CHAPTER 5. CONCLUSIONS, CONTRIBUTION AND SCOPE
FOR FUTURE STUDY

5.1 Summary and Conclusions

Financial distress in companies is the harbinger of profound financial losses to stakeholders in the realm of business. Non-performance by businesses leads to erosion of wealth of the investors. Lenders lose the funds given to loss making companies making them vulnerable to bankruptcy. Manufacturing sector in India is most affected. Large quantum of funds given by lending institutions to manufacturing sector has become non-performing assets. In such a state of affairs, it becomes imperative to identify the factors that can signal distress in companies. Past research have largely focused on development of bankruptcy prediction models. But financial distress precedes bankruptcy. It is important to understand the factors that announces the onset of financial distress in companies. This will enable the stakeholders to take remedial action to protect their assets before the stage of bankruptcy sets in. Factors which can signal distress can be financial and non-financial. Financial factors are the company specific factors which is the result of all the business decisions taken by the company. These factors, largely quantitative, present themselves in the form of profitability, liquidity, solvency, efficiency in operations of the business. Financial ratios can represent these factors. Non-financial factors are qualitative in nature. Quality of management, corporate governance, business climate, government policies etc. are the non-financial factors that affect a business performance. Macro-economic factors like growth in GDP, Inflation, Exchange rates, and Bank rates also affect the business. Hence the objective of this study was to identify the financial ratios that can discriminate a distressed manufacturing company from a non-distressed manufacturing company and develop a model for prediction of financial distress. An in depth and exhaustive review of existing literature in the area of corporate distress and bankruptcy was done to get an insight into the body of knowledge developed in this area. In pre 1990’s, studies focused on bankruptcy rather than distress. The
usefulness of financial ratios as distress predictors was examined. Altman (1968) developed a bankruptcy prediction model using Discriminant Analysis for manufacturing companies using 66 bankrupt and non-bankrupt US companies. Five financial ratios were identified as important predictors of bankruptcy. The model calculated ‘z’ score whose value will indicate whether a firm will become bankrupt or not. A revised model for non-manufacturing companies was also subsequently developed. The ‘z’ score model was observed to have very high accuracy level. Later, Ohlson (1980) developed a ‘o’ score model with 9 financial ratios using Logit Analysis. Zmijewski (1984) followed suit with a three factor model using Probit Analysis. All these models found acceptability however each model provided different sets of financial ratios as predictors of bankruptcy. There was no consensus as to which financial ratios are the best predictors of bankruptcy. Also the models were based on companies in US. The validity of the models across different countries, time periods and industry were not examined. Post 1990’s, studies on corporate distress incorporated more ratios. Newer methods like neural networks was increasingly used by researchers. Attention was drawn to the influence of non-financial factors and management efficiency in the bankruptcy of a company. It was observed that inclusion of non-financial factors along with financial factors improved the accuracy of models. Post 2000, the studies extended to European and Asian countries. Important observations were made. Different stages of financial distress can influence accounting variables differently. Cash flow ratios emerged as very important variable. Advanced statistical techniques like Survival Analysis, Support Vector Analysis, Wavelet Network, and Data Envelopment Analysis were adopted. Another significant development was the acceptance of influence of macro-economic factors and market measures on corporate distress. Factors like real interest rates, inflation, recession, exchange rates, Gross Domestic Product (GDP), market returns, market volatility, corporate governance were increasingly used along with financial factors in these studies. The validity and applicability of existing models were also tested. The question was “Can one model fit internationally to all data”? Altman (1968) ‘z’ score model was tested in 33 European nations. Although the model exhibited 75% accuracy, it was observed that inclusion of country specific estimates improves the accuracy of the model substantially. Ohlson (1980) ‘o’ score model and Zmijewski (1984) model was found to be sensitive to time, period and industry. Distress Prediction Models were not found to be stable across different economies. The factors unique to each country and economy has to be studied for best results. Thus it can be concluded that existing models should not be applied to
Indian companies as the results may not be conclusive. A model incorporating local conditions and factors should be developed. Research in the field of corporate distress and bankruptcy in India has not been encouraging. The studies in India focused on the application of existing models, mostly Altman (1968) model, to different sectors. Very few studies have been done to identify factors unique to Indian companies which can signal distress. Though some studies have attempted to identify factors influencing distress for specific sectors like pharma, steel etc, conclusive research validating the model is not done. The above observations highlight the need to develop a comprehensive and robust model based on Indian companies’ data so that the behaviour of Indian companies in times of distress and non-distress can be captured and important factors identified. The current study reviews and analyses financial ratios of listed manufacturing companies in India to identify the most significant factors leading to financial distress.

