

## Evaluating financial health of selected steel companies in India through 'Z' score model

Dr. Chetana R Marvadi

Assistant Professor, S.D. School of Commerce, Gujarat University, Ahmedabad, Gujarat, India

### Abstract

Measuring the financial health of a firm has been an extremely important need for both managers as well as investors. Several tools were developed to diagnose the financial strength of a Company based on the Financial Statements. Ratio Analysis, and Decision Theory etc., but they indicate the present result not the future. Edward I. Altman's discriminant analysis, which employs a combination of various ratios to form an index of liquidity, profitability, sustainability and feasibility, has been highly accurate in analyzing the present state of financial health of a firm as well as to enable one to predict the future, particularly in terms of probability of bankruptcy. This paper attempts to investigate the financial health of selected Steel companies in India with special reference to Tata Steel Ltd., JSW Steel Ltd., Jindal Steel Ltd., and SAIL. The period of study is 7 years from 2008-09 to 2014-15. As per the calculated Z-Score, the financial position of SAIL, Tata Steel Ltd., and JSW Steel Ltd. Were found to be satisfactory. Jindal Steel Ltd. needs to put in effort to increase the score. The study concludes that the selected steel companies' overall financial health was satisfactory during the study period.

**Keywords:** steel sector, z-score model, ratio analysis, financial health

### Introduction

Indian steel industry is a century old. It was the first core sector to be completely freed from the licensing regime (1990-91) and the pricing and distribution control. Prior to liberalization public sector had a dominant share in steel production but after economic reforms the scenario changed. More of the private companies enter into the competition. However, the performance of public sector steel companies also remarkable in the post-liberalized era. Actually, financial health of any company decides its sustainability in long run. Financial ratio is useful measure to provide a snapshot of a company's financial position at any certain point of time or to provide a comprehensive idea about the financial performance of the company (Muresan and Wolitzer, 2004). It is not only useful to analysis the performance of a company over the years but also facilities the comparison between the companies under the same industry. Therefore, to determine the financial performance of the public sector steel units financial ratios are taken into account. Measuring the financial health of a firm has been an extremely important need for both managers as well as investors. In cases of manufacturing firms, continuous monitoring of the financial health is still more important, given the higher proportion of funds tied up in real assets. Edward I. Altman's discriminant analysis, which employs a combination of various ratios to form an index of liquidity, profitability, sustainability and feasibility, has been highly accurate in analyzing the present state of financial health of a firm as well as to enable one to predict the future, particularly in terms of probability of bankruptcy.

This paper has made a sincere attempt to analyze and predict the financial health/strength/soundness of the firm by adopting Altman's Z – Score in the selected firms from the Indian Steel industry.

### Literature Review

Ambika & Sengottaiyan (2015) <sup>[2]</sup> in their article on "Financial Health Of Selected Fertilizer Companies In India - A Z - Model Approach" made an attempt to know financial health and efficiency of the company using data collected for the period of 1999-2012 and from secondary sources. Using statistical tool likemean, Z-score of selected 6 companies from public sector and 8 companies from private sectors, revealedthat SPICL has sound financial performance during the period. Kannadhasan (2015) <sup>[6]</sup> made an attempt to evaluate and predict financial health of company using z-score model. The data is collected from secondary sources for the period 2000-05. He has found that the company's overall financial performance is found to be good during the study period. Selvi & Dheenadhayalan (2014) <sup>[8]</sup> conducted a study with the objective to measure financial health of selected 7 bulk drugs and formulation companies in India through z-score model. The data is collected from the secondary sources like journal, annual reports for the period 2000-2012 They have concluded that z-score of Cipla Ltd has been increased during the period. Rooh Ollah Arab & Georgee (2014) <sup>[9]</sup> made an attempt to evaluate financial strength of selected 5 sample companies of steel sector in India. The data is collected from the secondary sources for the period 2003-2013. They has concluded that for short term solvency only quick ratio andfor long term solvencyall ratios found to be satisfactory. Sinkuand Kumar (2014) conducted a study aim to measure and predict the financial health and efficiency of SAIL through Z-Score model during 2005 to 2010 and found that overall health of SAIL is good. Shrabanti Pal (2013) have made an attempt to analyses the financial health, areas of weakness, suggestion for improvements for selected two public companies like Steel Authority of India Limited and Rastriya Ispat Nigam Limited. He found that overall liquidity

