

Trend in Debt-Equity Ratio of Select Pharmaceutical Companies in India - An Analytical Overview

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Abstract

Purpose of the Study: The Indian pharmaceutical industry, the largest generic drug provider in the world is selected for analyzing its debt-equity ratio in terms of the presence of a trend, if any. And also to know whether there is any significant difference amongst the select companies with respect to their capital structure choices

Study design/methodology/approach: For this study, the top ten pharmaceutical companies listed on the Bombay Stock Exchange (BSE) as of 18th April 2019, have been selected. Data for fifteen years, i.e. from 2003-04 to 2017-18 have been collected from the Capitaline database. To know the differences, if any, in the capital structure of the select companies, the Analysis of Variance (ANOVA) has been tested. To identify the trend in the debt-equity ratio, linear trend regression has been run on each of the time-series data. Further, the Mann-Kendall Trend test, a non-parametric test has been conducted to know the presence of any monotonic trend.

Findings: Results of the study revealed that Aurobindo pharma had the highest mean debt-equity ratio over the past fifteen years. Results of ANOVA revealed that there is a statistically significant difference amongst the ten select pharmaceutical companies with reference to their debt-equity ratio. Except for Piramal and Sun pharmaceutical company, all the other eight companies had been found to have some trend, either positive or negative.

Keywords: Indian Pharmaceutical Industry, Debt-Equity Ratio (DER), Bombay Stock Exchange (BSE), Analysis of Variance (ANOVA), Mann-Kendall Trend Test.

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Introduction: Indian pharmaceutical industry is the 3rd largest in terms of production volume and 14th largest in terms of value in the worldwide scenario. The industry is expected to reach a production value of 65 billion dollars by 2024 as projected by IBEF (Indian Brand Equity Foundation). “Indian pharmaceutical industry is the largest generic drug producer at global level” (Zadeshvariya, 2018). It is one of the 25 industries under the Government of India’s ‘Make In India’ project. The pharmaceutical industry is driven by huge investment in research and development expenditure, and this can be regarded as a highly regulated capital-intensive industry. The investments are either financed by debt, i.e. borrowed fund or by equity, i.e. ownership fund. The ratio of debt-to-equity, i.e. the leverage is a matter of concern for the ultimate owners of the companies, i.e. equity shareholders, as their returns in terms of return on equity largely depend on the proportion of funds financed by debt. More the debt in the capital structure more the company is said to be leveraged. An optimum amount of debt in the debt-equity mix is capable to generate optimum, often regarded as a maximum return in the hands of the owners. Though the determination of the optimum debt level is another issue, and not within the scope of this study, it aims at knowing whether different pharmaceutical companies resort to different debt-equity structures or not, and also to know whether there is any linear or otherwise trend in the debt-equity ratio (DER) of the select pharmaceutical companies.

Literature Review: The combination of firms’ debt-equity has been a major concern for researchers since the publication of the capital structure irrelevance proposition by **Modigliani and Miller (MM) (1958)**. Therefore, in the oversimplified market assumption i.e. in the assumption where the capital market is efficient, no capital structure is superior to others. They proposed that the increase in return due to an increase in the debt will exactly be offset by the increase in risk. While the **Net Operating Income (NOI)** approach

proposed by David Durand supports the MM approach of capital structure, **the Net Income (NI)** approach and Traditional Approach oppose the MM proposition.

Sarkar, R., & Choudhary, R. P. (2018) in their study on the capital structure of the automobile companies in India suggested increasing short-term debt of the automobile companies, as it has a favorable effect on the returns. **Sarkar, R. (2016)** in a study on Indian Information Technology (IT) companies concluded that the IT industry in India is more equity-oriented. Two possible reasons were pointed out, debt financing might be more costly than equity financing for IT companies. The other reason as per the study was that the IT companies may have more business risk, which in turn deter them to go for debt financing, as in that case financial risk would also be high and in turn, the overall risk will also increase to a greater extent. **Tawiah, V. K. (2014)** attempted to analyze the emerging trends in capital structure patterns of companies in Ghana and India. He found that the Ghanaian companies are less prone to debt financing as compared to the Indian companies. He has put forward the reason for that as the interest rate on debt is high in Ghana. **Panigrahi, A. K. (2010)** identified that Indian companies use a substantial amount of debt in their capital structure. Whereas foreign-controlled Indian companies are relatively less prone to debt financing as compared to Indian companies. He has also concluded that the trend in the use of debt capital of the Indian companies has started declining since the mid-nineties.

