CHAPTER – II

REVIEW OF LITERATURE

2.1 INTRODUCTION

Cash flow may be viewed as the lifeblood of a corporation and the essence of its very existence. Numerous empirical studies that use financial and accounting measures to predict business performance (i.e., success or failure) emphasise the importance of cash flow information in predicting bankrupt and non-bankrupt companies (Bernard and Stober, 1989; Gentry, 1984 and 1985; Barniv, 1990; Carslaw and Mills, 1991). Most of those studies conclude that the level of cash inflows and outflows from various activities are highly interrelated. A failure of any part of the system to operate may endanger or cause the entire firm to fail. The primary objective of this study is to assess the usefulness of cash flow information as required by Statement of Financial Accounting Standards No. 95 (SFAS 95) in the prediction of Bankruptcy, and whether cash flow data provide a superior prediction of business failure over the models employing conventional accrual accounting data. The business failure criterion was used for two reasons: (1) Business failure or success has been casually linked to the volume of net cash inflow and outflow components from various activities. For example, the inability of a company to generate
enough cash from its operations may force the company to borrow more money or to dispose of its capital investments to meet its obligations. If this situation persists over an expected period of time, it may lead to an involuntary bankruptcy. (2) This criterion, which is empirically testable, has been successfully used for investigating the usefulness of accounting information in other studies. A second objective of this study is to present a set of ratios derived from cash flow data and to highlight their potential use in financial analysis and prediction of business failure in a superior manner than financial ratios.

The motivation for this study came from two important developments in the business world:

1) the multitude of business failures across all types of business and
2) the emphasise placed on cash flow information by the Financial Accounting Standards Board on SFAS 95.

2.1.1 Could the use of cash flow data help predict business failure and thus help prevent business failure?

Numerous studies show that financial ratios based accrual accounting data possess significant ability to predict bankruptcy (Altman and Spivack, 1983; Beaver, 1966, 1968; Libby, 1975; Ohlson, 1980). Most of these studies concluded that companies with weak and unstable financial ratios are more likely to fail than those companies with stronger and more stable
financial ratios. However, these models did not emphasise the importance of cash flow data. An ideal approach is probably an integrated one, such as the approach suggested in this study. This study provides evidence on the usefulness of cash flow data in the prediction of business failure and whether the integration of cash flow data with accrual accounting data can provide a superior measure over accrual accounting data alone for predicting bankruptcy. It is to be noted that this present study does not suggest overlooking the earlier predictive methods, rather it addresses whether cash flow information can complement the information already provided by accrual accounting data.

This Chapter presents the thrust of the studies, made by researchers in the same area related to cash flow information and its usefulness in predicting business failure. It also analyses the usage of MDA as a statistical tool to build a model for predicting bankruptcy / financial distress at an early stage. This type of study is totally new to Indian environment whereas it is not new in other developed countries.

2.1.2 Ratios as predictors of corporate distress

Past studies indicate that one of the ways to identify corporate distress is through ratios. Ratios are a great source of identification of financial distress. The past studies indicate that there has been a tremendous change
over years and the authors / researchers have agreed that cash flow ratios are better predictors of financial distress than financial ratios which make the study more relevant. The past literature related to accrual concept, corporate distress and financial and cash flow ratios have been reviewed and presented in this chapter of the study.

2.2 ACCRUAL CONCEPT

- Sorter, Ingberman & Maximon (1990) suggested that allocation is the accounting process of assigning or distributing an amount based on a plan or formula. Some assets and liabilities will be allocated to expenses and revenues based on the length of time. Amortisation and depreciation mean the systematic reduction of an accounting amount related to the utilisation of long-lived assets or non-current assets, in order to allocate the costs of these assets to the time periods in which the asset is utilized.

- Trotman & Gibbins (1998) said that under the revenue recognition principle, companies recognise revenue when they have performed all, or a substantial portion of services that have to be rendered, and cash receipts from the transaction are reasonably certain, and under the matching principle, companies recognise all expenses associated with revenues in the same period in which the revenues have been
recognised. In addition, accrual accounting merges the concepts of allocation, amortisation, and realization.