performance of SAIL and RINL is good for both companies. Edward Altman (1968) <sup>[1]</sup> used multiple discriminant analysis (MDA) to build a bankruptcy prediction model. Altman made use of five ratios to develop a Z-Score which helped in the prediction of the financial health of a company. Altman found that his five ratios outperformed Beaver's (1966) cash flow to total debt ratio. His study was based on 60 firms in general.

**Research Methodology**

**Objectives of study**

- The study has been conducted with the following objectives:
- To evaluate the financial efficiency and performance of selected steel companies in India
  - To forecast financial health of the sample companies.

**Data Collection and Period of the study**

The study is based on secondary data collected from the published Annual Reports of selected Four companies of steel sector in India i.e. SAIL, Tata Steel Ltd., JSW Steel Ltd. And Jindal Steel Ltd., The study cover the period of five years from 2008-09 to 2014-15.

**Tools and techniques used**

The data have been tabulated and then analyzed and interpreted with the help of Altman's Z-Score Model as developed by Prof. Altman and Ratios Analysis.

**Altman's Multiple Discriminate Analysis Model (Z-Score Analysis)**

About 40 years ago, Edward I. Altman, a financial economist at New York University's Graduate School of Business, developed a model for predicting the likelihood that a company would go bankrupt. This model uses five financial ratios that combine in a specific way to produce a single number. This number, called the Z= score is a general measure of corporate financial health. The most famous failure prediction model is Altman's Z-Score Model. Based on Multiple Discriminate Analysis (MDA), the model predicts a company's financial health based on a discriminate function of the firm. The following is the Model given by Altman:

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 0.99 X_5$$

**Where:**

- Z = Discriminate function score of a firm
- X<sub>1</sub> = Working Capital / total assets
- X<sub>2</sub> = Retained earnings / total sales
- X<sub>3</sub> = Earnings before interest and taxes / total assets
- X<sub>4</sub> = Market value of equity / book value of total liabilities or reciprocal of debt- equity ratio,
- X<sub>5</sub> = Sales / total assets

The five ratios used in the model are as follows:

**Working Capital to Total Assets (X<sub>1</sub>)**

This is a measure of the net liquid assets of the firm in relation to total assets. This liquidity ratio, which records net liquid assets relative to total capitalization, is the most valuable indicator of a looming business disaster. Consistent operating losses will cause current assets to shrink relative to

total assets. A negative ratio, resulting from negative networking capital, is a serious problem. This ratio is computed with the help of the following formula.

$$\text{Working Capital to Total Assets} = \text{Working Capital} / \text{Total Assets} * 100$$

**Retained Earnings to Total Assets (X<sub>2</sub>)**

This is a more significant factor. The age of a firm is implicitly considered in this ratio. New firms are likely to have low figures for this ratio, because they have not had time to build up their cumulative profits. A negative ratio is a warning sign of cloudy skies. However, results can be distorted by manipulated retaining earnings data. To calculate this ratio the following formula was applied

$$\text{Retained Earnings to Total Assets} = \text{Retained Earnings} / \text{Total Assets} * 100$$

**EBIT to Total Assets (X<sub>3</sub>)**

This ratio is a measure of the true productivity of the firm's assets. 1 To calculate this ratio the following formula was applied

$$\text{EBIT to Total Assets} = \text{EBIT} / \text{Total Assets} * 100$$

**Market Value of Equity to Book value of Debt (X<sub>4</sub>)**

This ratio measures the market perception of the firm's performance which is reflected in market value. This ratio is computed with the help of the following formula.

