

PREDICTION & EVALUATION OF COMPANIES UNDER THE INSOLVENCY AND BANKRUPTCY CODE (IBC) USING ALTMAN Z-SCORE

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ABSTRACT

The Insolvency and Bankruptcy Code was implemented to address the emerging challenges of corporate insolvency in India and provide for a systematic approach toward resolution of distressed assets. By using the Altman Z-Score model, this paper analyses the financial condition of the firms under the IBC to predict the risk of bankruptcy of companies. This paper studies the way the Z-Score model correctly evaluates the solvency and risk of default of companies, thereby guiding the stakeholders through their decision-making processes. The analysis of companies in IBC proceedings will help bring out patterns in financial distress and evaluate if the relevance and accuracy of the Z-Score hold in emerging markets. The study offered an insight into bankruptcy predictive models, occasionally highlighting the importance of financial metrics in corporate recovery strategies.

Keywords: Insolvency and Bankruptcy Code, Altman Z-Score, corporate insolvency, financial distress, bankruptcy prediction, financial instability.

INTRODUCTION

Companies' stability and resilience in today's dynamic economic environment can well contribute to making even the most ailing of economies healthy. For emerging markets such as India, corporate insolvency and debt resolution would remain one of the focal areas of attention, considering the sheer challenges that have emerged with rising non-performing assets (NPAs) and increasing corporate defaults. To address this rising and urgent need for a comprehensive insolvency framework in India, the Indian government promulgated the Insolvency and Bankruptcy Code (IBC) in 2016 (Das et al, 2022).

The code replaced the limited perspective on insolvency that was held thus far by the Indian laws, completely reorienting the prevailing processes of addressing financial distress in

companies while enhancing recovery rates of creditors. IBC thus marks a giant leap for Indian corporate governance systematising the time-bound process dealing with insolvency and liquidation proceedings.

Until the IBC came into being, the approach to insolvency in India was ineffective and dragged on for several years as cases could drag along and get even prolonged because of procedural delays and legal ambiguities. This inefficiency translated into poor recovery rates besides causing significant value erosion of distressed assets over time. The slow and unpredictable process often kept creditors from approaching recovery, which gradually worsened the NPA crisis of the banking sector as well as straining the overall economy. Through the IBC, the government intended to rectify these failures by focusing on fast-tracking insolvency resolution and asset-value recovery. However, the IBC provides creditors with immense powers of decision-making within it, meaning, amongst other things, they have a right to vote on restructuring plans and can decide the future of a declining company under the watch of a resolution professional (Dev, 2021).

Even though the IBC has been in the pipeline for a long time and brought tremendous expectation and optimism to the stakeholders' table as they expected it to decrease the times of insolvency, make processes more transparent and ultimately make the Indian corporate debt landscape healthier. However, though the code has been successful on the whole, there are still a few challenges in particular pertaining to the prompt detection of firms that are more likely to face insolvency. One of the persistent challenges in the area of corporate finance is to develop trustworthy models for the prediction of financial distress before a firm actually goes into the stage of insolvency. Predictive models can yield critical early warning messages that will inform stakeholders like investors, creditors, and regulators about crucial strategic and possibly timely choices to avoid full insolvency. The alertness is a requirement that the organisation should avoid such financial loss, protect asset values, maintain employment, and reduce negative economic impacts of corporate bankruptcies of greater magnitude.

In this regard, the Altman Z-Score model has become one of the best-established and widely used models to predict the likelihood of bankruptcy of a corporation. Edward Altman, a financial economist, designed the Z-Score model in the 1960s. The Z-Score model is calculated by taking a weighted average of various financial ratios that describe the health of a company with regard to profitability, liquidity, leverage, solvency, and efficiency of operations. By putting these indicators together, the Z-Score gives a numerical value that classifies firms into three zones: "safe," "grey," and "distress." A firm classed in the "distress" zone has a high probability of default while "grey" zone companies may warrant further examination as modest financial risk persists. This model has been highly useful for the stakeholders by providing early indication of some potential financial distress so that the interventions can be made on a timely basis when required.

