

Capital Structure and Altman's Z score of Indian Capital goods Industry- Empirical Analysis

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Abstract

The present paper is to investigate the effect of capital structure on Altman's Z score of Capital goods industry in India. This study is based on the secondary data, collected from annual reports of the BSE 200 listed companies and applied content analysis. Mean, Standard Deviation, Correlation coefficients and linear regression analysis have been used. Edward Altman's Z score was calculated and applied as modern solvency variable with Debt equity, EPS and Book Value per share. This study found that the capital structure has no any impact on Altman Z score, but Z score is determined to the extent of 63.7% by debt equity at 1% levels and Earnings per share at 10% levels of selected Capital goods industry in India.

Keywords: Capital structure, Debt equity, current ratio, book value per share, Altman's Z score and Capital goods industry.

Introduction

Capital structure refers to the combination of long term funds required for an organization. Capital structure role is important because it affect the financial performance of the company. It is a mix of long term debts and owner's equity. Capital structure the way a company finance itself by combining long term debt, short term debt and equity, is one of the most important themes in corporate finance(Jothi,2010). Financial structure refers to the composition of the entire liabilities of the firm, where as Capital structure is the permanent financing of the firm represented primarily by long term debts and shareholders' funds but excluding all short term credit. Capital structure decision is used to examine, its impact factor on the value of firm. The use of debt in Capital structure leads toward finance cost. EBIT – EPS technique analysis is generally applied to determine an appropriate capital structure of the firm.

Capital Structure

“Capital structure encompasses a corporation's publicly issued securities, private placements, bank debt, and trade debt, leasing contracts, tax liabilities, pension liabilities, deferred compensation to management and employees, performance guarantees, product warranties and other contingent liabilities. This list represents the major claims to a corporation's assets. Increase or reduction in any of these claim represent a form of capital structure change.” There may be four fundamental patterns of capital structures. They are 1) Equity

share capital only, including Reserves and Surplus. 2) Equity share capital and Preference share capital. 3) Equity, preference share capital and long term debts. 4) Equity share capital and long term debt. Long term debt includes debentures, Bonds and loans from financial institutions. It is an overall policy decision about the proportion of various sources of long term finance and it provides qualitative decision in nature. Corporate Governance has mainly focused three principles namely, Accountability, Transparency and equality of treatment for all stakeholders. Accountability is not only for the shareholders, creditors and employees but also applicable to the Board of directors. Transparency is important for good corporate governance. It

should not be like Satyam, because the concern felt down by the improper maintenance of books accounts. SEBI introduced clause 49 to ensure the disclosures of the listed companies. Corporate excellence includes higher contribution to investors and money lenders based on required capital structure of the organization. Corporate governance is the social, legal and economic process in which companies function and are held accountable. It is the system by which companies are run (Cadbury Committee Report). Corporate governance insists the manner to organize its functions guided by the board of directors for value addition to the stakeholders and to make impression about the possible growth of the concern.

Table 1: Capital Employed of Capital Goods Industry in India (in crores)

Year	Shareholder Fund	Loan Fund	Capital Structure	Changes (%)
2009-10	44,133.00	8,274.00	52,407.00	-
2010-11	53,604.00	8,647.00	62,251.00	0.18
2011-12	64,066.00	11,272.00	75,338.00	0.21
2012-13	74,728.00	13,750.00	88,478.00	0.17
2013-14	83,573.00	19,022.00	1,02,595.00	0.16
2014-15	89,646.00	19,361.00	1,09,007.00	0.06

Solvency Health measurement

Leonard N Stern school of Business of New York university professor Edward I Altman published formulae to access the probability that a firm will go bankruptcy within two years. Edward Altman derived business ratios, weighted by coefficient with the help of multi-discriminant analysis. Z score = $1.2X_1 + 1.4 X_2 + 3.30 X_3 + 0.60 X_4 + 0.99X_5$

where X_1 stands for Working Capital / Total Assets, X_2 stands for Retained Earnings / Total Assets, X_3 stands for EBIT / Total Assets, X_4 stands for Market capitalization / Total Liabilities and X_5 stands for Sales / Total Assets. Altman stated that when the score is below 1.80 means failure is certain, Between 1.80 to 2.99 means uncertain is predict and above 2.99 means solvency is too healthy.

