

Financial Distress Prediction: Empirical Evidence From Indian Automobile Companies

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Abstract

Financial distress is of crucial importance in financial management especially in the case of competitive environment. Failure is not an impulsive outcome and it grows constantly in stages. A spontaneous protective effort could be accommodated if the company is anticipated to be proceeding in the direction of potential bankruptcy and this can help alleviate the financial distress to all investor and decrease the costs of bankruptcy. This study extends a failure prediction model for Indian Automobile companies. This study hopes to accommodate some important results relevant to authorities and stake holders. The capability to detect potential financial problems at a premature stage is absolutely essential because it helps to ensure business, financial, economic and political environment stability. The results show good performance with a highly correct categorization factuality rate of more than 90%. Eight ratios were determined significant out of 38 financial ratios utilized in this analysis to discriminate among failed and non- failed companies. The significant variables are Operating margin (%), Gross profit margin (%), Return on long term funds (%), Total debt/equity, Cash earnings retention ratio, Exports as percent of total sales, Import companies in raw material consumed, Bonus component in equity capital (%)

Keywords: Discriminant analysis, ratios, Indian automobile companies, sales

1. INTRODUCTION

Several recent papers have served to emphasize the need for a timely model of Indian corporate financial failure prediction, the parameters of which are fully in the public domain. In the current financial climate one scarcely needs to allude to the academic literature to justify an interest in a timely measure of failure prediction-the likely interest from the wider community in such a model is regrettably, all too obvious.

Financial distress in companies can lead to problems that can reduce the efficiency of management. As maximizing firm value and maximizing shareholder value cease to be equivalent, managers who are responsible to shareholders might try to transfer value from creditors to shareholders. The result is a conflict of interest between bondholders (creditors) and shareholders. As a firm's liquidation value slips below its debt, it is the shareholders interest for the company to invest in risky projects which increase the probability of the firm's value to rise over debt. Risky projects are not in the interest of creditors, since they also increase the probability of the firm's value to decrease further, leaving them with even less. Since these projects do not necessarily have a positive net present value, cost may arise from lost profits.

The problems of corporate financial structures have been an important factor in contributing to the Financial Crisis and leading many corporations to bankruptcy. Therefore, there is a need to develop a model to assess the financial health of firms in Indian context. The research findings from developed economies are not suitable to apply to Indian firms due to the differences in market structures, socio economic factors, provision and implementation of law, the political environment and accounting standards in these economies, which result in differences in financial reporting.

Corporate failures are a common problem of developing and developed economies. It is commonly described as being when an associate of the firm comes up with a resolution that the firm be wound up and assign a liquidator or the associate of the firm can satisfy a meeting of its creditors to deliberate its proposal for a voluntary winding up of the firm. Corporations are not invulnerable to failure, where commonly the firm is not able to meet its liabilities. In the late 1990's the economic recession invaded all Asian countries including India, which illustrated the need to develop an early alert method to reduce the circumstance of corporate failure among Indian firms.

Table 1 provides the statistics of Indian firm's liquidation. The number of companies winding up escalated since year 1995 to 2009 (for 15 years). Most firms illustrated in Table 1 are small-scale firms that not listed on the Indian Stock Exchange. It is difficult to find the failed firms as described above among Indian listed firms.

Failure is not an impulsive outcome and it grows constantly in stages. There are unique characteristics of failure in firm's financial levels prior achieving total failures. An impulsive protective effort could be accommodated if the company is foreseen to be proceeding in the direction of potential bankruptcy and this can help allay the financial distress to all investors and abate the costs of bankruptcy. It is clear that notwithstanding the tremendous amount of research that has gone into this topic around the world; the predicament of prediction can by no means be absolutely interpreted. This is because prediction is not an

actual science and at best, purely a calculated estimate.

