

Z score Estimation for Indian Companies With Reference To CNX Nifty Index of National Stock Exchange

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Abstract:- This study is an attempt to provide an empirical relationship of Z score across various index of CNX Nifty Index. The researchers try to analysis the relationship between Z score values and performance of Sectoral index of CNX Nifty Index. The secondary data has been used for the study from CNX Nifty index for the period of seven years from 2010 to 2016. The Z score value of Automobile sector, Infrastructure sector of CNX Nifty Index shows the companies are not in productive and possibility of insolvency will occur if the companies are not taken necessary steps to strengthen their financial position. At the same time, the Z score value of Pharmaceutical sector, Petroleum sector, Energy & FMCG sector and IT and Telecommunication sector shows a favourable response for investments.

Key words: Z score, Sectoral Index, Automobile, Infrastructure.

1. INTRODUCTION

The Z score are used as tool to evaluative the creditability of the firms. It uses profitability, leverage, liquidity, solvency and activity to predict whether a company has a high degree of probability of being insolvent. The Z-Score was developed in 1968 by Edward I. Altman, an Assistant Professor of Finance at New York University, as a quantitative balance-sheet method of determining a company's financial health. In 2012, he released an updated version called the Altman Z-score Plus that can be used to evaluate public and private companies, manufacturing and nonmanufacturing companies, and U.S. and non-U.S. companies. The Altman Z-score Plus can be used to evaluate corporate credit risk.

Importance of Z score Model:

Altman Z score is to measure the financial health of the company and predict the probability that the company will collapse in few years. It is proven by using ratios like probability, leverage, liquidity, solvency and activity to predict whether a company has high probability of being insolvent.

Altman Z score Model

$$Z = 1.2 \times \left[\frac{\text{Working Capital}}{\text{Total Assets}} \right] + 1.4 \times \left[\frac{\text{Retained Earnings}}{\text{Total assets}} \right] + 3.3 \times \left[\frac{\text{EBIT}}{\text{Total Assets}} \right] + 0.6 \times \left[\frac{\text{Market Cap}}{\text{Total Liabilities}} \right] + 0.99 \times \left[\frac{\text{Sales}}{\text{Total Assets}} \right]$$

The interpretation of the Z score results:

- **When Z is ≥ 3.0** , the firm is most likely safe based on the financial data.

- **When Z is 1.8 to 3.0**, the company is probably safe from bankruptcy, but this is in the grey area and caution should be taken.
- **When Z is ≤ 1.8** , the company is highly likely to be bankrupt.

The metrics used in the Z score are as follows.

1. Working Capital/Total Assets (WC/TA)

This ratio provides information about the short term financial position of the business. It is a measure of a firm's liquidity or short term health.

2. Retained Earnings/Total Assets (RE/TA)

This ratio captures the capital structure of a company by dividing Retained Earnings (the portion of net income not paid out as dividends but kept for reinvestment into the business) with Total Assets. The lower the RE/TA ratio the more the company funds its assets by borrowing as opposed to retained earnings which increases it chances of bankruptcy. The ratio is also a proxy for a firm's age, i.e. older companies will have more Retained Earnings than younger companies.

3. Earnings before Interest and Taxes/Total Assets (EBIT/TA)

This ratio is a measure of the "true productivity of the firm's assets, independent of any tax or leverage factors (Altman 2000)." A lower ratio indicates a company has declining earning power (lower EBIT) and insolvency occurs when total liabilities begin eroding that earning power.

4. Market Value of Equity/Book Value of Total Liabilities (MVE/TL)

The market value of equity is the market capitalization thus the ratio can be rewritten as Market Capitalization/Total Liabilities (MC/TL). A ratio above one is good as that entails that Total Liabilities have not exceeded the market value of the firm but the higher the ratio the better financial condition of the company.

5. Sales/Total Assets (S/TA)

This ratio is an efficiency metric used to gauge how good a company is at using assets to generate sales. It is also known as Asset Turnover. The higher the number the more efficient a company is at generating sales. If a company is taking on more debt, it better be efficient at using those assets to generate sales because inefficiency in generating sales can quickly lead to bankruptcy as there will be less revenue to pay back the debt.