- **IASC (2000)** The accrual concept recognises assets, liabilities, revenues and expenses to record the trade transactions, including cash and credit transactions. An asset refers to a resource that belongs to the company as a result of past financial transactions.

- **Henderson & Peirson (2000)** said that assets represent future benefits including cash that is expected in the future. They can be divided into two categories according to their longevity, current and non-current assets. In addition to cash, current assets include accounts receivable, inventories, prepayments and other assets that will be converted into cash within twelve months of the reporting date. In contrast, non-current assets refer to assets that will not be converted into cash within next twelve months after the end of the financial year, such as land and buildings, plant and equipment and intangible assets, including goodwill. A liability refers to a present obligation of a company as a result of past financial transactions and which the company is expected to pay for in cash, or other economic benefits in
the future. Liabilities can also be categorised into current and non-current.

- Kimmel, Weygandt & Kieso (2000)\(^9\) studied that Current liabilities include accounts payable, short-term debt and other liabilities that will be paid within one year, while non-current liabilities include long-term debts that will not be paid within the next twelve months.

- Godfrey, Hodgson & Holmes (2003)\(^9\) shared that accrual accounting involves concepts of historical cost and matching revenue to expenses. Assets or liabilities are recorded under the basis of historical cost. That is, the value of the assets of a company is measured by using their original acquisition cost, from which is deducted a proportion of this cost in the form of amortisation or depreciation. Additionally, recognition of revenue and expenses is based on a matching concept.

2.3 CORPORATE DISTRESS / FINANCIAL DISTRESS

- The Bureau of Business Research (BBR) (1930)\(^10\) published a bulletin with results of a study of ratios of failing industrial companies. The study analyzed 24 ratios of 29 firms to determine common characteristics of failing companies. Average ratios were
developed based on the ratios of the 29 firms. The ratios of each firm were then compared with the average ratios to show that the failing companies displayed certain similar characteristics or trends. The study found eight ratios that were considered to be good indicators of the “growing weakness” of a firm. These ratios were Working Capital to Total Assets, Surplus and Reserves to Total Assets, Net Worth to Fixed Assets, Fixed Assets to Total Assets, the Current Ratio, Net Worth to Total Assets, Sales to Total Assets, and Cash to Total Assets. BBR also reported that the Working Capital to Total Assets ratio appeared to be a more valuable indicator than the Current Ratio, despite the fact both were found to be good indicators of weakness.

- **Fitz Patrick (1932)**\(^\text{11}\) compared 13 ratios of failed and successful companies (19 of each category companies). He found that, in the overwhelming majority of cases, the successful companies displayed favorable ratios while the failed companies had unfavorable ratios when compared with “standard” ratios and ratio trends. He reported that two significant ratios were Net Worth to Debt and Net Profit to Net Worth. Also, Fitz Patrick suggested that less importance should be placed on the Current Ratio and Quick Ratio for companies with long-term liabilities.
Smith and Winakor (1935)\textsuperscript{12} analyzed ratios of 183 failed firms from a variety of industries in a follow-up study to the BBR’s 1930 publication. They found that Working Capital to Total Assets was a far better predictor of financial problems than both Cash to Total Assets and the Current Ratio. They also found that the Current Assets to Total Assets ratio dropped as the firm approached bankruptcy.

Merwin (1942)\textsuperscript{13} published the findings of his study focusing on small manufacturers. He reported that when comparing successful with failing firms, the failing firms displayed signs of weakness as early as four or five years before failure. Also, Merwin found three ratios that were significant indicators of business failure – Net Working Capital to Total Assets, the Current Ratio, and Net Worth to Total Debt.

Chudson (1945)\textsuperscript{14} studied patterns of financial structure in an effort to be significant to the development of bankruptcy prediction models. For example, Chudson’s findings indicate that models developed for general application across industries may not be as appropriate as industry-specific models.

