Financial distress in Manufacturing and Services Sector: An Empirical Analysis

Dr. Saib Fakhar

Assistant professor

New Delhi Institute of Management, New Delhi

Abstract

This study examines the degree of financial hardship in the manufacturing and services sectors by analysing a panel of 126 non-financial firms listed on the NSE 200 from 2012 to 2022. Utilising Altman's Z-Score model for manufacturing enterprises and the modified Z"-Score model for service organisations, we evaluate the financial health of firms over time. The results indicate that manufacturing companies faced increased financial difficulty, with a notable surge in troubled organisations in 2022 in which 56 out of 85 firms contrasted with just 7 healthy firms that year. Conversely, the services sector demonstrated superior resilience, with 24 of 41 enterprises deemed financially robust in 2022 and merely 4 firms in trouble. The research investigates the influence of board composition, ownership configuration, corporate social responsibility expenditures, and related party transactions on financial distress. The results indicate that these governance characteristics significantly impact a firm's financial health. This research offers essential insights for investors, regulators, and corporate managers to identify early indicators of distress and implement corrective actions, particularly in at-risk sectors.

Keywords: Financial distress, Bankruptcy, Manufacturing, Services.

1.0 Introduction

There has been a lot of research on financial distress prediction since the 1990s, and it's a significant area of accounting and finance. Beaver (1966) laid the groundwork for bankruptcy prediction and (E. I. Altman, 1968) built on it by extending multivariate discriminant methodology to use financial ratios to forecast which firms would fall into financial distress.

The ability to anticipate financial distress is crucial because it provides stakeholders and investors insight into the company's viability as an investment. In the aftermath of the global financial crisis that precipitated the 2009 recession, assessing the probability of corporate bankruptcy has assumed an even greater significance. There are a variety of definitions of an unsuccessful business enterprise that attempt to capture the formal process by which a company encounters economic difficulties. In the literature, four generic terms frequently used to describe economic issues are failure, insolvency, default, and bankruptcy (Outecheva, 2007;

Rajasekar et al., 2014). Failure, as defined by financial standards, occurs when the actual return on investment, accounting for risk, is significantly and persistently lower than the prevailing rates on comparable investments (E. I. Altman & Hotchkiss, 2005). These economic circumstances do not indicate the entity's continuation or cessation. The normative determination to cease operations is predicated upon anticipated returns and the organization's capacity to recoup its variable expenses. A business experiencing prolonged economic failure may still manage to fulfill its present financial obligations due to the lack of legally binding debt (Abdullah et al., 2023; Giannetti et al., 2014; Wu et al., 2022). A business's inability to fulfill its creditors' legally binding obligations is referred to as a legal failure.

The developed nations are primarily to blame for the global increase in default rates. In 2016, there were 165 defaults worldwide, up from 113 in 2015. As in prior years, most defaults were made in the United States, accounting for an astounding 64.8% of all defaults, the highest percentage since 2011. Moreover, a significant portion of the increase in default rates was caused by extended strain in the world energy markets, such as low prices for commodities and oil. Notably, more than half of all defaults in 2016 came from the energy and natural resources sector. According to a recent report by Vazza and Kraemer (2017), 63 of the 95 defaults in 2017 were related to the United States region, including Bermuda and the Cayman Islands. Furthermore, the combined impact of the retail and consumer service sectors on the overall number of defaults in 2017 was significant. However, there were fewer defaults overall in 2017, i.e., 95 compared to 163 in 2016.

