

Financial Soundness of Maharatna Companies : Application of Altman Z Score Model

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Abstract

Maharatna companies are the top most PSUs contributing greatly to the development of our nation and have existed for a long time and became self-sustained without depending on the government for funds. Recently, some of the companies have started losing profits continuously and are on the verge of bankruptcy. The government has been infusing funds to safeguard them, but is not able to improve their performance to the desired level. The purpose of this paper was to study the financial situation of eight Maharatna companies by applying the famous Altman Z score model to verify whether these companies really suffered financially during the period from 2014 to 2018. It was found that not all the Maharatna companies were performing as expected.

Keywords : Altman Z score, Maharatna, Navaratna, PSUs, bankruptcy

JEL Classification Codes : C53, G17, G21, G32, G33

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In the present world of globalization, the business environment is very much turbulent, and the manner in which the business operates is changing over time. With increasing competition and rising costs, many companies are on the verge of bankruptcy or becoming bankrupt. In light of this, it is very much important to measure the financial soundness of the enterprises to ensure the interest of the stakeholders. We can estimate the financial soundness of the companies by establishing the relationship between various financial variables. There are various studies, which attempted to study the nature of bankruptcies in various industries, and one of the most prominent among them was done by E.I. Altman, who developed the model named after him as the Altman's Z score model.

The Altman's Z - score test measures the likelihood of a publicly traded manufacturing company becoming bankrupt. The Z - score is calculated based on five financial ratios of a company, and uses profitability, leverage, liquidity, solvency, and activity to predict whether a company has high probability of becoming bankrupt.

Maharatna companies are the top most PSUs contributing greatly to the development of our nation. These companies have existed for a long time and became self-sustained without depending on the government for

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funds. In the recent past, some of them started reporting losses continuously and are on the verge of bankruptcy. The government has been infusing funds to safeguard them, but is not able to improve their performance to the desired level.

Review of Literature

Altman (1968) made an attempt to evaluate ratio analysis as an analytical technique. He took a sample of 66 firms in two mutually exclusive groups, namely 33 bankrupt firms and 33 non-bankrupt firms and developed the multiple discriminant analysis for manufacturing corporations. As per the author, ratio analysis is prone to faulty interpretations and can be analyzed subjectively, and therefore, a model has to be developed that aptly removes the possible ambiguities observed in traditional studies. He developed a model called the Altman's *Z* score model, which has been used extensively in various research studies.

Altman, Haldeman, and Narayanan (1977) developed a new model for identifying bankruptcy risks of the corporations. The model is named as the Zeta model, which considered the developments related to contemporary business failures, and was effective in classifying bankrupt companies up to 5 years prior to failure on a sample of corporations consisting of manufacturers and retailers.

Samarakoon and Hasan (2003) examined the ability of three versions of Altman's *Z* score model to predict bankruptcy of listed companies in Sri Lanka, and the results have shown that these models have a very high degree of accuracy in predicting corporate distress.

Jayadev (2006) provided empirical evidence on the acceptability of the *Z* - score model. The author used three forms of the model and estimated the coefficients in all the three equations on a sample of 112 companies. The results of the study revealed that Altman's model was capable of predicting default possibilities in most of the sample companies.

Gerantonis, Vergos, and Christopoulos (2009) took a sample of all listed companies on the Athens exchange for a period of 2002 - 2008 and concluded that failures can be predicted using the Altman's *Z* score model.

Hayes, Hodge, and Hughes (2010) attempted to construct and interpret *Z* score and apply it to the retail industry in the study period during 2007 and 2008. Their sample constituted the public retail companies which had assets greater than \$1,000,000 and had declared bankruptcy during 2007-2008. The results of the period under study accurately classified eight out of nine firms under investigation as bankrupt.

Ramaratnam and Jayaraman (2011) used Altman's *Z* score model for predicting, analyzing, and comparing the financial health of the major steel companies in India during 2006 - 2010 by applying ANOVA test for analyzing the consistency and stability of different ratios used in Altman's *Z* score.

