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Research Article

PORTFOLIO SELECTION REVISITED: EVIDENCE FROM THE INDIAN AUTOMOBILE INDUSTRY

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ABSTRACT

The paper investigates the volatility in stock return of Tata Motors Ltd and Mahindra & Mahindra Ltd over the eight years calendar period (2008-2015).The portfolio options and efficient frontier for the stocks of select companies is constructed for different levels of risk and return by taking monthly closing returns over the study period. The tools used for the purpose of studying volatility in stock return and portfolio options include time moving average method and descriptive statistics. The result of study shows that portfolio one to four are not ideal portfolios whereas portfolio four to eleventh are efficient portfolios for investors of both select companies. The investment in the proportion of 30% and 70% in the stocks of Tata Motors Ltd and Mahindra & Mahindra Ltd constitutes Minimum Variance Portfolio for investors.

INTRODUCTION

ISI stands for Income, Savings and Investment. These are closely interrelated terms. Income determines savings. Saving determines the investment. In turn Investment determines the economic development of a country. Investment has become common activity of everyone who has savings. In earlier, investors had made investment in fixed income securities like debt, bond, preference shares, govt securities etc. This is because; investors were risk aversers. In recent days investors realised that investment in fixed income securities is not worth and preferred to invest in equity market. This is the big changes in the attitudes of the investors and results in development of stock market in terms of size of investment and no of players.

The risk and return are two sides of investment coin in equity market. While taking investment decisions risk and return are seriously considerable aspects. Risk is a possibility of loss from investment. Risk that investor does not like and wish to manage it for better return. The risk is divided into systematic risk and unsystematic risk. Systematic risk is risk which arises due to changes in external aspects. This risk is uncontrollable. Unsystematic risk is a risk that arises because of changes in internal factors. This is controllable. The together of these two kinds of risk is called as total risk that can be estimated by calculating standard deviation. Therefore investors should know about risk management strategies. Whereas return is an income earned on investment made in stocks. Return has different form like dividend and capital appreciation. Return that investors like more. Return on investment can be maximised by managing risk. Thus return on investment in stock market is subject to risk. The investment decision should be taken by comparing risk with return in best manner.

Literature Review

Pradiptarathi Panda and Malabika Deo (2014) tried to investigate the volatility spillover effect between foreign exchange and stock market during pre, post and during - crisis period in India. In this research GARCH and EGARCH models have been applied. The research study concluded that the post-crisis period has higher asymmetric and volatility spillover as compared to that of pre and during-crisis period. Amitabh Gupta (2015) tried to examine the effect of block trades on equity share prices. 125 block deals on BSE considered as sample size during the study period from 2012 to 2016. The event study methodology was used for analysis of data. Finally, study result shows that stock prices increased generally an average around 1.32% on the date of block deals. Samveg A Patel (2013) in his research made an attempt to investigate the casual relationship between stock market indices and gold prices. The stock market indices viz., Sensex, BSE 100 and S&P CNX Nifty were used for the period January 1991 to

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December 2011. The study concludes that there is a long run equilibrium relation between all the variables. The study also evidenced that gold price contains some significant information to forecast Nifty return. Gagan Deep Sharma and Mansi Gupta (2015) in their research study made an attempt to analyse the impact of opening call auction on the efficiency of price discovery at the National Stock Exchange (NSE). Finally study found that there was no significant difference in the returns during, before and after introduction of call auction; and introduction of the pre-open auction market resulted in an improvement in the efficiency of price discovery of various stocks. Gaurav Dadhich, Varun Chotia and Omvir Chaudhry (2015) their research study tried to examine FII Flows in Indian securities market and assessed the impact of foreign institutional investment on Indian market volatility by using ARCH and GARCH models. Study concludes that FIIs contributed significantly to the Indian stock market volatility. Kushankur Dey and Debasish Maitra (2012) in their research study, tried to examine the reliability and usefulness of ex ante measures of portfolio formulation by selecting securities from a well-defined sampling frame. The four indices are employed to achieve the objectives of the study. Finally study concludes that performance of portfolio is superior relative to the index with regard to the given parameters and the chosen criteria.

