



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 Issue: IX Month of publication: September 2019

DOI: <http://doi.org/10.22214/ijraset.2019.9031>

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Portfolio Management - A Study with Special Reference to Selected Companies in Equity Market

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Abstract: *Portfolio management can be defined and used in many ways, because the basic meaning of the word is “combination of the various things keeping intact”. So I considered and evaluated this from the perspective of the investment part in the securities segment. From the investor point of view this portfolio followed by him is very important since through this way one can manage the risk of investing in securities and thereby managing to get good returns from the investment in diversified securities instead of putting all the money into one basket.*

This subject covers how a specific portfolio must be picked concerning every one of the protections individual return and there by landing at the general portfolio return. This likewise covers the different strategies of assessment of the portfolio as to every one of the vulnerabilities and gives an edge to choose the correct one. This likewise gives an edge in touching base at the correct portfolio in thought to various protections as opposed to one single security. The venture is embraced for the investigation of my subject altogether while understanding the distinctive contextual investigations for the better comprehension of the speculator and myself.

Keywords: *Portfolio Management, Investment, Uncertainties, Investor, Portfolio return.*

I. INTRODUCTION

A portfolio is a gathering of ventures held by an establishment or a private person. In structure up a speculation portfolio a monetary establishment will commonly lead its own venture investigation, while a private individual may utilize the administrations of a money related consultant or a budgetary foundation which offers portfolio the executives administrations. The benefits in the portfolio could incorporate stocks, securities, alternatives, warrants, gold testaments, land, prospects contracts, creation offices, or whatever other thing that is required to hold its worth.

Portfolio examination comprises of assurance of future hazard and return inholding different mixes of individual protections. Portfolio expected return is a weighted normal of the normal return of individual protections however portfolio change, in short differentiate, can be something not exactly a weighted normal of security fluctuations. Subsequently, a financial specialist can some of the time diminish portfolio hazard by including security with more noteworthy individual hazard than some other security in the portfolio. This is on the grounds that hazard depends incredibly on the co-change among return of individual protections.

II. OBJECTIVES OF THE STUDY

- A. To calculate risk and return of selected companies
- B. To understand and analyze the best portfolio.

III. NEED FOR THE STUDY

The study examines number of opportunities available with different expected returns and carrying different levels of risk. It is rare to find investors investing their entire savings in one security. Instead they tempt to invest in group of securities. Portfolio management helps the investors in the selection of securities is made with a view to provide the investors the maximum yield for a given level of risk or ensure minimum risk for a level of return. The modern theory says that by diversification, risk can be reduced. The investor can make diversification either by having a large number of shares of companies in different regions, in different industries or those producing different types of product lines.

IV. SCOPE OF THE STUDY

This study covers the Markowitz model. The study covers the calculation of correlations between the different securities in order to find out at what percentage funds should be invested among the companies in the portfolio. Also the study includes the calculation of individual Standard Deviation of securities and ends at the calculation of weights of individual securities involved in the portfolio. These percentages help in allocating the funds available for investment based on risky portfolios.

V. RESEARCH METHODOLOGY

The methodology used for the study is an analysis of the risk and return of the selected stocks.

A. Source of Data

In the present project work the data has been collected from readily available source that is secondary data. Some of them are textbooks, internet and newspapers.

B. Sample Size

The sample size of the project is confined to 3 different industries in which 2 companies have been selected from each industry on which the actual research is made. The project period is of 1 year i.e., April-2018 to March-2019.

VI. REVIEW OF LITERATURE

Jamadar Lal (1992) presents a profile of Indian financial specialists and assesses their investment choices. He attempted to think about their recognition with, and appreciation of money related data, and the degree to which this is put to utilize. The data that the organizations give for the most part neglects to address the issues of an assortment of individual financial specialists and there is a general impression that the organization's Annual Report and different articulations are not generally welcomed by them .

Jack Clark Francis (1986) He uncovered the significance of the rate of return in investments and audited the likelihood of default and liquidation chance. He opined that in an uncertain world, an investor can't foresee precisely what rate of restore a venture will yield. In any case he recommended that the financial specialists can define a likelihood appropriation of the possible rates of return.