Raiyani and Bhatsana (2011) studied the financial health of the textile industry in India by considering four major players during 2002 - 2009 and applied the Altman's *Z* score model to these companies for predicting, analyzing, and comparing the financial health of these companies.

Ray (2011) applied Altman's *Z* - score model on the Indian automobile industry to test the accuracy of the model in predicting bankruptcy cases in the industry for a study period from 2003-04 to 2009-10. The author considered a sample of 62 publicly traded companies listed on the Bombay Stock Exchange.

Reddy (2012) attempted to study the association between liquidity, profitability, and risk factors by employing Altman's *Z* score model on Dr. Reddy's Laboratories Ltd. during the time period from 2005 - 2011. As per the results of the study, the company was not suffering from financial distress.

Ahuja and Singhal (2014) applied the Altman's *Z* - score model to investigate the financial position of the companies operating in the Indian textile industry with a sample of 15 companies and concluded that the model can be used by banks to predict the signs of bankruptcy of firms and devise various strategies to overcome it.

Chatterjee (2018) made an attempt to compare the prediction accuracies of Altman's *Z* - score model and

Ohlson's *O* - score model in predicting financial distress for widely held large cap companies in India over a period of 2000 to 2013. The results of the study revealed that the prediction accuracy of Ohlson model was higher for predicting the financial distress for the companies ; whereas, the Altman model was highly accurate in predicting the overall financial health (both financial distress and non - distress) of the companies as well as in predicting the financial soundness (financial non - distress) of the companies. However, the Pearson chi - square test of significance revealed that the prediction accuracy of the Altman model in predicting financial soundness of widely held large cap companies in India was statistically significantly higher than that of the Ohlson model.

Objectives of the Paper

- (1) To investigate the financial performance of Maharatna companies with respect to selected ratios.
- (2) To study the relevance of ratios used in Altman's *Z* score model to predict the probability of a company becoming bankrupt.
- (3) To predict the possibility of bankruptcy of Maharatna companies using the Altman's *Z* score model.

Hypotheses of the Study

The hypotheses are stated in terms of various ratios used for calculating Altman's *Z* score as given below :

- ↵ **H1** : The *Z* score values are uniform for all the companies in the sample.
- ↵ **H2** : The working capital to total assets ratio is uniform among all the companies.
- ↵ **H3** : The retained earnings to total assets ratio is uniform among all the companies.
- ↵ **H4** : The EBIT to total assets ratio is uniform among all the companies.
- ↵ **H5** : The equity to total liabilities ratio is uniform among all the companies.
- ↵ **H6** : The sales to total assets ratio is uniform among all the companies.

Data Sources and Methodology

(1) Collection of Data : The study is based on secondary data analysis, and the data were collected from Bloomberg database and companies' annual reports during the study period from 2014 - 2018. The supporting data were collected from various other sources.

(2) Tools Used : The Altman's *Z* score model is used to predict the bankruptcy of the companies considered for the present study.

Altman's *Z* Score Model : The model is one of the important models used for predicting the possibility of bankruptcy of the companies. The *Z* - score is a set of financial ratios used in a multivariate context, based on a multiple discriminant model, which is a statistical technique used to classify and/or make predictions in problems where the dependent variable appears in qualitative form (Altman, 1968).

The formula for the standard *Z* - score for manufacturing firms is :

$$Z\text{- Score} = 1.2T_1 + 1.4T_2 + 3.3T_3 + 0.6T_4 + 0.999T_5$$

Altman Z Score

Weight	Factor	Ratio	Significance
1.2	A	Working capital / total assets	It measures the net liquid asset of a company relative to the total assets.
1.4	B	Retained earnings / total assets	It measures the financial leverage level of a company.
3.3	C	EBIT / total assets	It measures productivity of a company's total assets.
0.6	D	Equity / total liabilities	It measures what portion of a company's assets can decline in value before the liabilities exceed the assets.
0.999	E	Sales / total assets	It measures the revenue - generating ability of a company's assets.