Need for the Study

As it is mentioned in introduction part, in recent days there is drastic changes in investment pattern of investors i.e. individuals and institutions. Every investor prefers to invest in equity market as there is possibility to earn maximum return on investment. But return on investment in equity market is more subject to the risk. However it is most preferred area of investment by almost all investors including retail investors. The risk has become most important area of investment management. There are many techniques to manage risk and one among these techniques is portfolio management.

Portfolio is a process of investment in various securities. Optimum Portfolio is a combination of various securities in such a way that minimizes the risk and maximizes the return. That is why portfolio is considered as risk management tool. So portfolio management is most important and core concept in investment management. But individual investors (especially retail investors) lack with knowledge about portfolio management. Therefore there is a need to have regular study on portfolio management to provide fruitful information to investors. Hence the present study is undertaken on portfolio risk and return in automobile industry in India. The outcome of the study is more useful to both existing and prospective investors to make appropriate investment decisions for achieving their investment objectives.

Objectives of the Study

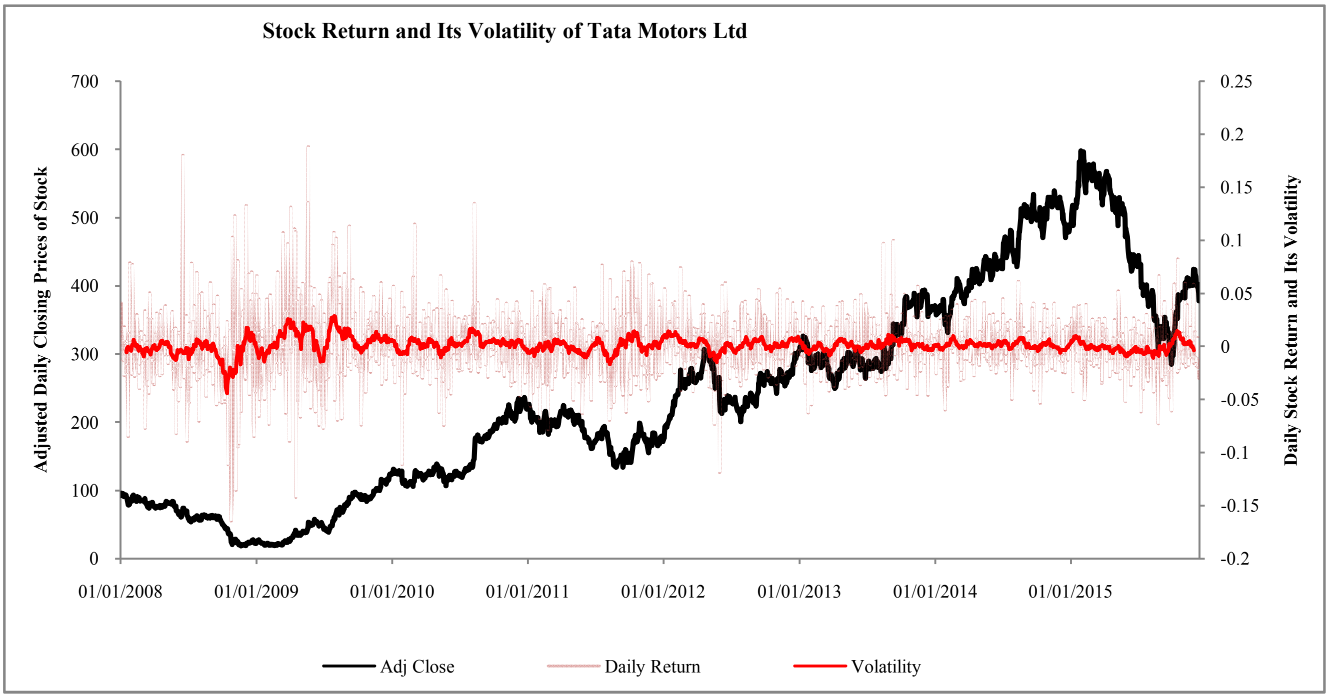
The present research study is based on the following objectives

1. To examine the volatility in return from stock of select automobile companies
2. To study the portfolio risk and return of stocks of select automobile companies
3. To examine the efficient frontier for stock return of select automobile companies

METHODOLOGY

Sample Size

The sample size of research study is two top automobile companies in India which are Tata Motors Ltd and Mahindra & Mahindra Ltd. These automobile companies have been selected based on high ranking in performance (2015) under convenience sampling method.