Jackendoff (1962)\textsuperscript{15} compared the ratios of profitable and unprofitable firms. He reported that the following two ratios are
higher for profitable firms than for unprofitable firms: the Current Ratio and Net Working Capital to Total Assets. Also, profitable firms had lower Debt-to-Worth ratios than unprofitable firms.

- **Ohlson (1980)**[^16] found that firm size was a significant negative predictor of bankruptcy, as bankrupt firms tend to be smaller than non-bankrupt entities. One point of concern raised by Ohlson was that if one employs predictors derived from statements that were released after the date of bankruptcy, then the evidence indicates that it will be easier to predict failure.

- **Scott (1981)**[^17] opined that although there were quite a number of possible financial variables available to predict bankruptcy, researchers were neither guided nor constrained by the theory for the selection of ratios.

- **Viscione (1985)**[^18] argued that cash flow from operations could be misleading because of management’s manipulation of the timing of cash flows, such as not paying bills on time or reducing inventory below desired levels. These maneuvers increase the measure of cash flows from operations reported in the income statement. Such an increase is probably not a good sign, and these distortions arise most often from companies experiencing financial distress.

[^16]: Ohlson (1980)
[^17]: Scott (1981)
[^18]: Viscione (1985)
• **Platt and Platt (1990)**\(^1^9\) recommended that industry-relative ratios should be used in lieu of the absolute financial ratios for the purpose of model development. The authors contended that such a consideration would produce better classification rates as the industry-relative ratios help stabilize the predictive ability of the model.

• **Piesse and Wood (1992)**\(^2^0\) examined the existing MDA models. The study evaluated an independent sample of 261 companies conducting tests using both ex-post and ex-ante approaches. This study showed that the ex-post criterion yielded a high rate of misclassification.

• **Altman (1993)**\(^2^1\) did not embrace the industry-relative ratio concept for the purpose at hand because of the time lag in obtaining the industry relative data. He noted that ratios measuring profitability, liquidity, solvency and cash flow were the most significant indicators of bankruptcy.

• **Watson, (1996)**\(^2^2\) said that regarding the use of cash flows to predict corporate bankruptcy, the common view is that cash flow information does not contain any significant incremental information over the accrual accounting information to discriminate between bankrupt and non-bankrupt enterprises.
• McGurr and DeVaney (1998) have in fact recommended “…that future failure studies use single industry samples to enhance their predictive accuracy” evaluated the effectiveness of five well-known models developed with the mixed industry data in classifying bankruptcy for a sample of retail firms. The findings confirmed the authors’ assertion in that the generic models are likely to be less successful in discriminating between bankrupt and non bankrupt firms from the retail industry, as compared to the classification results reported for the mixed industry samples in the original studies. They concluded that “… mixed industry failure prediction models appear to have a limited usefulness in a review of retail firm’s financial health due to the effect of industry, population, and time biases”.

• Shirata (1998) opined that regardless of bankruptcy prediction model’s disadvantages or shortcomings, the idea of developing such models to attempt to predict financial distress and failure has been welcomed around the globe. For example, previous empirical studies using financial ratios as predictors of corporate bankruptcy have been conducted in Japan. However, due to the limited sample size, the results are not general. The Japanese study proposed an universal
model that accurately predicts 86% of bankrupt companies, independent of industry type and its size.

- **Lennox (1999)**\(^{25}\) utilised cash flow ratios, specifically cash to current liabilities, debtor turnover ratio and gross cash flow ratio to explain bankruptcy in the UK.

- **Grice Sr., John Stephen (2000)**\(^{26}\) suggested that bankruptcy prediction models may help auditors to judge companies’ abilities to continue as a going-concern by alerting them to certain problems that may be difficult to detect using traditional auditing procedures”.

- In Korea, **Nam and Jinn (2000)**\(^{27}\) stated that financial expenses to sales, debt coverage and receivables turnover were important to explain bankruptcy.

- **Shumway’s bankruptcy prediction model (2001)**\(^{28}\) successfully illustrated the benefits of teaming financial statement based ratio variables with the market driven variables for the purposes of predicting bankruptcy. The two market variables in the study exhibited strong segregating ability along with the two financial ratios, while displaying low correlations among variables. Shumway’s model reported higher prediction accuracy one year before bankruptcy.
for a holdout sample, as compared to the benchmark models, which are solely based on financial statement ratios.