Altman's Z Score	Zone	Interpretation
$Z > 2.99$	Safe Zone	The probability of bankruptcy is low and the company is healthy.
$1.81 < Z < 2.99$	Grey Zone	The probability of bankruptcy is average - a watchful eye should be kept on these companies before they enter into distress zone.
$Z < 1.81$	Distress Zone	The probability of bankruptcy is high.

T_1 = Working capital / total assets

T_2 = Retained earnings / total assets

T_3 = Operating earnings / total assets

T_4 = Market capitalization / total liabilities

T_5 = Sales / total assets

The Z - score model was developed originally for manufacturing firms by Altman, but the emergence of service companies prompted him to develop a second Z - score model for non-manufacturing companies. The formula just excludes the last component (sales / total assets) of the original one, because Altman wanted to minimize the effects of manufacturing-intensive asset turnover.

The formula for the Z - score in case of service firms is :

$$Z\text{-Score} = 1.2T_1 + 1.4T_2 + 3.3T_3 + 0.6T_4$$

The Z - score, though it is one of the many credit scoring models, is widely used in the present world as it combines quantifiable financial indicators with a minimum number of variables to predict the failure of a company financially. The Z - score has been proven to be one of the reliable models for predicting bankruptcy to the extent that analysts sometimes equate certain Z-scores with corresponding bond ratings. When Altman re-evaluated his methods by examining 86 distressed companies from 1969 to 1975, 110 bankrupt companies from 1976 to 1995, and later 120 bankrupt companies from 1996 to 1999, the Z - score was accurate between 82% and 94%. However, since it depends on the financial information of the company, any misleading information will yield an incorrect Z - score.

(3) Maharatna Companies : A state - owned enterprise in India is called a public sector undertaking (PSU) or a public sector enterprise, owned by the Union Government of India, or one of the many state or territorial governments, or both. These can be further classified as central public sector enterprises (CPSEs) and state level public enterprises (SLPEs). In 1951, there were just five enterprises in the public sector in India, which increased to 246 by March 1991. The direct holding of the Central government is 51% or more in CPSEs, and these are

administered by the Ministry of Heavy Industries and Public Enterprises. Some of the public sector enterprises have been provided with additional financial autonomy, by virtue of their comparative advantages, giving them greater autonomy to compete in the global market and to support them to become global giants.

Initially, the financial autonomy was awarded to nine PSUs and these were given the Navratna status in 1997. Later, in 2010, the government established a higher category called Maharatna, by raising the investment ceiling of a company from ₹ 1,000 crore to ₹ 5,000 crore. These firms can decide on investments of up to 15% of their net worth in a project ; whereas, the Navaratna companies could invest up to ₹ 1,000 crore without explicit government approval.

The new industrial policy during 1990s gave independence for profit making PSUs and restructuring of loss-making firms through the Bureau of Industrial Financing and Restructuring (BIFR). The other key decisions of the liberalization policy are free entry to private sector firms in industries reserved exclusively for PSUs, and disinvestment of a small part of the government's shareholding and listing PSUs on the stock exchanges.

Eligibility Criteria for Grant of Maharatna Status

The CPSEs should fulfill the following criteria to be eligible for grant of Maharatna status :

- (i) It should have Navratna status.
- (ii) It should be listed on stock exchanges in India with the minimum prescribed public shareholding under SEBI regulations.
- (iii) It should have an average annual turnover of more than ₹ 20,000 crore during the last 3 years.
- (iv) It should have an average annual net worth of more than ₹ 10,000 crore during the last 3 years.
- (v) It should have an average annual net profit of more than ₹ 2,500 crore during the last 3 years.
- (vi) It should have significant global presence or international operations.