Lubos Pastor

Journal of Finance, vol. 55, no. 1 (February 2000):179–223

The author develops a portfolio-selection method using a Bayesian framework that incorporates a prior degree of belief in an asset-pricing model. In the empirical analysis, the author evaluates sample evidence on home bias, value, and size effect from an asset allocation perspective. The results provide a different perspective from that normally found in the literature on the benefits of international diversification.

VII. DATA ANALYSIS AND INTERPRETATION

Risk and Return of Benchmark Index: NSE NIFTY

Return, Avg Return calculation of NSE CNX Nifty

FY 2018-2019	P0	P1	RETURN
Apr-18	10211.8	10739.65	5.16
May-18	10718.05	10736.15	0.16
Jun-18	10696.3	10714.3	0.16
Jul-18	10657.3	11365.5	6.64
Aug-18	11346.2	11680.5	2.94
Sep-18	11582.35	10893.45	-5.94
Oct-18	11008.3	10386.6	-5.64
Nov-18	10380.45	10876.75	4.78
Dec-18	10883.75	10862.55	-0.19
Jan-19	10910.5	10830.95	-0.72
Feb-19	10893.65	10792.25	-0.93
Mar-19	10863.85	11623.9	6.99
Total			13.42
Avg Return			1.11

Return $R = \frac{P1 - P0}{P0} \times 100$

Return for the NSE is 1.11

Risk, Variance calculation of NSE CNX Nifty

FY 2018-19	Return	Avg Return	R- Avg Return	(R- Avg Return) ²
Apr-18	5.16	1.11	4.05	16.40
May-18	0.16	1.11	-0.95	0.90
Jun-18	0.16	1.11	-0.95	0.90
Jul-18	6.64	1.11	5.53	30.58
Aug-18	2.94	1.11	1.83	3.34
Sep-18	-5.94	1.11	-7.05	49.70
Oct-18	-5.64	1.11	-6.75	45.56
Nov-18	4.78	1.11	3.67	13.46
Dec-18	-0.19	1.11	-1.3	1.69
Jan-19	-0.72	1.11	-1.83	3.34
Feb-19	-0.93	1.11	-2.04	4.16
Mar-19	6.99	1.11	5.88	34.57
Total				204.64
Variance				15.64
standard deviation				3.955

$$\sigma = (\sum (R - \text{Avg } R)^2) / N$$

Risk, S.D= Square root $(\sum (R - \text{Avg } R)^2) / N$

FY 18-19 Risk for NSE Nifty = 3.95

NSE Nifty had given a good return of 1.11 per month with an adjusted risk rate of 3.95 during the financial year 2018.

Risk and return of the individual stocks

Return, R (Avg) Calculation of SBI Bank

FY 2018-19	P0	P1	RETURN
Apr-18	1804.6	1898	5.17
May-18	1868.3	1955.45	4.66
Jun-18	1915.4	1932.2	0.87
Jul-18	1948.8	1995.15	2.37
Aug-18	2001.35	1906.6	-4.73
Sep-18	1897.6	1690.05	-10.93
Oct-18	1642.65	1425.1	-13.24
Nov-18	1463.95	1631.8	11.46
Dec-18	1656.3	1599.3	-3.44
Jan-19	1595.3	1505.55	-5.62
Feb-19	1515.15	1473.85	-2.72
Mar-19	1514.1	1780	17.56
Total			1.41
Average return			0.11

$$\text{Return, } R = (P1 - P0) / P0 * 100$$

FY18-19 Return for SBI Bank = 0.11%

Risk, Variance Calculation of SBI bank

FY 2018-19	RETURN	AVG RETURN	R-AVG R	(R-Avg R) ²
Apr-18	5.17	0.11	5.06	25.60
May-18	4.66	0.11	4.55	20.70
Jun-18	0.87	0.11	0.76	0.57
Jul-18	2.37	0.11	2.26	5.10
Aug-18	-4.73	0.11	-4.84	23.42
Sep-18	-10.93	0.11	-11.04	121.88
Oct-18	-13.24	0.11	-13.35	178.22
Nov-18	11.46	0.11	11.35	128.82
Dec-18	-3.44	0.11	-3.55	12.60
Jan-19	-5.62	0.11	-5.73	32.83
Feb-19	-2.72	0.11	-2.83	8.00
Mar-19	17.56	0.11	17.45	304.50
Total				862.29
Variance				78.38
Standard deviation				8.85

$$\sigma = (\sum (R - \text{Avg } R)^2) / N$$

Risk, S.D= Square root $(\sum (R - \text{Avg } R)^2) / N$

FY 18-19 Risk for SBI = 8.85

SBI had given a good return of 0.11 per month with an adjusted risk rate of 8.85 during the financial year 2018.