$$\text{Equity to Debt} = \text{Market value of Equity} / \text{Book value of Debt} * 100$$

**Sales to Total Assets (X<sub>5</sub>)**

The sales turnover ratio measures the firm's ability in utilizing its assets. Higher ratio is an indicator of better performance and poor ratio indicates underutilization of assets. This ratio is computed with the help of the following formula.

$$\text{Sales to Total Assets} = \text{Sales} / \text{Total Assets} * 100$$

**Table 1: Altman's Guidelines for Healthy Zone**

Situation	Z- Score	Zone	
I	Below 1.8	Not Healthy	Failure is Certain
II	Between 1.8 To 2.99	Healthy	Uncertain to predict (Grey Area)
III	More Than 3.00	Too Healthy	No or Little Chances of failure

To interpret the resultant Z-Score, the following criterion is used

1. Firms with a Z-Score greater than 2.99 are considered to be safe and thus have a relatively remote risk of bankruptcy.
2. Firms with a Z-Score between 1.81 and 2.99 are less clear, existing in a grey area where a clear statement cannot be made.
3. Firms with a Z-Score less than 1.81 are considered to be in distress and thus at higher risk of bankruptcy.

**Data Analysis and Interpretation**

- Following table shows the five ratios used in the Altman's Model for SAIL ltd. From 2008-09 to 2014-15:

**Table 2:** Ratios Used In Altman Model for SAIL

Year	X1=WC/TA	X2=RE/TA	X3=EBIT/TA	X4=MVE/BVTD	X5=S/TA
2008-09	0.63	0.14	0.27	3.7	1.21
2009-10	0.58	0.10	0.21	2.01	0.81
2010-11	0.43	0.069	0.13	1.9	0.76
2011-12	0.28	0.048	0.10	2.4	0.81
2012-13	0.23	0.021	0.067	1.8	0.70
2013-14	0.17	0.026	0.062	1.6	0.69
2014-15	0.16	0.017	0.053	1.45	0.63
Mean	0.35	0.06	0.13	0.21	0.80

An analysis of average of the working capital to total assets of SAIL is 0.35%, the retained earnings to total assets ratio indicates the proportion of retained earnings to the total assets, the average of retaining is 0.06% of its total assets, the ratio of earnings before interest and tax (EBIT) to total assets

is 0.13%, the market value of equity compared to book value of total debt is 2.1times and the average sales compared to total assets is 0.80.

- Following table shows the five ratios used in the Altman's Model for Tata Steel Ltd. ltd. From 2008-09 to 2014-15.

**Table 3:** Ratios Used In Altman Model for Tata Steel Ltd.

Year	X1=WC/TA	X2=RE/TA	X3=EBIT/TA	X4=MVE/BVTD	X5=S/TA
2008-09	-0.01	0.08	0.16	0.88	0.43
2009-10	0.02	0.08	0.14	1.4	0.38
2010-11	0.01	0.09	0.16	1.7	0.40
2011-12	-0.05	0.08	0.15	2.2	0.44
2012-13	-0.06	0.06	0.11	2.1	0.47
2013-14	-0.08	0.08	0.13	2.3	0.47
2014-15	-0.05	0.07	0.11	2.5	0.44
Mean	-0.03	0.077	0.137	1.86	0.43

The ratio of working capital to total assets of Tata Steel Ltd. is -0.03% which indicates poor liquidity position over a period of study. The retained earnings to total assets ratio indicates the proportion of retained earnings to the total assets, the average of retaining is 0.077% of its total assets, The ratio of earnings before interest and tax (EBIT) to total

assets is 0.13%. The market value of equity compared to book value of total debt is 1.86 times and the average sales compared to total assets is 0.43

- Following table shows the five ratios used in the Altman's Model for JSW ltd. From 2008-09 to 2014-15.