The list of Maharatna CPSEs is given below :

- (i) Bharat Heavy Electricals Limited (BHEL)
- (ii) Coal India Limited (CIL)
- (iii) Gas Authority of India Limited (GAIL)
- (iv) Indian Oil Corporation Limited (IOCL)
- (v) National Thermal Power Corporation Limited (NTPC Limited)
- (vi) Oil & Natural Gas Corporation Limited (ONGC)
- (vii) Steel Authority of India Limited (SAIL)
- (viii) Bharat Petroleum Corporation Limited (BPCL)

Analysis and Results

The data of eight Maharatna companies are analyzed and the Z score is obtained for the period from 2014 - 2018 using the Altman's Z score model. The Table 2 shows the consolidated results of the Z score using Altman's Z score model. The Table 1 shows the mean Z score value of the companies during the last 5 years. As per the mean score,

Table 1. Altman's Z Score of Maharatna Companies

Name of the Company	2018	2017	2016	2015	2014	Mean	SD
CIL	2.423	3.656	3.612	3.439	3.246	3.275	0.503
BPCL	2.757	2.918	3.65	3.468	3.383	3.235	0.380
GAIL	2.119	2.161	2.156	1.947	2.053	2.087	0.089
IOCL	2.214	2.324	2.038	1.858	1.88	2.063	0.204
ONGC	0.614	0.876	0.91	0.941	1.071	0.882	0.167
SAIL	0.791	0.533	0.572	1.118	1.285	0.86	0.332
NTPC	0.652	0.676	0.733	0.859	1.05	0.794	0.164
BHEL	0.493	0.537	0.48	0.466	0.619	0.519	0.062
Mean	1.508	1.71	1.769	1.762	1.823	1.714	0.122
SD	0.952	1.216	1.313	1.156	1.029	1.133	0.144

Table 2. Altman's Z Score Model of the Companies

Z Score	Name of the Company
$Z > 2.99$	Coal India Limited, Bharat Petroleum Corporation Limited
$1.81 < Z < 2.99$	Gas Authority of India Limited, Indian Oil Corporation Limited
$Z < 1.81$	Oil and Natural Gas Corporation, Steel Authority of India Limited, National Thermal Power Corporation, Bharat Heavy Electricals Limited

Table 3. ANOVA (Single Factor) Results of Z - Score Points of Maharatna Companies from 2014 to 2018

Source of Variation	SS	df	MS	F	P-value	F-crit
Between Groups	43.5399	7.0000	6.2200	80.7329	1.62098E-18	2.3127
Within Groups	2.4654	32.0000	0.0770			
Total	46.0053	39.0000				

only two companies, namely Coal India Limited and Bharat Petroleum Corporation Limited have a score of $Z > 2.99$, which suggests that these companies are financially safe. However, the companies, namely Oil and Natural Gas Corporation, Steel Authority of India Limited, National Thermal Power Corporation, and Bharat Heavy Electricals Limited have an average Z score of less than 1.81, which indicates that these companies are not performing well and are in the bankruptcy zone.

From the Table 1, we can observe that Coal India Limited has the highest average Z score of 3.275, which is due to market capitalization, which was the highest during 2017, but decreased during 2018. Also, its EBIT was higher compared to other companies, but showed a declining trend during 2018. Bharat Petroleum Corporation Limited has the second highest Z score of 3.235, which is due to its EBIT and sales.

The Table 3 shows the results of ANOVA single factor Z-scores for the Maharatna companies. As per the Table 3, the calculated value of $F(80.7329)$ is greater than the critical value (2.3127) at the 95% confidence level, and the value of p is less than alpha. Hence, H_0 is rejected and it can be interpreted that the Z score values are not uniform for all the companies in the sample.

