

Inferential Statistics: An Alternative Approach to Examine Long Term Solvency [An empirical study of five pharmaceutical companies in India]

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"Inferential Statistics encompasses a variety of procedures to ensure that the inferences/ conclusions are sound and rational even though they may not always be correct. In short, inferential statistics enables us to make confident decisions in the face of uncertainty."

Dr. Stefano A. De Caro.

ABSTRACT

This empirical study of five pharmaceutical companies in India demonstrates the significance of inferential statistics in analyzing and solving complex business problems. The accounting technique of ratio analysis has been used in conjunction with the techniques of inferential statistics to draw inferences regarding long-term solvency of the companies selected for the study. The relevant capital structure ratios have been used to know how quickly the different components of capital structure are helping to maintain long term financial strength in the business. In addition, statistical tools like, arithmetic mean, Parametric Two way Analysis of Variance (ANOVA) and Non Parametric Kruskal Wallis H test of hypothesis testing have been applied. Thus, this study focuses on the pertinence of statistical tools in evaluating the long-term financial strength of the selected companies in conjunction with the relevant capital structure ratios. In the end, the study offers some meaningful suggestions in order to improve the long-term solvency of the pharmaceutical companies selected for this study.

Keywords

Long term solvency, Capital, Finance, Leverage.

Introduction

Inferential Statistics covers those methods which help in drawing inferences on the characteristics of the population, on the basis of sample. It is an applied branch of statistics that help in generalization of facts representing the population. These inferences are drawn for specific purposes, e.g. efficiency of management, strengths and weaknesses of the firm, cost and profit relationship, etc. With inferential statistics, you are trying to reach conclusions that extend beyond the immediate data alone. For instance, we use inferential statistics to infer from the sample data what the population might think. Or, we use inferential statistics to

make judgements of the probability that an observed difference between groups is a dependable one or one that might have happened by chance in this study. Thus, we use inferential statistics to make inferences from our data to more general conditions.

The term capital structure is comprised of two words - 'Capital' and 'Structure'. In accounting, 'capital' refers to the investment in business required for its running, while 'structure' is the manner in which anything is constructed. Basically, structure is an engineering term which refers to the arrangement of various components of a building structure in standard proportions. However, capital structure is a mix of various sources of finance in desired proportion. As observed by Hampton, "A firm's capital structure is the relation between debt and equity securities that make up the firm's financing of its assets. Ratio analysis is an important and widely used technique of financial management. 'As a tool of financial analysis, ratios are of crucial significance.

The importance of ratio analysis lies in the fact that it enables in drawing inferences regarding performance of the company as it shows facts logically on a comparative basis. Ratio analysis is quite relevant in evaluating the performance of a company in respect of different aspects such as liquidity position, long-term solvency, profitability, operating efficiency etc. Thus, it is used to interpret the financial statements in order to ascertain the strengths and weaknesses of a firm. The capital structure ratios reflect the long term financial strength/solvency of a firm.

This paper analyses long term debt paying capacity aspect of financial performance of five leading pharmaceutical companies in India. The present study is an attempt to portray some objective conclusions on the diverse aspects of capital structure of the selected pharmaceutical companies in India by applying different techniques of inferential statistics on different capital structure related ratios.

Objectives of The Study

This study has the following broad objectives:

1. To work out the overall quantum of long term solvency maintained by the selected five pharmaceutical companies in India and to compare the long term solvency position of all the companies by comparing

respective mean capital structure ratios.

2. To infer whether the difference of diverse capital structure ratios between and within the selected sample companies is significant by applying Parametric statistical test of Two way Analysis of Variance. (ANOVA).
3. To infer whether the difference of diverse capital structure ratios between the selected sample companies is significant by applying Non parametric statistical test of Kruskal Wallis H test.
4. To draw meaningful conclusions and offer necessary suggestions to improve the efficiency of long term solvency of all the companies.

Research Sample Design

The current study has been carried out by taking samples of five leading pharmaceutical companies of India viz. Cipla, Lupin, Novartis, Orchid and Torrent. These companies are selected as they all are maintaining their financial statements on the basis of the financial year. Moreover, all the selected companies hold a major market share in the Indian Pharmaceutical industry. The relevant data has been mainly gathered from the published annual reports and accounts of the selected pharmaceutical companies. The other sources which have been consulted are technical and trade journals, news papers and other published information. The study covers a period of nine years, from 2003-04 to 2011-12.