The paper is divided into four sections. Section I gives about the introduction about the Altman z score and its evaluation. Section II explains about the review of literature related to Altman Z score. Section III describes methodology and results of the nifty indexed companies. Section IV brings forth the finding and future scope of the research.

2. REVIEW OF LITERATURE

Murray Z. Frank & Vidhan K Goyal in their paper titled capital structure decisions examined the relative importance of publicly traded U.S firms by using Z score. It is useful to the stakeholder for their investment. The sample consists of nonfinancial U.S. firms from 1950-2000. The result shows that dividend paying firms have lower leverage than non-dividend paying firms and high interest rate is associated with an increase in leverage.

Tom Arnold and John H Earl, Jr, in their article titled Applying Altman's Z-Score in the Classroom to analysis the ratio analyses of bond rating and its bankruptcy. They develop a model to analysis Z score in Excel spread sheet. They collected data from yahoo finance and Security and Exchange commission website. The results shows richer context to discuss risks that corporate faces. Further, it gives reliable information for assessing investment decisions.

The secondary data has been used for the study from CNX Nifty index for the period of sevenyears from 2010 to 2016 taken from CMIE database.

Findings of the study

Table 1: Z score value of Automobile sector of CNX Nifty Index

Companies	2010	2011	2012	2013	2014	2015	2016
Bajaj Auto Ltd.	6.664091	6.029004	6.318368	5.122511	5.680835	5.436731	4.771524
Bosch Ltd.	3.178011	4.597822	4.928605	3.923756	5.400765	4.659825	5.294078

Edward I Altman in his article titled corporate distress prediction model in a turbulent economic and basel II environment to find out credit assessment using Z score model and The Expected Default Frequency (EDF) model.

Warren Miller in his article titled comparing models of corporate Bankruptcy prediction: Distance to Default Vs. Z score. He thought to find a relationship between the results Z score and bankruptcy of the company. The found out that it has less stable rating.

Peng Wang & Larry Kochard in their article entitled Using a Z score approach to combine value and momentum in tactical asset allocation. They combined model of short term effect and long term effect of Z score.

Sanobaranjum in his study "Business bankruptcy prediction models Asignificant study of the altman's Z score model" He has studied about the authors who have done their study of univariate and multiple discriminant analysis and discussion of their results.

Edward I Altman, Alessandro Danovi and Alberto Falini in their article titled Z score model application to Italian companies subject to extraordinary administration. They divide the results into safe zone, grey zone and Distress zone. The results are compared with credit rating agencies.

Scope of the Study

This study is an attempt to provide an empirical relationship of Z score across various index of CNX Nifty Index. Hence, the study proposes to seek answers to the following question. Is there any relationship between Z score and performance of the companies?

3. OBJECTIVES OF THE STUDY

- To analysis the relationship between Z score valuesand performance of Sectoral index of CNX Nifty Index.
- To identify the companies which are scored low Z value in CNX Nifty Index.

Hypothesis

H0: There is no relationship between Z score of the companies and performance of the companies in CNX Nifty Index.

H2: There is a relationship between Z score of the companies and performance of the companies in CNX Nifty Index.

Methodology

Eicher Motors Ltd.	4.273026	5.481114	6.958096	8.166924	14.19585	9.286214	7.925815
Hero Motocorp Ltd.	5.236651	6.589385	6.019828	6.850153	7.946447	6.204863	5.684158
Larsen & Toubro Ltd.	2.742416	1.986229	2.231035	2.154493	2.263542	1.934218	2.003849
Mahindra & Mahindra Ltd.	3.545609	3.286582	3.660301	3.294377	3.307938	3.13745	2.976898
Maruti Suzuki India Ltd.	3.923547	2.886003	3.244792	3.178502	3.66642	4.420846	4.284677
Tata Motors Ltd.	1.890382	1.760992	1.874884	1.82533	1.923597	1.960577	1.948809

