A STUDY ON RISK AND RETURN ANALYSIS OF PROMINENT STOCKS OF AUTOMOBILE AND PHARMACEUTICAL SECTORS IN INDIA

Ms. Nikhitha MH[1], Dr. Satyendra P. Singh[2]

Alliance School of Business, Alliance University, Bengaluru.
E-mail: nikhithahosalli@gmail.com;satyendras.14@gmail.com

Abstract

Out of various investment alternatives, equity shares are one of the most popular as well as fascinating alternative. Although they carry high risk, they have a potential to generate higher returns in comparison to most of the other investment alternatives. Therefore, equity shares are not only preferred by individual investors but also by institutional investors. While selecting stocks for investment, rational investors take their decisions on the basis of large number of factors but two of them are most important i.e. Risk and Return. Modern portfolio theory also emphasises on using these two parameters while analysing and selecting stocks for the purpose of investment.

This study is an attempt to analyse and compare ten prominent stocks each from two important sectors of Indian economy i.e. Automobile and Pharmaceuticals on the basis of their risk and return. Researchers have not only analysed these stocks using their total risk but have also used their beta factors, systematic risk as well as unsystematic risk for a rather comprehensive analysis. Sharpe's ration has also been used to analyse these stocks in terms of the risk-adjusted returns generated by them. The study reveals that among the stocks of two chosen sectors, stocks of pharmaceutical sector generated higher return and that too at relatively lower risk. Stock of the pharmaceutical company Abbott India Ltd has the highest value of Sharpe's ratio during the study period.

Keywords: Risk, Return, Equity Share, Stock Market, Nifty 50, Standard Deviation, Beta, Sharpe's Ratio

Introduction

Return and risk considered to be the two most important parameters required for analysing and selecting a security in an investment portfolio. The risk-return optimisation is a basic idea in financial decision making as well as in every other facet of life. A well-documented and time tested proposition of investment theory is that investors, by and large, can realize better return by taking more risk. Consistent with this proposition is a long-standing theory in Economics and Finance which hypothesizes that a positive relationship exists between a security's risk and its return i.e., greater is the risk or uncertainty of returns, greater would be the average return or risk premium.

A rational investor would analyse the return and risk associated with an investible asset before making the decision of investment in this asset. The real return which he gets from a share may additionally vary from its expected return and depends on the risk the investor is ready to take. The risk is measured in terms of fluctuations of returns. There are numerous factors that lead to risk. They are either common to all shares or specific to share of a company. Thus, the total risk associated with a security is made up of two components i.e. systematic or non-diversifiable risk and unsystematic or diversifiable risk. Every investor would decide upon to investigate the risk factors which would assist him to plan his portfolio in order that he can reduce his risk and maximize his return via diversifying into proper avenues. Managing risk is very important aspect for an investor.

With stock market volatility, diversification of portfolio is one of the best ways to navigate smoothly whatever the market brings. The key point is also that every sector doesn’t always perform the same way at different periods of an economic cycle. Therefore, it is important to understand and analyse the performance of stocks sector wise. This research involves studying of risk and return relationship of 10 prominent stocks each from automobile and pharmaceutical sectors in Indian stock market for a time period of ten years ranging from April 01, 2010 to March 31, 2020.

The study deals with comparative analysis of these stocks in terms of their return and risk. The paper is divided in six sections. Section 2 talks about the review of past literature and describes the research issues while Section 3 lists out the objectives of study. Section 4 is concerned with

the research methodology including statistical tools and techniques, followed by data analysis and interpretation in Section 5. The last section i.e. section 6 deals with the conclusion of the study.

Literature Review

There are large number of researches conducted by different researchers in the area of analysis of performance of various securities at different points of time. Many developments have occurred in the theory pertaining to the stock market and the way in which participants currently view investment theory. The modifications have occurred primarily because of extensive empirical research and theoretical innovations in three areas: (1) the publication of Harry Markowitz's article on portfolio theory, and the subsequent work of William F. Sharpe; (2) the extensive research and development of efficient market theory and the related implications for security analysis; and (3) the development of comprehensive data files and computer technology which make extensive empirical research feasible. There are few hypotheses to the relationship between expected return and the risk associated with these returns. One of these hypotheses emphasises on positive relationship between these two parameters.

Following are few important studies related to the topic:

Yasaswy, J. N. (1993) conducted a study to assess the risks associated with different groups of stocks. He suggested that investment in defensive shares carry lower risk followed by growth shares that carry moderate risk while the risk associated with cyclical shares is highest among these groups. Behaviour of return is also the same for these three groups of shares.

Jaiswal, Ajay (2001) assessed and elaborated the connotations of 'Equity Risk Premium'. He said, “investors look for a certain level of return for assuming the 'risk of equities’ volatile return' which can be measured through the equity risk premium”. He noticed that this risk premium has increased significantly over a period of time. He suggested that investment in equity shares is not for those investors who are weak-hearted because equity investors are impacted by various factor related to and developments of capital market.

Karthika, P. and Karthikeyan, Dr. P. (2011) compared shares of chosen companies from diverse sectors like Automobiles, Banking, IT, Oil, and Pharmaceuticals on the basis of their return, risk and liquidity. They also discussed the trade-off by using the standard deviations, beta factors, and coefficients of correlation etc. of these securities.

Vishal, Vaibhav (2012) performed sartorial risk analysis of Nifty Junior in respect of systematic risk and beta. He analysed the companies on the basis of sector wise risk and segmented various industries according to choice of investors for their risk taking ability so that they can prepare their own portfolio.

Ahuja, Juhi (2012) highlighted the structure of capital market in India. Paradigm shift was observed in Indian capital market over the years with the introduction of several reforms in the market. Regulatory mechanism along with the implementation of modern infrastructure had resulted in improved mobilization of financial resources along with better market capitalization and enhanced market liquidity. The Indian capital market was subdued with the global financial crisis in United States sub-prime mortgage market which impacted the markets across the world.

Bala, Ms. Anju (2013) advocates that stock market in India makes significant contribution in the economic advancement of the country and it is a vibrant sector in the financial system of the country. The objective of her study was to put forward the literature review pertaining to Indian Stock Market. This research provides guidelines to stock market investors to earn more profit with less risk.