Research Methodology

The study is broadly devoted on the application of different techniques of inferential statistics in the analysis of long term solvency position of all the selected companies. Under the present study, the technique of Ratio analysis is used to draw inferences regarding the long term solvency position of the companies under study. In the present study, the Debt/Equity, Proprietary, Solvency, Fixed Asset, Capital Gearing, Interest Coverage and Financial Leverage ratios served the purpose of determining the long-term solvency of the selected pharmaceutical companies under study for a period of nine years, i.e., from 2003-04 to 2011-12. Further, statistical tools like arithmetic mean, two way ANOVA and Kruskal Wallis H test have been applied to make inferences from the calculated ratios to draw some objective conclusions. Thus, this research study attempts to focus on pertinence of statistical tools in examining the financial performance of the selected companies. It also demonstrates the role of inferential statistics in analysing and solving complex business problems.

Research Hypothesis and Testing

In the present era of science, logic and technology, it's not possible to draw any conclusions accurately without proving it objectively. To test the validity of the conclusion or claim drawn on the basis of six capital structure ratios used in this research study, statistical technique of hypothesis testing is applied to decide whether the claim is true or false at a specified level of significance. Hypothesis testing enables a decision maker to draw inferences more precisely. Testing of the hypothesis is an essential part of the study of inferential statistics because it enables researchers to confidently examine the accuracy of their results. Several hypotheses have been formulated and tested statistically to draw conclusions on the liquidity position of the selected companies. The following hypothesis has been set and tested in the present study -

H0 There is no significant difference between the diverse capital structure aspects of the selected pharmaceutical companies.

H1 There is a significant difference between the diverse capital structure aspects of the selected pharmaceutical companies.

For this purpose, 5% level of significance has been used. The degree of freedom has been taken to be 8 (formula being N-1) as nine years are covered in this study.

Ratio Analysis

Ratio Analysis is an important technique of financial analysis. It is the process of determining and interpreting numerical relationship between figures of the financial statements. Leverage ratio is used to judge the long-term financial position of a firm. These ratios indicate the funds provided by owners and creditors. Long-term creditors include debenture holders, vendors selling equipment on instalment basis and other financiers supplying long-term loans. In order to test the long term financial strength position of the all the companies during the period of study from 2003-04 to 2011-12. The following seven important capital structure ratios have been computed and analysed.

Table No. 1: Mean Capital Structure Ratios

Companies	Debt Equity Ratio	Proprietary Ratio	Solvency Ratio	Fixed Asset Ratio	Capital Gearing Ratio	Interest Coverage Ratio	Financial leverage
Cipla	0.16	0.63	0.37	2.7	9.51	111.91	1.01 [L]
Lupin	1.33	0.36	0.64	2.18	0.84	7.34	1.35
Novartis	0.09 [L]	0.69 [H]	0.31 [L]	23.63 [H]	253.9 [H]	130.88 [H]	1.03
Orchid	2.28 [H]	0.29 [L]	0.71 [H]	1.46 [L]	0.53 [L]	1.9 [L]	1.78 [H]
Torrent	0.52	0.54	0.46	1.85	2.97	32.86	1.07

Source: Calculated from the annual reports and accounts of all the selected companies, from 2003-04 to 2011-12
Where, H refers to the highest ratio and L refers to the lowest ratio

- 1) The maximum and minimum mean debt equity ratio of Orchid and Novartis was 2.28 and 0.09, respectively. This ratio is used to appraise the financial structure of a firm. The high ratio of Orchid shows a large share of financing by creditors. The D/E ratio of 2.28:1 implies a low safety margin for the creditors. It indicates that the owners were putting in relatively lesser money of their own. If the company fails financially, the creditors would lose heavily. On the contrary, Novartis had a very low ratio, indicating a relatively high stake of the owners, implying a sufficient safety margin for creditors. For Novartis, the cost of debt is less burdensome and it will be able to raise additional funds. However, the main impact of such a low ratio is that the shareholders of Novartis are deprived of the benefits of trading on equity. The mean ratio of Lupin of 1.33 seems to be the most appropriate one among all the companies.
- 2) Overall analysis of the proprietary ratio reflects that Novartis had the maximum proprietary ratio of 0.69, which indicates that out of one rupee of

the assets of the company, proprietors have invested 0.69 paisa and outsiders 31 paisa. A ratio of above 50 percent is generally considered safe for the creditors. Therefore, in the case of Novartis, the creditors were in a secure position. On the other hand, Orchid had maintained a mean ratio of 0.29, which showed a high dependence of the company on outside working capital, which constituted a greater risk to the creditors. Cipla and Torrent, however, maintained their mean ratio at a satisfactory level, i.e., more than 50 percent, while the mean ratio of Lupin was not satisfactory, as it was less than 50 percent.