Table -2: Edward Altman's Z score of Capital goods Industry in India

Company Name	Year	X_1	X_2	X_3	X_4	X_5	Z Score
Bharat Electronics	2009-10	0.877	0.982	0.223	01.60	01.19	5.31
	2010-11	0.889	0.981	0.228	01.75	01.12	5.36
	2011-12	0.887	0.983	0.191	01.86	01.02	5.21
	2012-13	0.881	0.984	0.177	02.10	0.965	5.24
	2013-14	0.878	0.987	0.167	02.33	0.89	5.27
	2014-15	0.882	0.988	0.186	03.73	0.87	6.16
BHEL	2009-10	0.747	0.961	0.419	04.59	2.15	8.52
	2010-11	0.725	0.971	0.447	0.576	2.08	6.13
	2011-12	0.760	0.976	0.406	0.395	1.88	5.73
	2012-13	0.809	0.940	0.300	01.02	1.520	5.41
	2013-14	0.838	0.912	0.144	01.36	1.095	4.66
	2014-15	0.851	0.984	0.065	01.25	0.883	4.24
Crompton Greaves Ltd	2009-10	0.298	0.905	0.518	9.35	3.01	11.94
	2010-11	0.267	0.942	0.413	7.63	2.65	10.23
	2011-12	0.363	0.956	0.262	3.29	2.41	07.01
	2012-13	0.405	0.957	0.203	2.88	2.33	06.56
	2013-14	0.519	0.957	0.223	2.64	2.22	06.48
	2014-15	0.583	0.832	0.203	2.29	1.68	05.58

Larson and Toubro	2009-10	0.200	0.729	0.279	4.65	1.47	06.44
	2010-11	0.216	0.776	0.231	3.58	1.56	05.81
	2011-12	0.276	0.745	0.208	1.88	1.59	04.77
	2012-13	0.327	0.782	0.207	2.35	1.64	05.51
	2013-14	0.391	0.742	0.185	2.98	1.26	05.17
	2014-15	0.371	0.747	0.164	2.59	1.15	04.73
Havells India Ltd	2009-10	0.094	0.882	0.241	02.78	01.97	05.056
	2010-11	0.020	0.886	0.228	03.21	01.99	05.936
	2011-12	0.056	0.907	0.245	04.18	02.12	06.775
	2012-13	0.138	0.914	0.246	05.20	02.14	07.518
	2013-14	0.205	0.904	0.273	07.65	02.06	09.056
	2014-15	0.165	0.957	0.274	07.72	02.16	09.232
Pipavav	2009-10	0.17	0.330	0.009	0.240	0.210	1.32
	2010-11	0.30	0.295	0.048	0.260	0.250	1.34
	2011-12	0.41	0.265	0.070	0.310	0.396	1.67
	2012-13	0.23	0.211	0.068	0.368	0.406	1.42
	2013-14	0.15	0.23	0.07	0.411	0.327	1.30
	2014-15	0.13	0.15	-0.0008	0.59	0.101	0.82
Thermax Ltd	2009-10	0.157	0.98	0.30	2.00	2.92	6.64
	2010-11	0.34	0.94	0.43	1.99	3.62	7.91
	2011-12	0.326	0.89	0.34	1.99	3.00	6.98
	2012-13	0.223	0.98	0.28	2.00	2.49	6.23
	2013-14	0.225	0.90	0.19	1.99	1.94	5.26
	2014-15	0.17	0.98	0.22	2.00	2.04	5.52