2.0 Literature Review

The concept of financial distress outlines the meaning of financial distress used in the study. Different terms have been used in the literature to explain business failure. Many studies deal with bankruptcy prediction models, and several researches also focused on corporate financial distress prediction (E. I. Altman & Hotchkiss, 2005; Asquith et al., 2016; McKee, 2003; Rawal et al., 2022). In the literature, other terms such as failure, insolvency, or default describe the failure of a business. Default, insolvency, bankruptcy, and failure are all words that describe a financial crisis (Outecheva, 2007). Failure is when revenues are insufficient to cover the costs, and the average rate of return on investment is lower than the cost of capital (E. I. Altman & Hotchkiss, 2005). Insolvency is when a firm faces the problem of liquidity and cannot repay its current debts, resulting in a declaration of bankruptcy (E. Altman & Hotchkiss, 2006). When a debtor cannot repay the legal obligation of debt on time, it is known as default (E. Altman &

Hotchkiss, 2006). Some studies defined bankruptcy in legal terms when a financially distressed company is legally declared bankrupt (Balcaen & Ooghe, 2004; Karels & Prakash, 1987). The new problem in corporate finance is corporate failure or financial distress. Financial distress arises when a company cannot pay its debts when they become due, ultimately resulting in bankruptcy. Businesses must anticipate liquidity crises and economic downturns ahead of time to prevent business failure, defined as "an event which causes substantial losses to stockholders and creditors." These events may be the cause of companies' disappearance from the market (Deakin, 1972).

Therefore, financial distress is an expensive occurrence that affects the relationship between debt-holders and non-financial stakeholders, leading to a decrease in the availability of new funding. Gordon (1971) was a trailblazer in the process-oriented classification of financial distress. As he explained, financial distress is merely one component of a broader sequence that also includes insolvency, default, and performance deterioration; thus, it falls under the purview of capital structure and security valuation. Likewise, Gilbert et al. (1990) defined financial distress as a circumstance in which a business is faced with the following choices: liquidate, merge with another entity, or restructure its debt to achieve a specified level of solvency. Purnanandam (2008) described the initiation of financial distress as a transitional phase between solvency and insolvency, drawing on relevant research. In doing so, he constructed a corporate risk management model that considers the occurrence of financial distress costs. He elaborated that in the event of a breach of debt contracts or failure to pay interest on debt, a company enters into distress. A corporation transitions from a solvent to an insolvent state when, at maturity, the nominal value of its assets is reduced to an amount less than the nominal value of its debt. Financial distress was also defined by Denis and Denis (1995) as negative pre-tax net income for three years in a row. Asquith et al. (1994) defined financial distress as a company whose earnings before interest and taxes (EBITDA) is less than 80% of its interest expense in any of the two consecutive years. They based this determination on the interest coverage ratio.

Similarly, Opler and Titman (1994) used stock returns and negative median sales growth as indicators of financially troubled companies. Platt & Platt (2002) put forth a unified definition of financial distress that included long-term years of negative operating income, dividend deferral, economic restructuring, or sizable layoffs. Financial distress is the state through which a company has to pass before going bankrupt (McKee, 2003; Platt & Platt, 2002); hence, financial distress can be defined as the early stage of bankruptcy.

Several scholars have determined the essential indicators for forecasting financial distress (E. I. Altman, 1968; Beaver, 1966; Ohlson, 1980; Zmijewski, 1984) and being used in the context of default prediction, these indicators have also been used to assess the performance of distressed restructuring (Andrade & Kaplan, 1998; Opler & Titman, 1994). The company's financial ratios, such as liquidity, interest coverage, and return on assets, provide the most compelling signals. Thus, early prediction of financial distress may be used to take corrective actions in a timely manner to avoid future bankruptcy. Different studies used different meanings and events to define the state of financial distress. The number of events or series of events are responsible for emergence of financial distress situation which may leads to the serious problem of insolvency or bankruptcy of the company (Acharya et al., 2007; Broadie et al., 2007; Davydenko & Franks, 2008). Financial distress costs include direct and indirect costs associated with bankruptcy or the onset of financial distress. Direct costs are the professional and administrative fees paid to lawyers, accountants, and experts to handle legal negotiations (Chen & Merville, 1999). Direct costs, from a financial standpoint, represent payments for wealth transfers from creditors to professionals involved in the process (Branch, 2002). Thus, direct costs arise only when a distressed restructuring or bankruptcy occurs. Direct costs are typically associated with the costs associated with the legal process of distressed restructuring following default. As a result, they are generally investigated in terms of various financial distress resolution mechanisms (Outecheva, 2007). Empirical studies showed a negligible variation in direct costs ranging from 3.1 percent to 4.3 percent (Branch, 2002). Previous research has reached a consensus on the relative importance of direct costs in the total loss borne by a large firm after filing for bankruptcy (E. I. Altman, 1984; Betker, 1997; S C Gilson, 1997; Stuart C. Gilson, 1989; Warner, 1977; Weiss, 1990). For railroad firms, Warner (1977)) determined direct financial costs to be only 4% of total firm value one year before bankruptcy.

