www.eprawisdom.com e-ISSN : 2347 - 9671, p- ISSN : 2349 - 0187
EPRA International Journal of Economic and Business Review Vol - 4,Issue- 12, December 2016
Inno Space (SJIF) Impact Factor(2016) : 6.484 ISI Impact Factor (2013): 1.259 (UAE)

DETERMINANTS OF FINANCIAL SOUNDNESS IN INDIAN COMPANIES

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ABSTRACT

A number of researchers have undertaken empirical studies in predicting business failure. Using discriminant analysis Altman developed a z-score model long ago. Several other researchers in the developed countries developed different models to predict business failure. Most of the empirical studies reveals that z-score become best predictor of business failure. Z-score model uses financial information to predict business performance. The analysis of variance of 28 ratios reveal significant difference between different companies for 19 ratios. The discriminant coefficient of inventory turnover ratio, sales to total assets ratio, current ratio and total debt to total assets ratio are higher and emerged as discriminators between companies. These four ratios determine the financial efficiency of the companies and included in the z-score model.

KEY WORDS: *Ratio, z-Score, Discriminant Coefficient, Financial Efficiency.*

1. INTRODUCTION

The objective of financial statements is to provide valuable information about the financial position and performance of a business. Which is useful to several users in making various decisions. But understanding financial statements is not so easy for all. Financial statements of firm may be used by users for different objectives. Users expect that it should be understandable, relevant, reliable and comparable for analysis. Investors, analysts, researchers and regulators use it for different purposes. Financial researchers have undertaken empirical studies in predicting business failure and classification of business according to their financial efficiency. Using discriminant analysis Altman developed a z-score model long ago. Several other researchers in the developed countries developed different models to predict business failure. Most of the empirical studies reveals that z-score become best predictor of business failure and helps to classify the companies according to their financial strength. Z-score model uses financial information to predict business performance. Z-score model consists of the ratios with highest discriminate coefficients. Discriminate coefficients of ratios, determine the financial efficiency of the companies and included in the z-score model. This study examine the financial statements of BSE 500 companies to identify the ratios that best discriminates between companies.

2. OBJECTIVES

A number of researchers have undertaken empirical studies in predicting business performance using financial analysis. This study is conducted to identify the financial variables that best discriminate between companies. It also aims to develop a discriminant model (Z- score) model which discriminates between financially sound (creditworthy) and weak (non-creditworthy) companies.

3. METHODOLOGY

Financial performance of the companies are evaluated using discriminate analysis. Discriminant

analysis is used to classify companies according to their financial performance. This technique is used to classify objects/companies into one of the alternative groups on the basis of a set predictor variables. The methodology of the study involves use of multiple discriminate analyses (z-score) which was used and developed by Altman (1968a), Altman (2000). Discriminant model consists of independent variables and discriminant coefficients.

$$Z = V_1X_1 + V_2X_2 + V_3X_3 + V_4X_4 + ...+ V_xX_x$$

Z is the discriminant score used to group the companies according to their performance. X_1 X_2, X_3, X_4 and X_n are independent variables (financial ratios). V_1 V_2, V_3, V_4, and V_n are discriminant coefficients, which is sample specific.

Discriminant coefficients is based on the principle that the ratio of between group sum squares to within group sum squares should be maximised in one way ANOVA. This will make the make the groups differ as much as possible on the values of discriminant function (Altman (1968), Chawla and Neena (2011)). The discriminant coefficients are used to calculate the Z, the discriminant score by substituting the independent values (X_x) in the estimation model.

4. SOURCES OF DATA AND SAMPLE

The entire study is based on the secondary data collected from various sources. Financial statement information are collected from Prowess, the corporate database of Centre for Monitoring Indian Economy (CMIE). The sample size is restricted to BSE 500 companies and the 18 years (1998 to 2015) financial data were considered for the development of discriminant model.

5. LITERATURE REVIEW

Financial analysts and investors provide considerable emphasis on evaluating the financial ratios to evaluate the performance of the companies. Prior researchers provide evidence in support of the use of financial data for evaluating the financial soundness of companies. Williams and Goodman (1971) opines that financial variables do tend to distinguish the various industrial classifications and that, with only a corporation's financial characteristics known, its industrial classification may be reliably determined. Analysis of financial data of company provides sufficient evidence of the firm's creditworthiness. Deakin. (1972) opines that discriminant analysis, can be used to predict business failure from accounting data as far as three years in advance with a fairly high accuracy. Edmister (1972) indicates that analysis of selected financial ratios is useful for predicting failure of medium and large-asset size firms. He also opines that ratio analysis may be as useful in predicting small business failure as it is for predicting failure of medium and large businesses when three annual statements are available for analysis. Hunter and Natalia (2006), reveals that comparison of models based on financial ratios alone, the models with macro variables perform better in predicting company failure. They also report that in addition to the macro variables, gearing, liquidity and profitability are the important company specific determinants of failure. Ismael et al. (1980) examine ratio stability to predict corporate failure and reports that measures of ratio stability showed remarkable difference between failed and non-failed firms. They also opine that profitability ratio, activity ratios, liquidity ratios and indebtedness ratios have been shown to have considerable merit in financial analysis and in measurement of financial wellbeing of corporate entities.

