



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 10, Issue, 05(F), pp. 32527-32531, May, 2019

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

PORTFOLIO SELECTION REVISITED: EVIDENCE FROM INDIAN IT INDUSTRY

Prakash Yalavatti

Department of P. G. Studies and Research in Commerce Vijayanagara Sri Krishnadevaraya University,
Post Graduate Centre, Koppal (Karnataka)

DOI: <http://dx.doi.org/10.24327/ijrsr.2019.1005.3490>

ARTICLE INFO

Article History:

Received 10th February, 2019

Received in revised form 2nd

March, 2019

Accepted 26th April, 2019

Published online 28th May, 2019

Key Words:

Volatility in Stock Return, Portfolio Risk
and Return, Portfolio Options and
Efficient Frontier.

ABSTRACT

The paper investigates the volatility in stock return of Infosys Ltd and TCS Ltd over the five years calendar period (2014-2018). 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 three are not ideal portfolios whereas portfolio fifth to eleventh are efficient portfolios for investors of both select companies. The investment in the proportion of 30 percent and 70 percent in the stocks of Infosys Ltd and TCS Ltd constitutes Minimum Variance Portfolio for investors.

Copyright © Prakash Yalavatti, 2019, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

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. Investor does not like risk and they wish to manage it for better return. The risk is divided into two categories which are 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 risk 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. Return is an income earned on investment made in stocks. Return has different form like dividend and capital appreciation. Return on investment can be maximised by minimizing risk. Thus return on investment in stock market is subject to risk. The investment decision should be made 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 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

*Corresponding author: **Prakash Yalavatti**

Department of P. G. Studies and Research in Commerce Vijayanagara Sri Krishnadevaraya University, Post Graduate Centre, Koppal (Karnataka)

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 are drastic changes in investment pattern of investors i.e. individuals and institutions. Every investor prefers to invest in equity market where there is possibility to earn maximum return on investment. But return on investment in equity market is more subject to the risk. Though, it is most preferred area of investment by the investors including retail investors.

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 for every investors. 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 Selection Revisited: Evidence from the Indian IT Industry. The outcome of the study is more useful to both existing retail and institutional 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 stock return of select IT companies
2. To examine the risk and return of different portfolio options for select IT companies and
3. To examine the optimal portfolio option for select IT companies

METHODOLOGY

Sample Size

The sample size of research study is two top IT companies in India. They are Infosys Ltd and TCS Ltd. These IT companies have been selected based on high ranking in performance (2018) under convenience sampling method.

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, Percentage, 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 has been calculated by using financial models. The details of calculation of portfolio risk and return is explained 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, $E(R_1), E(R_2)$ are the expected return on security 1 and security 2 in the portfolio.

Portfolio Risk: 2- Security Case

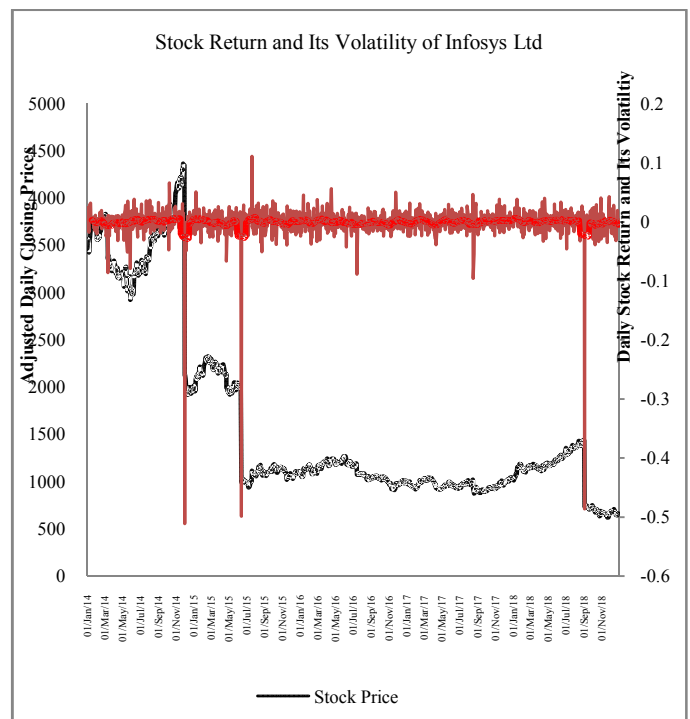
The risk of a portfolio consisting of two securities is given by the following formula: $\sigma_p^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2w_1 w_2 \rho \sigma_1 \sigma_2$