Detailed Analysis of Various Variables of Altman's Z Score

The Table 4 - Table 13 provides the detailed analysis of the variables used for Altman's Z score model. The Table 4

shows the working capital to total assets ratio, which reflects the operational efficiency of the companies. The ratio of all the companies shows a declining trend, with most of the values being negative, which indicates the companies' inability to meet their current obligations.

The Table 6 provides the ratio of retained earnings to total assets, which is an indicator of the extent to which the assets of a company have been financed by retained earnings. The results indicate that for most of the companies, the ratio shows an increasing trend, which is good for the companies. However, for BHEL, the ratio is negative, which indicates that the company borrowed debt in excess of retained earnings to finance its assets.

The Table 8 shows the analysis of EBIT to total assets, which indicates how efficiently a company is using its

Table 4. Ratio of Working Capital to Total Assets

Name of the Company	2018	2017	2016	2015	2014	Mean	SD
BHEL	0.328	0.372	0.374	0.385	0.364	0.365	0.022
CIL	0.017	0.123	0.206	0.384	0.372	0.22	0.159
ONGC	-0.096	0.043	0.058	0.053	0.054	0.022	0.066
GAIL	0.004	0.014	-0.002	0.011	0.036	0.012	0.014
NTPC	-0.028	-0.042	-0.02	0.035	0.081	0.005	0.051
BPCL	-0.079	-0.1	-0.048	-0.034	0.015	-0.049	0.044
IOCL	-0.117	-0.138	-0.043	-0.004	-0.003	-0.061	0.063
SAIL	-0.121	-0.195	-0.145	-0.06	-0.016	-0.107	0.070
Mean	-0.011	0.01	0.048	0.096	0.113	0.051	0.053
SD	0.147	0.179	0.166	0.181	0.160	0.167	0.014

Table 5. ANOVA (Single Factor) Results of Working Capital to Total Assets Ratio of Maharatna Companies from 2014 to 2018

Source of Variation	SS	df	MS	F	P-value	F - crit
Between Groups	0.8955	7.0000	0.1279	23.3276	7.08435E-11	2.3127
Within Groups	0.1755	32.0000	0.0055			
Total	1.0710	39.0000				

Table 6. Ratio of Retained Earnings to Total Assets

Name of the Company	2018	2017	2016	2015	2014	Mean	SD
GAIL	0.502	0.489	0.472	0.452	0.449	0.473	0.023
SAIL	0.213	0.236	0.287	0.339	0.359	0.287	0.063
IOCL	0.306	0.302	0.038	0.017	0.028	0.138	0.152
CIL	0.083	0.165	0.056	0.136	0.200	0.128	0.059
BPCL	0.078	0.041	0.075	0.057	0.046	0.059	0.017
ONGC	0.050	0.044	0.050	0.046	0.070	0.052	0.010
NTPC	0.033	0.038	0.050	0.045	0.038	0.041	0.007
BHEL	-0.002	-0.007	-0.009	0.033	0.052	0.013	0.028
Mean	0.158	0.163	0.128	0.140	0.155	0.149	0.014
SD	0.172	0.171	0.165	0.164	0.165	0.167	0.004

Table 7. ANOVA (Single Factor) Results of Retained Earnings to Total Assets Ratio of Maharatna Companies from 2014 to 2018

Source of Variation	SS	df	MS	F	P-value	F - crit
Between Groups	0.8596	7.0000	0.1228	30.5767	1.92905E-12	2.3127
Within Groups	0.1285	32.0000	0.0040			
Total	0.988143	39				

assets to generate earnings before interest and taxes. The results indicate that the ratio for all the companies shows a decreasing trend, which is an alarming situation, and needs to be taken care of.

The Table 10 indicates the detailed analysis of equity to total liabilities, which indicates whether a company has sufficient net worth to meet the total debt obligations. This ratio is directly related to the market capitalization of the companies, which in turn depends upon the trends in the stock markets, which are affected by the macro - economic factors. The results reveal that the ratio for most of the companies shows an increasing trend, which is a good sign, but for few of them, it decreased, which needs to be analyzed in light of the macro-economic factors.