After 1960s researchers concentrated on developing business failure prediction models. Altman is one of the pioneers in the development of failure prediction model. After his landmark discriminant model of 1968, more researchers developed new models to predict business failure. Altman (1968a) developed a discriminant model to assess and classify the bankrupt/ failed and non-bankrupt/successful firms. His model consists of working capital to total assets, retained earnings to total assets, EBIT to total assets, market value of equity to book value of debt and sales to total assets as discriminator. Altman (2000) replaced market value of equity to book value of debt with book value of equity to book value of debt. Altman (1968b) reveals that the multiple-discriminant model exhibits exceptional accuracy as a bankruptcy-prediction procedure. His results also reveal that the accuracy holds for even as much as two years prior to bankruptcy, with the effectiveness of the model substantially diminishing after the second year. Further his result implies that any potential bias, due to classifying firms in the same sample as the one in which the parameters are established, is not significant. He also opines that the discriminant technique for predicting bankruptcy also gives promise of application in the investment area. Deakin (1972) opines that discriminant analysis can be used to predict business failure from accounting data as far as three years in advance with a fairly high accuracy.

Pinches and Kent (1973) developed and tested a model for industrial bond ratings using factor analysis and M- groups multiple discriminant analysis. Their final MDA model incorporated six variables: X1-subordination, X2-years of consecutive dividends, X3-issue size, X4-net income + interest/interest: five year mean, X5-long term debt/total assets: five year mean, and X6-net income/total

assets. Results of their model performed very poorly for Baa rated bonds due to lack of statistically significant difference in the quantifiable variables considered for the study. Moyer (1977) re-examined the Altman's bankruptcy model and report that only modest predictive ability was found when the original model parameters were applied to the new data. His result also indicate that the original model is not generally suitable when applies to a sample of larger firms outside the original sample period. His study also finds better explanatory power with the estimation of new parameters using new data. Based on his re-examination he opines that the significance of variable in the model is sensitive to the sample data examined. Further he opines that in terms of explanatory discriminatory ability, Altman's model is superior to Beaver's model. Dimitras et al (1996) analyse 185 articles on predictions of business failure models. They find that the discriminant analysis method was the most frequently used in business failure studies and logit analysis ranks second among the methods used. They also reveal that the most important financial ratios came from the solvency category were working capital to total asset (WC/TA) and total debt to total assets (TD/TA). Further they reveal that the profitability ratios were also important. Eljelly and Mansour (2001) examine the characteristics of a sample of failed and non-failed companies in the Sudan in order to develop an early warning system to serve as a tool for identifying problematic companies. They re-estimated the Altman Z model parameters using the sample data set. Their new models predictive ability improved significantly to the effect that the successful classification rate increased to 80%, 67%, 65%, and 55% one, two, three, and four years prior to failure respectively. They developed a reduced variable model using a stepwise MDA that includes only the current ratio (liquidity measure), earning power ratio (profitability measure), and cash flow to total debt ratio (leverage measure). Their new model achieved considerable improvement in successful classification that reached 86.67%, 75%, 60%, and 53% one, two, three and four years prior to failure respectively. They also reveal that the three integrated ratios included in the final discriminant model, the profitability ratio, the liquidity ratio and the cash to debt ratio, have an intuitive appeal in a less developed economy such as that of the Sudan. They show that in such economy profitability and liquidity are ingredients for successful business.