- **Mohamed, Li and Sanda (2001)**\(^{29}\) found that the leverage ratio and efficiency ratio (total asset turnover) were found to be significant during the period 1987 to 1997. Mohamed et al. (2001) combined both the MDA and logit models.

- In another study by **Zulkarnain et al. (2001)**\(^{30}\) that concentrated on the MDA model, it was found that total liabilities to total assets, sales to current assets, and cash to current liabilities and market value to debt were significant in explaining financial distress in Malaysia during the period 1980 to 1996.

- **Sharma (2001)**\(^{31}\) expressed that there is an opinion that cash flow from operations has not been properly measured, that some researchers did not validate their model that cash flows and accrual data were highly correlated in the earlier days, and that incomplete information does not allow for study replication. These reasons and additional evidence are used to regard the significance and predictive ability of cash flows for financially distressed companies.
Grice & Dugan (2001)\(^{32}\) said that bankruptcy prediction models deal with potential problems associated with models inappropriately applied. This could be the case when statistical models derived for a certain time period, industries, and financial distress situations are applied to situations other than those originally developed for. It is found that these models are sensitive to time periods. This means that the accuracy of the model declines when they are applied to time periods different from those used to develop and build the model. Furthermore, while Ohlson’s model was sensitive to industry classification, Zmijewski’s model was not. However, neither model is sensitive to financial distress situations other than those used to develop the models. Therefore, it is not only necessary to understand the uses of prediction models, but to comprehend their limitations as well.

Steve R. Letza, Łukasz Kalupa, Tadeusz Kowalski (2003)\(^{33}\) The aim of their paper is to present how multi-discriminant models (MDA) perform in practice and to measure these models’ effectiveness in bankruptcy prediction. For this purpose an ex-ante approach is adopted to emulate the way in which the models are used in practice. Thus two commercially applied models, Altman’s and Data stream’s,
are presented and examined on independent samples of companies. The findings are that these two models have a very similar predictive ability and that the prior probability of failure is an important feature in determining this ability. The general conclusion of the paper is that the use of MDA models as predictors of bankruptcy can involve major understatement of classification errors. Therefore the robustness of these models as well as the acceptability of using the models as the sole means of assessing potential bankruptcy of companies could be doubtful. The paper fills a gap in the literature on independent testing of the developed MDA models. They stressed the importance of shifting the threshold and consequently they showed the impact of choice of the threshold in a practical setting.

- **Kamath (2005)** attempted to test the McGurr and DeVaney contention with an improved methodology using re-estimated generic models to predict bankruptcy for a holdout sample of firms belonging to the Equipment and Machinery Manufacturing (EMM) industry. The empirical findings showed that the models performed marginally better for a holdout sample of firms from the EMM industry than for the mixed industry holdout sample, up to three years prior to bankruptcy, and thereby contradicted the commonly held view.
- **Yihong He, Ravindra Kamath (2006)** in their paper, investigated whether generic bankruptcy prediction models can maintain their validity when applied to firms from an individual industry, namely, the retail industry. The literature suggests that the classification accuracy of generic models is reduced considerably when they are applied to samples drawn from an individual industry. Their study re-estimates two generic bankruptcy prediction models, one by Ohlson (1980) and one by Shumway (2001), with a mixed industry sample of 354 over-the-counter (OTC) traded small firms during the 1990s. Given the limited sample size for the retail industry, both models are validated with an ex post classification test by reclassifying the sample used to estimate the models.