From the table 1, depict the Z score value of Automobile sector of CNX Nifty Index. The companies like Bajaj Auto Ltd, Bosch Ltd, Eicher motors ltd, Hero Motocorp Ltd, Mahindra & Mahindra Ltd and Maruthi Suzuki India Ltd companies are in safe position i.e., more than 3 as Z score in more of the financial years. The companies like Larsen & Toubro Ltd and Tata Motors Ltd are scored the range between 1.8 to 3 as Z score. It shows the companies are not in productive and possibility of insolvency will occur if the companies are not taken necessary steps to strengthen their financial position.

Figure:1 Z score value of Automobile sector of CNX Nifty Index

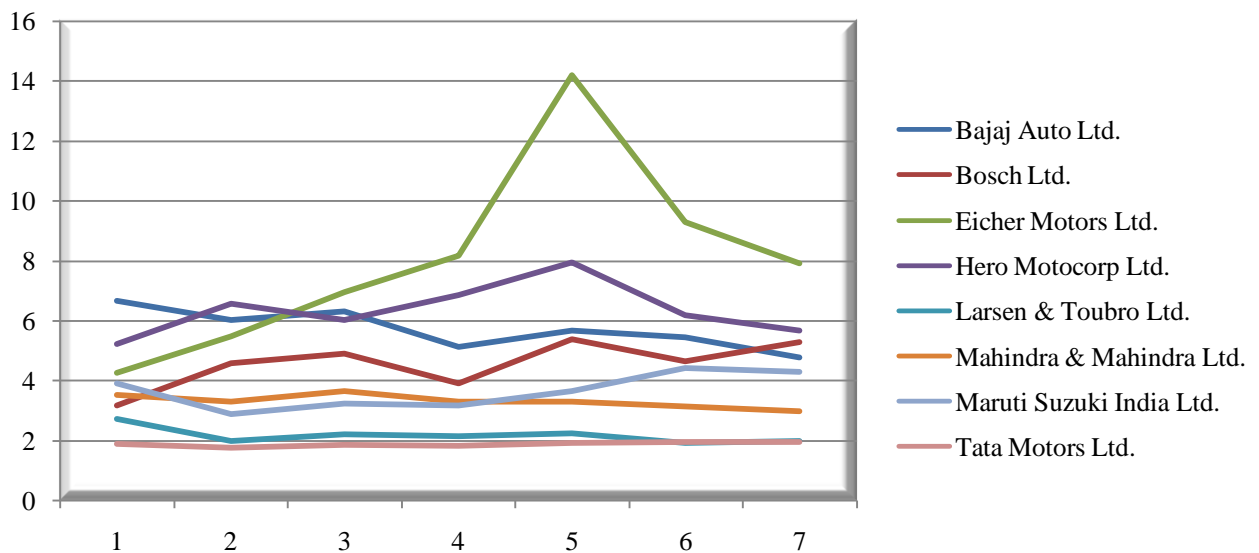


Figure 1 shows the Z score value of automobile sector of CNX Nifty index Eicher Motors Ltd shows highest score of 14 points and Tata Motors Ltd shows lowest score of 1.9 points.

Table 2: Z score value of Infrastructure sector of CNX Nifty Index

Companies	2010	2011	2012	2013	2014	2015	2016
Ambuja Cements Ltd.	2.964862	3.071327	3.570134	3.082083	3.322246	2.901882	1.919171
Asian Paints Ltd.	7.717598	6.471626	7.740022	7.373866	9.255354	8.974031	7.983543
Bharti Infratel Ltd.	0.989829	1.178441	1.682039	1.451996	2.618556	2.882522	2.448625
Housing DptFinancecorpn.	0.505	0.392231	0.470235	0.307651	0.38088	0.358949	0.372961
Tata Steel Ltd.	1.400261	1.092298	1.068083	1.052183	1.003923	0.692008	0.99253
Ultratech Cement Ltd.	2.333864	2.664927	2.847647	2.464637	2.473141	2.314317	2.683767

From the table 2, depict the Z score value of Infrastructure sector of CNX Nifty Index. Except the company Asian paints ltd all other companies are in risk, especially Housing development Finance corporation ltd and Tata Steel ltd has Z score less than 1. It shows it has high corporate risk in all the years.