Also, the meaningful variable in determining firm's stability and viability varies from territory to territory as documented in prior researches. In developed economies, most of the users utilized results from the research done in developed economies without making the certain accommodation to regional situations, which will result in misapplication. It is believed that result for India has its particular set of financial ratios in determining company's stability.

In Asian countries, access to literature on this topic is largely unavailable. Business collapses in Asian countries should be deliberately investigated adequate to the increasing expansion of economies that can endanger business performance to meet the treats imposed during economic downturn and this will minimize diminishing credibility of investors and creditors. The objective of this study is to recognize the indicative financial ratios which discriminate between top and least performing companies. This study hopes to accommodate some important results relevant to authorities and stakeholders. The capability to detect potential financial problems at a premature stage is absolutely essential because it helps to ensure business, financial, economic and political environment stability.

2. LITERATURE REVIEW

The earliest study using multivariate data analysis on failure prediction was conducted by Altman (1968) by using a set of financial and economic ratios as possible determinants of corporate failures. The study used sixty-six corporations from manufacturing industries comprising of bankrupt and non-bankrupt firms and 22 ratios from five categories, namely, liquidity, profitability, leverage, solvency and activity. Five ratios were finally selected for their performance in the prediction of corporate bankruptcy and the derived model correctly classified 95% of the total sample (correctly classifying 94% as bankrupt firms and 97% as non-bankrupt firms) one-year prior to bankruptcy. The percentage of the accuracy declined with increasing number of years before bankruptcy.

Altman et al. (1977) reported the use of neural network in identification of distressed business by the Indian central bank. Using over 1,000 sampled firms with 10 financial ratios as independent variables, they found that the classification of neural networks was very close to that achieved by discriminant analysis. They concluded that the neural network is not a clearly dominant mathematical technique compared to traditional statistical techniques.

John M. Trussel and Patrick A. Patrick (1997) conducted An Empirical Analysis of Financial Distress in Pennsylvania Hospitals to develop a comprehensive model for evaluating financial distress in hospitals. This research identifies several risk factors of financial distress in five categories- structural, financial, payer mix, utilization and market forces. The empirical results indicate that several of the risk factors are significantly related to financial distress. The results not only allow decision makers to predict financial distress, but also they can be used to evaluate the impact of a change in a risk-factor on the likelihood of financial distress.

William Hopwood, James McKeown and Jane Mutchler (1986) conducted a study on The sensitivity of financial distress prediction models to departures from normality. This research empirically investigated the effect on non-normality on financial stress prediction. The analysis included the application of Multiple Discriminant analysis to prediction models found in previous literature, and also involved separate samples for both bankrupt problem-status companies. Finally, the statistical techniques were evaluated under extreme conditions of non-normality.

Begley et al. (1998) incorporated the time "bias" factor into the classic business failure prediction model. Using Altman, (1968) and Ohlson's, (1980) models to a matched sample of failed and non-failed firms from 1980's, they found that the predictive accuracy of Altman's model declined when applied against the 1980's data. The findings explained the importance of incorporating the time factor in the traditional failure prediction models.

Campbell et al. (2008) constructed a multivariate prediction model that estimates the probability of bankruptcy reorganization for closely held firms. Six variables were used in developing the hypothesis and five were significant in distinguishing closely held firms that reorganize from those that liquidate. The five factors were firm size, asset profitability, the number of secured creditors. The prediction model correctly classified 78.5% of the sampled firms. This model is used as a decision aid when forming an expert opinion regarding a debtor's likelihood of rehabilitation.

3. METHODOLOGY

The data utilized in this analysis is extracted from the income statements, balance sheets, and cash flow statements of sampled firms attained from the Automobile Companies Annual Report accessible from the Indian Stock Exchange. The matched sample design was applied in this analysis. Each top performing company has a least performing "partner" in the sample. Samples of Automobile Companies from year 2007 to 2011 were utilized in this analysis. Top hundred Automobile companies were taken into account from NSE Listing. Five Good performing companies are selected from the top ten companies and five least performing companies are selected from the least ten companies. (Refer Table 2). A total of 10 companies were identified during the year of determination. The dependent variable is defined as the dichotomous event named as a failing or non-failing event. The independent variable is interpreted as the commonly used financial ratios. An itemized listing of variables is accessible in Table 3.