**Table 4:** Ratios Used In Altman Model for JSW Steel Ltd.

Year	X1=WC/TA	X2=RE/TA	X3=EBIT/TA	X4=MVE/BVTD	X5=S/TA
2008-09	-0.15	0.02	0.07	0.70	0.72
2009-10	-0.09	0.08	0.17	0.83	0.85
2010-11	0.004	0.06	0.13	1.6	0.83
2011-12	-0.1	0.05	0.10	1.5	1.01
2012-13	-0.03	0.04	0.04	1.20	0.97
2013-14	-0.11	0.02	0.09	0.97	0.91
2014-15	-0.22	0.04	0.11	0.99	0.89
Mean	-0.070	0.044	0.101	1.11	0.88

An analysis of average of the working capital to total assets of JSW is -0.070, the retained earnings to total assets ratio indicates the proportion of retained earnings to the total assets, the average of retaining is 0.044 of its total assets, the ratio of earnings before interest and tax (EBIT) to total assets

is 0.101, the market value of equity compared to book value of total debt is 1.11times and the average sales compared to total assets is 0.88.

- Following table shows the five ratios used in the Altman's Model for Jindal ltd from 2008-09 to 2014-15.

**Table 5:** Ratios Used In Altman Model for Jindal Steel Ltd.

Year	X1=WC/TA	X2=RE/TA	X3=EBIT/TA	X4=MVE/BVTD	X5=S/TA
2008-09	0.16	0.13	0.21	1.09	0.73
2009-10	0.10	0.09	0.14	0.80	0.15
2010-11	0.16	0.07	0.15	0.75	0.47
2011-12	-0.15	0.07	0.13	0.75	0.52
2012-13	-0.06	0.04	0.09	0.63	0.46
2013-14	-0.11	0.03	0.07	0.57	0.40
2014-15	-0.04	0	0.03	0.47	0.34
Mean	0.0085	0.061	0.117	0.72	0.44

An analysis of average of the working capital to total assets of Jindal Steel Ltd. is 0.0085, the retained earnings to total assets ratio indicates the proportion of retained earnings to the total assets, the average of retaining is 0.061of its total assets, the

ratio of earnings before interest and tax (EBIT) to total assets is 0.117, the market value of equity compared to book value of total debt is 0.72times and the average sales compared to total assets is 0.44.

**Table 6:** Z-Score of Sample Companies

Year	Sail	Tata Steel Ltd.	JSW Steel Ltd.	Jindal Steel Ltd.
2008-09	5.27	1.58	1.21	2.45
2009-10	3.5	1.81	1.91	1.33
2010-11	2.9	2.08	2.3	1.7
2011-12	2.98	2.3	2.1	1.31
2012-13	2.3	2.1	1.84	1.11
2013-14	2.09	2.29	1.68	0.88
2014-15	1.89	2.33	1.87	0.67
Mean	3.044	2.07	1.86	1.35

**Mean Value Wise Classification of the selected steel Companies: Z-Score Analysis**

The following Table-7 expressed the result of Z-score based on the mean value classification in different zones.

**Table 7:** Mean Value Wise Classification

Steel companies	Z-Score financial health	Zone
SAIL	3.044	Too healthy
Tata Steel Ltd.	2.07	Healthy
JSW Steel Ltd.	1.86	Healthy (Grey Zone)
Jindal Steel Ltd.	1.35	Not healthy

**Findings of Study**

- From the above study, it is found that Z-Score of SAIL was highest in year 2008-09 and lowest in the year 2014-15, but overall financial health of SAIL is found to be in too healthy zone which is good sign of financial strength of SAIL.
- Tata Steel Ltd. has highest Z-Score in 2014-15 but it has shown an increasing trend over all the years except 2012-13 and it is found to be in healthy zone.
- The Z-Score of JSW Steel Ltd. was highest in 2010-11 i.e. 2.3 but found to have fluctuating trend as regards to its Z-Score. Overall financial position of JSW Steel Ltd. has been found to be in grey zone.
- The z-score of Jindal Steel Ltd. was highest in 2008-09 i.e.2.45 but throughout the period it has a fluctuating trend. Financial position of Jindal Steel Ltd. is found to be unsatisfactory and also found that there was high risk of bankruptcy.