It is important to define financial distress through an event or a phenomenon which best describes distress in a company so that the factors leading to that event can be studied. Debt default, delisting of shares, negative cash flows, continuous losses are some of the events indicating distress in companies. For this study, financial distress is defined as the state of affairs when the company incurs losses for three consecutive years. 288 distressed listed companies from the manufacturing sector were selected through appropriate methods. Each of these companies were matched with non-distressed companies from the same industry. Eighteen financial ratios representing important aspects of the business viz profitability, efficiency in operations, working capital management and cash flows were selected for review. Along with financial ratios, five macro-economic factors were also selected. The financial ratios of the selected companies were computed from their financial statements and the macro-economic factors were derived from Government of India published data. Thus 23 factors (independent variables) were studied and analysed for 576 selected companies. Discriminant Analysis, Logistic Regression and Factor Analysis were the tools used to analyse and interpret the compiled data.

Discriminant Analysis of the data gave meaningful insights into the behaviour of distressed and non-distressed companies in India reflected through financial ratios. Eight financial ratios were observed to be significant in differentiating a distressed company and a non-distressed company. Gross Profit Margin (GPM), EBIT Margin (EBITM),
Debt–Equity (DE), Fixed Assets Turnover (FATO), Debtors Turnover (DTO), Working Capital Turnover (WCTO), Quick Ratio (QR) and Cash flow from Operation to Sales (CFOS) are the ratios which have exhibited strong discriminating ability. GPM and EBITM reflect the profitability from company’s core operations. DTO, FATO and WCTO shows the efficiency of asset and fund management. QR is a measure of liquidity whereas CFOS is a measure of effective debtors’ management and cash realisation. A company’s ability to generate profit from its core operating activities is an important indicator of its long term financial health. A high operating margin enables the company to operate with low business risks whereas a low margin makes the company susceptible to business risks and its adverse effects. The mean GPM and EBITM of distressed companies is observed to be very low in distressed company as compared to a non-distressed company. Their volatility measured by standard deviation is also very high in distressed companies. This corroborates the fact that operating margins are very critical for the survival of a company. The efficiency ratios also gives useful insight into the role of effective asset management in avoiding distress. Distressed companies exhibited a high DTO indicating slow realisation from customers as compared to non-distressed companies. A low WCTO and FATO shown by distressed companies in comparison to non–distressed companies indicates lower investment in assets both fixed and current. Assets. QR for distressed companies is very low in comparison to non-distressed companies indicating constrained availability of cash and near cash assets to meet current liabilities. Such as state of affairs leads to solvency crisis. Distressed companies also revealed a low CFOS which means low realisation of cash in relation to sales. This will again lead to liquidity crisis. The analysis clearly brings out the important factors which can discriminate a distressed company from a non-distressed company. Information about these factors can help the company’s management to devise strategies to improve these ratios. Close monitoring of these ratios can help a company mitigate or minimise distress. The ratios identified were compared with the existing models. Altman (1968) ‘z’ score model has also emphasised on EBITM as an important predictor of bankruptcy. However no similarity is observed between the other ratios in Altman’s model with that of this study. Altman’s model states Working capital to Total Assets, Retained Earnings to Total Assets and EBIT on Total Assets as the significant factors. The important discriminating ratios for Indian companies are different from that of existing model. Also the average predictive accuracy of Altman (1968) model across different economies is 75% whereas the model developed in this study has an accuracy of 82.2%. Altman (1968)
model gave the framework for predicting bankruptcy whereas the current study focuses on distress which is an event preceding bankruptcy. If distress can be identified and remedial strategies adopted, companies can turnaround itself and avoid further distress and consequent bankruptcy. Hence this study can add significant value to company’s stakeholders. The important ratios in Ohlson (1980) ‘o’ score model are Total Liabilities in relation to Total Assets, Working Capital to Total Assets, Net Income to Total Assets and Funds from Operations to Total Assets. According to Ohlson (1980) ‘o’ score model, Working capital, Net Income and Funds from Operations are important factors affecting bankruptcy. Thus Working capital Management and Funds from operations are the common factors identified in the current study. Zmijewski (1984) has incorporated only 3 factors in his model viz. leverage, net profit margin and current ratio. These ratios are not observed to be significant in Indian companies’ context. Of all the existing models available for distress prediction, Altman’s ‘z’ score model is the most widely used. However the current study is able to identify factors which are unique to Indian companies’ behaviour in the event of distress. The model developed using these factors also has a higher predictive accuracy as compared to Altman’s ‘z’ score model.