Section – I Volatility in Return from Stocks of Tata Motors and Mahindra and Mahindra Ltd

Data collection

The present study is based on secondary data which has been collected from Journals, books, website of the selected companies. The daily and monthly stock prices of select automobile companies are collected from NSE website for the study period.

Statistical Tools

In this study, Simple Moving Average (20 days) model has been used for processing and analyzing the data collected to arrive at reliable conclusion. In addition, Portfolio risk and return calculation in case of two securities is done as given below;

Portfolio Expected Return: 2- Security Case
The expected return of a portfolio comprising of two securities ($w_1 + w_2 = 1$) is:
$E(R_p) = w_1 E(R_1) + w_2 E(R_2)$

Where, $E(R_p)$ is the expected return on the portfolio, w_1 , w_2 are the weight of security 1 and security 2 in the portfolio, E (R_1), E (R_1) are the expected return on security 1 and security 2 in the portfolio.

Portfolio Risk: 2- Security Case
The risk of a portfolio consisting of two securities is given by the following formula:
$\sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\rho\ \sigma_1\ \sigma_2$

Where, σ_p^2 is the variance of the portfolio return, w_1, w_2 are the weights of securities 1 and 2 in the portfolio, σ_1^2, σ_2^2 are the variances of the returns on securities 1 and 2 and $\rho\ \sigma_1\ \sigma_2$ is covariance of the returns on securities 1 and 2.

Analysis and Interpretation

The analysis of the study has two sections. The first section explains level of volatility in return from stock of Tata Motors Ltd and Mahindra and Mahindra Ltd from 2008 to 2015 and in second section, Portfolio risk and return and efficient portfolio have been analysed and interpreted.

stock price with 9.71% of return. Similarly, On August 12, 2014 stock price was raised by 27.15 points and stock return was 6.15%. In May 08 2015 stock price rises by 25.59 points with the return of 5.24%. The Stock price was increased by 23.44 points with 5.85% of return on November 26, 2015. In the same year stock price rises by 22.79 points with a return of 5.97% on November 4. On January 23, 2015 stock price rises by 21.71 points. Further in the same year, on February 10, stock price was increased by 21.21 points with a return of 3.95%. The tenth biggest rise in stock price was recorded on November 17, 2014.

During the study period there were also biggest falls in stock price of Tata Motors Ltd. On May 30, 2012 stock price was decreased by 31.41 points with a loss of 11.86%, which was the biggest fall during the study period. In February 06, 2015 stock price decreased by 29.41 points with a loss of 5.02%. This is the second biggest fall in stock price during the study period. On October 10, 2014 the price of the stock was decreased by 27.59 points with a loss of 5.36%. In July 08, 2015 the stock price decreases by 26.59 points and loss was 6.16% on that date. On May 27 and August 24, 2015 stock price was decreased by 25.84 and 24.14 points with a loss of 5.19 % and 7.27% respectively. The price of the stock was decreased by 23.88 points with a loss of 4.98% on July 25, 2014. The stock price was increased by 22.15 points with 4.28% of loss. On September 23 and January 27, 2014 the stock price was decreased by 22.01 and 21.81 points with a loss of 4.12% and 5.98% respectively.

The rises and falls in stock price of Tata Motors Ltd were happened because of changes in corporate actions, EPS, Govt policy, economic conditions, sector index etc.

From the above table represents the top biggest rises in stock return of Mahindra & Mahindra Ltd during the period of eight years from 2008 to 2015. On July 15, 2015 stock price rises by 5.04 points with a return of 7.91%. This was the biggest rise in stock price during the study period. On November 13, 2013 the stock price rises by 4.01 points with a return of 9.39%.