Sinha, Dr. Ratna (2013) conducted a study of return and risk associated with in investment in shares of banking sector. Dr. Sinha analysed the return and risk in the stocks of banking sector vis-a-vis equity stocks of non-banking sector. The study compared the performance of banking stocks against the stocks of two key sectors i.e. Real Estate and IT. Dr. Sinha used t-test for the purpose of analysis.

Krishnaprabha, Dr. S. and Vijaykumar, M. (2015) conducted research on analysis of risk and return of chosen stocks in India. The study indicates that with high risk comes high return while

low risk lead to low return. The study concludes that stocks of FMCG and Pharmaceutical sectors gave higher return in comparison to stocks of Banking and Automobile sector.

Sowjanya and Kothari, Anshul (2016) conducted a study to analyse the performance of equity shares of Banking and Automobile sectors on comparative basis using their risk and return as parameters. They took nine stocks and conducted the study for time period ranging from 2011 to 2015. The study reveals that there is no substantial difference in the performance of banking and automobile stocks in terms of their risk and return.

Poornima, Dr. S. and Swathiga, P. (2017) conducted a study to analyse the relationship between return and risk of chosen stocks listed at National Stock Exchange using CAPM. They took five stocks from each of the two sectors i.e. Automobile and IT sector. The analysis showed that stocks of automobile sector generated positive return with low risk while stocks of IT sector gave negative return and that too with higher risk during the period of study.

Objectives of Study

The study has been undertaken keeping in mind following three objectives:

- To analyze the returns of prominent stocks of Automobile and Pharmaceutical sectors, and compare them with Nifty 50 returns.
- To measure the risks of prominent stocks of Automobile and Pharmaceutical sectors
- To analysis the performance of these stocks in terms of the risk-adjusted returns generated by them

Methodological Framework

Type of Data used - Secondary data

Sources of Data - Official website of National Stock Exchange and YahooFinance.

Time Period of Study - The study involves a time frame of ten years ranging from April 01, 2010 to March 31, 2020.

Market Index Selected for the Study – Nifty 50

Sectors Chosen for the Study - Two prominent sectors of Indian economy i.e. Automobile and Pharmaceutical have been chosen for the study.

Stocks Selected for the Study –

Sr. No.	Automobile Sector	Pharmaceutical Sector
1.	Maruti Suzuki India Ltd.	Sun Pharmaceuticals Industries Ltd.
2.	Bajaj Auto Ltd.	Divi's Laboratories Ltd.
3.	Mahindra & Mahindra Ltd.	Dr. Reddy's Laboratories
4.	Hero MotoCorp Ltd.	Cipla
5.	Eicher Motors Ltd.	Biocon
6.	Bosch Ltd.	Aurobindo Pharma
7.	Tata Motors	Torrent Pharmaceuticals
8.	MRF	Lupin Ltd
9.	TVS Motors Ltd.	Cadila Healthcare Ltd.
10.	Ashok Leyland Ltd.	Abbott India Ltd.

Data Analysis

The analysis has been done using following parameters:

- ✓ Mean Return
- ✓ Standard Deviation
- ✓ Co-efficient of Variation
- ✓ Correlation Coefficient
- ✓ Beta
- ✓ Sharpe Ratio

Methodology for calculation:

i. ***Mean Return:*** Monthly returns have been calculated using adjusted closing price of stocks.

The formula for calculating Mean Return:

$$\frac{(Adj\ close\ price\ of\ stock\ in\ current\ month - Adj\ close\ price\ of\ stock\ in\ previus\ month)}{Adj\ close\ price\ of\ stock\ in\ previous\ month}$$

These returns have been converted into mean annualised percentage returns.

ii. ***Risk:*** Standard deviation/variance of returns is one of the most accepted measure of risk. In this study, the researchers have taken the standard deviation of monthly returns as the measure of risk of that stock.

The formula for standard deviation is

$$SD = \sqrt{\frac{\Sigma(r_i - r_{avg})^2}{n-1}}$$

SD = Standard deviation

n = number of monthly returns

r_i = monthly returns of the stock

r_{avg} = mean return of the stock

$$Varience = SD^2$$

The formula used for Systematic and Unsystematic risk is

$$Systematic\ Risk = (\beta^2 \sigma_m^2)$$

β = Beta of the stock

σ_m = Standard deviation of the market

$$Unsystematic\ Risk = Total\ Varience - Systematic\ Risk$$

iii. ***Coefficient of Variation:*** The coefficient of variation gives the ratio of standard deviation and mean. It is another important parameter for measuring the degree of fluctuation in the data.

The formula used for calculation is:

$$CV = \frac{\sigma}{\mu}$$

CV = Coefficient of Variation

σ = Standard deviation

μ = Mean Return

iv. ***Beta:*** Beta value of a security measures the sensitivity of the price of a security to changes in the value of the market index (i.e., it measures relative volatility). Formula used for beta calculation is:

$$Beta = \frac{Covariance(Stock's\ \%\ monthly\ change, Index's\ \%\ monthly\ change)}{Varience(Index's\ \%\ monthly\ change)}$$

v. ***Sharpe's Ratio:*** Sharpe's Ratio is an important measure of performance of a stock as well as of a portfolio. It measures the risk-adjusted returns of a security/portfolio. Higher is the value of Sharpe's Ratio of a security, better is the performance of the security. The formula used is:

$$Sharpe\ Ratio = \frac{Risk\ Adjusted\ Return}{Standard\ deviation}$$

Observations & Analysis

Compilation is based on:

i. Monthly share prices of selected securities
ii. Period: 1st April 2010 to 31st March 2020
iii. Market Index: Nifty 50

The average annual Nifty 50 return calculated using a period of 10 years is 7.87%.