- 3) A greater reliance was put by Orchid on creditors to generate profits for the owners of the firm, which is evident from its highest solvency ratio of 0.71. On the contrary, Novartis, with the lowest solvency ratio of 0.31, exhibited a greater cushion against creditors' losses in the event of liquidation.
- 4) Novartis and Orchid had the maximum and the minimum fixed asset ratio of 23.63 and 1.46, respectively. The fixed assets ratio of Novartis reveals that long-term funds had been employed to finance a very large amount of current assets and a very little amount had been invested in fixed assets, which reflects a defective policy adopted for managing its long-term funds. On the contrary, Orchid and the other selected companies maintained their capital employed and utilised it in fixed assets in a satisfactory manner.
- 5) Orchid had the lowest mean gear ratio of 0.53 (variable cost-bearing capital is proportionately lesser than fixed cost-bearing capital), which is an indication of more dependence on the external sources of finance and, thus, overburden of fixed financial charges. In the case of the remaining sample companies, Lupin had used more external capital, as compared to internal capital, while Cipla and Torrent had a high mean gear ratio, indicating more dependence on variable cost-bearing capital.
- 6) Novartis had the highest mean interest coverage ratio of 130.88, which signifies a better interest-paying capacity of the firm, as compared with the other selected companies, and a good safety margin available to long-term creditors. However, it is too high, which indicates unused capacity of Novartis, which reduced the profits from trading on equity, resulting in the reduction in the shareholder's income. In contrast, the lowest interest coverage ratio of Orchid of 1.90 is a danger signal that the company has used excessive debt and does not have the ability to offer assured payment of interest to the lenders. In the case of the remaining three selected pharmaceutical companies, the mean interest coverage ratio during the study period was too high, indicating unused debt capacity.

Application of Inferential Statistics

Parametric Testing- Two-Way Analysis of Variance (ANOVA)

Two-way analysis of variance is used to test the significance of difference in the liquidity ratios within one Sample Company during the various years of study and also to examine the significance of the difference in the capital structure

ratios between selected sample companies simultaneously. With the two-factor analysis of variance, we can test two sets of hypotheses with the same data at the same time. The following hypotheses have been formulated for the purpose:

H01 There is no significant difference within one Sample Company during the various years of study.

H02 There is no significant difference between the ratios of different companies.

Intra-firm Comparison (within samples)

Intra-firm comparison involves comparing the ratios of a company over a period of years. It reflects the relative performance of a company from year to year. Since the calculated F-ratios are lower than the critical F-ratios in all the capital leverage ratios, thus null hypothesis (H01) is accepted, which means there is no significant difference between debt equity, proprietary, solvency, fixed assets, capital gearing and interest coverage ratios and financial leverage of all the companies during the various years of the study.

Inter-firm Comparison (between samples)

Inter-firm comparison involves comparing the ratios of a company with those of others in the same industry. It reflects a company's performance in relation to its competitors. Since the calculated F-ratios are higher than the critical F-ratios in case of capital gearing ratio and financial leverage, thus null hypothesis (H02) is rejected, which shows that there is a significant difference between the long-term financial position of all the selected sample companies used in this study. It is concluded that the long-term financial position of all the five selected companies differs significantly from the point of view of interest charge burden. On the contrary, the calculated F-ratios are lower than the critical F-ratios in case of debt equity, proprietary, solvency, fixed assets and interest coverage ratios. Therefore, null hypothesis (H02) is accepted, which shows that there is no significant difference between the long-term financial positions of all the selected sample companies used in this study.

Table 2: Two-Way Analysis of Variance

Ratios	Source of Variation	SS	DF	MSS	F-Ratio	Critical Value	Results: Ho Is
Debt Equity Ratio	Between Years (SSC)	1.04	8	0.13	0.41	3.93	Accepted
	Between Companies (SSR)	30.91	4	7.73	24.41	5.63	Rejected
	SSE	10.13	32	0.32			
Proprietary Ratio	Between Years (SSC)	0.01	8	0.00	0.14	3.93	Accepted
	Between Companies (SSR)	1.06	4	0.27	29.52	5.63	Rejected
	SSE	0.29	32	0.01			
Solvency Ratio	Between Years (SSC)	0.01	8	0.00	0.14	3.93	Accepted
	Between Companies (SSR)	1.06	4	0.27	29.52	5.63	Rejected
	SSE	0.29	32	0.01			
Fixed Assets Ratio	Between Years (SSC)	784.99	8	98.12	0.99	3.93	Accepted
	Between Companies (SSR)	3361.02	4	840.26	8.47	5.63	Rejected
	SSE	3173.69	32	99.18			
Capital Gearing Ratio	Between Years (SSC)	494450.15	8	61806.27	0.98	3.93	Accepted
	Between Companies (SSR)	452023.36	4	113005.84	1.80	5.63	Accepted
	SSE	2007154.04	32	62723.56			
Interest Coverage Ratio	Between Years (SSC)	9982.42	8	1247.80	0.29	3.93	Accepted
	Between Companies (SSR)	131021.32	4	32755.33	7.62	5.63	Rejected
	SSE	137468.64	32	4295.89			
Financial Leverage	Between Years (SSC)	7.45	8	0.93	1.16	3.93	Accepted
	Between Companies (SSR)	3.85	4	0.96	1.19	5.63	Accepted
	SSE	25.68	32	0.80			