2.1 Legal Framework in India

For more than 50 years, financial distress prediction models have been created and used because of their capacity to predict whether a company will face specific financial difficulties or possibly declare bankruptcy in the ensuing period, typically one year. Developing a model to detect financial distress is of great interest to entrepreneurs, investors, creditors, auditors, and other stakeholders, given the negative economic impact of corporate failure" (Jeger, 2011). The global corporate community is engulfed in the crisis of corporate default, bankruptcies, rising percentages of financial leverage, and rising expenses associated with financial distress, which are all common. The economic shock has hit both developed and developing countries

frequently. India's low standing in the global rankings for bankruptcy resolution and ease of doing business made it necessary to create a more robust legal framework for handling distressed assets. The current Indian situation called for a more comprehensive and simplified framework, even though the RBI has introduced guidelines on stressed assets, namely corporate debt restructuring, joint lenders forum, strategic debt restructuring, and sustainable structuring of stressed assets as the resolution mechanisms. A specialized forum was established by the Insolvency and Bankruptcy Code, 2016 to supervise all corporate insolvency and liquidation proceedings. Even though this law is a significant step toward making it easier to do business in India, some legal ambiguities make it difficult to operationalize the Code (Vakil, 2018). Thus, against this background, the regulatory and legal framework for financial distress and insolvency in India has been briefly reviewed.

The Companies Act, 2013

The Companies Act 2013's Chapter XIX outlines the legal guidelines for reviving and rehabilitating failing businesses. The chapter covers rehabilitating a sick company and the conditions that may lead to such a designation. The National Company Law Tribunal (NCLT), which assesses whether a company is sick, decides what steps must be taken to revive and rehabilitate it. Three measures are outlined in Section 261 of the Act for this purpose: financial reconstruction, management change, and merger of the sick company with another company. The chosen plan must first receive the creditors' approval for the Tribunal to grant its sanction. If the creditors reject the chosen scheme, the Tribunal will order the company to be wound up through Chapter XX procedures. Sections 270 to 365 of the company winding-up provisions are covered in Chapter XX. This chapter covers the two main winding up procedures, voluntary and winding up by the NCLT. However, these clauses were never announced, and as of November 15, 2016, Section 255 of the Insolvency and Bankruptcy Code, 2016, has replaced them.

Insolvency and Bankruptcy Code, 2016

On December 21, 2015, the Insolvency and Bankruptcy Code, 2016 (hereafter) was presented to the Lok Sabha. Referencing the draught Code submitted by the Standing Committee under the direction of Dr. T.K. Vishwanathan in November 2015, the Joint Parliamentary Committee's recommendations were incorporated into the Code, which the Lok Sabha passed in May 2016. On May 28, 2016, the President's assent brought the Code into full force. Corporate distressed restructuring provides an opportunity for the company to survive following adverse processes

of corporate decline and regain its financial status by adopting various restructuring strategies. However, if the company cannot disburse its debts as they mature and file for legal bankruptcy, it falls under the Insolvency and Bankruptcy Code, 2016. The Code is a historic and landmark development in resolving distressed companies, providing a simplified and time-bound framework for viable survival (Sharma & Vyas, 2017).

The Code repeals dated acts like the Presidency Towns Insolvency Act 1909 and Provincial Insolvency Act 1920. Sick Industrial Companies (Special Provisions) Repeal Act, 2003, and amends eleven other financial laws, including the recently revised Companies Act, 2013. The Code has been introduced to provide equal and expeditious division of assets of the debtor and discharge of duties from the creditors‟ demands (Goel, 2017).