Review of Literature

V N Parthiban (2011) explained three principles of Corporate Governance namely accountability, transparency and equality of treatment and its value addition to the stakeholders of the corporate sector and concluded that the directors are architects and guide in order to create goodwill and board members should act on a fully informed basis, in good faith with diligence and care. **Akinmulegun Sunday Ojo (2012)** have examined the effects of financial leverage measured by (Debt-Equity ratio) on Earnings per Share (EPS) and Net Assets per Share (NAPS). Author used panel data on effect of leverage on performance indicators of some corporate firms in Nigeria during 1993 and 2005 with employed econometric technique of Vector Auto Regression (VAR) on the variables and create that leverage shock on EPS indirectly affect the NAPS. Leverage so considerably affects Corporate Performance. **Dr. D P Singh (2012)** examined working capital management and profitability in the IT and Telecom industry in India by using Working capital ratio, Sales to Total Asset ratio, Cash conversion cycle and selected 11 companies in India and applied Karl Pearson's coefficient correlation and Regression analysis based on pooled observations and concluded that working capital turnover ratio, Sales to Total Assets ratio and ROCE has positive significant relationship with profitability of both IT and Telecom Industry in India and also observed that Telecom industry is operating below average so far as working capital management concerned. **Shailesh et al (2013)** examined capital structure practices with its effect on

profitability of top 5 pharmaceutical companies in India, listed on BSE for the period of 5 years and used operating profit margin ratio, ROCE, RONW and Debt to Equity ratio and tested through regression analysis and t test and concluded that firms profitability of pharmaceutical firms in India, is insignificant in bringing about any changes in their capital structure.. **Dr. Shiv Prasad et al (2013)** examined the financial health of ITDC, public sector undertaking in India and concluded that the financial health was in the too healthy zone during 2007, 2008 and 2009, which have come to gray area due to recession in tourism sector, global crisis and terrorist attack at Mumbai. **Dr Jothi Jayakrishnan et al (2015)** studied the relationship between fourteen capital structure determinants and its effects on capital structure of fifty chemical companies in India for the period of six years from 2000-2013 and concluded that profitability, uniqueness and manufacturing sources are the positive determinants, but tax and retained earnings are negative determinants of the capital structure of the selected chemical companies in India. **Parul Khanna et al (2015)** studied the capital structure and its returns through analyzing the CG practices of Nifty 50 companies with regard to Board of directors and its composition, shareholder grievances committee and handling of investor's complaints and explained about clause 49 of the listing agreement and concluded that 82% of the companies are not having pendency with respect to investor's complaint redresses. **Tahir Akhtar et al (2016)** investigated the effect of capital structure on firm performance of Karachi stock exchange listed companies under Textiles industry, using the agency

cost hypothesis and reverse causality hypothesis and concluded that ownership structure and leverage had positive relationship. Agency cost hypothesis supported the positive effect of leverage on efficiency.

Statement of the Problem

This study was descriptive in nature and expands the knowledge in the area of impact of capital structure on Altman Z score is that considerable attention in the financial literature in India. The statement of problem is Capital Structure and Altman's Z score of Indian Capital goods generation industry in India.

Objectives of the study

1. To calculate the Capital structure and Altman Z score of selected companies
2. To find the relationship between Capital Structure with Solvency variables of selected companies
3. To check whether solvency variables have any cause and effect relationship with Altman's Z score of selected companies.
4. To check whether Capital structure has any cause and effect relationship with Altman's Z score of selected companies.