Return, Avg Return Calculation of HDFC Bank Limited

FY 2018-19	P0	P1	RETURN
Apr-18	1838.05	1883.25	2.45
May-18	1910.6	2139.45	1.97
Jun-18	2046.2	2108.45	3.04
Jul-18	2073.25	2179.5	5.12
Aug-18	2158.7	2061.05	-4.52
Sep-18	2075.05	2006.05	-3.32
Oct-18	2035.45	1911.75	-6.07
Nov-18	1912.2	2128.45	1.30
Dec-18	2113.3	2121.7	0.39
Jan-19	2148.1	2009.95	-0.06
Feb-19	2090.45	2077.55	-0.61
Mar-19	2083.35	2318.9	11.30
Total			10.99
Average return			0.91

$$\text{Return, } R = (P1 - P0) / P0 * 100$$

FY18-19 Return for HDFC Bank = 0.91%

Risk and variance calculation of HDFC Bank

FY 2018-19	RETURN	AVG RETURN	R-AVG R	(R-Avg R) ²
Apr-18	2.45	0.91	1.54	2.37
May-18	11.97	0.91	11.06	122.32
Jun-18	3.04	0.91	2.13	4.53
Jul-18	5.12	0.91	4.21	17.72
Aug-18	-4.52	0.91	-5.43	29.48
Sep-18	-3.32	0.91	-4.23	17.89
Oct-18	-6.07	0.91	-6.98	48.72
Nov-18	11.3	0.91	10.39	107.95
Dec-18	0.39	0.91	-0.52	0.27
Jan-19	-0.06	0.91	-0.97	0.94
Feb-19	-0.61	0.91	-1.52	2.31
Mar-19	11.3	0.91	10.39	107.95
Total				462.48
Variance				38.54
Standard deviation				6.2

$$\sigma = (\sum (R - \text{Avg } R)^2) / N$$

Risk, S. D= Square root $(\sum (R - \text{Avg } R)^2) / N$

FY 18-19 Risk for HDFC = 6.2

HDFC had given a good return of 0.91 per month with an adjusted risk rate of 6.2 during the financial year 2018.

Return, R (Avg) Calculation of Infosys company

FY 2018-19	P0	P1	RETURN
Apr-18	568.58	599.75	5.48
May-18	598.53	615.9	2.90
Jun-18	610.4	653.6	7.07
Jul-18	667.03	682.55	2.32
Aug-18	677.03	720.55	6.42
Sep-18	717.13	730.05	1.80
Oct-18	746.65	659.6	-11.65
Nov-18	666.7	667.45	0.11
Dec-18	670.35	658.95	-1.70
Jan-19	665.05	649.55	-2.33
Feb-19	757.05	734.3	-3.00
Mar-19	741.9	743.85	0.26
Total			7.69
Average return			0.64

$$\text{Return, } R = (P1 - P0) / P0 * 100$$

FY18-19 Return for Infosys company = 0.64%

Risk and variance calculation of Infosys company

FY 2018-19	RETURN	AVG RETURN	R-AVG R	(R-Avg R) ²
Apr-18	5.48	0.64	4.84	23.4256
May-18	2.9	0.64	2.26	5.1076
Jun-18	7.07	0.64	6.43	41.34
Jul-18	2.32	0.64	1.68	2.82
Aug-18	6.42	0.64	5.78	33.40
Sep-18	1.8	0.64	1.16	1.34
Oct-18	-11.65	0.64	-12.29	151.04
Nov-18	0.11	0.64	-0.53	0.28
Dec-18	-1.7	0.64	-2.34	5.47
Jan-19	-2.33	0.64	-2.97	8.82
Feb-19	-3	0.64	-3.64	13.24
Mar-19	0.26	0.64	-0.38	0.14
Total				286.47
Variance				26.04
Standard deviation				5.10

$$\sigma = (\sum (R - \text{Avg } R)^2) / N$$

Risk, S.D = Square root $(\sum (R - \text{Avg } R)^2) / N$

FY 18-19 Risk for Infosys = 5.10

Infosys had given a good return of 0.64 per month with an adjusted risk rate of 5.10 during the financial year 2018