4. NORMALITY TESTS

Before the discriminant analysis, normality test were carried out to all independent variables. Two generally utilized tests were Shapiro-Wilks test and Lilifors test. the Lilifors test based on alteration of the kolgomorov-Smirnov test is utilized when means and variances are not known but must be approximated from the data. The Shapiro-Wilks test shows better tools in many statistical conditions correlated to other tests to normality. anyhow, the

Shapiro-Wilks test is well suited to small size samples. The null hypothesis will be rejected for large values of Kolmogorov Smirnov D- statistics. for most statistic test it is adequate that data are approximately normally distributed.

Table 4, disclose the Kolmogorov Smirnov tests (altered for Lilifors). 24 (R3, R4, R6, R7, R8, R9, R10, R13, R14, R16, R17, R18, R19, R20, R21, R37, R38, R33, R34, R35, R25, R26, R27) variables are found to be normal and 14 (R1, R11, R12, R15, R22, R23, R24, R36, R28, R29, R30, R31, R32, R36) variables significantly exit from normality assumptions with excessive skewness statistics and peaked distribution. Accordingly, we exclude the hypothesis null that all of the financial ratios examined are normally distributed. In order to enhance the normality, data transformation process were implemented. Datas are trimmed by eliminating the extreme values. Table 5 shows the Kolmogorov Smirnov tests for trimmed values. Thus, all ratios are found to be normal. It is proven that elimination of extreme values enhances the normality degree of variables. Using One way classification-simple ANOVA tests is applied to each ratio to find whether there is any significant difference between top performing and least performing companies. Table 6 shows the Group statistics. Table 7 discloses the ANOVA test.

5. RESULTS AND DISCUSSION

Utilizing samples of failed and non-failed companies as the categorization variables and the ratios as the independent variables, a forward stepwise multivariate discriminant analysis was used to determine the discriminating power of the variables. In stepwise estimation, independent variables were entered into the discriminant function one at a time on the basis of their discriminating power. This method starts by selecting the single outstanding discriminating variable. The first variables are then matched with each of the other independent variables one at a time, and the variables that are outstandingly able to enhance the discriminating power of the function in coalition with the first variable are selected. The remaining variables are selected in the same method. Table 8 gives the

canonical discriminant function and Table 9 discloses the coefficients of standardized canonical discriminant function.

The normal variables are entered into the discriminant analysis. Five groups of potential variables were examined. The Mahalanobis D² method was utilized in this process. Mahalanobis D² was used to select the variable that develops the highest separation for the pair of groups, which are precise at a particular step. This process starts with all of the variables excluded from the model and chooses the variable that's topmost in the Mahalanobis distance between the groups. As an additional means of interpreting the relative discriminating power of the independent variables, F test was utilized. Table 10 discloses the structure matrix which is pooled within group's correlations between discriminating variables and standardized canonical discriminant functions. Variables ordered by absolute size of correlation within function.

The prediction model was generated, as illustrated below:

$$Z = -11.988 + 0.947X_1 - 1.225X_2 + 0.143X_3 - 3.123X_4 + 0.52X_5 - 0.87X_6 + 0.145X_7 - 0.028X_8$$

Where,

Z=Overall Index

X₁= Operating margin (%)

X₂= Gross profit margin (%)

X₃= Return on long term funds (%)

X₄= Total debt/equity

X₅= Cash earnings retention ratio

X₆= Exports as percent of total sales

X₇= Import comp. in raw mat. consumed

X₈= Bonus component in equity capital (%)

Thus, from Table 11, Debt-Equity ratio discriminates the most with the top most discriminate loading and F-Statistics and Exports as percent of total sales ratio discriminates the least.