The following hypotheses have been formulated for the purpose:

H0 There is no significant difference between the long-term financial ratios of different companies.

HA There is a significant difference between the long-term financial ratios of different companies.

Table 3: Table Showing Results of Kruskal-Wallis H-Test for All the Capital Structure Ratios

Significance Level (α): 5 percent

Type of Test: Two-tailed

Ratio	Degree of Freedom	Computed Value	Critical Value	Result Ho Is
Debt Equity Ratio	4	37.83	9.488	Rejected
Proprietary Ratio	4	33.77	9.488	Rejected
Solvency Ratio	4	33.77	9.488	Rejected
Fixed Assets Ratio	4	32.92	9.488	Rejected
Capital Gearing Ratio	4	37.83	9.488	Rejected
Interest Coverage Ratio	4	32.96	9.488	Rejected
Financial Leverage	4	23.33	9.488	Rejected

Source: Calculated from the annual reports of the selected companies from 2003-04 to 2011-12.

The results of the non-parametric Kruskal-Wallis H-test show that, from all points of views, the long-term solvency of the selected companies is different. Since the calculated value of H is higher than the critical H-value in all the cases, thus null hypothesis (H₀) is rejected, which shows that there is a significant difference between the long-term financial positions of all the selected sample companies used in this study. It is concluded that all the five selected companies have adopted different policies to maintain their long-term financial strength. Moreover, all the sample companies have diverse capital structure. Some of them were more dependent on internal sources of capital, while the others relied on external sources of capital.

Conclusions and Suggestions

- Orchid should reduce its dependence on long-term external sources of finance to reduce the burden of interest and increase the safety margin for the creditors.
- Novartis, on the other hand, should increase its dependence on long-term sources of finance so that its stakeholders can enjoy the benefits of trading on equity.
- Orchid should review its policy regarding investment in assets in order to reduce the share of outside creditors in purchasing its total assets so that cushion against creditor's losses in the event of liquidation can be increased.
- Novartis should reduce employment of long-term funds for financing its current assets and increase fixed assets so that long-term financial needs of the company can be managed more efficiently.
- It is suggested that Orchid and Novartis both should evaluate their capital structure.
- Cipla, Lupin and Torrent are maintaining their long term solvency in a consistent manner.

References

- Elhance, D.N. (1964). *Fundamentals of Statistics*, Edition 30, Kitab Mahal, Allahabad.
- Guthman, H.G., Dougall, H.E. (1995). *Corporate Financial Policy*, Prentice Hall, New York.
- Gupta, S.P. (2008). *Statistical methods*, Sultan Chand & Sons, New Delhi.
- Khan, M.Y., Jain, P.K. (2007). *Management Accounting: Text, Problems and Cases*, Tata McGraw-Hill Publishing Company Limited, Noida.
- Levin, Richard I, David, Rubin S. (1995). *Statistics for Management*, Prentice- Hall of India (P) Ltd., New Delhi.
- Rao, Prabhakara J.V., Subbarayudu, V. (2000). *Management Accounting*, Himalaya Publishing House, Mumbai. Retrieved from: www.socialresearchmethods.net/kb/order.php.
- Sadhu, A.N., Singh, Amarjit. (1996). *Research Methodology Social Sciences*, Himalaya Publishing House, Mumbai.
- Sancheti, D.C., Kapoor, V.K. (2011). *Statistics (Theory, methods and applications)*, Sultan Chand & Sons, New Delhi.
- Trochim, William M.K. (2006). *The Research methods knowledge base*, Atomic Dog Publication, Ohio.
- Vinyakam, N., Sihna, I.B. (2002). *Management Accounting- Tools and Techniques*, Himalaya Publishing House, Mumbai.