Another technique which is widely used in corporate distress studies is Logistic Regression. The current study applied Logistic Regression to the data to reaffirm the important discriminating factors revealed using Discriminant Analysis. The significant factors identified using Logistic Regression are EBIT margin (EBITM), Operating Profit to Interest (OPI), Capital to Turnover (CTO), Debtors to Turnover (DTO), Quick ratio (QR), Working Capital to Turnover (WCTA) and Cash flow from Operations to sales (CFOS). Both Discriminant Analysis and Logistic Regression identifies EBITM, DTO, WCTA, QR and CFOS as critical factors. Hence it is reiterated that operating margins, debtors management , investment in working capital and cash realisation from debtors are very important for the survival and stability of a company. The model developed was tested on the selected companies. The model correctly classified 90.1% of the selected companies thereby exhibiting strong discriminating and predictive ability. Since the model was developed and tested using data for the period 2005-2015, it was necessary to test the model with a new set of data to examine its validity over different time periods. To reaffirm the classification and predictive accuracy, the model was applied on a new data set of distressed and non-distressed companies for the year 2016. The model could
correctly predict 91% of the sample companies as distressed / non-distressed. Thus the robustness of the model in predicting distress in manufacturing companies is proved.

The data was further analysed using Factor Analysis to classify the financial ratios used into factors which can best explain the difference between distressed and non-distressed companies. Interestingly, the most significant factor which accounted for over 20% of the difference comprised of GPM, EBITM, DTO and CFOS. These ratios have also been identified by Discriminant Analysis and Logistic Regression as important discriminators. Further the first five factors which accounts for more than 60% of the difference includes WCTA and QR. Thus all the three techniques adopted points to EBITM, DTO, WCTA, CFOS and QR as very important factors critical to a company’s survival. Low EBITM + high DTO + low CFOS+ low QR + low WCTO indicates distress whereas a high EBITM + low DTO + high CFOS+ high QR + high WCTO is an indicator of a non-distressed company.

A comparison of the model developed in this study with existing models is depicted below:

(i) **Logistic regression model developed in this study**

\[
\log\left(\frac{p}{1-p}\right) = 1.253 \text{ GPM} + 25.045 \text{ EBITM} + 0.109 \text{ NPNW} + 1.794 \text{ NPTA} - 0.003 \text{ DE} + 0.068 \text{ OPI} + 0.271 \text{ DTA} + 0.028 \text{ FATO} + 0.270 \text{ CTO} - 0.135 \text{ INVTO} - 6.094 \text{ DTO} + 0.002 \text{ WCTO} - 0.281 \text{ CR} + 0.788 \text{ QR} - 1.526 \text{ WCTA} - 4.207 \text{ FATA} + 1.357 \text{ CFOTA} + 3.483 \text{ CFOS}
\]

(ii) **Altman’s ‘z’ score model**

\[
Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 0.9X5
\]

where:

(iii) **Ohlson’s ‘o’ score model**

\[
Y \text{ (log odd score)} = -1.3 - 0.4Y_1 + 6.0Y_2 - 1.4Y_3 + 0.1Y_4 - 2.5Y_5 - 1.8Y_6 + 0.3Y_7 - 1.7Y_8 - 0.5Y_9
\]

where:
- \(Y_1 = \log \text{(Total Assets/GNP price level index)}\)
- \(Y_2 = \text{Total Liabilities/Total Assets}\)
- \(Y_3 = \text{Working capital/Total Assets}\)
- \(Y_4 = \text{Current Liabilities/Current Assets}\)
- \(Y_5 = 1 \text{ if Total liabilities > Total Assets else } Y_5 = 0\)
- \(Y_6 = \text{Net Income/Total Assets}\)
- \(Y_7 = \text{Funds from operations/Total Liabilities}\)
- \(Y_8 = 1 \text{ if Net Income is negative else } Y_8 = 0\)
- \(Y_9 = \text{measure of change in Net Income}\)

(iv) **Zmijewski model**

\[
X = -4.3 - 4.5X_1 + 5.7X_2 - 0.004X_3
\]

where:
- \(X_1 = \text{Net Income/Total Assets}\)
- \(X_2 = \text{Total Debt/Total Assets}\)
- \(X_3 = \text{Current Assets/Current Liabilities}\)
- \(X = \text{Overall index}\)