The companies like Ultratech Cement ltd, Bharti Infratel Ltd and Ambuja cement Ltd has shown acceptable points which are in the range of 1.8 to 3. Indian Infrastructure companies arenot safe for investments.

Figure:2Z score value of Infrastructure sector of CNX Nifty Index

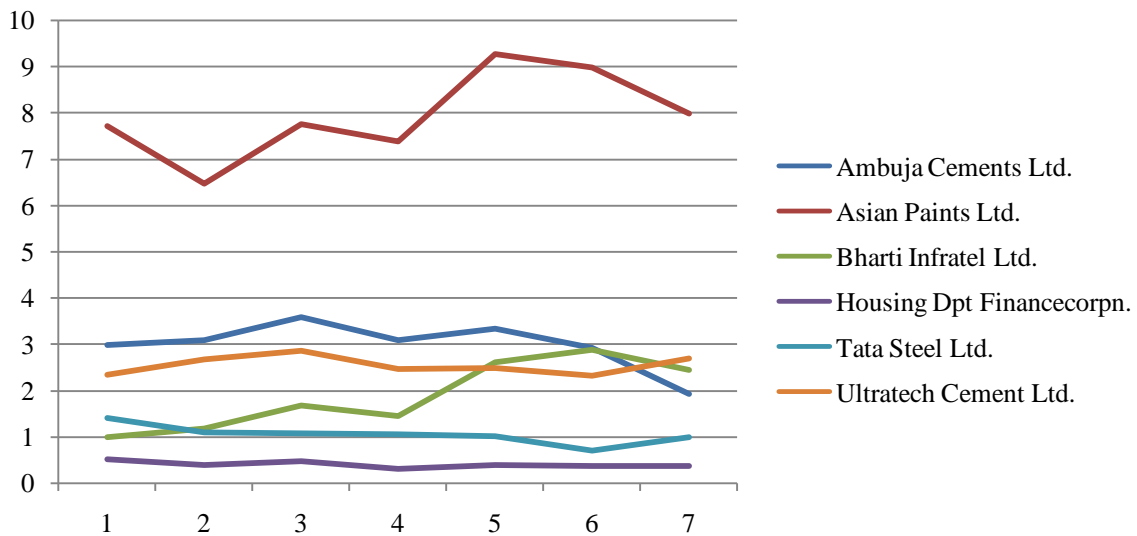


Figure 2clearly depicts the Z score value of Infrastructure sector of CNX Nifty index. It shows except Asian paints Ltd all other companies are in the range of 0 to 3 points.

Table 3: Z score value of Pharmaceutical sector of CNX Nifty Index

Companies	2010	2011	2012	2013	2014	2015	2016
AurobindoPharma Ltd.	2.330592	1.179228	2.021312	2.870791	3.973571	4.194479	3.490301
Cipla Ltd.	3.767653	3.587501	3.571984	2.913148	3.118357	3.224666	3.008388
Dr.Reddy'S Laboratories Ltd.	2.968585	2.902813	2.864937	3.251138	3.198406	3.400224	3.333348
Lupin Ltd.	4.167457	3.794392	4.768671	5.843333	6.218063	5.864909	4.4495
Sun Pharmaceutical Inds. Ltd.	5.735178	4.888528	5.7484	4.338498	2.646324	3.408043	2.739371

From the table 3, shows the Z score value of Pharmaceutical sector of CNX Nifty Index. The Pharmaceutical sector shows a favourable response for investments. The companies like sun pharmaceutical industries ltd, Lupin Ltd, Cipla ltd and Dr Reddy's laboratories ltd shown a Z score of more than 3 points. AurobindoPharma Ltd also shows a good sign except some few years. (2010-2012).