Automobile Sector

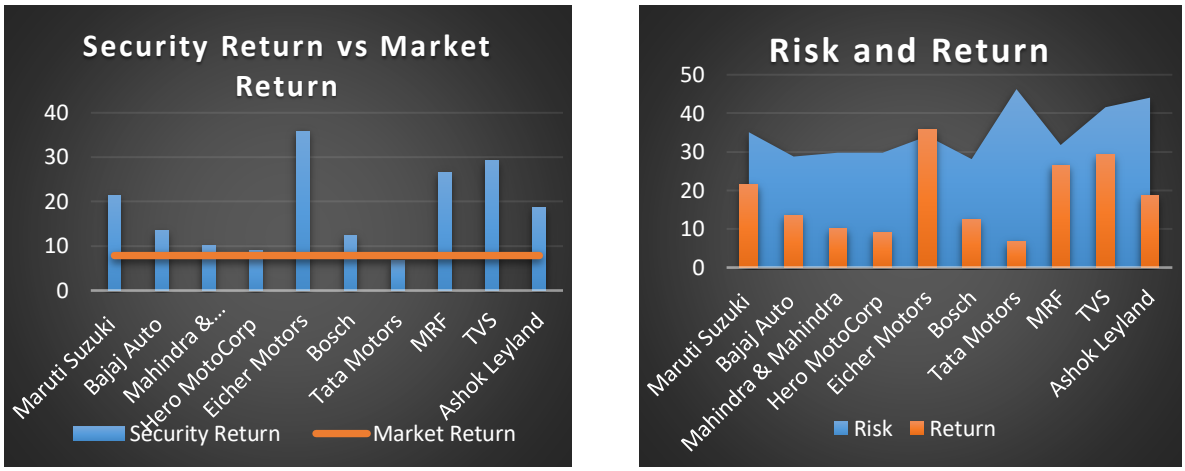
Sr No	Security	Mean Annual Return (%)	Annualized Standard Deviation	Beta	Annualized Variance	Systematic Risk	Un-systematic Risk	Correlation Coefficient	Coefficient of Variation	Sharpe Ratio
1	Maruti Suzuki	21.48	35.07	1.50	1230	709.36	520.65	0.76	1.63	0.45
2	Bajaj Auto	13.58	28.71	1.18	824.54	387.92	436.62	0.69	2.11	0.27
3	Mahindra & Mahindra	10.07	29.72	1.12	883.18	391.01	492.17	0.67	2.95	0.14
4	Hero Moto Corp	9.01	29.84	0.90	890.88	251.98	638.90	0.53	3.31	0.11
5	Eicher Motors	35.88	34.18	0.88	1168.93	241.52	927.41	0.45	0.95	0.88
6	Bosch	12.38	28.08	0.93	788.40	274.25	514.14	0.59	2.27	0.24
7	Tata Motors	6.71	46.26	1.79	2139.65	1005.24	1134.41	0.69	6.90	0.02
8	MRF	26.59	31.77	0.73	1009.56	168.42	841.14	0.41	1.19	0.66
9	TVS	29.23	41.58	1.25	1729.33	487.41	1241.92	0.53	1.42	0.56
10	Ashok Leyland	18.70	44.14	1.49	1948.44	693.86	1254.58	0.60	2.36	0.29

Table 1 - Table showing performance of stocks of Automobile sector

Risk and Return

Average Annual Return of the 10 selected shares of the sector = 18.37%

Average Risk (Standard Deviation) of the 10 selected shares of the sector = 34.94



Stock vs. Market Return & Risk and Return of Automobile Sector

It is evident from the charts that in Automobile sector, the share of Eicher Motors Ltd. generated the highest return in the considered period while share of Tata motors gave the lowest return and all the stocks except Tata Motors have returns higher than the average return of Nifty50. Similarly, from Risk and Return graph, it is clear that stock of Bosch Ltd. has the lowest risk and that of Tata Motors has highest risk out of all ten stocks.

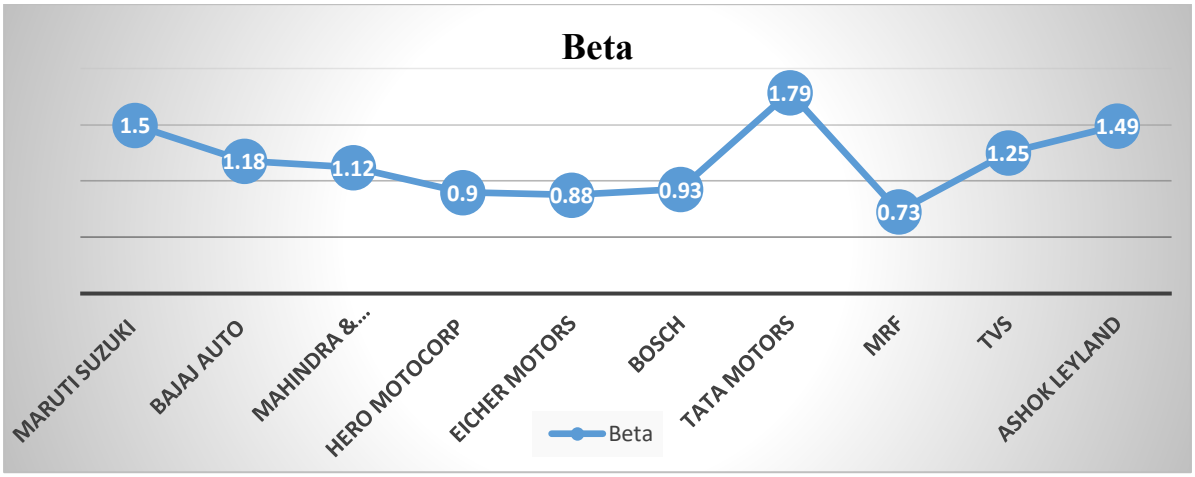
Beta

The beta (β) of a security is the measure of volatility of its returns with respect to the returns of market. Stocks with beta less than 1 indicate that these stocks are less volatile than the market i.e. their returns change less than proportional change in the market. Investors who want to take less risk would like to invest in a stock having a beta value of one or less. Stocks with beta more than one indicate that price of the stock price would be more fluctuating in comparison to that of market index i.e. their returns would change more than proportional change in the market.

Based on beta, the stocks in Automobile sector can be classified into following two categories:

Low Beta Stocks - Hero MotoCorp Ltd., Eicher Motors Ltd., Bosch Ltd., MRF Ltd.

High Beta Stocks (Aggressive Stocks) - Maruti Suzuki, Mahindra & Mahindra, Bajaj Auto, Tata Motors, TVS, Ashok Leyland.