6. JUSTIFICATION OF THE DISCRIMINANT OUTCOMES

This section elaborates on the validity of the discriminant function. For that reason, it is required

to elaborate validation matrices for both the analysis sample and cross-validated validation. In the earlier section, cutting score which is equal to zero is determined. The process is as follows:

- Categorize a company as good performing companies if its discriminant score is positive value.
- Categorize a company as least performing company if its discriminant score is negative value.

Utilizing this precedent, the SPSS generated justification matrices for the observation in the examine sample. The validation outcome of the analysis is illustrated in table 12

It is determined that 100.0% of originally grouped cases are correctly classified and 97.7% of cross validated groups are correctly classified. This outcome indicates that the model is valid for application.

7. CONCLUSION

The outcome shows good performance with a highly correct categorization factuality rate of more than 90%. Eight ratios were determined significant out of 38 financial ratios utilized in this analysis to discriminate among failed and non-failed companies. The significant variables stated below are in the accord with their discriminating power or position in condensing series:

- Total debt/equity
- Cash earnings retention ratio
- Gross profit margin
- Operating margin
- Import component in raw material consumed
- Return on long term funds (%)
- Exports as percent of total sales
- Bonus component in equity capital

The significant variables captioned could assist the users of the results to generate a similar

framework of advanced indicator mode to either avoid or mitigate impending difficulty.

The following are the possible entities to utilize the characteristic failure and non-failure result:

- The result can determine the risk postulate to that future customer. Additionally this result can be utilized as a yearly appraisal of customer's financial situation in making decisions to renew or continue the loan provided.
- Investor can utilize the results to reach a certain conclusion. The result can contribute in advance an indication of the financial situation to aid the investor's selection of companies.

Table - 1

The Statistics of Indian firm's Liquidation.

Year	Petition Filed	Wound up	Wound up(%) over
1995	688	393	57.1
1996	858	485	56.5
1997	637	449	70.5
1998	503	364	72.4
1999	385	229	59.5
2000	273	161	59
2001	279	17	62.4
2002	318	200	62.9
2003	329	204	62
2004	314	314	78
2005	309	188	60.8
2006	305	222	72.8
2007	3340	227	66.8
2008	435	295	68
2009	469	368	78.5

Insolvency, Public Trustee's Office, Ministry of Law, India

Table - 2

The Name of Sample Companies.

Top performing companies	Least performing companies
Omax Auto Ltd	TATA Motors Ltd
Force Motors Ltd	Bajaj Auto Ltd
Jay Maruti Ltd	Ashok Leyland
Majestic Auto Ltd	Mahindra & Mahindra Ltd
Wheels India Ltd	Hero Honda Motors Ltd

Table - 3

List of Ratios Examined

R1	'Adjusted EPS (Rs)'	R6	'Operating profit per share (Rs)'
R2	'Adjusted cash EPS (Rs)'	R7	'Book value (excl rev res) per share (Rs)'
R3	'Reported EPS (Rs)'	R8	'Book value (incl rev res) per share (Rs.)'
R4	'Reported cash EPS (Rs)'	R9	'Net operating income per share (Rs)'
R5	'Dividend per share'	R10	'Free reserves per share (Rs)'

Table - 3 Continued
List of Ratios Examined

R11	'Operating margin (%)'	R25	'Inventory turnover ratio'
R12	'Gross profit margin (%)'	R26	'Dividend payout ratio (net profit)'
R13	'Net profit margin (%)'	R27	'Dividend payout ratio (cash profit)'
R14	'Adjusted cash margin (%)'	R28	'Earning retention ratio'
R15	'Adjusted return on net worth (%)'	R29	'Cash earnings retention ratio'
R16	'Reported return on net worth (%)'	R30	'Adjusted cash flow time total debt'
R17	'Return on long term funds (%)'	R31	'Financial charges coverage ratio'
R18	'Long term debt / Equity'	R32	'Fin. charges cov.ratio (post tax)'
R19	'Total debt/equity'	R33	'Material cost component (% earnings)'
R20	'Owners fund as % of total source'	R34	'Selling cost Component'
R21	'Fixed assets turnover ratio'	R35	'Exports as percent of total sales'
R22	'Current ratio'	R36	'Import comp. in raw mat. consumed'
R23	'Current ratio (inc. st loans)'	R37	'Long term assets / total Assets'
R24	'Quick ratio'	R38	'Bonus component in equity capital (%)'