The Altman Z-Score has received a long-standing reputation in bankruptcy prediction but it has been tested and applied mainly in the developed economies having different corporate structures, financial disclosure standards, and hence different economic conditions than those of emerging markets, like India. Given the distinct regulatory, economic, and market conditions in India, the question remains as to whether this model can effectively predict insolvency, and if it cannot, then the possible adaptations or even the complementary models that could help make the predictions richer so that the model may be relevant and accurate.

This paper attempts to evaluate the financial condition of a set of firms under the Insolvency and Bankruptcy Code 2016, using the Altman Z-Score, that have undergone various

stages of the process under the IBC. The research is conducted in order to identify patterns of financial distress in these firms and understand the accuracy of predictive capabilities of the Z-Score in determining an Indian firm's risk of insolvency. It throws light on the predictive power of financial distress models in emerging markets and contributes to a larger debate pertaining to the role of such models within regulatory frameworks like the IBC.

The insights obtained from this research would enable policymakers, investors, and other institutions to know which financial indicators are critical for indicating insolvency and, therefore, would make frameworks more effective in dealing with issues of insolvency. As financial distress continues to impact companies in emerging markets, instruments like the Altman Z-Score are likely to be crucial in risk analysis, especially if they can be modified to better fit the needs of these economies.

LITERATURE REVIEW

The Insolvency and Bankruptcy Code of India has significantly altered the dimensions in terms of financial health for companies as well as the methods employed to evaluate distress. Considerable improvement has been seen in insolvency resolution cases with a structured approach towards handling the complexities of distressed corporate entities (Bayhan, 2023). Despite such strides, weaknesses like delayed rulings, judicial system inefficiencies, and incomplete enforcement of the process remain in place, especially when the IBC is still in its infancy. (Arora and Saurabh, 2022) The Altman Z-score, popularly known as such, has been of widespread application in predicting corporate bankruptcy and is still an important score for such an assessment under IBC. Studies involving the application of Z-score on Indian companies established its utility in diagnosing financial distress, especially if applied across a broad spectrum of industries, such as banking, steel, and pharmaceuticals (Soni et al (2021); Asif et al.(2024).

With respect to this, a few research studies have focused on the applicability of the predictive power of the Z-score compared to other, such as the DEA or Machine Learning-based models. In the context of India, the analyses often mention that the Z-score has an advantage for the fact that it is very easy and historical but may not capture the distinct ordeal by companies facing emerging market that is India (Shome and Verma). As evidence from empirical observation, Indian firms that are distressed usually become technically insolvent much before they find themselves formally referred to the IBC. Analysis of the companies referred to the IBC revealed that a sizeable majority had Z-scores indicating a high probability of default years before the initiation of bankruptcy proceedings. This means that despite the IBC's efficient process of resolution, the inability to recognize financial distress at an early stage may only aggravate the liquidation and recovery problems for these types (Philosophov and Philosophov 2002). Again, despite the improvements in debt resolutions credited to the IBC, the recovery rates themselves still take a lot of criticism, including that on legacy cases (Rakshit et al.). Severe consequences are often felt when the IBC is approached too late in the affairs of distressed companies. Many firms had high default risks for years before the legal process started. In summary, though the IBC and Altman's Z-score both play critical roles in the Indian bankruptcy landscape of corporate resolution (Agrawal and Chatterjee, 2015), research should be conducted with regards to further optimising these tools and processes in the Indian context to address specific challenges emerging from that market. Probing into the points that how to make the IBC more congruent with a predictive model like Z-score may lead to more effective interventions and, eventually, a much more efficient regime of insolvency (Singh and Mishra, 2016).