Beta value of stocks of Automobile Sector

As seen from the graph, in Automobile sector, Tata Motors has highest beta, which means it is the most risky stock out of all. MRF has the lowest beta and it comes out to be less than one that means it is less volatile in comparison to Nifty 50. However, Hero MotoCorp and Bosch have beta nearly equal to 1, which means these stocks have volatility nearly same as that of the market returns.

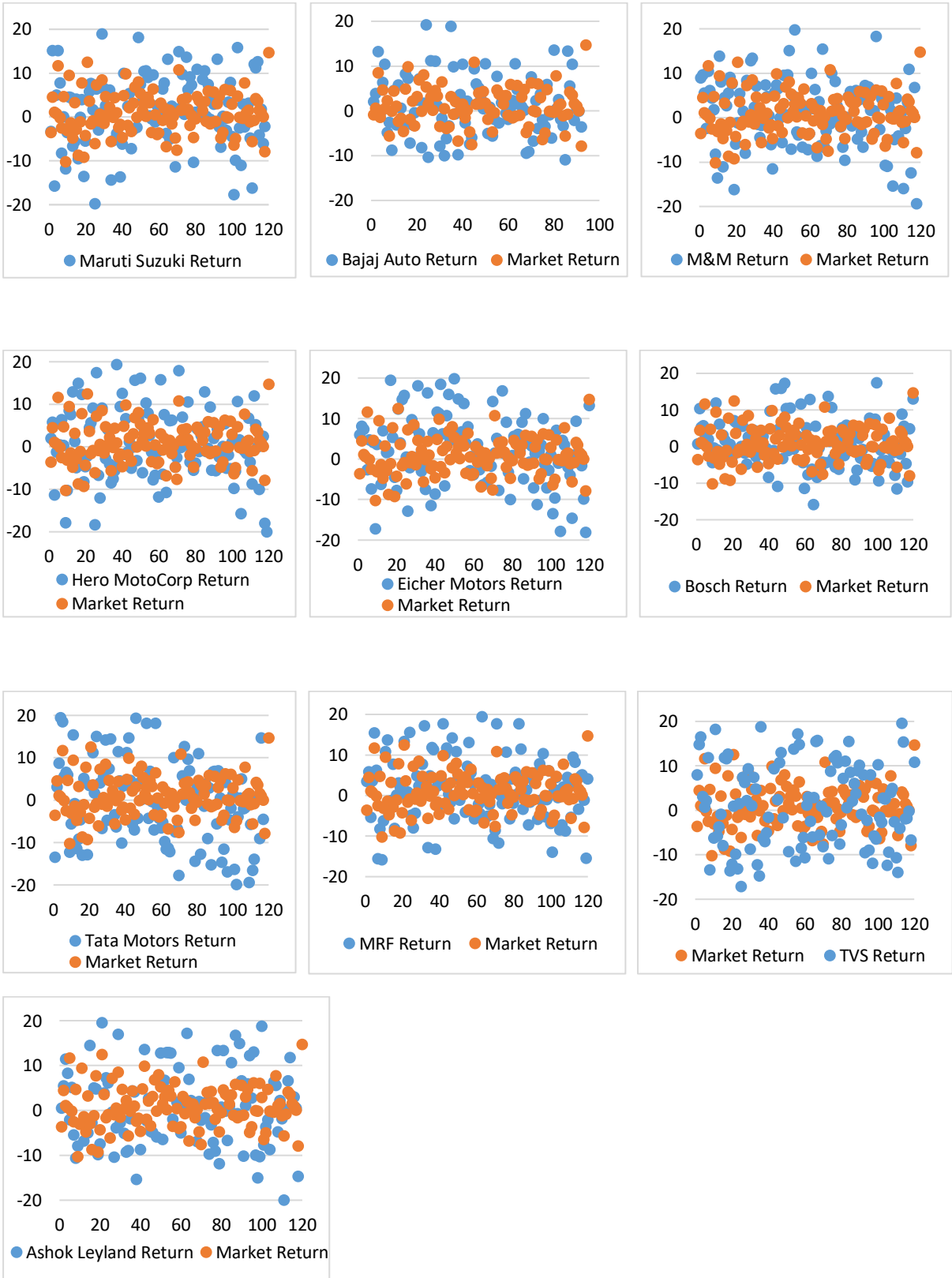
Correlation Coefficient

Correlation coefficient is used to measure the degree of co-movement between the security return and market return. The positive value indicates that both variables, i.e. return on security and return on market index tend to move in the same direction. However, the value nearer to 1 indicates the strength of correlation.

Stocks with Strong Correlation - Maruti Suzuki, Bajaj Auto, Tata Motors

Stocks with Moderate Correlation - Mahindra & Mahindra, Hero MotoCorp, Eicher Motors, Bosch, MRF, TVS, Ashok Leyland

Following scatter plots show the correlation between securities return and market return:



Scatter Plot Showing Correlation between Security Return & Market Return for Automobile sector

In Automobile sector, Maruti Suzuki Ltd. has highest value of correlation coefficient, which means it is highly correlated to market in positive direction, and MRF is least correlated to market. Both strong and weak correlated stocks are important according to need of investors as they help in diversifying the risk of investment.