Return, R (Avg) Calculation of Wipro company

FY 2018-19	P0	P1	RETURN
Apr-18	217.24	209.06	-3.76
May-18	206.66	196.43	-4.95
Jun-18	195.45	196.13	0.34
Jul-18	195.45	207.3	6.06
Aug-18	208.01	225.94	8.61
Sep-18	231.26	243	5.07
Oct-18	247.61	248.4	0.31
Nov-18	247.24	243.49	-1.51
Dec-18	246.19	248.14	0.79
Jan-19	244.99	276.9	13.02
Feb-19	278.66	276.68	-0.71
Mar-19	281.78	254.8	-9.57
Total			13.72
Average return			1.14

$$\text{Return, } R = (P1 - P0) / P0 * 100$$

FY18-19 Return for Wipro company = 1.14%

Risk and variance calculation of Wipro company

FY 2018-19	RETURN	AVG RETURN	R-AVG R	(R-Avg R) ²
Apr-18	-3.76	1.14	-4.9	24.01
May-18	-4.95	1.14	-6.09	37.08
Jun-18	0.34	1.14	-0.8	0.64
Jul-18	6.06	1.14	4.92	24.20
Aug-18	8.61	1.14	7.47	55.80
Sep-18	5.07	1.14	3.93	15.44
Oct-18	0.31	1.14	-0.83	0.68
Nov-18	-1.51	1.14	-2.65	7.02
Dec-18	0.79	1.14	-0.35	0.12
Jan-19	13.02	1.14	11.88	141.13
Feb-19	-0.71	1.14	-1.85	3.42
Mar-19	-9.57	1.14	-10.71	114.70
Total				424.28
Variance				38.57
Standard deviation				6.21

$$\sigma = (\sum (R - \text{Avg } R)^2) / N$$

Risk, S.D= Square root $(\sum (R - \text{Avg } R)^2) / N$

FY 18-19 Risk for WIPRO = 6.21

Wipro had given a good return of 1.14 per month with an adjusted risk rate of 6.21 during the financial year 2018.

Return, R (Avg) Calculation of Bajaj company

FY 2018-19	P0	P1	RETURN
Apr-18	2808.95	2952.6	5.11
May-18	2965.95	2750.3	-7.27
Jun-18	2896.55	2910.3	0.47
Jul-18	2835.15	2700.05	-0.04
Aug-18	2680.9	2744.85	2.38
Sep-18	2771.9	2687.45	-3.04
Oct-18	2730.1	2593.7	-4.99
Nov-18	2598.85	2745.7	5.65
Dec-18	2736	2720.15	-0.57
Jan-19	2726.65	2554.55	-6.31
Feb-19	2602.75	2900.6	11.44
Mar-19	2863.5	2948.8	2.97
Total			5.8
Average return			0.48

$$\text{Return, } R = (P1 - P0) / P0 * 100$$

FY18-19 Return for Bajaj company = 0.48%

Risk and variance calculation of Bajaj company

FY 2018-19	RETURN	AVG RETURN	R-AVG R	(R-Avg R) ²
Apr-18	5.11	0.48	4.63	21.43
May-18	-7.27	0.48	-7.75	60.06
Jun-18	0.47	0.48	-0.01	0.0001
Jul-18	-0.04	0.48	-0.52	0.27
Aug-18	2.38	0.48	1.9	3.61
Sep-18	-3.04	0.48	-3.52	12.39
Oct-18	-4.99	0.48	-5.47	29.92
Nov-18	5.65	0.48	5.17	26.72
Dec-18	-0.57	0.48	-1.05	1.10
Jan-19	-6.31	0.48	-6.79	46.10
Feb-19	11.44	0.48	10.96	120.12
Mar-19	2.97	0.48	2.49	6.20
Total				327.94
Variance				27.32
Standard deviation				5.22

$$\sigma = (\sum(R - \text{Avg } R)^2) / N$$

Risk, S.D= Square root $(\sum(R - \text{Avg } R)^2) / N$

FY 18-19 Risk for BAJAJ = 5.22

Bajaj had given a good return of 0.48 per month with an adjusted risk rate of 5.22 during the financial year 2018.