RESEARCH OBJECTIVES

This study will enable the analysis of numerical data on companies that have undergone IBC procedures with their respective financial health, as represented by the Z-Score model. Therefore, the present research focuses on ascertaining the suitability of the Altman Z-Score as a predictor of corporate insolvency in the Indian scenario, especially for companies referred to the IBC.

The primary objectives of this study are:

Q.1: How effective is the Altman Z-Score model in predicting corporate insolvency for Indian companies entering the Insolvency and Bankruptcy Code (IBC) process?

Q.2: How reliable is the Altman Z-Score as an early warning system for corporate insolvency in the context of emerging markets like India?

Q.3: What are the distinctive patterns of financial distress exhibited by Indian companies in the years preceding their entry into IBC proceedings, as identified through the Z-Score analysis?

Data Collection

A sample of 10 companies referred to the IBC for insolvency resolution has been used in this study. The selected companies are Bhushan Steel Limited, Kingfisher Airlines Limited, ABG Shipyard Limited, Jyoti Structures Limited, Lanco Infratech Limited, Jaypee Infratech Limited, Gitanjali Gems Limited, Unity Infraprojects Limited, Usher Agro Limited, and Viceroy Hotels Limited. Such firms are part of the Indian corporate distress landscape, wherein a number of such firms had been referred to the IBC resolution process because of financial issues such as accumulation of debt and poor financial performance.

Some such companies are the ones listed by the Reserve Bank of India (RBI) for corporate debt restructuring under IBC, which is aimed at more efficient resolution of insolvencies. In any event, some of these are quite attention-worthy by way of size and sector: Kingfisher Airlines Limited, for example, and Bhushan Steel Limited. In addition to the global market volatility, further sufferance of these companies belonging to steel and shipping industries (like ABG Shipyard Limited) has been accompanied by relatively higher levels of debt burden coupled with operational inefficiencies that are driving them towards the insolvency proceeding under IBC Code.

In relation to the companies stated above, it will be useful to determine the probabilities of potential bankruptcy using the Altman Z-score model. The Z-score would thus prove useful in detecting whether the financial performance of the companies were signalling distress much earlier than when the IBC process was formally launched. This can be helpful in determining how apt the Z-Score model is in predicting distress and thus guide stakeholders to intervene early on, more effectively. The publicly published financial statements of the aforementioned companies have been reviewed in search of the following important financial information: working capital, sales, earnings before interest and tax, total assets, retained earnings, total liabilities, and market value of equity. Data was taken from the annual reports, balance sheets, and profit and loss statements that were then collated for computation in the Z-score. Data in respect of three years preceding the date of referral of the companies to the IBC were used.

METHODOLOGY

This study uses a quantitative approach by applying statistical tools to compute the Z-Scores of each selected company. The study relies on Altman's original formulae for the calculation of the Z-Scores of publicly traded firms divided over 2 categories Tables 1-3.

i. Manufacturing Companies

Once the Z-scores are calculated, the companies are categorised into the following groups based on their scores:

- **Safe Zone** (Z-score > 2.99)
- **Grey Zone** (1.81 < Z-score < 2.99)
- **Distress Zone** (Z-score < 1.81)

Table 1 Z-SCORE EQUATION FOR MANUFACTURING COMPANIES $Z = 1.2 \times X1 + 1.4 \times X2 + 3.3 \times X3 + 0.6 \times X4 + 1.0 \times X5$	
X1	Working Capital / Total Assets
X2	Retained Earnings / Total Assets
X3	Earnings Before Interest and Taxes (EBIT) / Total Assets
X4	Market Value of Equity / Total Liabilities
X5	Sales / Total Assets

ii. Non-Manufacturing Companies

Once the Z-scores are calculated, the companies are categorised into the following groups based on their scores:

- **Safe Zone** (Z-score > 2.6)
- **Grey Zone** (1.1 < Z-score < 2.6)
- **Distress Zone** (Z-score < 1.1)