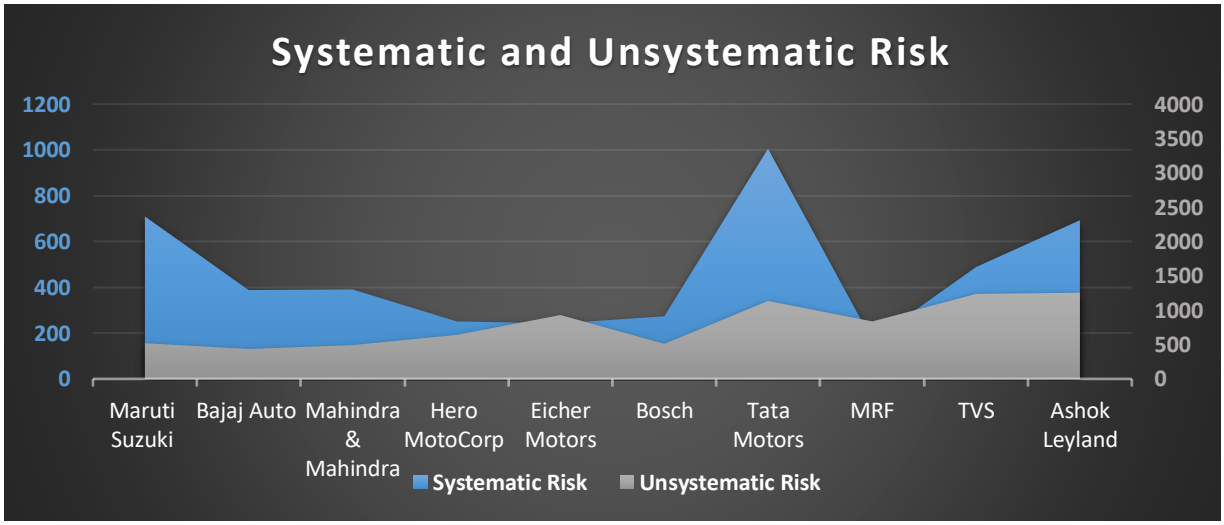
Sharpe's Ratio

The Sharpe's ratio is used to find out the excess return earned on a security (average return over and above the risk free rate of return) per unit of risk (standard deviation of returns). Higher the Sharpe's ratio better is the investment option, as it gives higher return on risk-adjusted basis. If we rank the stocks in Automobile sector according to better return with respect to risk undertaken, we get, in order - Eicher Motors, MRF, TVS, Maruti Suzuki, Ashok Leyland, Bajaj Auto, Bosch, Mahindra and Mahindra, Hero MotoCorp, Tata Motors.

Systematic Risk and Unsystematic Risk

Systematic risk is the non-diversifiable risk of a security. It is caused by general or macro factors and it is beyond the control of management of the company or investors for that matter. Unsystematic risk or diversifiable risk is specific to the stock of a company or industry. This risk is caused by firm-specific or industry specific factors. In other words, we can say that this risk is caused by micro factors.

Based on systematic and unsystematic risk calculated in Table 1, following graph has been plotted:



Graph of Systematic vs. Unsystematic Risk of Automobile sector

From the chart, it can be seen that in Automobile sector, MRF has lowest systematic risk and Bajaj Auto has lowest unsystematic risk, while Tata Motors has highest systematic and Ashok Leyland has highest unsystematic risk.

Pharmaceutical Sector

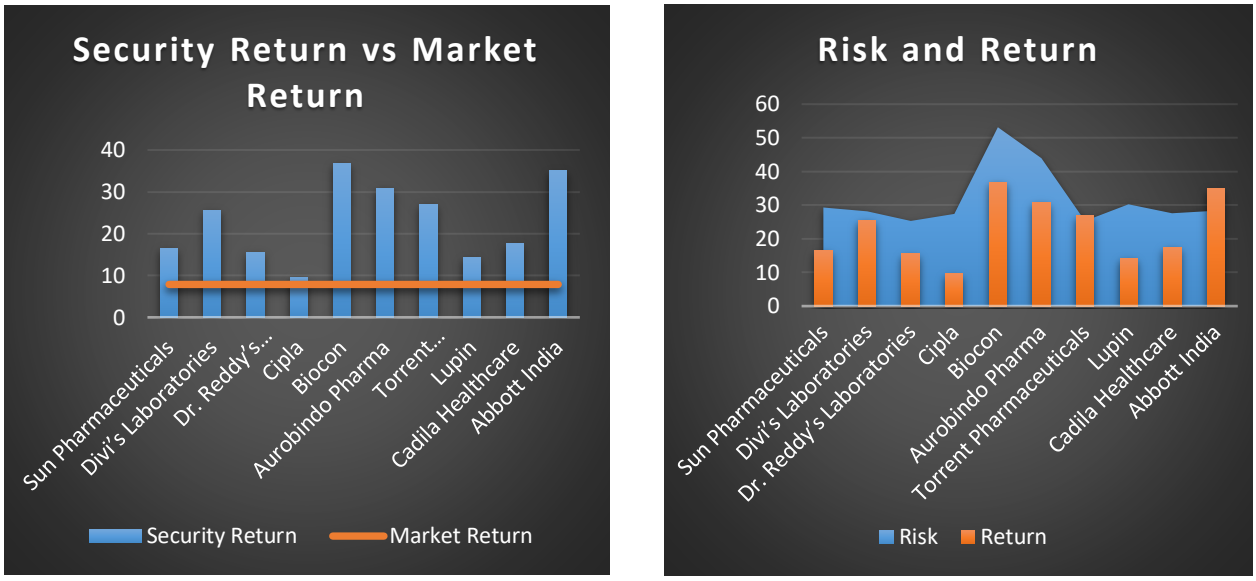
Sr No	Security	Mean Annual Return	Annualized Standard Deviation	Beta	Annualized Variance	Systematic Risk	Un-systematic Risk	Correlation Coefficient	Coefficient of Variation	Sharpe Ratio
1	Sun Pharmaceuticals	16.54	29.22	0.51	853.78	82.97	770.81	0.31	1.77	0.37
2	Divi's Laboratories	25.56	28.25	0.13	798.12	5.18	792.94	0.08	1.10	0.70
3	Dr. Reddy's Laboratories	15.55	25.38	0.30	643.94	27.38	616.56	0.21	1.63	0.39
4	Cipla	9.58	27.41	0.51	751.20	81.60	669.60	0.33	2.86	0.14
5	Biocon	36.85	53.16	0.81	2825.55	205.97	2619.58	0.27	1.44	0.58
6	Aurobindo Pharma	30.80	43.99	1.18	1935.29	439.96	1495.33	0.48	1.43	0.57
7	Torrent Pharmaceuticals	27.02	25.32	0.42	641.33	54.22	587.11	0.29	0.94	0.84
8	Lupin	14.29	30.31	0.40	918.71	51.33	867.38	0.24	2.12	0.28
9	Cadila Healthcare	17.55	27.51	0.39	757.01	47.25	709.76	0.25	1.57	0.43
10	Abbott India	35.00	28.31	0.27	801.55	22.52	779.02	0.17	0.81	1.03

Table 2: Performance of Stocks of Pharmaceutical Sector

Risk and Return

Average Annual Return of the 10 selected shares of the sector = 22.87%

Average Risk (Standard Deviation) of the 10 selected shares of the sector = 31.89



Stock vs Market Return & Risk and Return of Stocks of Pharmaceutical Sector

From the chart, it is clear that in share of Biocon Ltd. generated the highest return during the considered period and share of Cipla gave the lowest return. However, all the stocks in this sector have return higher than the Nifty 50 (market) return.

