

## An Examination of the Systematic Risk Determinants in the Pharmaceutical Industry

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**ABSTRACT:** This paper aims to study the impact certain financial variables have on the systematic risk of companies in the pharmaceutical industry. Investors usually decide whether to invest or not based on the risk patterns and the risk appetite. This study aims to help investors gain a better understanding of the pharmaceutical industry and the factors which influence risk in the same.

**KEYWORDS:** systematic risk, pharmaceutical sector, investor, risk pattern, beta

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### I. INTRODUCTION:

Over the past 60 years, the Indian pharmaceutical industry has witnessed immense growth and transformation. With wide ranging capabilities in the field of drug manufacture and technology, it is currently on top of the chart amongst India's science based industries. The pharmaceutical sector is one of the sectors that face the most government control and severe price competition. It is expected to grow at 20% compound annual growth over the next five years. The rapid growth of the industry could be attributed to some of the recent developments that have taken place. The market grew by 8.7% year-on-year with sales of Rs. 11,342 crore(US\$1.69 billion) in August, 2018. The sector also witnessed private equity and venture capital investments of US\$396 million during the months of April and June of 2018. Exports to US will also get a boost, as branded drugs worth US\$ 55 billion will become off-patent during 2017-2019. Despite this, investment in the pharmaceutical industry can be risky, considering the fact that is one of the most government-regulated sectors. Shareholders are wary of the increasing legal and regulatory issues as well as issues concerning pricing. Not only has this, but the declining productivity of in-house research and development also contributed to the pressure for changes in the industry by the shareholders, market, and regulators. Clearly, investments in the pharmaceutical industry can be very rewarding, as it is one that is undergoing constant growth and development. However, it is also risky. This makes it vital for drug companies and potential investors to undertake a careful analysis of the systematic risk faced by the pharmaceutical companies and how these risks would impact their performance on the stock market.

### II. REVIEW OF LITERATURE:

1. The primary motive for both investors as well as firms is profit maximization. Creating returns has always been the aim. However, with return comes risk, which makes it imperative to take into account the various determinants of systematic risk, and how these determinants affect the organization and its performance (Kumar, Aleemi, & Ali, 2015).
2. Over the years, various methods to determine systematic risk have been discovered. The most popular and extensively used method of measuring systematic risk is Beta, which considers the sensitivity of the returns of an individual stock in relation to the market risk. Another well-known and widely used method is the Capital Asset Pricing Method (CAPM), which describes the relationship between risk and the expected returns of the stock. It determines the expected return that a potential investor requires from their investment in a firm's' stock, and generally, there is a positive relationship between the risk and return. (Kim, Gu, & S.Mattila, 2002)
3. Although there isn't published research on the determinants of systematic risk in the pharmaceutical industry, extensive research has been done on the same in other industries like restaurant, casino and airline and banking industries. Sound knowledge of the characteristics of the risk of the pharmaceutical sector would give investors a better idea of the nature of investments. A better understanding of the firms' systematic risk would enable implementation of better policies which would consequently reduce risk and enhance the firm value. (Kim, Gu, & S.Mattila, 2002).

4. In the hotel industry, the systematic risk of hotel real estate investment trust (REIT) companies were examined using seven specific variables as determinants of systematic risk. These variables were leverage, firm size, liquidity, growth, efficiency, profitability and dividend payout ratio. It was found that there was a positive relationship between systematic risk and leverage ratio. (Shin, 2005)
5. Variables such as debt leverage, profitability, firm size, and EBIT growth were used to determine systematic risk in the airline industry. It was found that debt leverage and firm size were positively related to beta (Lee & Jang, 2007).
6. However, certain researchers have found different results in other industries. It was found that Profitability, leverage, and liquidity were the factors that most significantly affected the systematic risk in the restaurant industry. Their results showed that there was a strong negative relationship between profitability and systematic risk. (Ceschini, 1999)

### III. RESEARCH DESIGN

The study uses the following financial variables: profitability(ROA), liquidity(current ratio), growth(EBIT), leverage(D/E), size of the firm(market capitalisation), efficiency(receivables turnover),sustainability (R&D expenses to sales). The main objective of the paper is to investigate the determinants of systematic risk. The seven financial variables for the study are selected based on the empirical study on the systematic risk. The specific indicators for the financial variables are also of the previous studies which validate the use of the following indicators to measure the relationship between financial variables and systematic risk. The additional indicator taken for this study is Research and Development expenses. This is because there is always extensive research undertaken by companies in the Pharmaceutical sector, which would consequently have an effect on the performance of the companies.