- **Li-Chiu Chi, Tseng-Chung Tang (2006)** said that to date, relatively little empirical research has been conducted on the efficacy of the trade credit risk prediction model in the context of international trade applications. Using a sample of listed firms in seven Asia-Pacific capital markets (Hong Kong, Japan, Korea, Malaysia, Singapore, Thailand, and the Philippines) from 2001 to 2003 with available data, they have made a preliminary attempt at empirically studying a predictive export credit risk model based on financial
ratios, firm-specific characteristics (size, maturity, R&D expenses, and depreciation expenses), and country risk measures. The results show that the Logit models demonstrate decent classification accuracy and robustness. Specifically, the predictive ability is approximately equal to classification ability when the model is applied to a testing sample. Furthermore, the results indicate that the closer the analysis is to the credit crisis occurrence, the more improved the classification accuracy and prediction accuracy.

- **Jodi L. Bellovary, Don E. Giacomino and Michael D. Akers (2007)** opined that the most well-known bankruptcy prediction model is the one that was developed by Altman [1968] using multivariate discriminant analysis. Since Altman’s model, a multitude of bankruptcy prediction models have flooded the literature. The primary goal of their paper is to summarize and analyze existing research on bankruptcy prediction studies in order to facilitate more productive future research in this area. This paper traces the literature on bankruptcy prediction from the 1930’s, when studies focused on the use of simple ratio analysis to predict future bankruptcy, to present. The authors discuss how bankruptcy prediction studies have evolved, highlighting the different methods, number and variety of factors, and
specific uses of models. Analysis of 165 bankruptcy prediction studies published from 1965 to present reveals trends in model development. For example, discriminant analysis was the primary method used to develop models in the 1960’s and 1970’s. Investigation of model type by decade shows that the primary method began to shift to logit analysis and neural networks in the 1980’s and 1990’s. The number of factors utilized in models is also analyzed by decade, showing that the average has varied over time but remains around 10 overall. Analysis of accuracy of the models suggests that multivariate discriminant analysis and neural networks are the most promising methods for bankruptcy prediction models. The findings also suggest that higher model accuracy is not guaranteed with a greater number of factors. Some models with two factors are just as capable of accurate prediction as models with 21 factors.

2.4 FINANCIAL AND CASH FLOW RATIOS

- **William H. Beaver (1966)** studied that the usefulness of ratios can only be tested with regard to some particular purpose. The purpose chosen here was the prediction of failure, since ratios are currently in widespread use as predictors of failure. This is not the only possible use of ratios but is a starting point from which to build an empirical
verification of ratio analysis. The data exhibit a remarkable degree of consistency among themselves and with previous studies. Subject to the reservations that must accompany inferences drawn from this study, the evidence indicates that ratio analysis can be useful in the prediction of failure for at least five years before failure. Beaver was the first to recognise the importance of operating cash flow as a predictor of financial distress. Four cash flow ratios were included in a financial analysis that concluded that the ability to predict failure was the strongest in the cash flow model.

- **Edward I. Altman (1968)**[^39] made an attempt on the assessment of the quality of ratio analysis as an analytical technique. The prediction of corporate bankruptcy is used as an illustrative case. Specifically, a set of financial and economic ratios will be investigated in a bankruptcy prediction context wherein a multiple discriminant statistical methodology is employed. The data used in the study are limited to manufacturing corporations. It reviews empirical results obtained from the initial sample and several secondary samples, the latter being selected to examine the reliability of the discriminant model as a predictive technique. The discriminant-ratio model appears to have the potential to ease this problem.

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• Edward B. Deakin (1972)\(^{40}\) had a purpose in his study to propose an alternative model for predicting failure. It is concluded that the discriminant classification is sufficiently robust to be used for distributions of financial data.

• Edward 1. Altman and Thomas P. Mc Gough (1974)\(^{41}\) analysed the purpose to develop criteria to aid the auditor in identifying situations where the status of a company as a going concern is in doubt by analyzing the relationship between bankrupt companies and auditors' reports prior to bankruptcy. The model described may be an effective aid to the auditor in forming his judgment. This suggestion is based on the apparent superiority of the model in signaling going-concern problems for companies that actually enter bankruptcy, and on the apparent fact those auditors' opinions usually signal going concern problems for firms which were also identified as bankruptcy prospects by the discriminant bankruptcy model.