The Table 12 shows the analysis of sales to total assets, which measures the effectiveness with which a firm uses its total assets to generate sales revenue. Except for SAIL and CIL, the ratio for other companies shows a decreasing trend. It indicates that these companies are not able to utilize their assets to generate sales revenue.

The Table 5 shows the results of ANOVA single factor for working capital to total assets ratio for the Maharatna companies. As per the Table 5, the calculated value of F (23.3276) is greater than the critical value (2.3127) at the 95% confidence level, and the value of ' p ' is less than alpha. Hence, H_2 is rejected and it can be interpreted that the working capital to total assets ratio is not uniform among all the companies.

Table 8. Ratio of EBIT to Total Assets

Name of the Company	2018	2017	2016	2015	2014	Mean	SD
CIL	0.490	0.761	0.778	0.627	0.626	0.657	0.117
BPCL	0.112	0.122	0.147	0.158	0.152	0.138	0.020
GAIL	0.120	0.126	0.131	0.102	0.109	0.118	0.012
ONGC	0.099	0.117	0.114	0.113	0.135	0.116	0.013
IOCL	0.116	0.126	0.119	0.077	0.032	0.094	0.040
NTPC	0.063	0.065	0.064	0.066	0.091	0.070	0.012
BHEL	0.025	0.026	0.010	-0.017	0.030	0.015	0.019
SAIL	0.020	-0.025	-0.048	0.039	0.044	0.006	0.041
Mean	0.131	0.165	0.164	0.146	0.152	0.152	0.014
SD	0.151	0.247	0.257	0.201	0.197	0.211	0.043

Table 9. ANOVA (Single Factor) Results of EBIT to Total Assets Ratio of Maharatna Companies from 2014 to 2018

Source of Variation	SS	df	MS	F	P-value	F - crit
Between Groups	1.5369	7.0000	0.2196	96.2644	1.13846E-19	2.3127
Within Groups	0.0730	32.0000	0.0023			
Total	1.6099	39.0000				

Table 10. Ratio of Equity to Total Liabilities

Name of the Company	2018	2017	2016	2015	2014	Mean	SD
CIL	1.076	1.249	1.184	1.166	0.735	1.082	0.204
NTPC	0.185	0.213	0.242	0.270	0.326	0.247	0.054
SAIL	0.095	0.089	0.107	0.120	0.146	0.111	0.023
GAIL	0.127	0.098	0.057	0.053	0.056	0.078	0.033
ONGC	0.066	0.104	0.076	0.067	0.068	0.076	0.016
IOCL	0.056	0.030	0.018	0.016	0.013	0.026	0.018
BPCL	0.030	0.021	0.015	0.015	0.014	0.019	0.007
BHEL	0.024	0.017	0.015	0.014	0.012	0.016	0.005
Mean	0.207	0.228	0.214	0.215	0.171	0.207	0.022
SD	0.355	0.418	0.399	0.394	0.251	0.363	0.067

Table 11. ANOVA (Single Factor) Results of Equity to Total Liabilities Ratio of Maharatna Companies from 2014 to 2018

Source of Variation	SS	df	MS	F	P-value	F-crit
Between Groups	4.5715	7.0000	0.6531	112.0281	1.13118E-20	2.3127
Within Groups	0.1865	32.0000	0.0058			
Total	4.7580	39.0000				

Table 12. Ratio of Sales to Total Assets

Name of the Company	2018	2017	2016	2015	2014	Mean	SD
BPCL	2.358	2.569	3.110	2.900	2.792	2.746	0.292
IOCL	1.510	1.636	1.632	1.579	1.733	1.618	0.082
GAIL	0.941	0.988	1.031	0.933	0.990	0.976	0.040
SAIL	0.516	0.467	0.437	0.515	0.570	0.501	0.051
ONGC	0.292	0.314	0.349	0.398	0.421	0.355	0.055
NTPC	0.321	0.331	0.329	0.375	0.405	0.352	0.036
CIL	0.022	0.016	0.008	0.019	0.013	0.016	0.005
BHEL	0.006	0.005	0.003	0.006	0.004	0.005	0.001
Mean	0.746	0.791	0.863	0.841	0.866	0.821	0.052
SD	0.822	0.901	1.060	0.977	0.960	0.944	0.089