Table-4
Raw Data of Normality Test

Ratios	No.	Mean	S.D	Skewness	Kurtosis	K-S	Sig.
Adjusted EPS (Rs)	50	22.63	41.71	-0.80	4.48	1.45	*
Adjusted cash EPS (Rs)	50	37.61	40.76	-0.44	2.64	0.82	Ns
Reported EPS (Rs)	50	30.88	37.18	0.74	1.14	1.09	Ns
Reported cash EPS (Rs)	50	45.86	38.71	0.70	0.21	0.74	Ns
Dividend per share	42	14.73	23.53	3.16	10.63	1.81	*
Operating profit per share (Rs)	50	48.74	46.93	0.26	0.32	0.67	Ns
Book value (excl rev res) per share (Rs)	50	132.02	99.17	1.50	4.79	0.83	Ns
Book value (incl rev res) per share (Rs.)	50	132.72	98.55	1.53	4.91	0.81	Ns
Net operating income per share (Rs)	50	544.16	363.63	0.86	0.96	0.69	Ns
Free reserves per share (Rs)	47	126.07	97.72	1.51	5.21	0.81	Ns
Operating margin (%)	50	9.02	5.75	-1.16	2.90	1.44	*
Gross profit margin (%)	50	6.10	6.52	-0.95	2.54	1.37	*
Net profit margin (%)	50	5.62	5.22	0.23	0.81	0.84	Ns
Adjusted cash margin (%)	50	7.18	5.60	-1.75	7.10	1.17	Ns
Adjusted return on net worth (%)	50	16.13	26.91	-1.81	5.82	1.65	*
Reported return on net worth (%)	50	20.97	23.13	-1.39	7.31	1.28	Ns
Return on long term funds (%)	50	22.52	19.00	0.22	1.75	1.09	Ns
Long term debt / Equity	50	0.64	0.43	0.76	0.37	0.94	Ns
Total debt/equity	50	1.00	0.69	1.07	2.30	0.73	Ns
Owners fund as % of total source	50	55.82	18.85	0.73	-0.02	0.74	Ns
Fixed assets turnover ratio	50	2.50	1.33	1.36	1.50	1.08	Ns
Current ratio	50	2.24	8.14	7.05	49.75	3.52	*
Current ratio (inc. st loans)	50	1.92	8.18	7.06	49.87	3.46	*
Quick ratio	50	0.74	0.35	1.16	0.81	1.35	*
Inventory turnover ratio	50	20.78	13.39	0.67	-0.76	1.34	Ns
Dividend payout ratio (net profit)	42	39.81	23.89	2.08	5.22	1.18	Ns
Dividend payout ratio (cash profit)	42	26.85	22.05	2.13	6.08	1.03	Ns
Earning retention ratio	47	66.21	46.75	3.13	18.76	1.47	*
Cash earnings retention ratio	48	74.86	23.98	-1.99	5.72	1.02	*
Adjusted cash flow time total debt	48	4.29	7.45	5.51	34.58	1.96	*
Financial charges coverage ratio	50	86.32	313.43	6.24	41.58	2.76	*
Fin. charges cov.ratio (post tax)	50	75.10	293.12	6.51	44.34	2.82	*
Material cost component (% earnings)	50	73.38	4.23	-0.06	1.39	0.96	Ns
Selling cost Component	47	4.00	2.11	0.37	-0.67	0.75	Ns
Exports as percent of total sales	46	8.59	8.00	1.24	0.83	1.19	Ns
Import comp. in raw mat. consumed	49	6.03	6.29	1.95	3.82	1.67	*
Long term assets / total Assets	50	0.58	0.14	-1.08	4.07	0.75	Ns
Bonus component in equity capital (%)	49	51.48	27.31	-0.18	-0.85	0.81	Ns