• Marc Blum (1974)\(^{42}\) made a comparison with other studies of business failure and found that the Failing Company model predicted better than others.
• **Hawkins (1977)** found that it is merely consistent with an apparent shift in preference by many analysts to use cash flow data for assessing a firm's financial performance.

• **James. A. Ohlson (1980)** presented some empirical results of a study predicting corporate failure as evidenced by the event of bankruptcy. There are two conclusions which should be restated. First, the predictive power of any model depends upon when the information is financial based. Second, the predictive power helps to know the current status of the company.

• **Ray Ball and George Foster (1982)** said that Discriminant analysis based models have the potential to provide improvements in several areas over existing procedures used in such contexts; for example, they can process information quicker and at a lower cost.

• **Lee (1982)** showed that the failure of Laker Airways could also have been predicted by evaluating its cash flow. Lee evaluated the financial statements of Laker Airways to provide a summary of the entity’s profitability and cash flow. It showed that it was the cash flow, or its lack thereof, that caused the demise of Laker Airways. In 1976, the entity contributed 100% of cash flow from operations. This figure fell to 25% in 1980. Borrowings increased and 47% of cash
outflow was used to repay borrowings in 1976. In 1980, 74% of cash inflow was received from net borrowings. Lee stressed the fact that no entity can survive if it cannot contribute to the majority of cash inflow needed to pay for capital investments, taxation, dividends and repayment of borrowings.

- **Griffin (1982)** 47 found that historical operating cash flows enable better assessments of future cash flows, however, it is based on intuition rather than on empirical evidence.

- **Gomboia and Ketz (1983)** 48 found that cash flow ratios contain certain information not revealed by other financial ratios. They said that the ratios based on operating cash flow load on a separate statistical factor, suggesting that operating cash flow variables may be useful in descriptive and predictive studies involving financial ratios.

- **Edward I. Altman and Joseph Spivack (1983)** 49 said that both the Zeta® model of bankruptcy classification and the Value Line Relative Financial Strength System classify public corporations according to characteristics of financial health. Zeta® uses financial variables to discriminate between bankrupt and non-bankrupt firms, whereas Value Line relates similar types of variables to the observed yields of outstanding debt securities. Despite these differences, a comparison of
the two systems reveals that Value Line's scores exhibit a high correlation with Zeta® scores, which have been shown to discriminate well between bankrupt and non bankrupt firms. Both systems' scores also correlate well with published bond ratings.

- **Casey and Bartczak (1984)** attempted to demonstrate that the current emphasis on cash flow reporting is unwarranted. They maintain that not only is cash flow a poor predictor of financial distress, but it also fails to even marginally improve a ratio-based model's predictive value. They also report that cash-flow-based (CFB) models misclassify non bankrupt firms at a higher rate than do ratio based model.

- **Mark E. Zmijewski (1984)** examined conceptually and empirically two estimation biases which can result when financial distress models are estimated on non-random samples. Estimation techniques do not appear to provide different qualitative results from the results provided by techniques that assume random sampling. Only the individual group error rates are significantly affected.

- **Cornelius Casey and Norman Bartczak (1985)** conducted a study to assess whether operating cash flow data and related measures lead to more accurate predictions of bankrupt and non-bankrupt firms. This
study provides evidence on whether operating cash flow data can increase the accuracy of accrual-based multiple discriminant and logit models to distinguish between bankrupt and non-bankrupt firms. Their results suggested that operating cash flow data did not provide incremental predictive power over accrual-based ratios.

- **Ezzamel et al (1987)** 53 studied the distributional properties of financial ratios of firms in textiles, retail foods and the metal industry for the period of 1980-81. Two statistical tests for normality were used; the Kolmogorov smirnov test and the shapirowilk test. They found that the results were consistent with previous research, the raw financial ratios exhibiting positive skewness except for the leverage ratio for the retail food industry.

- **So (1987)** 54 investigated the outlier and the non normal distribution. They used eleven financial ratios for ten fiscal years from 1970 to 1979. They found that the outliers are one of the factors that cause the distribution of cross sectional financial ratios to be skewed and normally distributed.