Table 4: Z score value of Petroleum sector of CNX Nifty Index

Companies	2010	2011	2012	2013	2014	2015	2016
Bharat Petroleum Corp. Ltd.	3.334911	3.76615	4.351788	4.494592	4.538764	3.978339	3.560791
Hindustan Petroleum CorpnLtd	2.698927	2.941199	3.139445	3.459317	3.860442	3.651678	3.619111
Indian Oil Corp. Ltd.	2.63577	2.540629	2.616605	2.522856	2.666246	2.32387	2.403171
Oil & Natural Gas Corp. Ltd.	2.251087	2.103291	2.011386	1.935233	1.947904	1.493621	1.41479

From the table 4, shows the Z score value of Petroleum sector of CNX Nifty Index. The Bharat Petroleum corporation ltd and Hindustan Petroleum corporation ltd are safe in the point of investment. At the same time, the Indian oil corporation ltd and oil and natural gas corporation ltd are scored the range of 1.8 to 3 points. Especially oil and natural gas Corporation is scored less than 1.8 points in recent years. It shows the company is going to face huge financial liquidity in the near future.

Table 5: Z score value of Energy & FMCG sector of CNX Nifty Index

Companies	2010	2011	2012	2013	2014	2015	2016
G A I L (India) Ltd.	3.080448	2.314258	2.070117	2.113781	2.031755	1.773836	1.924356

Hindustan Unilever Ltd.	7.190094	8.279661	9.658434	9.454975	11.26751	11.93422	11.05459
N T P C Ltd.	1.84826	1.560017	1.452854	1.258848	1.138942	1.001764	0.968487
Power Grid Corpn. Of India Ltd.	0.863056	0.726552	0.660664	0.572402	0.606372	0.650407	0.77153
Reliance Industries Ltd.	2.327941	2.415256	2.400681	2.13531	1.784163	1.235195	1.164544

From the table 5, shows the Z score value of Energy & FMCG sector of CNX Nifty Index. Hindustan Unilever Ltd is the only company which has good Z score ranges from 7 to 11 points. Power Grid Corporation of India ltd and NTPC ltd has scored less than 1.8 Z score values. It shows very poor financial position of those companies and also not good for investment. The Reliance Industries ltd and GAIL India Ltd have in safe Z score ranges from 1.1 to 3.0 Z score.