Table No. 01

10 Biggest Rises in Stock Prices during 2008 - 2015

Date	Adjusted Closing Prices	Changes in Prices	Stock Return in %
10-09-2013	344.26	31.32	10.01%
15-10-2015	381.15	28.99	8.23%
14-08-2013	314.23	27.82	9.71%
12-08-2014	468.78	27.15	6.15%
08-05-2015	513.49	25.59	5.24%
26-11-2015	424.23	23.44	5.85%
04-11-2015	404.69	22.79	5.97%
23-01-2015	581.97	21.71	3.87%
10-02-2015	557.89	21.21	3.95%
17-11-2014	539.25	21.12	4.08%

Table No. 02

10 Biggest Falls in Stock Prices during 2008 - 2015

Date	Adjusted Closing Prices	Changes in Prices	Stock Return in %
30-05-2012	233.45	-31.41	-11.86%
06-02-2015	553.44	-29.27	-5.02%
10-10-2014	487.27	-27.59	-5.36%
08-07-2015	404.79	-26.59	-6.16%
27-05-2015	471.56	-25.84	-5.19%
24-08-2015	308.13	-24.14	-7.27%
25-07-2014	456.02	-23.88	-4.98%
06-01-2015	495.88	-22.15	-4.28%
23-09-2014	512.10	-22.01	-4.12%
27-01-2014	342.93	-21.81	-5.98%

Source: Compiled from data obtained from NSE Website

From the above chart and table it has been observed that there were movements in stock return of Tata Motors Ltd from 2008-2015. On September 10, 2013 stock price of Tata Motors Ltd raised by 31.32 points with a stock return of 10.01%, which was the biggest rise during the period of 8 years from 2008 to 2015. The second biggest rise was recorded on October 15, 2015 with 28.99 point rises. On August 14, 2013 stock price increased by 27.82% which was the third biggest rise in the

This is the second biggest rises in stock price during the study period. On January 9, 2014 and May 15, 2015 the stock price was increased by 3.67 and 3.14 points with a return of 7.64% and 5.24% respectively. On February 25 and November 12, 2014 stock price rises by 2.96 and 2.80 points with a return of 6.01% and 5.09% respectively. Further on January 7 and April 2, 2015 the stock price was increased by 2.51 and 2. 28 points with a return of 4.10% and 3.67% respectively.