Emerging Market Score (EMS) Model of Altman (2005) is an enhanced version of the statistically proven Z-Score model. His EMS model can be applied to nonmanufacturing companies, and manufacturers, and is relevant for privately held and publicly owned firms. His adjusted EMS Model incorporates the particular credit characteristics of emerging markets companies, and is best suited for assessing relative value among emerging markets credits. Further his original model has been enhanced to make it applicable for private companies and non-manufacturers. Altman (2005) concludes that the original Z-Score model was tested on samples of both non-manufacturers and manufacturers in the U.S. and its accuracy and reliability have remained high. He also advocates building and testing models derived from the country's own data and experience. Jayadev (2006) provides empirical evidence on the significance of financial risk factors in predicting default companies. He records that combining various ratios through application of multivariate statistical techniques and testing their predictive power has been popular in credit risk quantification and Altman's Z-score model is the most acceptable model in this category. He applied three forms of Z-score models. He developed the first equation by surveying the internal credit rating models of the Indian banks and the ratios selected are: current ratio, debt-equity ratio, and operating margin. His second equation is similar to that of Altman's (1968) original equation with a slight modification: instead of debt-to-market value of equity, debt-to-book value of equity is considered. His second model also consists of working capital to total assets, retained earnings to total assets, and earnings before interest and taxes to total assets. He also used Emerging Market Score Model of Altman, Hartzell and Peck's, which consists of all the ratios of Altman's (1968a) equation except the asset turnover ratio. He finds that dominant variables discriminating the default companies from non-default ones are: current ratio, debt-equity ratio, operating margin, working capital to total assets, earnings before interest and tax to total assets, net worth to debt, and asset-turnover ratio. Further he finds that the classification accuracy of the second and the third equations is 82 per cent while that of the first equation is only 57 per cent. His result provide evidences that the most widely used two ratios current ratio and debt-equity ratio are relatively poor in predicting the default companies. Further his results reveal that Altman's model is capable of predicting default in most of the sample companies. His hold-out sample accuracy results show that the selected variables are capable of predicting default. Consistent with Altman's (1968a), Jayadev (2006) opines that failing firms exhibit ratios and financial trends that are very different from those companies that are financially sound.

6. DISCRIMINATE COEFFICIENT AND DISCRIMINANT MODEL

Table No. 1 Variance Analysis of Ratios between Companies

Sl.no	SS Between groups	SS within Groups	MS between Groups	MS within Groups	F	F crit
X_1	75076269.1	110045614.7	375381.3457	40592.2592	9.2476091	1.1776
X_2	1071.73372	10226.4736	5.358668608	3.229072826	1.6595068	1.1765
X_3	7.24417E+1	2.80608E+1	3.62208E+11	83913759749	4.3164354	1.1762
X_4	133736.717	1101885.08	668.6835874	347.8172616	1.9225140	1.1765
X_5	75076269.1	110045614.	375381.3457	40592.2592	9.2476091	1.1776
X_6	1565220.78	12803867.1	7826.103916	4068.594586	1.9235398	1.1765
X_7	13.4346714	14.0096234	0.067173357	0.004535326	14.811140	1.1767
X_8	13541.7321	75539.7565	67.7086606	32.06271501	2.1117569	1.1787
X_9	6957266.62	57329227.2	34786.33313	23097.99648	1.5060324	1.1783
X_{10}	16734851.2	2608061.08	83674.25646	1529.654594	54.701405	1.1820
X_{11}	8.31806E+1	3.04168E+17	4.15903E+13	1.78607E+14	0.2328590	1.1820
X_{12}	3.79027E+1	1.17865E+17	1.89513E+13	6.921E+13	0.2738236	1.1820
X_{13}	1.33582E+1	74134331555	667909004.7	24030577.49	27.794130	1.1767
X_{14}	16122.9845	92211.2611	80.61492272	29.74556812	2.7101490	1.1766
X_{15}	408902435.	5737376091	2044512.179	3435554.545	0.5951039	1.1823
X_{16}	8.62347E+1	1.406E+14	4.31174E+11	84647853102	5.0937330	1.1823
X_{17}	6398.72407	136105.601	31.99362038	43.29058584	0.7390433	1.1765
X_{18}	27637389.7	204900611.3	138186.9486	66075.65667	2.0913443	1.1766
X_{19}	154587.321	462652.882	772.9366063	144.9413792	5.3327532	1.1764
X_{20}	278906.886	2292552.97	1394.534433	1803.739552	0.7731351	1.1861
X_{21}	26.5794872	16.1065244	0.132897436	0.006644606	20.000800	1.1785
X_{22}	4111315608	3.93851E+1	205565780.4	299734078.6	0.6858271	1.1855
X_{23}	4.72446E+2	2.86635E+2	2.36223E+18	1.1709E+18	2.0174548	1.1784
X_{24}	1048.80173	200.376527	5.244008676	0.078517448	66.787813	1.1781
X_{25}	58090676.1	93722068.5	290453.3807	35581.65092	8.1630102	1.1778
X_{26}	4.72007E+1	7.78786E+1	2360037259	624027524.9	3.7819441	1.1863
X_{27}	3.23702E+1	3.84448E+1	1.61851E+13	1.23856E+13	1.3067686	1.1766
X_{28}	5.50640720	12.1957465	0.027532036	0.003926512	7.0118301	1.1766

The analysis of variance of 21 ratios reveal significant difference between different companies. This result indicates that these ratios differentiate between companies. All other 7 ratios reveal insignificant difference between different companies. Discriminant coefficient of inventory turnover ratio, sales to total assets, current ratio and total debt to total assets are higher than one. The discriminant coefficients of net profit to total assets ratio, net profit to sales ratio are less than 1 and emerged as next higher discriminators. The above four ratios may be used to differentiate companies and can be used to determine the financial efficiency of the companies.

