td>E, D</td>
</tr>
<tr>
<td>R2. Cash Flow/Current Liabilities</td>
<td>E</td>
</tr>
<tr>
<td>R3. Cash Flow/Total Assets</td>
<td>E+M</td>
</tr>
<tr>
<td>R4. Cash Flow/Total Debt</td>
<td>Bl, B, D</td>
</tr>
<tr>
<td>R5. Cash/Net Sales</td>
<td>D</td>
</tr>
<tr>
<td>R6. Cash/Total Assets</td>
<td>D</td>
</tr>
<tr>
<td>R7. Current Assets/Current Liabilities</td>
<td>M, B, D, A+H+N</td>
</tr>
<tr>
<td>R8. Current Assets/Net Sales</td>
<td>D</td>
</tr>
<tr>
<td>R9. Current Assets/Total Assets</td>
<td>D</td>
</tr>
<tr>
<td>R10. Current Liabilities/Equity</td>
<td>E</td>
</tr>
<tr>
<td>R11. Ebit/Total Interest Payments</td>
<td>A+H+N</td>
</tr>
<tr>
<td>R12. Equity/Net Sales</td>
<td>R+F, E</td>
</tr>
<tr>
<td>R13. Inventory/Net Sales</td>
<td>E</td>
</tr>
<tr>
<td>R14. Long-term Debt/Net Capital</td>
<td>E+M</td>
</tr>
<tr>
<td>R15. MV of Equity/Book Value of Debt</td>
<td>A</td>
</tr>
<tr>
<td>R16. Net Income/Total Assets</td>
<td>B, D</td>
</tr>
<tr>
<td>R17. Net Quick Assets/Inventory</td>
<td>Bl</td>
</tr>
<tr>
<td>Ratio</td>
<td>Study</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>R18. Net Sales/Total Assets</td>
<td>R+F, A</td>
</tr>
<tr>
<td>R19. Net Worth/Total Liabilities</td>
<td>Bl</td>
</tr>
<tr>
<td>R20. Operating Income/Total Assets</td>
<td>A, T</td>
</tr>
<tr>
<td>R21. Quick Assets/Current Liabilities</td>
<td>D</td>
</tr>
<tr>
<td>R22. Quick Assets/Net Sales</td>
<td>D</td>
</tr>
<tr>
<td>R23. Quick Assets/Total Assets</td>
<td>D, T,</td>
</tr>
<tr>
<td>R24. Rate of Return to Common Stock</td>
<td>Bl</td>
</tr>
<tr>
<td>R25. Retained Earnings/Total Assets</td>
<td>A,</td>
</tr>
<tr>
<td>R26. Total Debt/Equity</td>
<td>S</td>
</tr>
<tr>
<td>R27. Total Debt/Total Assets</td>
<td>B, D</td>
</tr>
<tr>
<td>R28. Total Liabilities/Net Capital Emp</td>
<td>T</td>
</tr>
<tr>
<td>R29. Working Capital/Net Sales</td>
<td>E, D</td>
</tr>
<tr>
<td>R30. Working Capital/Net Worth</td>
<td>T</td>
</tr>
<tr>
<td>R31. Working Capital/Total Assets</td>
<td>W+S, M, B, A, D</td>
</tr>
<tr>
<td>R32. Ebit/Total Assets</td>
<td>A</td>
</tr>
</tbody>
</table>

Table 2.1 (A)
List of Various Studies on Distress Prediction

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Type and Number of Firms</th>
<th>Period</th>
<th>Matching</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaver</td>
<td>1966</td>
<td>79 Failed and 79 Non Failed Industrials</td>
<td>------------</td>
<td>Industry Asset Size (cash flow concept)</td>
<td>USA</td>
</tr>
<tr>
<td>Allman</td>
<td>1968</td>
<td>33 Bankrupt and 33 non Bankrupt Firms</td>
<td>1946-1965</td>
<td>Industry Asset Size</td>
<td>USA</td>
</tr>
<tr>
<td>Deakin</td>
<td>1972</td>
<td>32 Failed and 32 Non Failed Industries</td>
<td>1964-1970</td>
<td>Non-Failed Firms selected Randomly</td>
<td>USA</td>
</tr>
<tr>
<td>Edmister</td>
<td>1972</td>
<td>42 Failed and 42 Non Failed small business Loans</td>
<td>1958-1965</td>
<td>no (cash flow frame work)</td>
<td>USA</td>
</tr>
<tr>
<td>Blum</td>
<td>1974</td>