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 about volatility in stock return of Infosys Ltd and TCS Ltd from 2014 to 2018 and in second section, Portfolio risk and return and efficient portfolio have been analysed and interpreted.

Section I Volatility in Stock Return of Infosys Ltd and TCS Ltd



Section I Volatility in Stock Return of Infosys Ltd and TCS Ltd

Table 1 10 Biggest Rises in Stock Prices during 2014- 2018

Date	Adjusted Closing Prices	Changes in Prices	Stock Return in %
10-10-2014	3888.65	241.85	6.63
24-11-2014	4275.1	128.95	3.11
04-08-2014	3465.55	124.25	3.72
03-09-2014	3734.25	120.5	3.33
11-06-2014	3193.35	118.2	3.84
23-07-2014	3349.45	115.75	3.58
13-01-2014	3665	113.75	3.20
21-07-2015	1112.65	111.4	11.13
20-05-2014	3122.2	107.15	3.55
31-10-2014	4051.25	104.7	2.65

Table 2 10 Biggest Falls in Stock Prices during 2014 – 2018

Date	Adjusted Closing Prices	Changes in Prices	Stock Return in %
02-12-2014	2126.6	-2223.25	-51.11
15-06-2015	990.45	-984.6	-49.85
04-09-2018	737.15	-697.1	-48.60
13-03-2014	3357.6	-313.7	-8.54
29-05-2014	2924.5	-248.8	-7.84
08-10-2014	3650.15	-181.15	-4.73
19-05-2014	3015.05	-162.5	-5.11
24-04-2015	1995.2	-140.9	-6.60
15-07-2016	1072.55	-103.7	-8.82
16-04-2014	3157.3	-102.5	-3.14

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 Infosys Ltd from 2014 to 2018. The highest rises and falls in CNX IT Index have been recorded in 2014. On October 10, 2014 the price of the stock was Rs. 3888.65 with return of 6.63 percent, which was the biggest rise during the period of 8 years from 2014 to 2018. The second biggest rise in stock price was recorded on November 24, 2014 with Rs. 4275.10. On August 04, 2014, stock price increased by Rs. 124.25 which was the third biggest rise in stock price with 3.72 percent return. Similarly on September 03, 2014 stock price was raised by Rs. 120.5 and return was 3.33 percent. In June 11 and July 23, 2014 stock price raised by Rs. 118.2 and 115.75 with return of 3.84 percent and 3.58 percent respectively. In January 13, 2014 and July 21, 2015 stock price was increased by Rs. 113.75 and 111.4 with return of 3.20 percent and 11.13 percent respectively. In may 20 and October 31, 2014 stock price was Rs. 3122.2 and Rs. 4051.25 with return of 3.55 percent and 2.65 percent.

During the study period there were also biggest falls in stock price of Infosys Ltd. On December 02, 2014 stock price was decreased by Rs. 2223.25 with a loss of 51.11 percent, which was the biggest fall during the study period. In June 15, 2015 stock price decreased by Rs. 984.6 with a loss of 49.85 percent. This is the second biggest fall in stock price during the study period. On September 04, 2018 the price of the stock was decreased by Rs. 697.1 with a loss of 48.60 percent. From March to September, 2014 three times biggest falls had happened with a loss in the range of 5.11 percent to 8.54 percent. Further, on April 24, 2015 stock price was recorded with Rs. 1995.2 and loss was 6.60 percent. The ninth and tenth biggest fall was happened on July 15, 2016 and April 16, 2014 with a loss of Rs. 8.82 percent and 3.14 percent respectively.