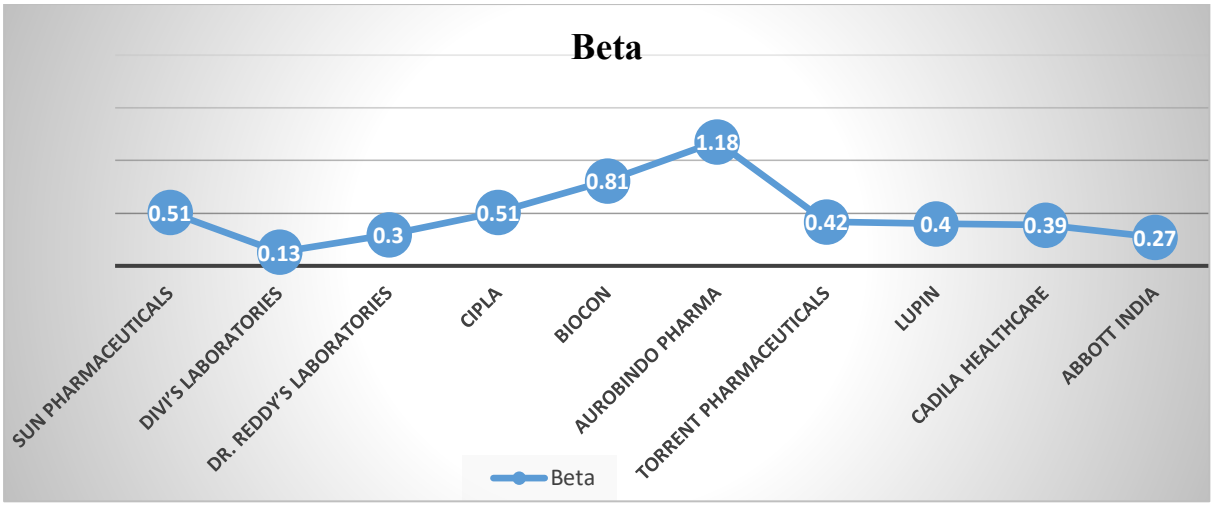
Similarly, in Risk and Return graph, it can be seen that stock of Biocon has the highest risk while stock of Torrent Pharmaceuticals has the lowest risk among the ten stocks.

Beta

Based on Beta value, the stocks in pharmaceutical sector can be classified into following two categories:

Low Beta Stocks- Sun Pharmaceuticals, Dr. Reddy's Laboratories, Divi's Laboratories, Cipla, Biocon, Torrent Pharmaceuticals, Lupin, Cadila Healthcare, and Abbott India

High Beta Stocks (Aggressive stocks) - Aurobindo Pharma



Beta value of stocks of Pharmaceutical Sector

It is clear from the chart, that in pharmaceutical sector, all stocks have beta less than 1 except that of Aurobindo Pharma, which means all stocks except the stock of Aurobindo Pharma are less volatile than market.