Null Hypothesis

1. There is no significant relationship between capital structure and solvency variables of capital goods industry in India
2. There is no significant relationship between capital structure and Altman Z score of capital goods industry in India

3. That the solvency variables has no any cause and effect relationship with Altman's Z score of selected companies
4. That the Capital structure has no any impact on Altman's Z score of capital goods industry in India

Research Design

The study is based on the secondary data collected from annual reports of the BSE 200 Listed companies belong under this industry were 10 Companies. They were ABB Ltd, Bharat Electronics, BHEL, Crompton Greaves, Havells India, Larson and Toubro, Pipavav Defence, Siemens, Suzlon Energy and Thermax Ltd. Out of which ABB India Ltd, Siemens Ltd and Suzlon Energy Ltd (Loss) were not furnished required data for the study period in addition to applied content analysis Nazli et al., 2003, Tamoi et al., 2007, Md Abdur Rouf 2011. Secondary data was collected from the annual reports of selected companies and websites of moneycontrol.com, BSE.com etc for the period of Six years, which ended on 31st March. The period of the study is 2009-10 to 2014-15. Capital employed was treated as Capital Structure of the selected companies which comprises equity share capital, preference share capital along with reserves and surplus and long term debts (Tahir Akhtar 2016). Altman's Z score (Dr Shivprasad 2013) was computed by author based on the Edward Altman derived business ratios, weighted by coefficient with the help of multi-Discriminant analysis and used as modern solvency variable. Debt equity ratio (Sunday Ojo 2012, Shailesh 2013), Book Value and EPS were used as control variables. For the analysis Mean, Standard Deviation, Correlation coefficients and regression analysis have been used for its validity.

Analysis and Interpretations

Table 3: Descriptive Statistics of selected variables of Capital goods industry in India

Variables	Company Name	Mean	Std Dev	Skewness
Capital Employed	Bharat Electronics	01.83	0.408	-2.449
	BHEL	4.83	0.408	-2.449
	Crompton Greaves Ltd	1.00	0.00	-
	Havells Ltd	1.00	0.00	-
	Larson and Toubro Ltd	4.83	0.408	-2.449
	Pipavav Defence	1.00	0.00	-
	Thermax Ltd	1.00	0.00	-
	Capital Goods Industry	2.21	1.71	0.922
Current ratio	Bharat Electronics	01.69	0.164	0.772
	BHEL	1.53	0.178	1.133
	Crompton Greaves Ltd	1.61	0.369	1.385
	Havells Ltd	1.22	0.167	-0.558
	Larson and Toubro Ltd	1.248	0.084	-0.269
	Pipavav Defence	0.811	0.224	0.689
	Thermax Ltd	1.12	0.055	0.259
	Capital Goods Industry	1.32	0.35	0.203
Debt Equity ratio	Bharat Electronics	-	-	-
	BHEL	0.025	0.327	1.234
	Crompton Greaves Ltd	0.03	0.06	2.372
	Havells Ltd	0.068	0.029	-0.565

	Larson and Toubro Ltd	0.316	0.029	-1.063
	Pipavav Defence	1.77	0.835	0.816
	Thermax Ltd	0.05	0.043	0.341
	Capital Goods Industry	0.388	0.725	2.557
Book Value Per share	Bharat Electronics	753.68	163.45	0.195
	BHEL	206.52	128.93	1.119
	Crompton Greaves Ltd	44.90	12.95	0.149
	Havells Ltd	130.63	53.59	-1.037
	Larson and Toubro Ltd	384.67	57.63	0.218
	Pipavav Defence	27.61	2.60	0.631
	Thermax Ltd	141.35	38.48	-0.222
	Capital Goods Industry	241.34	251.87	1.463
EPS	Bharat Electronics	112.52	18.62	01.17
	BHEL	47.76	46.76	1.056
	Crompton Greaves Ltd	9.20	1.81	0.230
	Havells Ltd	26.23	11.82	-0.639
	Larson and Toubro Ltd	67.31	9.50	-0.151
	Pipavav Defence	-0.725	2.14	-2.216
	Thermax Ltd	26.15	8.27	-1.203
	Capital Goods Industry	41.20	40.86	0.959
Altman Z score	Bharat Electronics	5.42	0.363	2.34
	BHEL	6.09	1.46	1.47
	Crompton Greaves Ltd	8.24	2.70	0.665
	Havells Ltd	6.86	1.53	0.472
	Larson and Toubro Ltd	5.54	0.635	0.393
	Pipavav Defence	1.31	0.27	-1.013
	Thermax Ltd	6.60	0.97	-0.090
	Capital Goods Industry	5.65	2.36	-0.042