**Conclusion**

Assessment of financial position and health of the firm is a very crucial point for shareholders. All the decision of firms is taken on the basis of financial soundness of a firm. Under this background Altman’s Z-Score dominates for deciding the financial bankruptcy of a firm and there by a firm can easily judge its financial condition. The present study is conducted with the parameters of liquidity, profitability, sustainability, feasibility to compare the financial performance of select firms of steel industry. As per the calculated Z-Score, the financial position of SAIL, Tata Steel Ltd., and JSW Steel Ltd. is found to be satisfactory. Jindal Steel Ltd. needs to put in effort to increase the score. The study concludes that the selected steel companies’ overall financial health was satisfactory during the study period.

**References**

1. Altman EI. Financial Ratios, Discriminate Analysis and the Prediction of Corporate Bankruptcy. Journal of Finance. 1968.
2. Ambika Sengottaiyan T. Financial Health of Selected Fertilizer Companies In India - AZ - Model Approach, International Journal of Research in Economics & Social Science. 2015, 5(8). ISSN: 2249-7382.
3. Gururaj Barki, Sadanand Halageri. Analysis of Financial Strength of select firms from Indian Textiles Industry using Altman’s “Z” Score Analysis, Acme Intellects International Journal of Research in Management Technology & Science. 2014, 5(5). ISSN: 2320-2939P, ISSN: 2320-2793O.
4. Jignesh, Togadiya, Utkarsh Trivedi. “A Study on Financial Health of Kingfisher Airlines Ltd: (Z- Score Approach)”, International Journal of Research In Commerce, IT & Management. 2012, 2(8). ISSN: 2231-5756.
5. Kavitha KS, Palanivelu P. An Analysis on Financial Health of NSE Listed Steel Industries, International Journal Of Scientific Researchers. 2013, 2(9). ISSN: 2277-8179.
6. Kannadhasan M. Measuring Financial Health of a Public Limited Company Using ‘Z’ Score Model - A Case Study, Research Gate. 2015.
7. Muresan ER, Wolitzer P. Organize Your Financial Ratio Analysis with P A L M S, Working. 2004, 02-01. September 20, 2004, <http://papers.ssrn.com>
8. Selvi R, Dheenadhayalan V. An Analysis of Financial Health of Select Indian Bulk Drugs and Formulations Companies”, Journal of Executives Management Science. 2014, 3(7). ISSN: 2277-5684.
9. RoohOllah Arab, Georgee K. An Analysis of the Financial Strength of Steel Industry in India International Journal of Research. 2014, 11. ISSN: 2348-6848.
10. SenthilVadivu S, Mani Mehalai N. A Study on Financial Health of Select Indian Pharmaceutical Companies, Peer Reviewed International Journal. 2014. ISSN: 2347-5587.
11. Sanjay Pandey, Vijay Verma, Vikas Jain. Measuring Financial Soundness of Indian Telecom Companies – A Comparative Analysis, International Journal of Management. 2013, 2(2). ISSN: 2277-5846.
12. Sumita Sinku, Prashant Kumar. Analysis of Financial Health of Steel Authority of India Limited”, Industrial Engineering Letters. 2014, 4(4). ISSN: 2224-6096P, ISSN: 2225-0581O.

13. Vikas Tyagi. A Study To Measures The Financial Health Of Selected Firms With Special Reference To Indian Logistic Industry: An Application of Altman's Z-Score, Industrial Engineering Letters. 2014, 4(4). ISSN: 2224-6096 P, ISSN: 2225-0581.