<td>115 Failed (With a minimum of $1m debt) &amp; 115 Non-Failed</td>
<td>1954-1968</td>
<td>Industry Sales, Employees and Fiscal Year</td>
<td>USA</td>
</tr>
<tr>
<td>Altman et.al</td>
<td>1977</td>
<td>53 Bankrupt and 58 Non Bankrupt Manufacturers</td>
<td>1969-1975</td>
<td>Industry and Year of Data (ZETA Model)</td>
<td>USA</td>
</tr>
<tr>
<td>Deakin</td>
<td>1977</td>
<td>63 Bankrupt and 80 Non Bankrupt Industrials</td>
<td>1966-1971</td>
<td>Non Failed Failed Firms selected randomly</td>
<td>USA</td>
</tr>
<tr>
<td>Taffler and</td>
<td>1977</td>
<td>46 Failed and 46 Non Failed Firms</td>
<td>1975-78</td>
<td>Size and Industry</td>
<td>UK</td>
</tr>
<tr>
<td>Tisshaw</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Kaveri</td>
<td>1978</td>
<td>40 Good, 40 Irregular and 20 small scale industries</td>
<td>1965-1973</td>
<td>Industry, size and age</td>
<td>India</td>
</tr>
<tr>
<td>L.C.Gupta</td>
<td>1979</td>
<td>20 Sick and 20 Non Sick Textile Companies</td>
<td>1962-1974</td>
<td>Product, age, size</td>
<td>India</td>
</tr>
<tr>
<td>Ohlson</td>
<td>1980</td>
<td>105 Bankrupt and 2085 Non Bankrupt Industrials</td>
<td>1970-1976</td>
<td>Logit regression analysis</td>
<td>USA</td>
</tr>
<tr>
<td>Taffler</td>
<td>1983</td>
<td>22 Failed and 49 Distinct Healthy enterprises</td>
<td>1969-1976</td>
<td>Asset size</td>
<td>UK</td>
</tr>
<tr>
<td>Name</td>
<td>Year</td>
<td>Type and Number of Firms</td>
<td>Period</td>
<td>Matching</td>
<td>Country</td>
</tr>
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<td>---------------------------</td>
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<td>---------------------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Fanning &amp; Cogger</td>
<td>1994</td>
<td>115 Failed and 190 good firms</td>
<td></td>
<td>Artificial Neural Network analysis compared with Logit analysis</td>
<td></td>
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<tr>
<td>Cindy Yoshika Shirata</td>
<td>1998</td>
<td>686 Bankrupt and 300 Non-Bankrupt Firms</td>
<td>1986-1996</td>
<td>Systematic Sampling and MDA analysis</td>
<td>Japan</td>
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<tr>
<td>Aekkachai Nittayagasetwat</td>
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<tr>
<td>Laitinen &amp; Teija Laitinen</td>
<td>2000</td>
<td>200 Bankrupt and 200 non bankrupt companies</td>
<td>1985-1993</td>
<td>Industry size, asset base</td>
<td>Finland</td>
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<tr>
<td>Edward I. Altman</td>
<td>2000</td>
<td></td>
<td></td>
<td>ZETA Validity Analysis</td>
<td>USA</td>
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<tr>
<td>Lubomir Lizal</td>
<td>2002</td>
<td>227 Firms</td>
<td>1993-1999</td>
<td></td>
<td>Czech Republic</td>
</tr>
<tr>
<td>Suzan Hol, Sjur Westgaard</td>
<td>2002</td>
<td>149 Bankrupt companies and 1394 Non Bankrupt firms</td>
<td>1995-2000</td>
<td>Norwegian companies</td>
<td>Norway</td>
</tr>
</tbody>
</table>
REFERENCES