Table-5
Normality Test for Trimmed data

Ratios	No.	Mean	S.D	Skewness	Kurtosis	K-S	Sig.
Adjusted EPS (Rs)	35	25.27	17.30	0.26	-1.26	0.82	Ns
Adjusted cash EPS (Rs)	35	41.54	19.74	0.07	-1.16	0.80	Ns
Reported EPS (Rs)	36	29.44	20.94	0.83	0.90	0.70	Ns
Reported cash EPS (Rs)	35	44.07	20.72	-0.06	-1.28	0.79	Ns
Dividend per share	23	11.45	6.19	0.23	-1.29	0.74	Ns
Operating profit per share (Rs)	35	52.99	26.88	0.24	-0.96	0.88	Ns
Book value (excl rev res) per share (Rs)	40	122.57	64.71	-0.17	-1.50	0.90	Ns
Book value (incl rev res) per share (Rs.)	37	130.51	60.83	-0.28	-1.40	0.89	Ns
Net operating income per share (Rs)	40	511.43	240.46	0.13	-0.54	0.40	Ns
Free reserves per share (Rs)	35	123.09	60.85	-0.44	-1.27	0.95	Ns
Operating margin (%)	34	10.13	2.11	0.31	-0.91	0.58	Ns
Gross profit margin (%)	34	7.26	2.68	0.46	-0.83	0.69	Ns
Net profit margin (%)	34	5.51	2.84	0.45	-1.02	1.00	Ns
Adjusted cash margin (%)	31	8.30	1.91	0.31	-0.87	0.63	Ns
Adjusted return on net worth (%)	35	20.45	8.78	0.94	1.52	0.53	Ns
Reported return on net worth (%)	35	21.81	8.24	0.39	-0.67	0.56	Ns
Return on long term funds (%)	35	23.86	8.53	0.70	-0.24	0.70	Ns
Long term debt / Equity	37	0.56	0.24	0.16	-0.99	0.73	Ns
Total debt/equity	37	0.88	0.40	0.31	-0.87	0.54	Ns
Owners fund as % of total source	38	54.88	12.02	0.35	-0.69	0.44	Ns
Fixed assets turnover ratio	32	2.51	0.67	0.75	-0.40	0.86	Ns
Current ratio	36	1.02	0.23	0.11	-0.74	0.73	Ns
Current ratio (inc. st loans)	36	0.75	0.17	0.09	-1.02	0.82	Ns
Quick ratio	36	0.64	0.14	0.65	-0.22	0.71	Ns
Inventory turnover ratio	37	20.64	10.08	0.58	-0.89	1.24	Ns
Dividend payout ratio (net profit)	27	37.89	8.01	0.50	-0.82	0.67	Ns
Dividend payout ratio (cash profit)	29	25.13	10.92	-0.21	-1.46	0.83	Ns
Earning retention ratio	28	58.20	10.00	-0.46	-0.83	0.73	Ns
Cash earnings retention ratio	29	72.87	11.56	0.23	-1.37	0.82	Ns
Adjusted cash flow time total debt	37	2.97	2.00	0.72	-0.87	1.13	Ns
Financial charges coverage ratio	35	24.71	36.02	1.99	3.07	1.91	Ns
Fin. charges cov.ratio (post tax)	37	19.33	28.09	2.09	3.47	1.96	Ns
Material cost component (% earnings)	30	73.14	1.21	-0.47	-0.43	0.55	Ns
Selling cost Component	31	3.69	1.23	-0.19	-0.82	0.95	Ns
Exports as percent of total sales	33	7.85	5.03	0.86	-0.14	0.92	Ns
Import comp. in raw mat. consumed	35	4.50	2.64	1.04	0.63	0.71	Ns
Long term assets / total Assets	37	0.59	0.08	-0.22	-1.20	0.86	Ns
Bonus component in equity capital (%)	37	50.99	20.39	-0.23	-1.27	0.80	Ns