Return, R (Avg) Calculation of Tata company

FY 2018-19	P0	P1	RETURN
Apr-18	339.15	340.4	0.36
May-18	336.05	282.5	-0.15
Jun-18	287.2	269.3	-0.06
Jul-18	266.2	264.1	-0.78
Aug-18	265.05	267.5	0.92
Sep-18	266.6	223.7	-0.16
Oct-18	229.35	179.1	-0.21
Nov-18	179.45	171.95	-0.04
Dec-18	175.45	172.7	-0.15
Jan-19	173.45	181.2	0.04
Feb-19	181.65	177.45	-0.02
Mar-19	180.3	170.55	-0.05
Total			-0.3
Average return			-0.02

$$\text{Return, } R = (P1 - P0) / P0 * 100$$

FY18-19 Return for Tata company = -0.02%

Risk and variance calculation of Tata

FY 2018-19	RETURN	AVG RETURN	R-AVG R	(R-Avg R) ²
Apr-18	0.36	-0.02	0.38	0.14
May-18	-0.15	-0.02	-0.13	0.01
Jun-18	-0.06	-0.02	-0.04	0.001
Jul-18	-0.78	-0.02	-0.76	0.57
Aug-18	0.92	-0.02	0.94	0.88
Sep-18	-0.16	-0.02	-0.14	0.01
Oct-18	-0.21	-0.02	-0.19	0.03
Nov-18	-0.04	-0.02	-0.02	0.004
Dec-18	-0.15	-0.02	-0.13	0.01
Jan-19	0.04	-0.02	0.06	0.003
Feb-19	-0.02	-0.02	0	0
Mar-19	-0.05	-0.02	-0.03	0.009
Total				1.70
Variance				0.15
Standard deviation				0.38

$$\sigma = (\sum (R - \text{Avg } R)^2) / N$$

Risk , S.D= Square root $(\sum (R - \text{Avg } R)^2) / N$

FY 18-19 Risk for TATA = 0.38

Tata had given a good return of -0.02 per month with an adjusted risk rate of 0.38 during the financial year 2018.

Co variance and correlation of individual stocks with respect to NSE CNX Index:

$$\text{Covariance} = \frac{\sum (R_x - \text{Avg } R_x) \sum (R_y - \text{Avg } R_y)}{12}$$

$$\text{Correlation} = \text{covariance} / \text{Std}(x) * \text{Std}(y)$$

Stock	Covariance	Correlation
SBI	29.38	0.84
HDFC	20.58	0.84
Infosys	9.83	0.48
Wipro	-7.83	-0.31
Bajaj	0.04	0.001
Tata	-0.06	-0.008

Calculation of beta with respect to NSE CNX Index

$$\beta_a = \frac{\text{Cov}(r_a, r_p)}{\text{Var}(r_p)}$$

Stock	Covariance	Nifty variance	Beta, β	Result
SBI	29.38	15.41	1.90	Aggressive
HDFC	20.58	15.41	1.33	Aggressive
INFOSYS	9.83	15.41	0.63	Conservative
WIPRO	-7.83	15.41	-0.50	Conservative
BAJAJ	0.04	15.41	0.002	Conservative
TATA	-0.06	15.41	-0.003	Conservative

When $\beta > 1$ = aggressive

$\beta = 1$ = moderate

$\beta < 1$ = conservative

where SBI, HDFC is beating the market return with the beta 1.90, 1.33 respectively.

While Wipro, Bajaj, Infosys & Tata has the lowest beta of -0.50, 0.002, 0.63 & -0.003 which are conservative.

Risk, Return & Beta of Stocks

Stock	Return	Risk	Beta
SBI	0.11	8.85	1.90
HDFC	0.91	6.2	1.33
INFOSYS	0.64	5.10	0.63
WIPRO	1.14	6.21	-0.50
BAJAJ	0.48	5.22	0.002
TATA	-0.02	0.38	-0.003

Wipro and the Infosys has the positive returns of 1.14 & 0.64 return and when it comes to risk side HDFC has the highest risk of 27.56 and Bajaj followed by the risk of 22.57. where HDFC has the highest beta of 1.92.