- **Karels and Prakash (1987)** 55 had an objective of investigating whether or not the financial ratios used in previous firm failure studies
satisfy the normality conditions required by the multiple discriminant analysis technique. Out of many financial ratios were tested, only nine of the ratios were found normal, and six ratios found log normal. They concluded that no matter how complicated the procedures, used it does not necessarily provide better results if the ratios used depart from the normality assumptions.

- **Giacomino and Mielke (1988)** suggested the use of cash flow statement to analyse corporate performance. Four sets of ratios were listed to provide insight into management’s cash management policies, performance and apparent priorities.

- **Ismael G. Dambolerm and Joel M. Shulman (1988)** opined that financial analysts may be able to improve their liquidity forecasts significantly by including net liquid balance indicators in their bankruptcy models. Furthermore, analysts may be able to use the net liquid balance indicator as part of their normal cash-flow projections in order to improve their insights into the ability of a firm to finance capital expansions, or growth, without impairing liquidity.

- **Bernard and Stober (1989)** observed that the stock prices react more favourably to larger cash flows than larger earnings.
• **Abdul Aziz and Gerald H. Lawson (1989)** \(^{59}\) in their study, demonstrated that operating cash flow, lender cash flow, net capital investment, and taxes paid are important variables for bankruptcy prediction. Further, their contribution to conservative lending / investing strategies is achieved without a significant loss in overall prediction accuracy when compared with the ZETA and Z models. With the cost of incorrectly classifying a potentially bankrupt firm in mind, it appears that suggestion to de-emphasize cash flows in tracking the financial health of firms would be a retrogressive step.

• **Carslaw & Mills (1991)** \(^{60}\) suggested that Cash flow information can also be useful by complementing the information already provided by accrual accounting. A set of cash flow ratios, if used in conjunction with traditional balance sheet and income statement ratios, can be valuable in determining the financial strengths and weaknesses of an entity.

• **Giacomino and Mielke (1993)** \(^{61}\) claimed that cash flow based ratios were suggested in evaluating an entity’s financial strength and profitability. One of the important uses of cash flow ratios is relative performance evaluation. Sufficiency ratios were introduced to evaluate the adequacy of cash flows for meeting an entity’s needs, and
efficiency ratios were introduced to evaluate how well an entity generates cash flows relative to other years and other entities. They also suggested developing benchmarks for each cash flow ratio in a specific industry to make the ratios more meaningful and to enable an industry to compare its performance with that of similar entities.

- **Carslaw & Mills (1993)**[^62] suggested the use of cash flow ratios as a more appropriate measure of liquidity than adjusted profit and loss account data. The latter include various provisions and deferrals that do not have any immediate impact on cash flow. Certain of the suggested ratios are currently being used by analysts that are appeared in annual company reports or have been proposed as useful in countries where cash flow statements have been prepared for some time.

- **Zeller and Stanko (1994)**[^63] suggested operating cash flow ratios to measure an entity’s ability to generate cash flow and to meet current obligations as they become due.

- **Rujoub et al. (1995)**[^64] viewed cash flow as the lifeblood of an entity and the essence of its very existence. The ratios listed by them were to be used to predict bankruptcy. They used cash flow ratios suggested by other authors and developed new ratios in their study.
• **Clark (1996)** agreed that the cash flow must be computed monthly. It is the lifeblood of an entity and by monitoring the cash flow an entity’s future growth will be guided more effectively and revenue problems may be prevented.

• **Scott (1996)** pointed out that the income statement is not a predictor of an entity’s cash situation but the cash flow statement shows what is happening with cash flow.

• **Brown (1996)** indicated that Cash flow on hand is the measure by which real estate investments are valued. When asset conditions change and more in-depth analysis is needed, cash flow results are more revealing since it is important to know where the cash flows are coming from and where are being spent or distributed.

• **Durham (1997)** indicates that the cash flow statement is one of the most important tools for planning future expenditures of non-profitable entities.