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

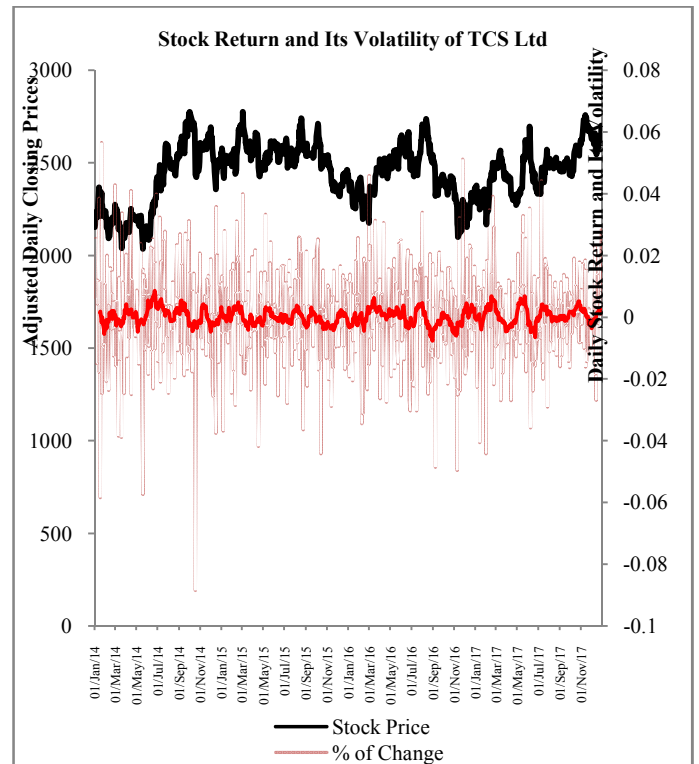


Table 3 10 Biggest Rises in Stock Prices during 2014 – 2018

Date	Adjusted Closing Prices	Changes in Prices	Stock Return in %
20-01-2014	2338.20	125.15	5.66
25-11-2016	2300.35	111.90	5.11
03-03-2015	2776.00	106.60	3.99
10-07-2017	2434.95	103.00	4.42
01-03-2016	2276.65	99.85	4.59
20-02-2017	2502.20	94.30	3.92
28-02-2014	2275.75	93.60	4.29
06-06-2017	2696.00	92.05	3.54
27-06-2014	2399.55	91.90	3.98
01-08-2016	2708.25	88.95	3.40

Table 4 10 Biggest Falls in Stock Prices during 2014 – 2018

Date	Adjusted Closing Prices	Changes in Prices	Stock Return in %
17-10-2014	2441.15	-236.95	-8.85
17-01-2014	2213.05	-137.25	-5.84
19-05-2014	2036.7	-124.05	-5.74
08-09-2016	2322.1	-118.45	-4.85
14-10-2015	2483.7	-114.85	-4.42
09-11-2016	2169.85	-113.35	-4.96
17-04-2015	2474.85	-107.95	-4.18
31-01-2017	2229.8	-103.1	-4.42
24-08-2015	2578.65	-97.5	-3.64
13-01-2017	2249.3	-95.05	-4.05

Source: Compiled from data obtained from NSE Website

From the above table represents the top biggest rises in stock return of TCS Ltd during the period of five years from 2014 to 2018. On January 20, 2014 stock price raised by Rs. 125.15 with a return of 5.66 percent. This was the biggest rise in stock price during the study period. On November 25, 2016 the stock price rises by Rs. 111.90 with a return of 5.11 percent. This is the second biggest rises in stock price during the study

period. On March 3, 2015 and July 10, 2017 the stock price was increased by Rs. 106.60 and 103 with a return of 3.99 percent and 4.42 percent respectively. On March 01, 2016 and February 20, 2017 stock price rises by Rs. 99.85 and 94.30 with a return of 4.59 percent and 3.92 percent respectively.

Further on February 28, 2014 and June 06, 2017 the stock price was increased by Rs. 93.60 and 92.05 with a return of 4.29 percent and 3.54 percent respectively. On June 27, 2014 and August 01, 2016 stock price rises by Rs. 91.90 and 88.95 points with a return of 3.98 percent and 3.40 percent respectively.