Research design & Methodology:

Data Type, Source of data, Study Period, and Sample description: The study is completely based on secondary data which have been collected from the “Capitaline Database” which provides audited data, hence are reliable. The debt-equity ratio (DER) data have been collected for fifteen years ranging from 2003-04 to 2017-18. On BSE (Bombay Stock Exchange), 118 pharmaceutical companies are found to be listed as of April 18, 2019. Out of these 118 companies top 10 companies have been selected based on their

market capitalization. The following table shows the selected sample companies with their market capitalization as of a particular date.

Table (1): Sample Pharmaceutical Companies with Respective Market Capitalization

Serial Number	Name of the Companies	Market Capitalization
		(Rs. crore)
1	Sun Pharma	1,10,609.34
2	Piramal Enter	48,860.93
3	Dr Reddys Labs	46,449.48
4	Aurobindo Pharm	46,032.46
5	Divis Labs	45,761.47
6	Cipla	44,925.90
7	Lupin	37,344.30
8	Biocon	36,861.00
9	Cadila Health	34,571.79
10	Torrent Pharma	30,871.30

Source: www.moneycontrol.com

Statistical Tools Used: Descriptive Statistics like mean (\bar{x}), standard deviation (σ), coefficient of variation (CV), etc. have been computed. A comparative column chart for all the ten companies for fifteen years has been drawn for descriptive analysis. To know whether the select companies have different capital structures or not in terms of DER, the ANOVA (Analysis of Variance) methodology has been adopted. For trend analysis, a linear trend regression equation has been estimated. The following linear trend model has been fitted for each of the data series:

$$DER_t = \alpha + \beta t$$

Where DER_t = Debt-equity ratio for time period t.

α = constant term (intercept of the trend line)

β = coefficient of t (slope of the trend line)

t = time.

The intercept and the slope of the trend line have been estimated using simple regression in which DER is the dependent variable and the time “t” is the independent variable. F test value has been obtained from the Analysis of Variance (ANOVA) table to test the hypothesis of whether the model is significant or not. The null hypothesis (H_0) and alternative hypothesis (H_1) of the F - test are as follows:

Null Hypothesis (H_0): The fit of the intercept-only model and the present model are equal.

Alternative Hypothesis (H_1): The fit of the intercept-only model is significantly reduced compared to the present model.

In this case where the probability value (P-value) of F-statistic for overall significance is less than the level of significance, which is 5% (0.05), we reject the null hypothesis and conclude that the present model provides a better fit than the intercept only model.

Apart from this, **Mann-Kendall** (MK) test has also been employed to determine whether there is any monotonic upward or downward trend in the time series data. A monotonic upward or downward trend implies that the variable of interest is consistently increasing or decreasing over time. But the trend may or may not be the linear one. This **MK** test can be used as a non-parametric counter-part of linear regression. This test is used to know whether the slope of the estimated linear regression is different from zero. The null hypothesis (H_0) and alternative hypothesis (H_1) of the Mann-Kendall test are as follows:

Null Hypothesis (H_0): There is no trend in the time series.

Alternative Hypothesis (H_1): There is some trend (linear or quadratic) in the series of composite Gross Profit margin ratios of the industry (that may be positive or negative).

Results: Table 2 and figure 1 below depicts respectively the raw data matrix for the study period from 2003-04 to 2017-18 along with the descriptive

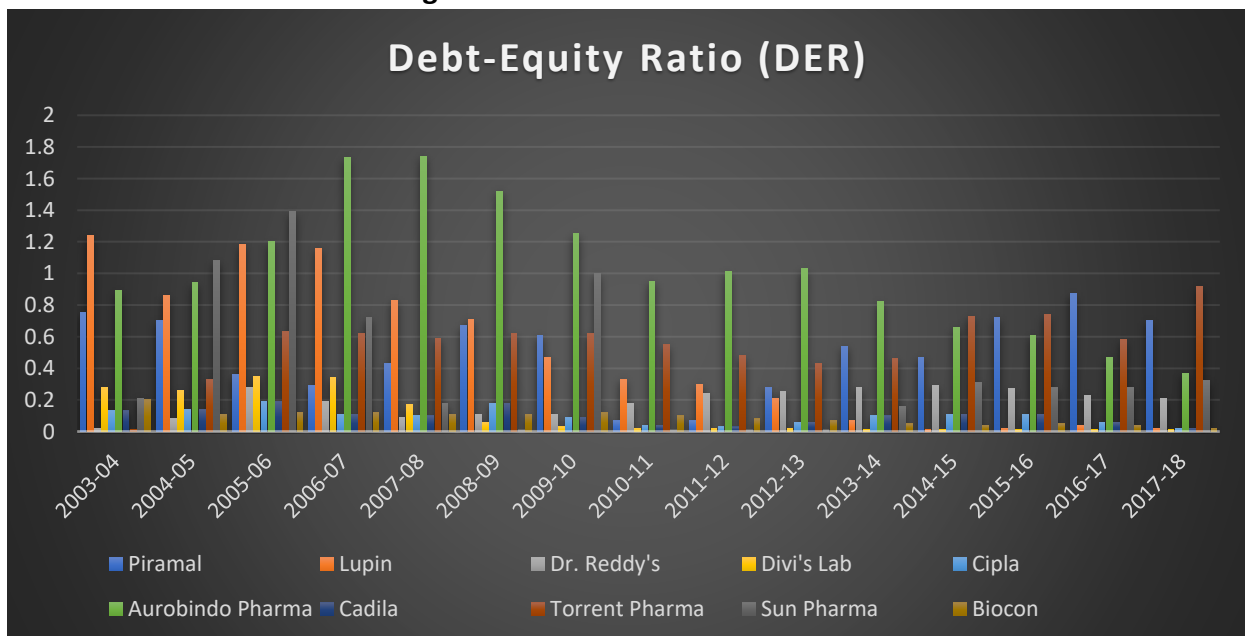
statistics and the column chart of all the select pharmaceutical companies for the whole study period.