Table 2 Z-SCORE EQUATION FOR NON-MANUFACTURING COMPANIES $Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4 \dots\dots\dots$ (Eqn. 2)	
X1	Working Capital / Total Assets
X2	Retained Earnings / Total Assets
X3	Earnings Before Interest and Taxes (EBIT) / Total Assets
X4	Market Value of Equity / Total Liabilities

DATA ANALYSIS & INTERPRETATION

Table 3 ALTMAN Z SCORE FOR 3 CONSECUTIVE YEARS OF SELECTED SAMPLE COMPANIES		
Companies	Year	Altman-Z Score
Bhushan Steel Limited	2016-17	-0.2737
	2015-16	-0.2305
	2014-15	0.2473
	2010-11	-0.2748

Kingfisher Airlines	2009-10	-1.1683
	2008-09	-2.1412
	2015-16	-1.4791
ABG Shipyard	2014-15	0.0672
	2013-14	0.6399
	2015-16	0.4300
Jyoti Structures	2014-15	1.0238
	2013-14	0.1401
	2016-17	-0.4423
Lanco Infratech	2015-16	-0.3890
	2014-15	0.0152
	2015-16	1.6653
Jaypee Infratech	2014-15	1.3988
	2013-14	1.3595
	2016-17	1.3702
Gitanjali Gems	2015-16	1.5184
	2014-15	1.3982
	2017	-2.0555
Unity Infraprojects Limited	2016	0.2953
	2015	0.5341
	2018	-2.1940
Usher Agro Limited	2017	-1.9259
	2016	0.3923
	2017	-2.5916
Viceroy Hotels Limited	2016	-2.1955
	2015	-2.4099

Bhushan Steel Limited: Analysis of Bhushan Steel's Z-scores reveals that the company has remained in the distress zone since 2010-11. This distress zone reflects a high likelihood of financial distress, suggesting that the company could face bankruptcy in the near future. Further application of liquidity ratios corroborates the financial weaknesses identified. The company was, in fact, declared bankrupt in 2017, confirming the model's accuracy and effectiveness in this context.

Kingfisher Airlines Limited: On evaluating Kingfisher's performance with the help of Altman Z score, it was found that although the company's Z-score has always been in the distress zone, the score has been improving since 2013-2014. However, the company had its licence revoked in the year 2012 due to failure to fulfil its debt obligations, serving as a proof of the validity of the model (Kolte et al. 2018).

ABG Shipyard Limited: Application of the Altman Z Score on ABG Shipyard gave results that the company had been in the distressed zone since 2009-2010, yet was able to sustain itself throughout the next 6 years. The Altman Z score for the company has been deteriorating over the years and was finally pushed into the insolvency proceedings in the year 2017.

Jyoti Structures Limited:

The Altman-Z Scores indicate that Jyoti structures limited has been in the distressed zone since 2013-14. The evidence of the weak financials are supported by the continuously declining EBIT and retained earnings. The company finally filed for bankruptcy in 2017.

Lanco Infratech Limited:

Lanco Infratech has been in the distressed zone since 2014-15 as suggested by the declining liquidity of the company over the years, which might have pushed the company towards bankruptcy. The bankruptcy process for Lanco Infratech was initiated in the year 2018.

Jaypee Infratech Limited:

Jaypee Infratech had consistently been in the grey zone since 2013-2014 to 2015-2016, indicating high probability of the company going towards bankruptcy in the future, and the company filed for bankruptcy in 2017.

Gitanjali Gems Limited:

After applying the Altman Z score on the financials of Gitanjali gems the company has been found to be in the distressed zone since 2014-2015, and finally the bankruptcy was initiated in the year 2017.

Unity Infraprojects Limited:

The Altman-Z Scores of Unity Infraprojects indicate that the company has been in the distressed zone since 2016, slowly moving towards impending bankruptcy. The analysis is further supported by the consistently declining sales and negative EBITDA and the fact that Unity Infraprojects filed for bankruptcy in 2017.