Table-6
Group statistics

Ratios	Good performing companies		Least performing companies	
	Mean	S.D	Mean	S.D
Adjusted EPS (Rs)	44.69	33.70	4.11	42.20
Adjusted cash EPS (Rs)	54.92	36.52	27.16	44.59
Reported EPS (Rs)	49.07	37.30	22.16	24.64
Reported cash EPS (Rs)	59.30	40.17	45.21	33.86
Operating profit per share (Rs)	66.41	44.88	44.19	45.49
Book value (excl rev res) per share (Rs)	161.64	112.95	128.92	82.44
Book value (incl rev res) per share (Rs.)	163.04	111.44	128.92	82.44
Net operating income per share (Rs)	505.41	275.69	718.17	493.05
Free reserves per share (Rs)	151.05	108.21	119.25	81.67
Operating margin (%)	12.35	3.49	5.97	4.54
Gross profit margin (%)	10.30	4.01	2.37	5.08
Net profit margin (%)	8.65	3.83	3.18	3.61
Adjusted cash margin (%)	9.98	2.76	3.86	6.14
Adjusted return on net worth (%)	28.70	16.60	5.02	24.55
Reported return on net worth (%)	30.95	17.37	15.70	12.06
Return on long term funds (%)	30.86	18.35	15.07	12.13
Long term debt / Equity	0.47	0.31	0.77	0.46
Total debt/equity	0.54	0.36	1.39	0.50
Owners fund as % of total source	68.35	16.86	43.73	10.24
Fixed assets turnover ratio	3.32	1.42	1.73	0.46
Current ratio	0.89	0.30	1.33	0.38
Current ratio (inc. st loans)	0.80	0.30	0.71	0.20
Quick ratio	0.62	0.20	0.86	0.40
Inventory turnover ratio	22.24	14.37	18.33	13.33
Earning retention ratio	45.20	26.70	92.66	64.74
Cash earnings retention ratio	58.50	22.71	91.69	5.82
Adjusted cash flow time total debt	2.11	2.02	5.14	3.24
Financial charges coverage ratio	168.03	432.03	4.18	3.64
Fin. charges cov.ratio (post tax)	145.67	406.25	4.32	2.79
Material cost component (% earnings)	72.50	2.30	74.17	4.87
Selling cost Component	4.67	1.40	2.62	1.85
Exports as percent of total sales	10.71	8.53	6.83	7.27
Import comp. in raw mat. consumed	3.51	2.05	10.57	9.02
Long term assets / total Assets	0.62	0.12	0.54	0.09
Bonus component in equity capital (%)	48.11	31.38	60.87	22.17