Table 3 showed that the mean value of capital employed of the industry is 2.21. BHEL and Larson and Toubro Ltd has got higher than the industry level but all other companies have showed lower than the industry level. It shows that the capital employed of the industry was not normally distributed. The mean value of Current ratio of the industry is 1.32. Bharat electronics ltd, BHEL and Crompton Greaves Ltd have showed higher the industry level which indicates that these companies applied proper working capital management. The mean value of Debt equity is 0.388, the Pipava defence Ltd have higher than the industry

level and it shows that higher debts than the other companies in this industry. Mean value of Book value per share is 241.34, Bharat Electronics and Larson and Toubro Ltd had higher than the industry level, but other companies show lesser than the average level of the industry. Mean value of EPS is 41.20. Bharat electronics, BHEL and Larson and Toubro have higher than the industry level. Mean value of Altman z score is 5.65. It means the solvency level of the industry is very high, but Pipavav defence Ltd only shows bankruptcy level.

Table 4: Correlation coefficient of Capital structure with solvency variables

		Capital Employed	Current ratio	Debt equity	EPS
Current ratio	Pearson Correlation	0.242	1.000		
	Sig. (2-tailed)	0.127	-		
Debt equity	Pearson Correlation	-0.217	-0.645	1.000	
	Sig. (2-tailed)	0.211	0.000	-	
EPS	Pearson Correlation	0.377	0.418	-0.358	1.000
	Sig. (2-tailed)	0.014	0.007	0.035	-
Altman Z score	Pearson Correlation	-0.045	0.341	-0.736	0.147
	Sig. (2-tailed)	0.776	0.029	0.000	0.353

Table 4 showed that the correlation coefficient between capital structure and EPS is significant at 5% level. Current ratio have significant relationship with Debt equity ratio, EPS and Altman Z score too. Debt equity ratio has significant relationship with EPS and Altman Z score.

Hence author accepts the null hypothesis-1 and rejects the null hypothesis - 2 and concluded that capital structure has no any significant relationship with solvency variables and Altman Z score has significant relationship at 5% levels.

Table 5: ANOVA Table

Model	Sum of square	df	Mean square	F value	Sig
Regression	145.230	5	29.046	9.827	0.000 ^a
Residual	82.757	28	2.956		
Total	227.987	33			

Table -6 Regression Analysis Table

Model	Unstandardized coefficient		Standardized coefficient	t	Sig
	B	Std. Error			
(Constant)	7.375	1.848		3.990	0.000
Capital structure	0.324	0.260	0.225	1.248	0.222
Current Ratio	0.022	1.296	0.003	0.017	0.986
Debt equity	-2.566	0.600	-0.719	-4.277	0.000
Earnings per share	0.051	0.026	0.587	1.966	0.059
Book value per share	0.009	0.006	0.475	1.460	0.156

a. Predictors: (Constant), Capital Employed, Current Ratio, Debt equity, EPS, Book Value per share

b. Dependent Variable: Z Score

Findings and Conclusion

Table 5 ANOVA table shows that the significance value is 0.000, which means dependent variable Z score have significantly predicted. Table 6 showed that the effect of capital structure and other solvency variables on Altman Z score is given by the regression equation, $Z \text{ score } (Y) = a + b_1 (\text{Capital structure}) + b_2 (\text{Current ratio}) + b_3 (\text{Debt equity}) + b_4 (\text{EPS}) + b_5 (\text{Book value per share})$. Debt equity ratio only has significant impact on Z score at 1% level, being the f value is 9.287. R square is 0.637. So author reject the null hypothesis 3 and stated that Debt equity have the cause and effect relationship at 1% level and EPS at 10% levels, and author accept the null hypothesis-4 and concluded that the Capital structure has no any impact on Altman's Z score of capital goods industry in India.