Figure: 3Z score value of Energy & FMCG sector of CNX Nifty Index

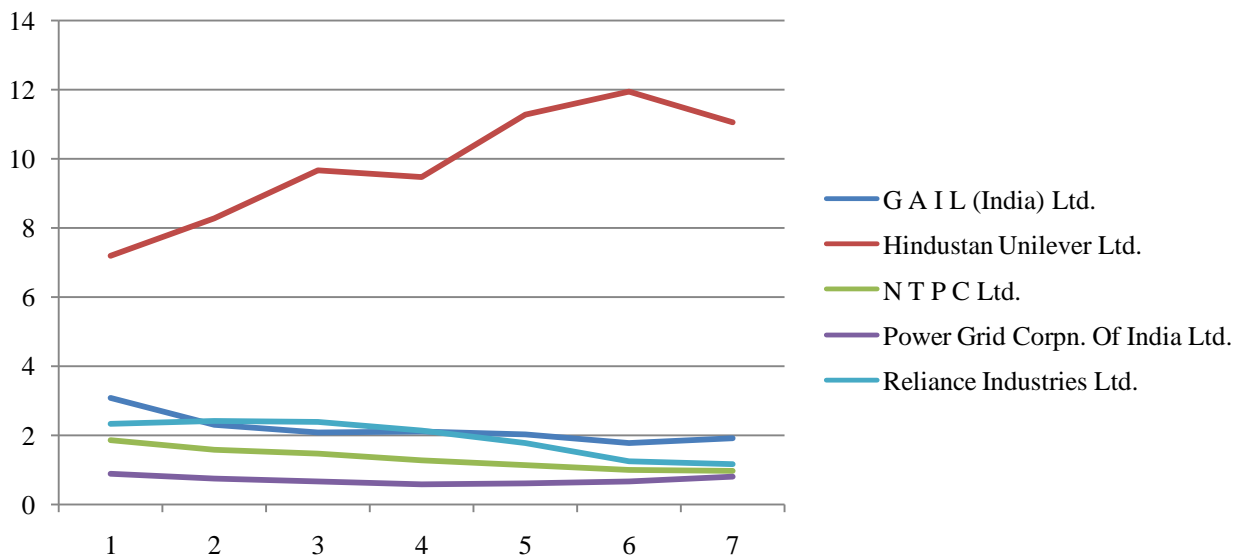


Figure 3 clearly depicts the Z score value of Energy & FMCG sector of CNX Nifty index. It shows except Hindustan Unilever Ltd all other companies are in the range of 0 to 3 points only.

Table 6: Z score value of Information Technology & Telecommunication of CNX Nifty Index

Companies	2010	2011	2012	2013	2014	2015	2016
Bharti Airtel Ltd.	2.174647	2.026236	1.750947	1.757007	1.738361	1.109516	0.68352
H C L Technologies Ltd.	3.682053	3.309329	3.706566	4.658682	4.515006	4.690129	4.22462
Infosys Ltd.	6.972315	5.744545	4.764408	5.032741	4.782632	4.411762	4.04123
Tata Consultancy Services Ltd.	8.053007	7.104985	6.567965	7.821726	7.824434	7.015188	6.25140
Tech Mahindra Ltd.	2.502271	2.118286	2.453525	4.251553	4.459359	3.778925	3.33642
Wipro Ltd.	4.115996	3.535514	3.48226	4.114472	3.722372	3.596417	3.29115

From the table 6, shows the Z score value of IT & Telecommunication sector of CNX Nifty Index. The IT and Telecommunication sector shows a significant sign for investors for their investment. All the companies (HCL technologies Ltd, Infosys Ltd, Tata Consultancy Services Ltd, Tech Mahindra Ltd and Wipro Ltd) have a Z score value of more than 3 points except Bharti Airtel ltd because last 5 years it has shown the range of 1.7 to 0.6 points as Z score.

Figure: 4Z score value of Information Technology & Telecommunication sector of CNX Nifty Index