Table 13. ANOVA (Single Factor) Results of Sales to Total Assets Ratio of Maharatna Companies from 2014 to 2018

Source of Variation	SS	df	MS	F	P-value	F-crit
Between Groups	31.0932	7.0000	4.4419	354.2126	1.86667E-28	2.3127
Within Groups	0.4013	32.0000	0.0125			
Total	31.4945	39.0000				

The Table 7 shows the results of ANOVA single factor for retained earnings to total assets ratio for the Maharatna companies. As per the table, the calculated value of F (30.5767) is greater than the critical value (2.3127) at the 95% confidence level, and the value of p is less than alpha. Hence, H3 is rejected and it can be interpreted that the retained earnings to total assets ratio is not uniform among all the companies.

The Table 9 shows the results of ANOVA single factor for EBIT to total assets ratio for the Maharatna companies. As per the Table 9, the calculated value of F (96.2644) is greater than the critical value (2.3127) at the 95% confidence level, and the value of p is less than alpha. Hence, H4 is rejected and it can be interpreted that the EBIT to total assets ratio is not uniform among all the companies.

The Table 11 shows the results of ANOVA single factor for equity to total liabilities ratio for the Maharatna companies. As per the table, the calculated value of F (112.0281) is greater than the critical value (2.3127) at the 95% confidence level, the value of p is less than alpha. Hence, H5 is rejected and it can be interpreted that the equity to total liabilities ratio is not uniform among all the companies.

The Table 13 shows the results of ANOVA single factor for sales to total assets ratio for the Maharatna companies. As per the table, the calculated value of F (354.2126) is greater than the critical value (2.3127) at the 95% confidence level, and the value of p is less than alpha. Hence, H6 is rejected and it can be interpreted that the sales to total assets ratio is not uniform among all the companies.

Conclusion

Sound financial health is an important requirement for the survival and growth of a business. Since crucial business decisions are taken keeping in mind the financial capability of the firm, it is important to select and use optimal tools to analyze and predict financial strength of the firms. Altman's Z score is one of the effective models, which helps in judging the financial position of the firm and predicting bankruptcy.

A planned and bolder roadmap for gradually getting the government out of the business must be prepared with a hard look at the real economic benefits from some of the profit-making state-owned firms as well. For now, India could leave the Maharatnas which hold about one-third of the total assets of all PSUs in state hands, but with a plan to make them world - class companies.

Research Implications

Many studies have been conducted to predict the bankruptcy of firms by using Altman's Z score model. However, these studies were limited to a particular sector or industry only. No research was conducted on predicting the bankruptcy of Maharatna companies, and hence, the present study is different in relation to previous studies conducted in this area.

The findings of the study can be used as an indicator for predicting the bankruptcy of the firms as the Altman's Z score is an important tool for credit risk assessment. Banks and financial institutions can use this tool while assessing the borrower companies during the period of financial crisis in the companies, and devise strategies by detecting the early signs of bankruptcy. From the perspective of borrower companies, the evidences of the empirical research can be used to assist the management to forecast financial distress and take appropriate measures to overcome the situation of bankruptcy.

Limitations of the Study and Scope for Further Research

The study covers only Maharatna companies, which are limited in number, as the Maharatna status was given to only eight PSUs during the period of the study. Another limitation is that the study covers only a period of

5 years - from 2014 to 2018. Very few or no research has been conducted on Maharatna PSUs till date. Hence, the results of the research could be used by researchers willing to work on the given subject area.

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