Calculation of Correlation and covariance of portfolios

Portfolio	Stock combinations	Covariance	Co-relation
1	SBI & HDFC	35.21	0.86
2	SBI & INFOSYS	17.24	0.38
3	SBI & WIPRO	-35.36	-0.64
4	SBI & BAJAJ	18.49	0.38
5	SBI & TATA	-0.13	-0.03
6	HDFC & INFOSYS	7.78	0.33
7	HDFC & WIPRO	-15.20	-0.53
8	HDFC & BAJAJ	5.25	0.20
9	HDFC & TATA	-0.57	-0.31
10	INFOSYS & WIPRO	0.12	0.003
11	INFOSYS & BAJAJ	5.19	0.18
12	INFOSYS & TATA	0.70	0.35
13	WIPRO & BAJAJ	-10.37	-0.30
14	WIPRO & TATA	0.27	0.11
15	BAJAJ & TATA	0.54	0.25

The Correlation between the stocks / securities should be negative. So that if one of the stock / securities moves up other moves down therefore the profit and loss are limited in the portfolio and the risk also will be low.

If the correlation between the stock / securities is positive, there is a chance of unlimited loss, and profit in the portfolio. The risk of portfolio will be comparatively very low.

The combination of the SBI & HDFC, Infosys & Bajaj, Wipro & Tata, Infosys & Wipro, Bajaj & Tata got negative correlation which is better

Return and risk of various portfolio:

Calculation of portfolio return

$$R_p = (R_A * W_A) + (R_B * W_B)$$

Where R_p = portfolio return

R_A = return of A W_A = weight of A

R_B = return of B W_B = weight of B

Calculation of portfolio risk:

Portfolio risk =

$$\text{SQRT } [((W_x^2 * S_dX^2) + (W_y^2 * S_dY^2) + (2 * W_x * W_y * (r_{xy} * S_{dx} * S_{dy})))]$$

Where

W_x, W_y = proportion of total portfolio invested in security X & Y respectively s_{dx}, s_{dy} = standard deviation of stock X & stock Y respectively

r_{xy} = correlation coefficient of x & y

1) Portfolio: 1

Risk and Return of portfolio 1

Stocks	Return	Weightage	SD	Individual R
SBI	0.11	0.50	8.85	0.05
HDFC	0.91	0.50	6.2	0.45
Portfolio return				0.50
Portfolio variance				42.89
Portfolio risk				6.54

$$\text{Portfolio return} = (0.11 * 0.50) + (0.91 * 0.50)$$

$$\text{Portfolio risk} = 6.54$$

2) Portfolio: 2

Risk and Return of portfolio 2

Stocks	Return	Weightage	SD	Individual R
SBI	0.11	0.50	8.85	0.05
Infosys	0.64	0.50	5.1	0.32
Portfolio return				0.37
Portfolio variance				34.19
Portfolio risk				5.84

$$\text{Portfolio return} = (0.11 * 0.50) + (0.64 * 0.50)$$

$$\text{Portfolio risk} = 5.84$$

3) Portfolio: 3

Return and Risk of portfolio 3

Stocks	Return	Weightage	SD	Individual R
SBI	0.11	0.50	8.85	0.05
Wipro	1.14	0.50	6.21	0.57
Portfolio return				0.62
Portfolio variance				46.23
Portfolio risk				6.79

$$\text{Portfolio return} = (0.11 * 0.50) + (1.14 * 0.50)$$

$$\text{Portfolio risk} = 6.79$$

4) Portfolio: 4

Return and Risk of portfolio 4

Stocks	Return	Weightage	SD	Individual R
SBI	0.11	0.50	8.85	0.05
Bajaj	0.48	0.50	5.22	0.24
Portfolio return				0.29
Portfolio variance				32.84
Portfolio risk				5.73

$$\text{Portfolio return} = (0.11 * 0.50) + (0.48 * 0.50)$$

$$\text{Portfolio risk} = 5.73$$

5) Portfolio: 5

Return and Risk of portfolio 5

Stocks	Return	Weightage	SD	Individual R
SBI	0.11	0.50	8.85	0.05
TATA	-0.002	0.50	0.38	-0.001
Portfolio return				0.04
Portfolio variance				19.68
Portfolio risk				4.43

$$\text{Portfolio return} = (0.11 \times 0.50) + (-0.002 \times 0.50)$$

$$\text{Portfolio risk} = 4.43$$

6) Portfolio: 6

Return and Risk of portfolio 6

Stocks	Return	Weightage	SD	Individual R
HDFC	0.91	0.50	6.20	0.455
Infosys	0.64	0.50	5.10	0.32
Portfolio return				0.77
Portfolio variance				28.12
Portfolio risk				5.30