Table No: 2 Discriminant Coefficients Between Companies

Sl No	Ratios	Discriminant coefficient
X_{10}	Inventory Turnover Ratio	6.416587176
X_{24}	Sales to Total Assets Ratio	5.234154669
X_{13}	Current ratio	1.80188852
X_{21}	Total debt to total assets Ratio	1.650231077

Four ratios emerged as the major discriminating ratios between companies followed by net profit to total assets ratio and net profit to sales ratio. The discriminant coefficient of inventory turnover ratio, sales to total assets ratio, current ratio and total debt to total assets are highest, and they are included in the discriminant model to classify companies according to their financial efficiency. The discriminant model for BSE 500 companies consists of X_{10} X_{13} X_{21} and X_{24} variables and their respective discriminant coefficients.

X_{10}*6.4165+ X_{13}*1.8018 + X_{21}*1.6502+ X_{24}*5.2341

Where, X_{10}= Inventory turnover ratio, X_{13}=Current ratio, X_{21}= Total debt to total assets ratio and X_{24}= Sales to total assets ratio

This new discriminant model can be used to classify the companies according to their financial strength.

7. CONCLUSION

This study uses financial information's to discriminate between companies and classify the companies based on the financial soundness. Discriminant coefficients is based on the principle that the ratio of between group sum squares to within group sum squares should be maximised in one way ANOVA. This will make the make the companies differ as much as possible on the values of discriminant score. The discriminant analysis finds four discriminators, viz., inventory turnover ratio, sales to total assets ratio, current ratio and total debt to total assets for which the discriminant coefficients are highest. These four ratios determine the financial efficiency of the companies and included in the z-score model. This new discriminant model can be used to classify the companies according to their financial strength.

REFERENCE

1. *Altman, E. I. (1968a), 'Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy', The Journal of Finance, Vol. 23, No.4, pp. 589-609*
2. *Altman, E. I. (1968b), 'The Prediction of Corporate Bankruptcy: A Discriminant Analysis', The Journal of Finance, Vol. 23, No. 1, pp. 193-194.*
3. *Altman, E. I. (2000), 'Predicting Financial Distress of Companies: Revisiting the Z- Score and Zeta ® Model', Retrieved on January 1st, 2010 from http:// pages.stern.nyu.edu/~ealtman/Zscores.pdf.*
4. *Altman, E. I. (2005), 'An emerging market credit scoring system for corporate bonds', Emerging Markets Review, Vol. 6, No. 4, pp. 311–323.*
5. *Deakin, E. B. (1972), 'A Discriminant Analysis of Predictors of Business Failure', Journal of Accounting Research, Vol. 10, No. 1, pp. 167-179.*
6. *Dimitras, A. I., Zanakis, S. H. and Zopounidis, C. (1996), 'Theory and Methodology: A Survey of Business Failures With an Emphasis on Prediction Methods and Industrial Applications', European Journal of Operational Research, Vol. 90, No. 3, pp. 487-513.*
7. *Edmister, R. O .(1972), 'Financial Ratios as Discriminant Predictors of Small Business Failure', The Journal of Finance, Vol. 27, No. 1, pp. 139-140*
8. *Eljelly, A. M. A. and Mansour, I. H. F. (2001), 'Predicting Private Companies Failure in the Sudan', Journal of African Business, Vol. 2, No. 2, pp. 23-43.*
9. *Hunter, J. and Natalia, I. (2006), 'Aggregate Economy Risk and Company Failure: An Examination of UK Quated Firms in the Early 1990's', Journal of Policy Modeling, Vol. 28, No. 8, pp. 911-919.*
10. *Jayadev, M. (2006), 'Predictive Power of Financial Risk Factors: An Empirical Analysis of Default Companies', Viklpa, Vol. 31, No. 3, pp. 45-56.*
11. *Moyer. R. C., (1977), 'Forecasting Financial Failure: A Re-Examination', Financial Management, Vol. 6, No. 1, pp. 11-17*
12. *Pinches, G. E., and Kent, A. M. (1973), 'A Multivariate Analysis of Industrial Bond Ratings', The Journal of Finance, Vol. 28, No.1, pp. 1-18*
13. *Williams, W. H. and Goodman, M. L. (1971), 'A Statistical Grouping of Corporations by their Financial Characteristics', The Journal of Financial and Quantitative Analysis, Vol. 6, No. 4, pp.1095-1104.*