3.0 Research Methodology

Recently, distressed companies such as Jet Airways, which went bankrupt, posted a net loss of Rs 5539 Cr, with a negative net worth of Rs 12,695 Cr during the financial year 2019 (Saxena, 2020). Jaypee Infratech Ltd went into insolvency in 2017 as it could not pay the outstanding loan amount OF ₹9,800 crore to 13 banks (NCLAT, 2019). Another case of the biggest defaulter of loans is Essar Steel Ltd. In 2019, it reported an outstanding debt of Rs 42,000 Cr to various Indian banks (The Economics Times, 2019). So Reliance Communications owes around Rs 26,000 Crore to banks and financial institutions (Business Standard, 2024). Tata Steel took control of bankrupt Bhushan Steel, setting off its two-third loans of nearly Rs 35,200 Cr (Dash & Varma, 2020).

3.1 Research Question

- What is the status of financial distress in the manufacturing sector
- What is the status of financial distress in the services sector

3.2 Research objective

- To investigate the various levels of financial distress in manufacturing sector.
- To investigate the various level of financial distress in services sector.

3.3 Sources of Data

The study is based on data that was already known. The Center for Monitoring the Indian Economy (CMIE) PROWESS database is used to get the needed information about the companies.

3.4 Sampling Method

The information from companies included in the NIFTY 200 index on the National Stock Exchange (NSE) has been chosen for this research. Information is gathered over 11 years, from 2012 to 2022. The index includes the 200 largest companies in the pool of eligible companies as determined by their total market capitalization. Out of the sample, 200 firms related to the financial industry have been excluded due to their different structure and nature of business. Moreover, banks are regulated firms, which makes them complicated to analyze(Berger & Bonaccorsi di Patti, 2006). A final sample of126 firms is achieved by removing the financial firms and firms with insufficient data.

After getting the final sample of 126 firms. The sample is then divided into manufacturing and service sectors. Table 2 shows the division of firms based on the nature of the business and firms in manufacturing and services.

Nature of Business	**Number of firms**
Manufacturing	85
Services	41

Table 1

3.5 Altman's Z-Score (1968)

Altman (1968) raised doubts regarding the suitability of univariate analysis (Beaver, 1966) for failure prediction purposes. Using multiple discriminant analysis (MDA), he established explicit group classifications based on a linear combination of ratios, such as financially distressed and solvent. The individual analyzed the twenty-year predictive capability of the chosen ratios by employing a sample comprising 33 insolvent and 33 matched non-insolvent manufacturing companies (1946-1965). Twenty-two ratios were selected considering their potential significance and prevalence in the literature. Based on an assessment of statistical significance, analyst judgment, inter-correlations among the variables, profitability, liquidity, leverage, solvency, and activity ratios, these ratios were subsequently classified into five standard ratios: profitability, liquidity, leverage, solvency, and activity ratios. In conclusion, a

Z-score was obtained using the discriminant function. The classification zones for classifying the companies into one of the two categories, sound or distressed, are also detailed.

Financially sound companies possess a Z-score exceeding 2.99, while those below 1.81 are classified as economically distressed. Therefore, as a firm's Z-score increases, so does its likelihood of defaulting.

$Z = 0.012\ X_1 + 0.014\ X_2 + 0.033\ X_3 + 0.006X_4 + .999\ X_5$

X1 = Working Capital/Total Assets;

X2 = Retained Earnings/ Total Assets;

X3 = Earnings before Interest and Taxes/Total Assets;

X4 = Market Value of Equity/ Total Liabilities;

X5 = Sales/Total Assets; Z = Overall Index.

By analyzing the companies in the initial sample by the discriminant model, it was possible to conclude that all companies with a Z score of more than 2.99 belong in the non-distressed region (healthy firms). In contrast, all companies with a Z score of less than 1.81 are insolvent and financially distressed. The region with coordinates between 1.81 and 2.99 will be called the "zone of ignorance" or the "grey area."