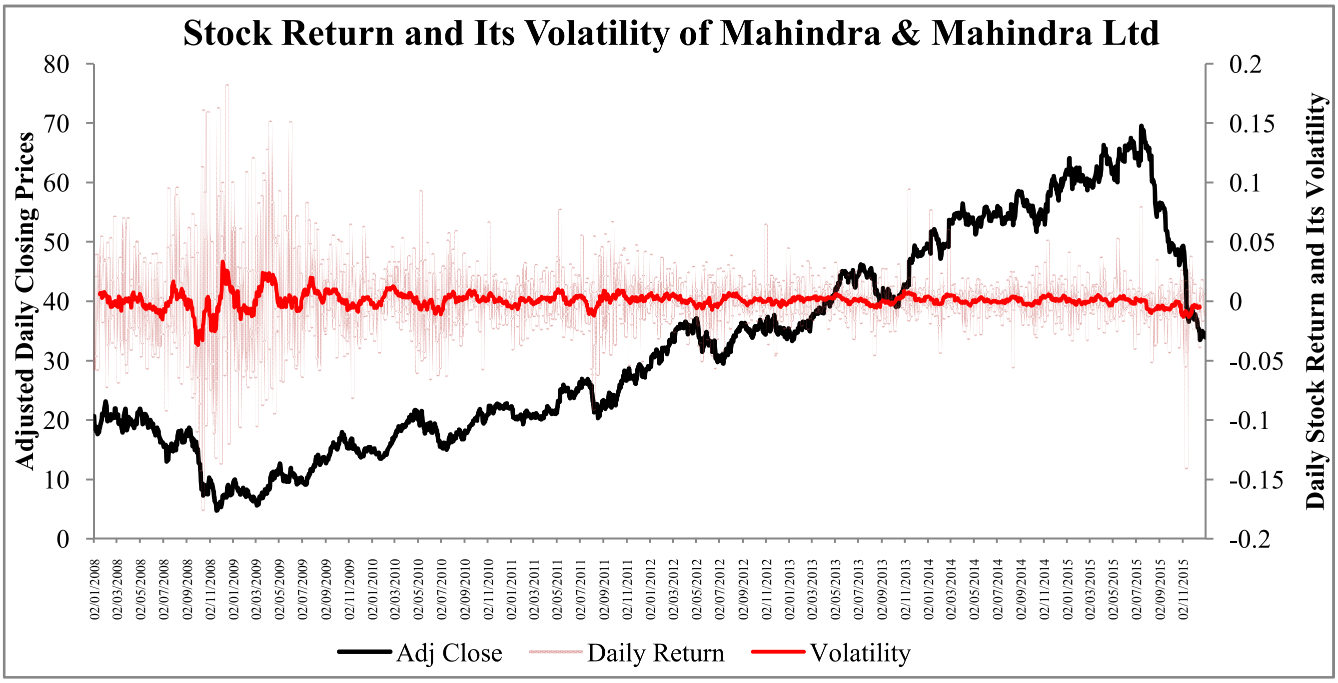


Table No.03

10 Biggest Rises in Stock Prices during 2008 - 2015

Date	Adjusted Closing Prices	Changes in Prices	Stock Return in %
15-07-2015	68.77	5.04	7.91%
13-11-2013	46.73	4.01	9.39%
09-01-2014	51.71	3.67	7.64%
15-05-2015	63.21	3.14	5.24%
25-02-2014	52.12	2.96	6.01%
12-11-2014	57.90	2.80	5.09%
07-01-2015	63.86	2.51	4.10%
02-04-2015	64.46	2.28	3.67%
01-11-2012	36.60	2.21	6.44%
26-08-2015	56.08	1.86	3.43%

Table No.04

10 Biggest Falls in Stock Prices during 2008 - 2015

Date	Adjusted Closing Prices	Changes in Prices	Stock Return in %
11-11-2015	38.86	-6.32	-13.99%
12-08-2015	61.23	-3.27	-5.06%
13-08-2014	52.83	-3.08	-5.51%
29-06-2015	64.07	-2.64	-3.95%
09-11-2015	44.43	-2.56	-5.44%
21-08-2015	56.53	-2.15	-3.66%
28-09-2015	48.33	-2.13	-4.23%
08-08-2011	21.31	-2.13	-9.08%
03-02-2014	47.17	-2.12	-4.30%
14-08-2013	42.48	-1.99	-4.47%

Source: Compiled from data obtained from NSE Website

On November 1, 2012 and August 26, 2015 stock price rises by 2.21 and 1.86 points with a return of 6.44% and 3.43% respectively.

During the study period there were also biggest falls in stock price of Mahindra & Mahindra Ltd. On November 11 and August 12, 2015 stock price falls by 6.32 points and 3.27% with a loss of 13.99% and 5.06%. Similarly on August 13, 2014 stock price decreases by 3.08 points with a loss of 5.51%. It is interestingly traced that there were four times biggest falls in 2015. On June 29, November 09, August 21 and September 28, 2015 stock price falls by 2.64, 2.56, 2.15 and 2.13 points with a loss of 3.95%, 5.44%, 3.66% and 4.23% respectively.
Further on August 8, 2011 stock price decreases by 2.13 points with a loss of 9.08 %. On February 03, 2014 and August 14, 2013 stock price falls by 2.12 and 1.99 points with a loss of 4.30% and 4.47% respectively.

Section-II: Portfolio Risk and Return and Efficient Frontier for the Stocks of Tata Motors Ltd and Mahindra & Mahindra Ltd.

Table No. 05 Descriptive Statistics of Stock Return

Return	**Stock of Tata Motors Ltd**	**Stock of Mahindra & Mahindra Ltd**
Mean	2.76%	1.22%
Variance	2.21%	1.52%
Standard Deviation	14.85%	12.32%
Covariance	0.92%	
Correlation	50.36%	

Source: Compiled from the data obtained from NSE Website

The table no. 05 depicts the descriptive statistics on stock return of Tata Motors Ltd and Mahindra & Mahindra Ltd. The mean return from Stock of Motors Ltd is 2.76% which higher that mean return from stock of Mahindra & Mahindra Ltd over period of 8 years. The variance of return of stocks of both the companies is 2.21% and 1.52% respectively. The standard deviation of stock return of Tata Motors is 14.85% which is higher than 12.32% is standard deviation of Mahindra & Mahindra Ltd. The covariance of stock return of both the companies is 0.92% which is almost near to 1. The correlation between the stocks of both companies is 50.36%.