Table 2: Debt-Equity Ratio and Descriptive Statistics of Select Pharmaceutical Companies

Company	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average	SD	CV	Max	Min
Piramal	0.75	0.7	0.36	0.29	0.43	0.67	0.61	0.07	0.07	0.28	0.54	0.47	0.72	0.87	0.7	0.5020	0.2476	49.3158	0.75	0.07
Lupin	1.24	0.86	1.18	1.16	0.83	0.71	0.47	0.33	0.3	0.21	0.07	0.01	0.02	0.04	0.02	0.4967	0.4613	92.8818	1.24	0.01
Dr. Reddy's	0.02	0.08	0.28	0.19	0.09	0.11	0.11	0.18	0.24	0.25	0.28	0.29	0.27	0.23	0.21	0.1887	0.0864	45.8090	0.02	0.02
Divi's Lab	0.28	0.26	0.35	0.34	0.17	0.06	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.1067	0.1332	124.9107	0.28	0.01
Cipla	0.13	0.14	0.19	0.11	0.1	0.18	0.09	0.04	0.03	0.06	0.1	0.11	0.11	0.06	0.02	0.0980	0.0503	51.3401	0.13	0.02
Aurobindo Pharma	0.89	0.94	1.2	1.73	1.74	1.52	1.25	0.95	1.01	1.03	0.82	0.66	0.61	0.47	0.37	1.0127	0.4182	41.2937	0.89	0.37
Cadila	0.13	0.14	0.19	0.11	0.1	0.18	0.09	0.04	0.03	0.06	0.1	0.11	0.11	0.06	0.02	0.0980	0.0503	51.3401	0.13	0.02
Torrent Pharma	0.01	0.33	0.63	0.62	0.59	0.62	0.62	0.55	0.48	0.43	0.46	0.73	0.74	0.58	0.92	0.5540	0.2064	37.2484	0.01	0.01
Sun Pharma	0.21	1.08	1.39	0.72	0.18	0.01	1	0.01	0.01	0.01	0.16	0.31	0.28	0.28	0.32	0.3980	0.4390	110.3127	0.21	0.01
Biocon	0.2	0.11	0.12	0.12	0.11	0.11	0.12	0.1	0.08	0.07	0.05	0.04	0.05	0.04	0.02	0.0893	0.0461	51.5528	0.2	0.02
Industry Average																0.3544				

Source: Authors' Computation

Figure 1: Column Chart of Debt-Equity Ratio of Select Pharmaceutical Companies Taken Together From 2003-04 to 2017-18



Source: Authors' Compilation

From table 2 it can be seen that the industry average debt-equity ratio is 0.3544. But the Piramal, Lupin, Aurobindo Pharma, Torrent Pharma, and Sun Pharma are using debt-equity proportion above the industry average.

The SD value of using debt-equity is as high as 0.4613 for Lupin company and as low as 0.0461 for Biocon company. The coefficient of variation (CV), which represents the percentage of variation with respect to its mean value, is highest in the case of Sun Pharmaceutical, which is 110.3127.

Figure 1 above, depicts the debt-equity ratio of all the ten sample firms in a combined bar chart. It shows that the Aurobindo pharma had the highest debt content amongst the sample companies during the study period, followed by Sun Pharma and Lupin. Dr. Reddy's lab, Divi's Lab, Cipla, Cadila, and Biocon had consistently maintained a low to moderate debt-equity ratio.