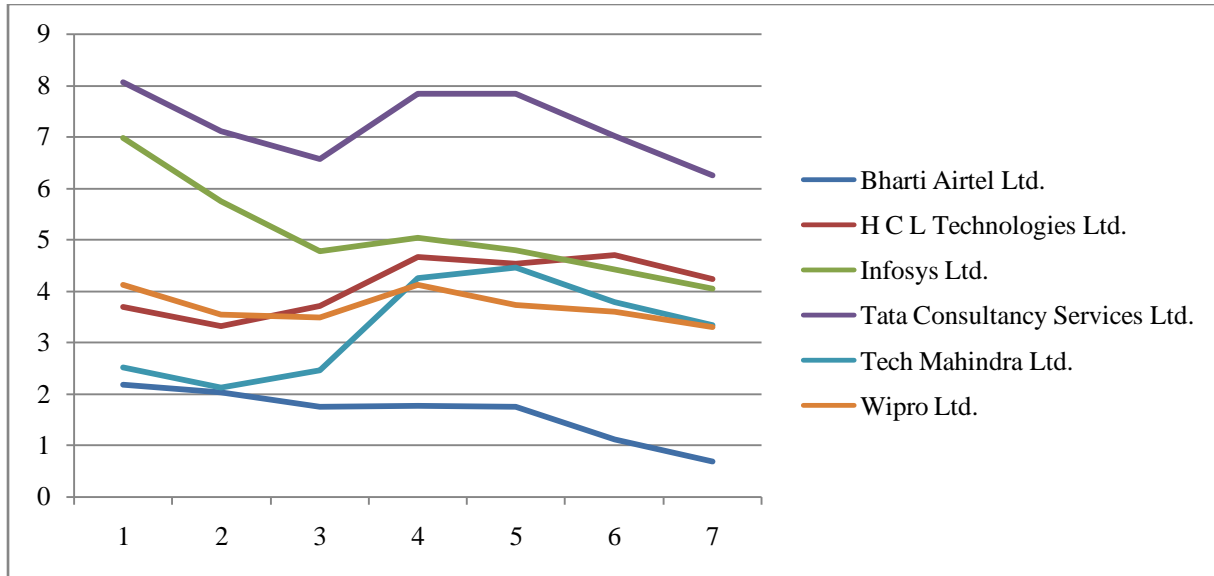


Figure 4 clearly depicts the Z score value of Information Technology & Telecommunication sector of CNX Nifty index. TCS Ltd shows a high Z score of 8 points. Next level goes to Infosys Ltd and HCL Technologies Ltd with a range of 4 to 6 points. Bharti Airtel Ltd shows a lowest point of 2 to 0.5.

Table 7: Z score value of Combined sector of CNX Nifty Index

Companies	2010	2011	2012	2013	2014	2015	2016
Adani Ports & Special Economic Zone Ltd.	2.703949	1.685889	1.783351	1.972615	2.333218	1.727051	1.623424
Coal India Ltd.	5.587767	5.341932	5.657007	6.785186	8.563776	8.665937	8.762869
Hindalco Industries Ltd.	1.642244	1.174313	1.045988	0.953519	1.067505	0.929637	1.054578
I T C Ltd.	5.753583	5.981285	6.786859	6.768246	6.803877	5.658128	5.657865
U P L Ltd.	1.699388	1.8076	1.713858	2.207952	2.479988	1.982929	2.912127
Vedanta Ltd.	3.947485	1.43325	0.646496	0.773266	1.014083	-0.17481	0.75839
Zee Entertainment Ltd.	4.728864	4.156054	5.41283	5.63137	6.177561	6.106018	5.896725

From the table 7, shows the Z score value of combined sector (Port, coal, entertainment) of CNX Nifty Index. Coal India Ltd, ITC ltd and Zee Entertainment Ltd has scored more than 3 points in Z score. So these companies are safe and good for investment. The companies like Vedanta Ltd and Hindalco Industries ltd has secured a Z value of less a 1.8 points. It shows the company's financial position is too bad. UPL Ltd and Adani ports and special economic zone ltd are having a z score value ranges from 1.8 to 2.9 points.

4. CONCLUSION

This study is an attempt to provide an empirical relationship of Z score across various index of CNX Nifty Index. The researchers try to analysis the relationship between Z score values and performance of Sectoral index of CNX Nifty Index. The secondary data has been used for the study from CNX Nifty index for the period of seven years from 2010 to 2016. The Z score value

of Automobile sector of CNX Nifty Index shows the companies are not in productive and possibility of insolvency will occur if the companies are not taken necessary steps to strengthen their financial position.

The Z score value of Infrastructure sector of CNX Nifty Index shows except the company Asian paints ltd all other companies are in risk, It shows it has high corporate risk in all the years. The Z score value of Pharmaceutical sector shows a favourable response for investments. The Z score value of Petroleum sector shows safe in the point of investment except oil and natural gas corporation ltd.

The Z score value of Energy & FMCG sector Shows good investment. Hindustan Unilever Ltd is the only company which has good Z score ranges from 7 to 11 points. Power Grid Corporation of India ltd and NTPC ltd has very poor financial position of those companies and also not good for investment. The Z score value of IT and

Telecommunication sector shows a significant sign for investors for their investment. All the companies (HCL technologies Ltd, Infosys Ltd, Tata Consultancy Services Ltd, Tech Mahindra Ltd and Wipro Ltd) have a Z score value of more than 3 points except Bharti Airtel Ltd.

Recommendation for future research

The study can be further extended to comparing the results of various stock exchanges and further the results are linked with the rating of the credit agencies.

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