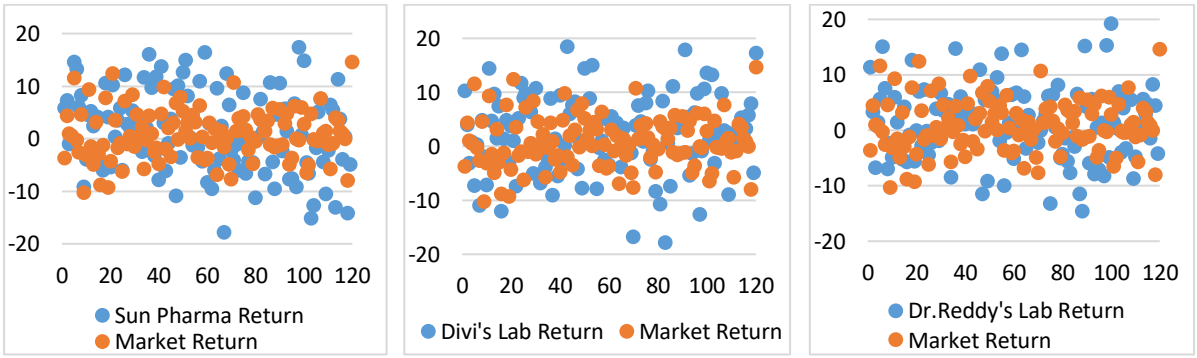
Correlation Coefficient

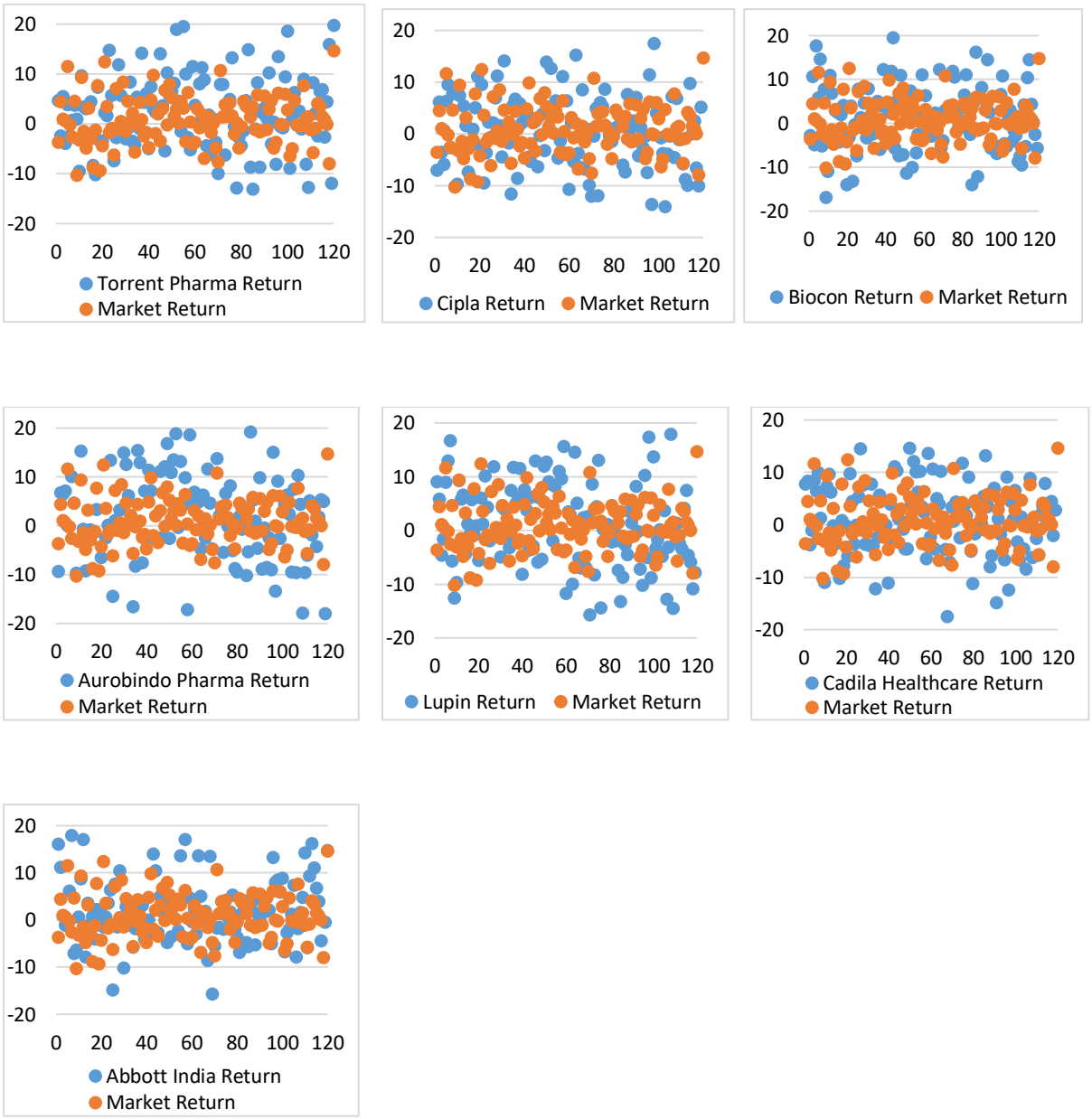
Based on the values of their correlation coefficients, the stocks of pharmaceutical sector are classified as follows:

Moderate Correlation - Cipla, Aurobindo Pharma

Weak Correlation - Sun Pharmaceuticals, Dr. Reddy's Laboratories, Divi's Laboratories, Biocon, Torrent Pharmaceuticals, Lupin, Cadila Healthcare, Abbott India

The following scatter plots show the correlation between securities return and market return.





Scatter Plot Showing Correlation between Security Return & Market Return for the Stocks of Pharmaceutical Sector

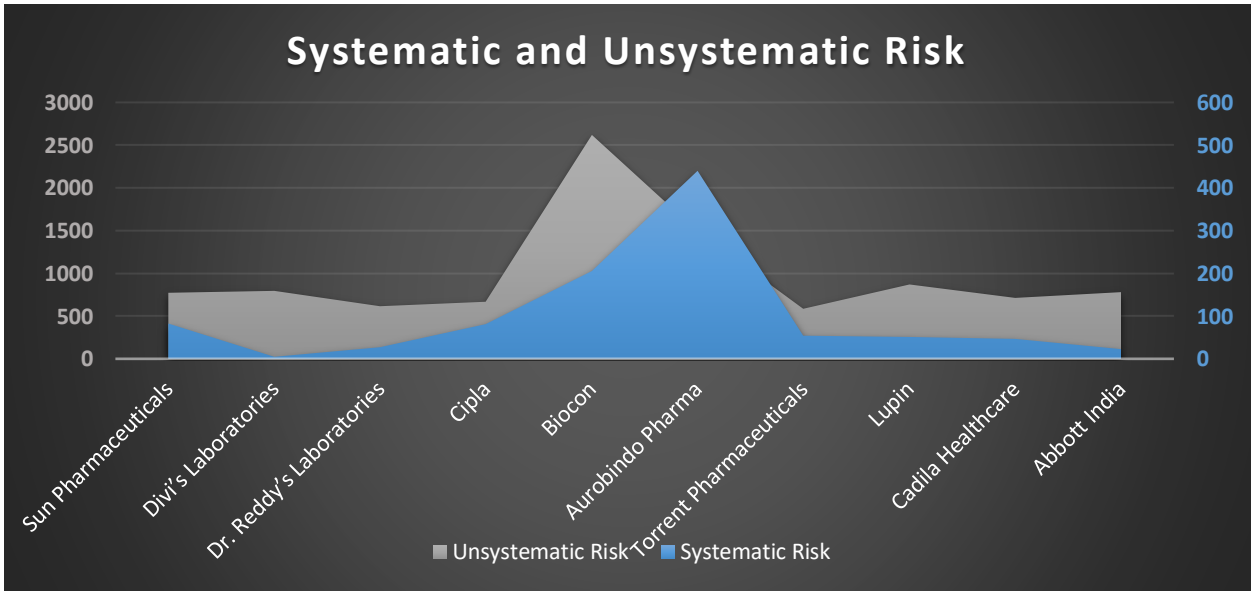
In Pharmaceutical sector, no stocks exhibit strong correlation with Nifty50. However, Aurobindo Pharma is comparatively high correlated and Divi's Laboratories is least correlated to market.

Sharpe's Ratio

If we rank the stocks in pharmaceutical sector according to better return with respect to risk undertaken, we get stocks in following order- Abbott India Ltd., Torrent Pharmaceuticals Ltd., Divi's Laboratories Ltd., Biocon Ltd., Aurobindo Pharma, Cadila Healthcare Ltd., Dr. Reddy's Laboratories, Sun Pharmaceuticals Ltd., Lupin, and Cipla.