Distressed firms (Z<1.81) Firms in Grey zone (1.81<Z>2.99) Healthy firms (Z>2.99)

3.6 Modified Z"-Score Model

The Z-Score model will undergo one more adjustment in which the characteristics and accuracy of a model that does not include X5 (sales/total assets) will be evaluated. We do this to reduce the potential influence on the industry, which is more likely to occur when an industry-sensitive variable such as asset turnover is included in the analysis. In this scenario, the book value of equity was utilized to calculate X4.

The new Z″-Score model is:

$Z'' = 6.56\ (X1) + 3.26\ (X2) + 6.72\ (X3) + 1.05\ (X4)$

Where X1, X2, X3, and X4 are

X1 = Working Capital/Total Assets;

X2 = Retained Earnings/ Total Assets;

X3 = Earnings before Interest and Taxes/Total Assets;

X4 = Book value of equity/ Total Liabilities;

However, he analyzed the accuracy of a four-variable Z"-Score model that excluded the Sales/ Total assets ratio, X5, from the revised model because of a potential industry effect that is more likely to occur when this kind of industry-sensitive variable (asset turnover) is included in the model. This conclusion was reached due to his investigation into the model's accuracy. After that, Altman derived the subsequent four-variable Z”-score model and estimated it (E. I. Altman & Hotchkiss, 2005). We believe this model is better suited for use with non-manufacturers than the Z-Score model initially developed. Naturally, models created for specific sectors are an even better way to determine the likelihood that a company in a similar industry may experience financial distress.

Distressed firms (Z” <1.10) Firms in Grey zone (1.10<Z”>2.60) Healthy firms (Z”>2.60)

4.0 Result and Discussion

4.1 Result of Altman’s Z-score applied to Manufacturing sector firms

Table 2 shows the result of the Altman Z-Score model applied to manufacturing sample of 85 firms from a period of 2012 to 2022. The value of Z-Score decides the difference between healthy firms and distressed firms and also firms in grey zone.

In 2012 out of 85 firms 35 distressed firms and 29 firms are healthy and firms in grey zone are 21. In 2013 out of 85 firms 33 are healthy firms and 28 firms are in distressed and 24 firms are in grey zone which means they have chance to improve its Z-Score and come to healthy firms list. In 2014 out of 85 firms 41 firms are in healthy zone with Z-Score higher than 2.99 and 26 firms are in distressed zone with Z-Score less than 1.81 and 18 firms are in grey zone with Z-Score value between 1.81 to 2.99. In 2015 out of 85 firms 39 firms are healthy with Z-Score higher than 2.99 and 34 firms are distressed firms with Z-Score below 1.81 and 12 firms are in grey zone with Z-Score between 1.81 to 2.99. In 2016 out of 85 firms 37 firms are healthy firms with Z-Score higher than 2.99 and 31 firms are distressed firms with Z-Score less than 1.81 and 17 firms are in grey zone with Z-Score between 1.81 to 2.99. In 2017 out of 85 firms 41 firms are healthy firms and 20 firms are distressed firms and 24 firms in grey zone. In 2018 out of 85 firms 36 firms are healthy firms and 27 firms are distressed firms and 22 firms are in grey zone. In 2019 out of 85 firms 41 firms are healthy firms with Z-Score more than 2.99 and

22 firms are distressed firms with Z-Score below 1.81 and 22 firms are in grey zone with Z-Score between 1.81 to 2.99. In 2020 out of 85 firms 36 firms are healthy firms with Z-Score higher than 2.99 and 24 firms are distressed firms with Z-Score below 1.81 and 25 firms are in grey zone with Z-Score between 1.81 to 2.99. In 2021 out of 85 firms 53 firms are healthy firms and 16 firms are distressed firms and 16 firms are in grey zone. In 2022 out of 85 firms only 7 firms are healthy with Z-Score higher than 2.99 and 56 firms are in distress zone and 22 firms are in grey zone with Z-Score between 1.81 to 2.99.