#### A. Statement of the Problem:

Although research has been conducted previously on the impact of financial variables on risk, the results have been mixed. The findings were unclear on which of the financial variables have a definite impact on the systematic risk. Moreover, no research has been conducted so far on the same in the pharmaceutical sector.

#### B. Research Objectives:

- To examine whether the systematic risk is influenced and predicted by certain financial variables in listed pharmaceutical companies in India.
- To determine which of the variables better explain the systematic risk

### IV. RESEARCH HYPOTHESIS

The previous studies on the determinants of risks in general and in particular to the pharmaceutical industry show an ambiguous relationship between systematic risk and the financial variables. Hence the hypothesis study relates to the ascertainment of the relationship between the systematic risk and the financial variables. The CAPM model of beta is used as dependent variable and the financial variables are the independent variables on the other hand. The dependant variables include the liquidity, profitability, growth, size of the firm etc. Considering the fact that the pharmaceutical companies are unique in terms of operations especially when it comes to the pricing of the medicine and the importance of Research and Development expenses, this papers takes the liberty to use R&D expenses to sales as a financial variable to ascertain the relationship between the R&D expenses ad systematic risk.

Therefore we arrive at the following hypotheses:

H0 : There is a significant relationship between beta and financial ratios

H1 : There is no significant relationship between beta and financial ratios

### V. RESEARCH METHODOLOGY

#### Data Source

This study used secondary data collected from NSEINDIA and the financial ratios of the selected companies are taken from the financial reports available from MONEYCONTROL. The data required for this research included Return on Assets (ROA), Current Ratio(CR), Receivables Turnover ratio (RR), Earning Before Interest and Taxes (EBIT),Debt to Equity ratio (DE) ,Market Capitalization (MC) and R&D to Sales ratio.

Beta was computed by using the daily closing prices of individual stocks and the daily returns of the sectoral index - Nifty Pharma and Market Capitalisation was computed using the Number of Shares Outstanding year's end multiplied with Stock Price year's end.

The research has considered 5 years data from Financial Year March 31st 2014 to March 31st 2018. The mean value of the 5 years data is used for the analysis and interpretation.

There are 170 pharmaceutical companies listed in Stock Exchange as on 7th December 2018. For the purpose of this research Top 10 companies based on the market capitalisation were chosen as sample.

Dependent variable - Beta

Independent variables - ROA ratio, Current ratio, Receivables Turnover Ratio, EBIT, D/E Ratio, Market Capitalization, and R&D to Sales ratio.

The collected data was analysed using IBM SPSS Statistics 25.

**Limitations**

1. Lack of availability of complete information for the calculation of the financial variables
2. Since only standalone figures were considered in the calculation of the financial variables, the effect of mergers and acquisitions are neglected, which could be a drawback.
3. The research is limited to the use of few significant ratios and inclusion of only 5 years data which can be extended further in future research.

**VI. DATA ANALYSIS**

**Table1 : The 5 year mean values of the financial variables and beta**

COMPANY	ROA	CR	RR	EBIT	DE	MC	RD	BETA
Sun Pharma	-2.004	0.558	4.39	0.926	0.282	161672.7	2.910107	1.333769
Dr Reddy's Labs	8.59	2.084	2.326	18.282	0.254	231869.7	14.42289	0.916602
Aurobindo Pharm	12.76	1.546	2.514	24.248	0.434	28209.34	3.344849	1.070594
Cipla	8.156	2.464	5.598	15.712	0.052	88408.58	7.95938	0.823214
Divis Labs	16.69	6.008	3.88	33.984	0.01	37032.27	0.915507	0.862637
Piramal Enterprises	1.7	0.644	8.376	42.108	0.618	47365.43	2.350552	0.605894
Lupin	18.57	3.678	3.172	30.85	0.018	119176.1	6.267587	0.561561
Biocon	7.26	2.82	4.106	18.36	0.032	52343.2	3.880179	0.968469
Cadila Health	13.914	1.236	4.91	27.204	0.318	34535.63	7.397784	0.723664
Torrent Pharma	13.15	2.146	3.966	30.688	0.674	99678.98	12.40697	0.467577

**Testing of hypothesis**

**Results of Paired Sample T Test**

A paired sample t-test was conducted to determine whether the mean differences of the dependent variable (Beta) with the mean differences of the financial ratios are statistically significant in order to answer the first objective, that is to examine whether systematic risk is influenced and predicted by certain financial variables.