Usher Agro Limited:

Usher Agro filed for bankruptcy in the year 2018. The Altman-Z scores also show that the company has been in the distressed zone since 2016. The weak financials and instability of the company are proven by the increasing reliance on liabilities and consistently accumulated losses over the years.

Viceroy Hotels Limited:

Viceroy Hotels have had a negative Altman-Z score since 2015, and the negative working capital and negative EBITDA indicate that the company has been making losses for consecutively 3 years. The company consequently filed for bankruptcy in 2018.

Findings

The research aimed to explore the relationship between the Insolvency and Bankruptcy Code (IBC) and the Altman Z-Score as a predictive tool for corporate insolvency in India.

The analysis of the companies that underwent the insolvency process under the IBC revealed several key Findings:

Z-score Distribution

The Z-scores for the companies that have been analysed show that most of the companies have been falling into the category of the distressed zone and were likely to default, and the companies consequently filed for bankruptcy with the IBC.

Correlation with Insolvency:

The companies with Z-scores below 2.0 are under severe financial distress, whereas those above 2.99 are mainly outside of any risk of insolvency. All the companies with scores under 2.0 were in a higher category of risk which aligns with referring them to the IBC.

Predictive Ability of the Z-Score

The results were able to confirm that it is possible for a business firm to use this Altman Z-Score as an early warning device for companies that may easily slip into insolvency. However, it has limited application depending on the sectors, since such complex financial structures and firms in a highly volatile industry might not apply to every sector.

LIMITATIONS

The availability and validity of financial information relating to companies that have passed through the IBC process may present a limitation for this research. Financial information on certain organisations may not be provided in full detail, or there could be errors within their report. As a result, the research will be limited by use of imperfect data. Another limitation arises from the fact that India's landscape of insolvency is changing, and this changes the manner in which the health of financial companies is evaluated in due time.

RECOMMENDATIONS

Based on the findings of this research, the following recommendations can be made:

Improvement in Early Warning System:

The potential of using Z-score for improvement in corporate financial monitoring systems, especially in high-volatility industries, such as textiles or shipbuilding, to screen companies early before eventual formal IBC introduction into their process is also envisaged.

Sector-specific adjustments

Applying the Z-score model, sector-specific adjustments should be taken. For example, X4-the market value of equity-is relatively insignificant for a privately owned company or those firms involved in the low market capitalization industries, and would have to be adjusted somehow in the model.

Strengthening the Insolvency Resolution Framework

Policymakers and industry regulators may update the IBC insolvency process in such a way that the financial health indicators, including the Z-score, form part of the decision. This would likely make the time taken for cases to be resolved shorter and avoid protracted financial stress.

Corporate Governance Upgrades

Companies need to focus more on sound corporate governance and financial management; apply Z-score and similar tools for on-the-go ongoing monitoring and assessment of their financial health in order not to necessitate the entry into insolvency proceedings.

Future Research Agenda

Subsequent research could further expand on this study by taking in more diversified companies from various regions and geographies in India. A longitudinal study could be designed to explore whether the Z-scores of the companies change over time and whether there is a difference in pre versus post-referral to IBC. It can then be analyzed if the model has long-term predictive power. Other possible further studies could be conducted in comparison with other financial distress prediction models such as the Ohlson O-score, ZETA model amongst others. Finally, research into the effects of macroeconomic factors, for example, interest rate and inflation rates on corporate distress could be carried out by integrating the different variables into the financial models to form a more comprehensive prediction framework.

CONCLUSION

This study works toward validating the Altman Z-score model as an effective predictor for corporate insolvency within India's IBC framework. The companies that reported Z-scores at below 2.0 faced serious indicators of financial distress, consistent with the referral to IBC.

The conclusions presented show that there should be a sector-specific approach toward insolvency prediction and financial distress models must be included in early warning systems to avert corporate insolvencies. The results conclude that, though the Z-score is indeed a very useful tool, it would only be aptly applied if improved and adapted to Indian corporate realities continually.

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