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Annexure -1:**1. Bharat Electronics**

S No	Solvency Variables	2014-15	2013-14	2012-13	2011-12	2010-11	2009-10
01	Current ratio	1.95	1.82	1.69	1.54	1.54	1.62
02	Debt Equity	-	-	-	-	-	-
03	EPS	145.91	116.45	111.23	103.74	107.68	90.11
04	Book Value per share	985.63	877.15	787.96	702.78	625.32	543.21
	Altman Z Score	6.164	5.271	5.249	5.21	5.362	5.306

2. BHEL

S No	Solvency Variables	2014-15	2013-14	2012-13	2011-12	2010-11	2009-10
1	Current ratio	1.85	1.59	1.57	1.47	1.38	1.37
02	Debt Equity	0.00	0.08	0.05	0.00	0.01	0.01
03	EPS	5.80	14.14	27.03	28.76	122.80	88.06
04	Book Value per share	139.26	135.02	124.38	103.67	411.71	325.06
	Altman Z Score	4.24	4.66	5.41	5.73	6.13	8.52

3. Crompton Greaves

S No	Solvency Variables	2014-15	2013-14	2012-13	2011-12	2010-11	2009-10
01	Current ratio	2.28	1.74	1.55	1.52	1.30	1.28
02	Debt Equity	0.16	0.01	0.00	0.00	0.01	0.02
03	EPS	11.67	8.31	6.95	7.87	10.82	9.62
4	Book Value per share	63.80	53.33	47.44	41.88	35.70	27.28
	Altman Z Score	5.58	6.48	6.56	7.01	10.23	11.94

4. Havells India Limited

S No	Solvency Variables	2014-15	2013-14	2012-13	2011-12	2010-11	2009-10
01	Current ratio	1.32	1.41	1.31	1.04	0.99	1.24
02	Debt Equity	0.02	0.07	0.06	0.06	0.10	0.10
03	EPS	7.45	38.35	29.76	24.48	19.40	37.92
04	Book Value per share	38.04	170.63	149.89	128.90	107.46	188.48
	Altman Z Score	09.23	09.06	07.52	06.77	05.93	05.06

5. Larson and Toubro

S No	Solvency Variables	2014-15	2013-14	2012-13	2011-12	2010-11	2009-10
01	Current ratio	1.34	-	1.27	1.31	1.15	1.17
02	Debt Equity	0.33	0.34	0.34	0.27	0.33	0.29
03	EPS	54.39	59.26	79.80	72.77	65.01	72.66
04	Book Value per share	399.00	363.00	473.00	412.00	358.00	303.00
	Altman Z Score	4.73	5.17	5.51	4.77	5.81	6.44

6. Pipavav Defence

S No	Solvency Variables	2014-15	2013-14	2012-13	2011-12	2010-11	2009-10
01	Current ratio	0.77	0.54	0.64	0.82	0.92	1.18
02	Debt Equity	3.17	1.98	2.10	1.41	1.20	0.81
03	EPS	-5.01	0.11	0.41	0.27	0.60	-0.73
04	Book Value per share	26.71	31.74	29.17	28.05	25.23	24.81
04	TA Turnover	0.10	0.33	0.41	0.40	0.24	0.21
	Altman Z Score	0.82	1.30	1.42	1.67	1.34	1.32

7. Thermax Limited

S No	Solvency Variables	2014-15	2013-14	2012-13	2011-12	2010-11	2009-10
01	Current ratio	1.13	1.06	1.18	1.20	1.11	1.08
02	Debt Equity	0.01	0.09	0.01	0.10	0.04	-
03	EPS	28.19	21.23	29.37	34.15	32.09	11.87
04	Book Value per share	190.24	169.94	156.88	134.38	108.46	88.19
	Altman Z Score	5.52	5.26	6.23	6.98	7.91	6.64