During the study period there were also biggest falls in stock price of TCS Ltd. On September 17 and January 17, 2014 stock price falls by Rs. 236.95 and 137.25 with a loss of 8.85 percent and 5.84 percent respectively. Similarly on May 19, 2014 stock price decreases by Rs. 124.05 with a loss of 5.74 percent. It is interestingly traced that there were four times biggest falls with loss in the range of 4.18 percent to 4.96 percent. On August 24, 2015 and January 13, 2017 stock price was decreased by Rs. 97.5 and 95.05 with a loss of Rs. 3.64 percent and 4.05 percent 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.

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

Table 5 Descriptive Statistics of Select IT Companies

	Infosys Ltd	TCS Ltd
Return		
Mean	1.61%	1.37%
Variance	0.55%	0.44%
Standard Deviation	7.43%	6.61%
Covariance	0.29%	
Correlation	59.47%	

Source: NSE Website

The table no. 05 depicts the descriptive statistics on stock return of Infosys Ltd and TCS Ltd. The mean return from Stock of Motors Ltd is 1.61 percent which higher than mean return from stock of Mahindra & Mahindra Ltd over period of 5 years. The variance of return of stocks of both the companies is 0.55 percent and 0.44 percent respectively. The standard deviation of stock return of Infosys Ltd is 7.43 percent which is higher than that of TCS Ltd. The covariance of stock return of both the companies is 0.29 percent. The correlation between the stocks of both companies is 59.47 percent.

Table 6 Portfolio Options for the stocks of Infosys Ltd and TCS Ltd

Portfolio	Proportion of Stock of Infosys Ltd (In %)	Proportion of Stock of TCS Ltd (In %)	Expected Return (In %)	Standard Deviation (In %)
1	0	100	1.37	6.61
2	10	90	1.40	6.04
3	20	80	1.42	5.70
4	30	70	1.44	5.63
5	40	60	1.47	5.82
6	50	50	1.49	6.27
7	60	40	1.52	6.92
8	70	30	1.54	7.72
9	80	20	1.57	8.63
10	90	10	1.59	9.62
11	100	0	1.61	10.66

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 Infosys Ltd and TCS Ltd. The investment in the stock of TCS Ltd has expected return of 1.37 percent with standard deviation of 6.61. In the second portfolio, investment is 10 percent and 90 percent percent in the stocks of both companies; portfolio return has been increased from 1.37 percent to 1.40 percent with decline in standard deviation to 6.04 percent. Similarly in third portfolio expected return is 1.42 percent with standard deviation of 5.70 percent when there is a proportion of investment is 20 percent and 80 percent in the stocks of Infosys Ltd and TCS Ltd. The proportion of investment is 30 percent and 70 percent in fourth portfolio; expected return is 1.44 percent and standard deviation is 5.63 percent. In this portfolio expected return is with minimum standard deviation so that is considered as optimal portfolio for ideal investment.

In the rest of the portfolios, proportion of investment has been changed by 10 percent increase and decrease in the stocks of Infosys Ltd and TCS Ltd. As a result of it, expected portfolio return is increased with increase in standard deviation. When the proportion of investment is 100 percent in the stock of Infosys Ltd; expected return is 1.61 percent and standard deviation is 10.66 percent.