Table No. 06 Portfolio Options for the stocks of Tata Motors and Mahindra and Mahindra Ltd

Portfolio	Proportion of Stock of Tata Motors Ltd	Proportion of Stock of Mahindra & Mahindra Ltd	Expected Return	Standard Deviation
1	0.00	1.00	1.22%	12.32%
2	0.10	0.90	1.38%	11.91%
3	0.20	0.80	1.53%	11.64%
4	0.30	0.70	1.68%	11.53%
5	0.40	0.60	1.84%	11.58%
6	0.50	0.50	1.99%	11.80%
7	0.60	0.40	2.15%	12.16%
8	0.70	0.30	2.30%	12.67%
9	0.80	0.20	2.45%	13.29%
10	0.90	0.10	2.61%	14.03%
11	1.00	0.00	2.76%	14.85%

Source: Compiled from the data obtained from NSE Website

The above table no. 06 depicts the various portfolio options with different expected return and standard deviation for the stocks of Tata Motors Ltd and Mahindra & Mahindra Ltd. The investment in the stock of Mahindra & Mahindra Ltd has expected return of 1.22% with standard deviation. In the second portfolio, investment is 10% and 90% percent in the stocks of both companies; portfolio return has been increased from 1.22% to 1.38% with decline in standard deviation to 11.91%. Similarly in third portfolio expected return of portfolio is 1.53% with standard deviation of 11.64 when there is a proportion of investment is 20% and 80% in the stocks of Tata Motors Ltd and Mahindra & Mahindra. The proportion of investment is 30% and 70% in fourth portfolio; expected return is 1.68% and standard deviation is 11.53%. In this portfolio expected return is with minimum standard deviation.

In the rest of the portfolios, proportion of investment has been changed by 10% increase and decrease in the stocks of Tata Motors and Mahindra & Mahindra Ltd.

As a result of it, expected portfolio return is increased with increase in standard deviation. When the proportion of investment is 100% in the stock of Tata Motors Ltd; expected return is 2.76% and standard deviation is 14.85%.

Therefore from the above analysis it is found that portfolio one to four are not ideal portfolios. Fourth portfolio is best portfolio for risk averse investors as it gives maximum return with minimum standard deviation. Portfolio fifth to eleventh is also ideal portfolios for risk takers.

The above graph represents the portfolio options and efficient frontier for stock return of Tata Motors and Mahindra and Mahindra Ltd. The graph also indicates the effect of diversification. The straight line indicates the risk and return possibilities by combining the stocks of Mahindra & Mahindra Ltd and Tata Motors Ltd. The curve has egg shape and represents the eleven portfolio options with different expected return and standard deviation i.e. risk. The curve bends backward between points Mahindra & Mahindra Ltd and fourth portfolio option (i.e., minimum variance portfolio). This shows that portfolio one to the four are not ideal portfolios for investors as these portfolios have lower expected return and higher standard deviation. Therefore these portfolios are not to be chosen by the any investors. The fourth portfolio option has minimum standard deviation for given level of expected return. Hence it is considered as a best portfolio for investors who do not like risk.

The segment between fourth portfolio and Eleventh portfolio (Tata Motors Ltd) is efficient set or efficient frontier for investors who like risk. From fourth to eleventh portfolio, expected return of portfolio has been increased with increase in standard deviation. These portfolios are optimum portfolios for investors.