Model developed in this study has emphasized the importance of operating margin which is an important predictor in both Altman’s and Ohlson’s model. Though the existing models have identified Working Capital to Total Assets as significant factor, Working capital to Total Sales is a better measure reflecting the productivity of working capital. Altman’s model compares market value of equity in relation to liabilities, whereas a better measure is used in current study i.e book value of debt to book value of equity, since market value of equity do not necessarily reflect the fundamentals of a company. Cash flow from Operations, as identified in the current study, is an important indicator of distress. Ability to generate cash from operations is a critical test of company’s operational efficiency. However none of the existing models incorporates this variable. Since the logistic regression model developed in this study uses data from Indian companies’ financials, it will be more relevant in Indian context.
The influence of macro-economic factors on the event of distress in companies is also examined. Past research have established that corporate distress can be triggered by macro-economic conditions like inflation, recession etc. Macro- economic factors can add informative value in distress prediction (Hui Hu, 2011). Very few studies however have attempted to correlate distress in Indian companies with the prevailing economic environment. Pearson’s Correlation Coefficient Analysis and Logistic Regression was used to check if distress in Indian companies’ is influenced by the existing economic conditions. Bank rate, Inflation, Net National Income, Exchange rate and Industrial Production Index Manufacturing were selected to represent the macroeconomic environment. Interesting results were observed. The correlation between 18 financial ratios of distressed companies and 5 macro-economic factors were tested. No significant correlation was observed. An alternate method of validating the above observation was to check whether inclusion of macro-economic factors along with financial ratios improves the predictive accuracy of the logit model with financial ratios developed in the current study. Though the classification accuracy of the model increased marginally from 90.1% to 91.5%, the macro-economic factors were not significant. Thus it can be inferred that macro-economic conditions are not important factors influencing distress in Indian companies. Indian manufacturing companies are more affected by firm specific factors like profitability, working capital management and liquidity rather than economic conditions. Distress in Indian companies are not largely affected by macro-economic conditions of the country. There is no enhancement to predictive value of distress prediction model with the inclusion of macro-economic factors. The conclusions from the current study can be stated as under:

(i) Financial ratios are different for distressed and non-distressed manufacturing companies in India.
(ii) Identified Financial ratios can predict financial distress in listed manufacturing companies in India.
(iii) There is no significant relation between macro-economic conditions and financial distress in manufacturing companies in India.

5.2 Contribution of the Study
Contribution of this study can be discussed under two broad heads (i) Existing Literature (ii) Stakeholders of business

(i) Existing Literature:

Corporate distress is a much researched area. Enormous literature is available on the role of financial ratios in identifying distress and bankruptcy. However these studies were limited to European and American nations. Very few studies have been done for Asian countries and much less in Indian context. The current study has extensively reviewed listed manufacturing companies in India using various statistical techniques to identify the specific financial ratios which is relevant for Indian companies in distress identification and prediction. Distress prediction models developed using Logistic Regression can add immense informative value to corporate distress studies for Indian companies. Another important revelation was the absence of correlation between macro economy and state of financial distress. This behaviour exhibited by Indian companies is in contrast to other nations where macro economy is a large influencer. It is established that firm specific internal factors are more critical to the performance of Indian companies as compared to non-firm specific external factors. These findings will add value to existing literature on corporate distress studies in India.

(ii) Stakeholders of the Business:

Managers, investors, lenders and Government are the stakeholders of any business. Financial distress can cause huge financial losses to them. The development of distress prediction model will serve as an early warning signal to these stakeholders. Distress prediction has more value than bankruptcy prediction since distress precedes bankruptcy and will enable the stakeholders to take remedial steps to minimise or mitigate risks. Managers of the business, through regular review, can identify the areas which can reduce the distress probability score. Remedial measures can be taken to prevent further damage to the company. Investors can review their portfolio and identify companies which can be potentially distressed and take appropriate steps to avoid losses. Lenders can review the borrowers profile and identify potential bad loans. This will enable them to take appropriate steps to minimise the adverse effect of non-payment of loans.
Government can review different business facing financial distress and develop policies and implement programs to support such business. Distress Prediction models and understanding factors leading to financial distress can be of immense value to all stakeholders of business.

5.3. Limitations of the Study

No research can be completed without acknowledging the limitations in of the study. The current study has used a time period from 2005-2015. A larger time frame would have given different results. Also the current study excludes all listed companies with a turnover of less than 10 crores. Results would be different with the inclusion of these companies.

5.4 Recommendations for Future Study

Future studies on corporate distress may consider the following further aspects:

a) Scope of Study

The current study focuses on listed manufacturing companies in India. India has a large section of manufacturing activity conducted in unorganised sector. Factors leading to financial distress in such unlisted companies and other companies in unorganised sector may be examined and compared with the results of current study to identify similarities or deviations.
b) **Inclusion of Non- Financial Variables:**

The current study has used only financial ratios and macro- economic factors as variables. The impact of non- financial or qualitative factors like top management profile, corporate governance, dividend payout pattern, number of independent directors on financial distress can be examined.

c) **Development of Distress Prediction Model for Service Sector:**

Service sector in India is gaining lot of prominence. Companies in service sector can be studied to understand the specific factors which can be used as distress predictors.