Systematic Risk and Unsystematic Risk

Based on systematic and unsystematic risk calculated in Table 3, the following graph has been plotted:

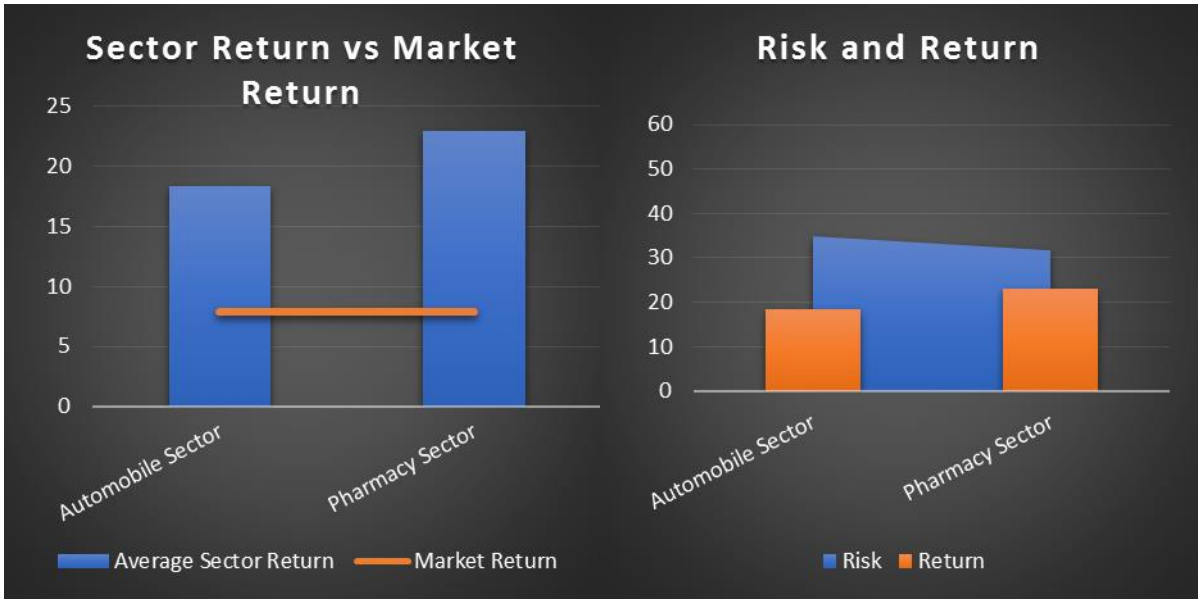


Graph of Systematic Vs Unsystematic Risk of Stocks of Pharmaceutical Sector

From the chart, it can be seen that in pharmaceutical sector, Divi's Laboratories has lowest systematic risk and Dr. Reddy's Laboratories has lowest unsystematic risk, while Aurobindo Pharma has highest systematic risk and Biocon has highest unsystematic risk.

Sector-wise Risk-Return Analysis

Sector wise return and risk have been calculated by taking the average return and risk of 10 selected stocks of the particular sector. On plotting them, we get the following charts:



Sector vs. Market Return & Sector Risk vs. Sector Return

It is clear from the chart that stocks of pharmaceutical sector (as an average) offered higher returns in comparison to stocks of automobile sector. If we compare on the basis of risk, it was opposite. That means, as an average the risk associated with pharmaceutical stocks was lower in comparison to the stocks of automobile sector. The chart also clearly indicates that on an average both the sectors i.e. pharmaceutical as well as automobile offered better return in comparison to the market index i.e. Nifty 50.

Conclusion

The study reveals that out of the two important sectors for the purpose of investment, stocks of pharmaceutical sector generated higher average return as compared to the same of the stocks of automobile sector during the 10 years' period of the study. Surprisingly, the stocks of pharmaceutical sector also, by and large, had lower risk as compared to the same of the stocks of automobile sector. As an average the stocks of both these sectors offered better returns than that of the selected market index i.e. Nifty 50.

Out of the 10 pharmaceutical shares chosen for the study, highest returns were generated by the stock of Biocon Ltd. followed by the shares of Abbott India and Aurobindo Pharma, while the lowest return was generated by the stock of Cipla. In terms of overall risk, the share of

Torrent Pharmaceuticals was found to be least risky while the stock of Biocon was found to be most risky. Aurobindo Pharma has the highest beta while Divi's Laboratories has the lowest. In terms of systematic risk, Aurobindo Pharma has the highest systematic risk and Divi's Laboratories has the lowest, while Biocon has the maximum unsystematic and Torrent Pharmaceuticals has the minimum. As far as generating more risk-adjusted returns is concerned, the stock of Abbott India Ltd. is the best followed by the stocks of Torrent Pharmaceuticals and Divi's Laboratories, while the stock of Cipla has the last rank among the selected pharmaceutical stocks.

Out of the 10 automobile shares chosen for the study, highest returns were generated by the share of Eicher Motors followed by shares of TVS Motors and MRF, while the lowest return was generated by the stock of Tata Motors. In terms of overall risk, the stock of Bosch Ltd. was found to be least risky while Tata Motors was found to be most risky. Tata Motors has the highest beta while MRF has the lowest. In terms of systematic risk, Tata Motors has the highest systematic risk and MRF has the lowest, while Ashok Leyland has the maximum unsystematic and Bajaj Auto has the minimum. As far as generating more risk-adjusted returns is concerned, the stock of Eicher Motors is the best followed by the stocks of MRF and TVS Motors, while the stock of Tata Motors has the last rank among the 10 selected automobile stocks.

On the basis of the study, it is safe to conclude that during the period of the study pharmaceutical stocks offered better risk-return combination in comparison to automobile stocks. Pharmaceutical stocks not only generated better returns in comparison to automobile stocks but at the same time they did it with lower risk. Out of all the 20 stocks studied from both the sectors, the stock Biocon was best in terms of returns as it generated highest returns during the period of study, while Torrent Pharmaceuticals was best in terms of total risk as it had minimum variance of returns. In terms of risk adjusted returns, Abbott India was found to be the best with highest Sharpe's Ratio while Tata Motors was found to be the last in the ranking with lowest Sharpe's Ratio.

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