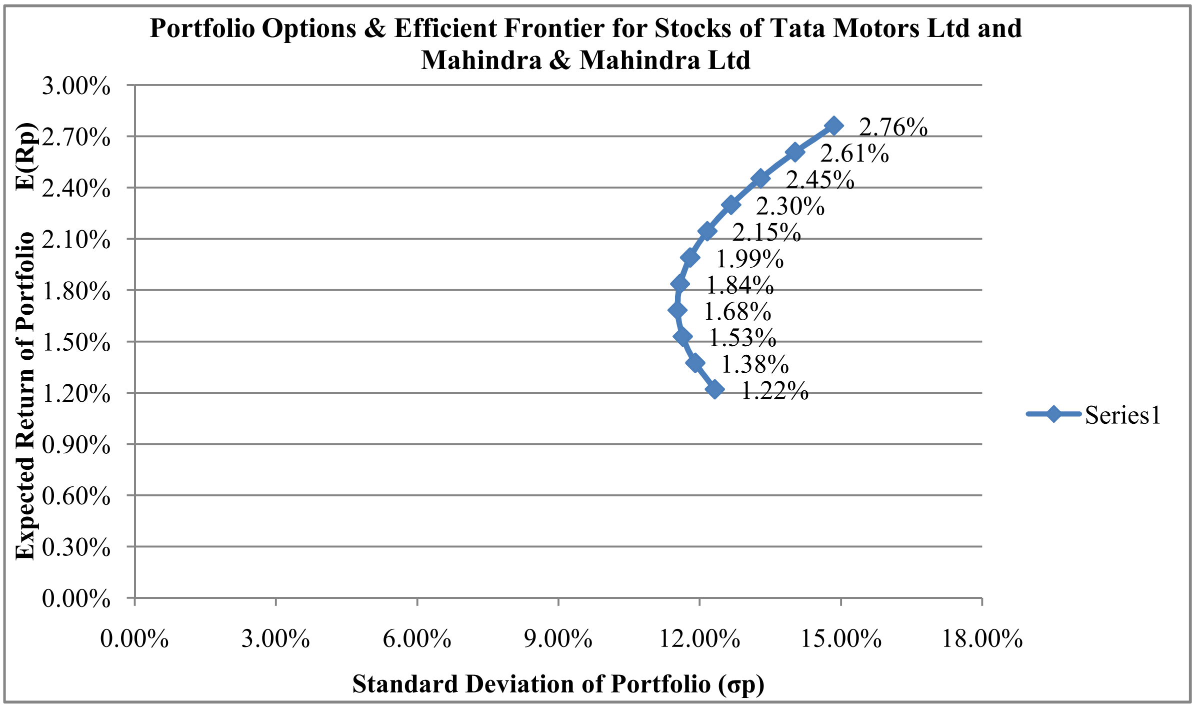


Figure – 01 Efficient Frontier

FINDINGS AND SUGGESTIONS

Findings

The following are the findings of the study

1. During the study period, biggest rises and falls in the stock price of Tata motors Ltd was recorded in the year 2013 and 2012 respectively.
2. The biggest rises and falls in the stock price of Mahindra and Mahindra Ltd was happened in the year 2015.
3. The mean return and standard deviation of the stock of Tata Motors Ltd is higher than mean return and standard deviation of stock of Mahindra and Mahindra Ltd.
4. There is positive correlation between stock return of Tata Motors Ltd and Mahindra and Mahindra Ltd.
5. The portfolio one to the fourth are not efficient portfolios for the stocks of Tata Motors Ltd and Mahindra and Mahindra Ltd.
6. The portfolio fourth to eleventh are efficient portfolios for the stocks of Tata Motors Ltd and Mahindra and Mahindra Ltd.

Suggestions

The following are the suggestions given to investors based on findings of the study

1. The investors of the both the companies should observe the volatility in return from stocks to make appropriate decision.
2. The investors should not select non-efficient portfolio.
3. The risk averse investors should choose minimum variance portfolio. Here it is fourth portfolio.
4. The investors who wish to take risk can choose efficient portfolio for desired level of return.

CONCLUSION

Investment in equity market is more worth than debt market for investors. But investment in equity market is subject to the risk. In the present scenario risk can be managed to greater extent through portfolio strategy. The investors of Tata Motors Ltd and Mahindra & Mahindra Ltd would get desired level of return with minimum risk by choosing appropriate mix of investment in stocks of the companies. The efficient frontier for stocks represents the best portfolio options for investors. The investor can choose efficient portfolio based on their desired level of risk and return to achieve their investment objectives.

Limitation of the Study and Scope for further Research

Like any other study, this study has a few limitations. Firstly the study is concerned with two automobile companies only in India. Secondly the analysis is based on monthly closing stock prices of select companies for the period of 8 years from 2008 to 2015. There is future scope to study the portfolio options and efficient frontier for more than two stocks of automobile companies in India.

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