• **Zaidi (1997)** investigated the distribution of financial ratios of Malaysian listed companies in manufacturing and financial services industries during 1990 to 1995. He found that all ratios used are not normally distributed. However, after removing outliers and being transformed the distribution close to normal. Also some other ratios
were still not normally distributed even through remedial procedures have been carried out. Finally, he suggested the use of industrial average as benchmark, and non parametric test as a tool in financial ratio analysis.

- **Arif et al (1998)** examined the distributional characteristics of the financial ratios of Malaysian firms after classifying them into relevant industry groups, and inspecting the degree of informational redundancy among ratios in a particular sector. 57 firms for a period of 5 years from 1987 to 1991 were investigated using 13 financial ratios. The Kolmogorov- smirnov test was employed to investigate the approximation of normality. They found that the distribution of ratios did not conform to normal distribution, finally it was found that an informational redundancy existed between the ratios, and there were differences in the characteristics of the various industries.

- **Mossman, Bell and Swartz (1998)** found that bankruptcy will result if an entity has insufficient cash available to serve debt outflows as they become due, and the value of the entity is insufficient to obtain additional financing.
• **Mills and Yamamura (1998)**\(^{72}\) suggested cash flow ratios as a better indicator of liquidity than balance sheet and income statement information. The cash flow statement is dynamic as it records the changes in the other statements. The ratios suggested by them can be used to measure solvency, liquidity and financial health. Other ratios to measure financial viability as a going concern are net free cash flow ratios. To measure the risk involved in their investments, bondholders also use the net free cash flow ratios.

• **Joselyne Williams (2000)**\(^{73}\) had a purpose in his study to determine whether accounting numbers are able to predict financial distress within the high-tech industry. The statistical analysis or model prediction combined with historic practices of auditing is used to provide a concrete investigation of those aids in forming an opinion on the financial future of the company being audited. The prediction models have proved to be useful tools in establishing a company’s ability to continue as a going-concern.

• **Evridiki Neophytou, Andreas Charitou, Chris Charalambous (2002)**\(^{74}\) made a study with the main purpose of the development and validation of a failure classification model for UK public industrial companies using current techniques: logit analysis and Neural
Networks. The model developed, can assist managers, shareholders, financial institutions, auditors and regulatory agents in the UK to forecast financial distress. The results indicate that operating cash flows play an important role in predicting failure.

- **Zulkarnain Mohamad Sori, Mohamad Ali Abdul Hamid, Annvar Md Nassir and Shamsher Mohammed (2006)** in their study, investigated the distributional characteristics and appropriate remedial actions of selected financial ratios from failed and non failed Malaysian listed firms. The findings suggest that outlier trimming improves the normality of variable after the data transformations, and this technique is more effective on the specific industry compared to the mixed industry sector.

- **Roy Choudhury (2007)** studied on risk based financial planning to leverage. The finding are the advantages of multidimensional risk based financial planning model that includes alignment with business strategy, managing credit concentration risk, capital allocation and management, stress testing and scenario analysis, and risk adjusted performance management. The multidimensional financial planning fosters a strong understanding of the underlying risk profile and aids assessing the resilience of the financial plans.
Jooste L(2007) had an aim of the analysis to outline the general relationship between failed and non-failed entities using cash flow information derived from the cash flow statement. Income statement and balance sheet ratios are not enough to measure liquidity. An entity can have positive liquidity ratios and increasing profits, yet have serious cash flow problems. Ratios developed from the cash flow statement should supplement traditional accrual-based ratios to provide additional information on the financial strengths and weaknesses of an entity.

An analysis over the earlier studies so far shows the various aspects related to financial and cash flow ratios. Since 1960’s, the studies related to cash flow ratios and their ability to predict the financial distress of companies have been conducted in many countries, but till now, such a study is perceived to be new in India. Though, Indian Companies have been making use of cash flow ratios for financial analysis, the cash flow variables other than ‘cash flow’ have not been utilised. But, the present study makes use of cash flow ratios, constructed using many other cash flow variables to develop financial distress prediction model. In addition, it tests whether cash flow ratios are better than financial ratios in predicting the financial distress of companies in India.
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