Table 2 represents the mean values of the variables of selected 10 companies with its respective standard deviations and Table 3 representing the results of the correlation between dependent variable (beta) and Independent variables. While most of the independent variables are negatively correlated to beta which suggests that higher ROA, CR,RR, EBIT, DE AND R&D Expenses, lower the beta as it reduces the risk. BETA-EBIT,BETA- ROA have a strong negative correlation of -0.786 and -0.501 respectively, followed by all other variables with weak negative correlation between beta and other financial variables, except for BETA and MC which is showing a weak positive correlation.

**Table 2: Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BETA	.8333980	10	.25911801	.08194031
	ROA	9.8786000	10	6.47040415	2.04612145
Pair 2	BETA	.8333980	10	.25911801	.08194031
	CR	2.3184000	10	1.61554746	.51088096
Pair 3	BETA	.8333980	10	.25911801	.08194031
	RR	4.3238000	10	1.74348194	.55133740
Pair 4	BETA	.8333980	10	.25911801	.08194031
	EBIT	24.2360000	10	11.52079221	3.64319438
Pair 5	BETA	.8333980	10	.25911801	.08194031
	DE	.2692000	10	.24702353	.07811570
Pair 6	BETA	.8333980	10	.25911801	.08194031
	MC	90029.1988 950	10	65952.13218506	20855.89542493
Pair 7	BETA	.8333980	10	.25911801	.08194031
	RD	6.1855805	10	4.44442158	1.40544951

**Table 3: Paired Samples Correlations**

		N	Correlation	Sig.
Pair 1	BETA & ROA	10	-.507	.135
Pair 2	BETA & CR	10	-.190	.599
Pair 3	BETA & RR	10	-.285	.424

Pair 4	BETA & EBIT	10	-.786	.007
Pair 5	BETA & DE	10	-.274	.444
Pair 6	BETA & MC	10	.200	.580
Pair 7	BETA & RD	10	-.354	.316

**Table 4: Paired Samples Test**

Paired Differences

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	
					Lower	Upper
Pair 1	BETA - ROA	-9.04520204	6.60551517	2.08884731	-13.77050294	-4.31990115
Pair 2	BETA - CR	-1.48500204	1.68413122	.53256905	-2.68975695	-.28024714
Pair 3	BETA - RR	-3.49040204	1.83429643	.58005546	-4.80257867	-2.17822542
Pair 4	BETA - EBIT	-23.40260204	11.72564511	3.70797456	-31.79062325	-15.01458084
Pair 5	BETA - DE	.56419796	.40398451	.12775112	.27520485	.85319106
Pair 6	BETA - MC	-90028.36549704	65952.08045505	20855.87906646	-137207.64171370	-42849.08928039
Pair 7	BETA - RD	-5.35218250	4.54263254	1.43650654	-8.60178606	-2.10257894

**Table 5: Paired Samples Test**

		t	df	Sig. (2-tailed)
Pair 1	BETA - ROA	-4.330	9	.002
Pair 2	BETA - CA	-2.788	9	.021
Pair 3	BETA - RR	-6.017	9	.000

Pair 4	BETA - EBIT	-6.311	9	.000
Pair 5	BETA - DE	4.416	9	.002
Pair 6	BETA - MC	-4.317	9	.002
Pair 7	BETA - RD	-3.726	9	.005

Table 5 are the results of the mean differences of dependent variable with the independent variables. The significance value (P value) of 0.05 is considered for the analysis and the results indicate that beta is significantly impacted by all of the financial variables.

From the significant values we can conclude that the mean difference of all independent variables and the mean difference of the dependent variable are statistically significant. It suggests that there exists significant relationship between beta and the financial ratios.

### VII. CONCLUSION:

This paper studies the effects of financial variables on the systematic risk. Through the study, the two objectives have been established- a) whether systematic risk is influenced and predicted by certain financial variables in listed pharmaceutical companies in India, and b) which of the variables better explain the systematic risk.

The below table shows the summary of the hypotheses, and presents the acceptance or rejection of null hypothesis:

Hypotheses	Acceptance/Rejection
There is a significant relationship between beta and financial ratios	Accept
There is no significant relationship between Beta and financial ratios	Reject

The results indicate that the receivables ratio and growth of the firm (EBIT) seem to have the most significant effect on the beta, with their p values very close to 0.000. The primary concern for both investors as well as the firm's is to maximize the return on investment. And the rate of return depends on the amount of risk that investors and firms are willing to take. This emphasizes the usefulness of determining the factors affecting one of the major component of risk (i.e, systematic risk) which provides information relating the risks associated with investing and helps the firms in determining the cost of capital.

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