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

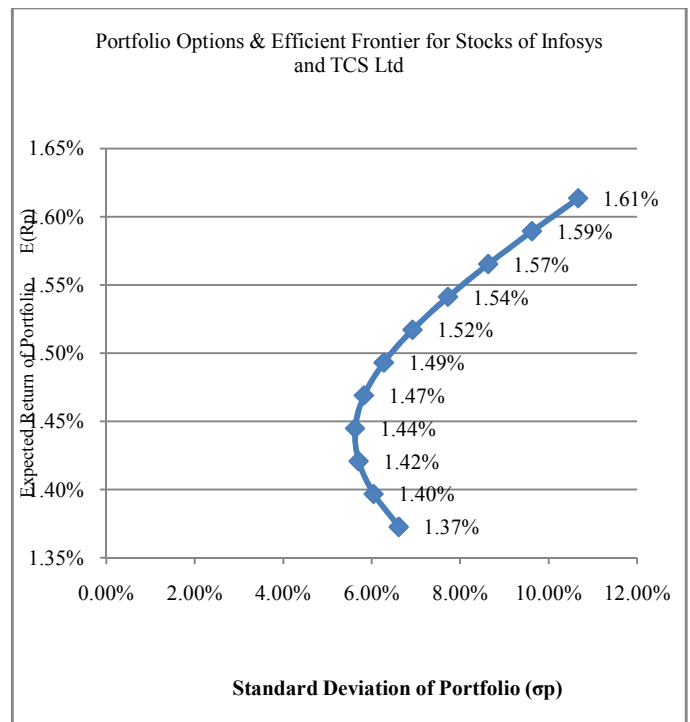


Figure 1 Efficient Frontier

The above graph represents the portfolio options and efficient frontier for stock return of Infosys Ltd and TCS Ltd. The graph also indicates the effect of diversification. The straight line indicates the risk and return possibilities by combining the stocks of Infosys Ltd and TCS Ltd 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 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 maximum expected return. Hence it is considered as a best portfolio for investors.

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.

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 2014 and 2015 respectively.
2. The biggest rises and falls in the stock price of TCS was happened in the year 2014.
3. The mean return and standard deviation of the stock of Infosys Ltd is higher than that of TCS Ltd.
4. There is positive correlation between stock return of Infosys Ltd and TCS Ltd.
5. The portfolio one to the fourth are not efficient portfolios for the stocks of Infosys Ltd and TCS Ltd.
6. The portfolio fourth to eleventh are efficient portfolios for the stocks of Infosys Ltd and TCS Ltd.
7. Fourth portfolio is optimal/ best portfolio

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 stock return 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 Infosys Ltd and TCS 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 IT companies only in India. Secondly the analysis is based on monthly closing stock prices of select companies for the period of 8 years from 2014 to 2018. There is future scope to study the portfolio options and efficient frontier for more than two stocks of automobile companies in India.

References

1. Sortino F A and Robert M Vander (1991), "Downside Risk", *Journal of Portfolio Management*, Vol.17, No.4, pp. 27-33.
2. Sortino F A and Price L (1994), "Performance Management in a Downside Risk Framework", *Journal of Investing*, Vol. 3, No. 3, pp. 59-64.
3. Merton R C (1972), "An Analytic Derivation of the Efficient Portfolio Frontier", *Journal of Financial and Quantitative Analysis*, Vol. 7, No. 4, pp. 1851-1872.
4. Markowitz H M (1959), "Portfolio Selection", *Journal of Finance*, Vol. 7, No. 1, pp. 77-91.
5. Amitabh Gupta (2015), "Price Impact of Block Trading on the Bombay Stock Exchange", *The IUP Journal of Applied Finance*, Vol.21, No.3, pp.5-15.
6. Gagan Deep Sharma and Mansi Gupta (2015), "Does the Pre-open Auction Market Improve Efficiency of Price Discovery in Stock Markets? Evidence from India", *Indian Journal of Finance*, Vol. 9, No.11, pp. 19-32.
7. Gaurav Dadhich, Varun Chotia and Omvir Chaudhry (2015), "Impact of Foreign Institutional Investments on Stock Market Volatility in India", *Indian Journal of Finance*, Vol. 9, No.10, pp.22-35.
8. Pradiptarathi Panda and Malabika Deo (2014), "Asymmetric and Volatility Spillover Between Stock Market and Foreign Exchange Market: Indian Experience", *The IUP Journal of Applied Finance*, Vol. 20, No.4, pp.69-82.
9. Pushpa Negi, Romit Raja Srivastava and Shiva Bhasin (2014), "The Impact of IFRS Adoption on Stock Market Volatility", *The IUP Journal of Applied Finance*, Vol. 20, No.4, pp.58-68.
10. Vishwanath R and Krishnamurthi C (2009), *Investment Management: A Modern Guide to Security Analysis and Stock Selection*, pp. 49-81.