Table 3: Result of ANOVA of Debt-Equity Ratio

Source of Variation	SS	df	MS	F	P-value	F critical
Between Groups	12.11495	9	1.346105	18.78172	0.000	1.9473
Within Groups	10.03395	140	0.071671			
Total	22.1489	149				

Source: Authors' Computation

Table 3 above shows the result of Analysis of Variance or ANOVA. The one-way ANOVA has been used to know whether there are any statistically significant differences among the mean debt-equity ratios of the ten select firms over the fifteen years. The F statistic value is found to be 18.7817 which is greater than the tabulated or critical value of F which is 1.9473. Also, P-value is found to be 0.000 (less than 0.01), so we may reject the null hypothesis of equality of mean and thereby conclude that there is a significant difference among the companies as to their approaches of debt-equity mix with 99% level of confidence.

Table 4: Results of the Linear Trend Regression DER of Sample Pharmaceutical Companies

Company	Trend Equation	R ² - Value	F - Statistic*	Mann-Kendall Trend Test*
Piramal	$DER_t = 0.439 + 0.080t$	0.020	0.267 (0.614)	$z = 0.39687$ (0.6915)
Lupin	$DER_t = 1.277 -$	0.984	109.710	$z = -4.5089$

	0.098t		(0.000)	(0.0000)
Dr Reddy's	$DER_t = 0.087 + 0.013t$	0.433	9.921 (0.008)	$z = 2.3812$ (0.01726)
Divi's Lab	$DER_t = 0.306 - 0.025t$	0.700	30.350 (0.000)	$z = -4.2137$ (0.0000)
Cipla	$DER_t = 0.154 - 0.007t$	0.383	8.076 (0.014)	$z = -2.2425$ (0.02493)
Aurobindo Pharma	$DER_t = 1.518 - 0.063t$	0.455	01.875 (0.006)	$z = -2.6723$ (0.0075)
Cadila	$DER_t = 0.154 - 0.007t$	0.383	8.076 (0.014)	$z = -2.2425$ (0.02493)
Torrent Pharma	$DER_t = 0.327 + 0.028t$	0.379	7.921 (0.015)	$z = 1.3422$ (0.1795)
Sun Pharma	$DER_t = 0.749 - 0.044t$	0.199	3.235 (0.95)	$z = -0.55092$ (0.5817)
Biocon	$DER_t = 0.165 - 0.009t$	0.845	70.680 (0.000)	$z = -4.2053$ (0.0000)

Source: Authors' Computation; *P-Values within parenthesis

Above table 4 shows the summarized result of linear trend equations, respective R-square values and F-test values performed using SPSS 18. The table also shows the Z-test values of the Mann-Kendall trend test done using R Software. From F-statistics and their respective probability values (P-value within parenthesis), it is clear that the firms such as Lupin, Dr Reddy's, Divi's Lab, Cipla, Aurobindo Pharma, Cadila, Torrent Pharma, and Biocon have some kind of linear trends, as their respective P-values of the F-statistics are all well below 0.05.

Whether such trends are positive or negative can be known from the slope coefficient of the trend equations (i.e. coefficient values of 't'). Now, from among the eight firms having some trends, i.e. Lupin, Divi's Lab, Cipla, Aurobindo Pharma, Cadila, and Biocon, it is seen that they have a negative trend in their use of debt-equity ratio, as the coefficients of 't' are found to be negative for these firms. Whereas, Dr Reddy's and Torrent Pharma have positive trends in the debt-equity ratio, as the coefficients of 't' are found to be positive for these firms.

The time trend regression is the parametric one, so it requires the normality assumption to be fulfilled. Whereas, the Mann-Kendall trend test is a non-

parametric test, a distribution-free test, which requires no such normality assumption to be fulfilled. This non-parametric test is a kind of support to the results as discussed above. As the positive and negative values of Z-statistics in the Mann-Kendall test exactly tallied with that of the coefficients of 't' and the p-values are also the same as that have been generated by trend equations. So, the reliability of the trend equation results is assured.

Conclusions & Discussions: Indian pharmaceutical industry is the largest generic drug provider in the world. It is one of the twenty-five industries identified under the Make in India initiative of the government of India. Among the top ten pharmaceutical companies in India, the Aurobindo pharmaceutical company had the highest average debt-equity ratio over the past fifteen years. Except for Piramal and Sun pharma companies, all the eight companies were found to have some trend, either positive or negative, in their use of debt in the capital structure. It has also been found in the study that the select companies do have different orientations to the use of debt capital in their capital structure, though they belong to the same industry.

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