Year	Total no. of firms	Distressed firms (Z<1.81)	Firms in Grey zone (1.81<Z>2.99)	Healthy firms (Z>2.99)
2012	85	35	21	29
2013	85	28	24	33
2014	85	26	18	41
2015	85	34	12	39
2016	85	31	17	37
2017	85	20	24	41
2018	85	27	22	36
2019	85	22	22	41
2020	85	24	25	36
2021	85	16	16	53
2022	85	56	22	7

Table 2: Result of Altman's Z-score applied to Manufacturing sector firms

4.2 Result of Modified Altman's Z"-score applied to service sector firm

Table 3 shows the result of Alman Z-Score model applied to service sample of 41 firms from a period of 2012 to 2022. The value of Z-Score decides the difference between healthy firms and distressed firms and also firms in grey zone.

In 2012 out of 41 firms 8 are distressed firms and 20 firms are healthy and firms in grey zone are 13 when value of Z-Score is less than 1.10 for distressed firms and Z-Score value is more than 2.60 for healthy firms and for grey zone Z-Score value is in between 1.10 to 2.60. In 2013 out of 41 firms 20 are healthy firms and 4 firms are in distressed and 17 firms are in grey zone which means they have chance to improve its Z-Score and come to healthy firms list. In 2014 out of 41 firms 21 firms are in healthy zone with Z-Score higher than 2.60 and 4 firms are in

distressed zone with Z-Score less than 1.10 and 16 firms are in grey zone with Z-Score value between 1.10 to 2.60. In 2015 out of 41 firms 19 firms are healthy with Z-Score higher than 2.60 and 8 firms are distressed firms with Z-Score below 1.10 and 14 firms are in grey zone with Z-Score between 1.10 to 2.60. In 2016 out of 41 firms 23 firms are healthy firms with Z-Score higher than 2.60 and 4 firms are distressed firms with Z-Score less than 1.10 and 14 firms are in grey zone with Z-Score between 1.10 to 2.60. In 2017 out of 41 firms 16 firms are healthy firms and 9 firms are distressed firms and 16 firms in grey zone. In 2018 out of 41 firms 24 firms are healthy firms and 7 firms are distressed firms and 10 firms are in grey zone. In 2019 out of 41 firms 19 firms are healthy firms with Z-Score more than 2.60 and 6 firms are distressed firms with Z-Score below 1.10 and 16 firms are in grey zone with Z-Score between 1.10 to 2.60. In 2020 out of 41 firms 18 firms are healthy firms with Z-Score higher than 2.60 and 6 firms are distressed firms with Z-Score below 1.10 and 17 firms are in grey zone with Z-Score between 1.10 to 2.60. In 2021 out of 41 firms 17 firms are healthy firms and 10 firms are distressed firms and 14 firms are in grey zone. In 2022 out of 41 firms 24 firms are healthy with Z-Score higher than 2.60 and 4 firms are in distress zone and 13 firms are in grey zone with Z-Score between 1.10 to 2.60.

Year	Total no. of firms	Distressed firms (Z" <1.10)	Firms in Grey zone (1.10<Z">2.60)	Healthy firms (Z">2.60)
2012	41	8	13	20
2013	41	4	17	20
2014	41	4	16	21
2015	41	8	14	19
2016	41	4	14	23
2017	41	9	16	16
2018	41	7	10	24
2019	41	6	16	19
2020	41	6	17	18
2021	41	10	14	17
2022	41	4	13	24

Table 3: Result of Modified Altman's Z"-score applied to service sector firm

Conclusion

The Altman Z-Score research underscores the escalating financial instability in recent years, reaching a peak of distress in 2022. The most recent data indicates an urgent necessity for financial restructuring, strategic management, and governmental support in the manufacturing sector to avert widespread insolvency, contrasting with previous years that exhibited a balance among healthy, grey, and distressed enterprises. The service sector firms exhibited overall

financial stability and low distress risk over the 11-year period. Despite temporary fluctuations and a significant grey zone population, the number of healthy firms consistently outnumbered distressed ones. The positive trend in 2022 suggests a strong post-crisis recovery and highlights the resilience and adaptability of the service sector in India (or the region studied). Continuous monitoring and strategic support for firms in the grey zone can further enhance the sector's financial health.

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