Table-7
Test of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
Adjusted EPS (Rs)	0.772	11.242	1	38	**
Adjusted cash EPS (Rs)	0.892	4.59	1	38	*
Reported EPS (Rs)	0.861	6.157	1	38	*
Reported cash EPS (Rs)	0.967	1.291	1	38	Ns
Operating profit per share (Rs)	0.943	2.276	1	38	Ns
Book value (excl rev res) per share (Rs)	0.976	0.95	1	38	Ns
Book value (incl rev res) per share (Rs.)	0.973	1.055	1	38	Ns
Net operating income per share (Rs)	0.925	3.085	1	38	Ns
Free reserves per share (Rs)	0.975	0.962	1	38	Ns
Operating margin (%)	0.603	25.026	1	38	**
Gross profit margin (%)	0.559	29.982	1	38	**
Net profit margin (%)	0.656	19.956	1	38	**
Adjusted cash margin (%)	0.669	18.799	1	38	**
Adjusted return on net worth (%)	0.741	13.278	1	38	**
Reported return on net worth (%)	0.81	8.927	1	38	**
Return on long term funds (%)	0.813	8.762	1	38	**
Long term debt / Equity	0.869	5.705	1	38	*
Total debt/equity	0.492	39.166	1	38	**
Owners fund as % of total source	0.593	26.05	1	38	**
Fixed assets turnover ratio	0.686	17.423	1	38	**
Current ratio	0.699	16.359	1	38	**
Current ratio (inc. st loans)	0.972	1.086	1	38	Ns
Quick ratio	0.852	6.584	1	38	*
Inventory turnover ratio	0.981	0.733	1	38	Ns
Earning retention ratio	0.782	10.586	1	38	**
Cash earnings retention ratio	0.554	30.534	1	38	**
Adjusted cash flow time total debt	0.74	13.368	1	38	**
Financial charges coverage ratio	0.947	2.135	1	38	Ns
Fin. charges cov.ratio (post tax)	0.955	1.797	1	38	Ns
Material cost component (% earnings)	0.946	2.156	1	38	Ns
Selling cost Component	0.706	15.809	1	38	**
Exports as percent of total sales	0.946	2.157	1	38	Ns
Import comp. in raw mat. consumed	0.727	14.301	1	38	**
Long term assets / total Assets	0.871	5.604	1	38	*
Bonus component in equity capital (%)	0.952	1.9	1	38	Ns

Table-8
Canonical Discriminant Function

Canonical Correlation	Wilks' Lambda	Chi-square	df	Sig.
.966	92.040	8	.000	92.040

Table-9
Standardized Canonical Discriminant Function -
Coefficients

Variables	Function
Operating margin (%)	3.702
Gross profit margin (%)	-5.432
Return on long term funds (%)	2.329
Total debt/equity	1.301
Cash earnings retention ratio	.961
Exports as percent of total sales	-.705
Import comp. in raw mat. consumed	.828
Bonus component in equity capital (%)	.802

Table-10
Structure Matrix

	Function
Total debt/equity	.271
Cash earnings retention ratio	.240
Gross profit margin (%)	-.238
Operating margin (%)	-.217
Import comp. in raw mat. consumed	.164
Return on long term funds (%)	-.128
Exports as percent of total sales	-.064
Bonus component in equity capital (%)	.060

Table-11
Canonical Discriminant Function Coefficients

	Function
Operating margin (%)	.947
Gross profit margin (%)	-1.225
Return on long term funds (%)	.143
Total debt/equity	3.123
Cash earnings retention ratio	.052
Exports as percent of total sales	-.087
Import comp. in raw mat. consumed	.145
Bonus component in equity capital (%)	.028
(Constant)	-11.988

Table-12
Classification results

		Predicted Group Membership			Total
		Group	Top	Bottom	
Original	No.	Top	25	0	25
		Bottom	0	18	18
	%	Top	100.0	.0	100.0
		Bottom	.0	100.0	100.0
Cross-validated	No.	Top	25	0	25
		Bottom	1	17	18
	%	Top	100.0	.0	100.0
		Bottom	5.6	94.4	100.0

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END NOTES:

- One way classification ANOVA is applied to each ratio to find the significant difference between top performing and least performing companies.
- Discriminant analysis is done to all ratios under step-wise method to find those ratios that contributes to the discrimination.
- Exports as percentage of total sales is not significant for actual data but after filtration it is significant
- Correlation analysis was implemented on the variables that were normal under the normality tests. Variables with negative value were eliminated from the analysis. But variable those are statistically normal but with low significance level were incorporated.
- Selected variable and associated variable that are highly correlated with it will not incorporate in a similar group and will create other group for following analysis. The optimum group with elevated achieves ratio will be selected as the final independent variables.