$$\text{Portfolio return} = (0.91 \times 0.50) + (0.64 \times 0.50)$$

$$\text{Portfolio risk} = 5.30$$

7) Portfolio: 7

Return and Risk of portfolio 7

Stocks	Return	Weightage	SD	Individual R
HDFC	0.91	0.50	6.20	0.45
Wipro	1.14	0.50	6.21	0.57
Portfolio return				1.02
Portfolio variance				38.50
Portfolio risk				6.20

$$\text{Portfolio return} = (0.91 \times 0.50) + (1.14 \times 0.50)$$

$$\text{Portfolio risk} = 6.20$$

8) Portfolio: 8

Return and Risk of portfolio 8

Stocks	Return	Weightage	SD	Individual R
HDFC	0.91	0.50	6.20	0.45
Bajaj	0.48	0.50	5.22	0.24
Portfolio return				0.69
Portfolio variance				27.42
Portfolio risk				5.23

$$\text{Portfolio return} = (0.91 \times 0.50) + (0.48 \times 0.50)$$

$$\text{Portfolio risk} = 5.23$$

9) Portfolio: 9

Table No-4.7.9 Return and Risk of portfolio 9

Stocks	Return	Weightage	SD	Individual R
HDFC	0.91	0.50	6.2	0.45
TATA	-0.02	0.50	0.38	-0.01
Portfolio return				0.44
Portfolio variance				10.15
Portfolio risk				3.18

$$\text{Portfolio return} = 0.91 \times 0.50 + (-0.02 \times 0.50)$$

$$\text{Portfolio risk} = 3.18$$

10) Portfolio: 10

Return and Risk of portfolio 10

Stocks	Return	Weightage	SD	Individual R
Infosys	0.64	0.50	5.10	0.32
Wipro	1.14	0.50	6.21	0.57
Portfolio return				0.89
Portfolio variance				30.07
Portfolio risk				5.48

$$\text{Portfolio return} = (0.64 \times 0.50) + (1.14 \times 0.50)$$

$$\text{Portfolio risk} = 5.48$$

11) Portfolio: 11

Return and Risk of portfolio 11

Stocks	Return	Weightage	SD	Individual R
Infosys	0.64	0.50	5.1	0.32
Bajaj	0.48	0.50	5.22	0.24
Portfolio return				0.56
Portfolio variance				20.76
Portfolio risk				4.55

$$\text{Portfolio return} = (0.64 \times 0.50) + (0.48 \times 0.50)$$

$$\text{Portfolio risk} = 4.55$$

12) Portfolio: 12

Return and Risk of portfolio 12

Stocks	Return	Weightage	SD	Individual R
Infosys	0.64	0.50	5.10	0.32
Tata	-0.02	0.50	0.38	-0.01
Portfolio return				0.31
Portfolio variance				6.80
Portfolio risk				2.60

$$\text{Portfolio return} = (0.64 \times 0.50) + (-0.02 \times 0.50)$$

$$\text{Portfolio risk} = 2.60$$

13) Portfolio: 13

Table No-4.7.13 Return and Risk of portfolio 13

Stocks	Return	Weightage	SD	Individual R
Wipro	1.14	0.5	6.21	0.57
Bajaj	0.48	0.5	5.22	0.24
Portfolio return				0.81
Portfolio variance				29.41
Portfolio risk				5.42

$$\text{Portfolio return} = (1.14 \times 0.50) + (0.48 \times 0.50)$$

$$\text{Portfolio risk} = 5.42$$

14) Portfolio: 14

Return and Risk of portfolio 14

Stocks	Return	Weightage	SD	Individual R
Wipro	1.14	0.5	6.21	0.57
Tata	-0.02	0.5	0.38	-0.01
Portfolio return				0.56
Portfolio variance				10.32
Portfolio risk				3.21

$$\text{Portfolio return} = (1.14 \times 0.50) + (-0.02 \times 0.50)$$

$$\text{Portfolio risk} = 3.21$$

15) Portfolio: 15

Return and Risk of portfolio 15

Stocks	Return	Weightage	SD	Individual R
Bajaj	0.48	0.50	5.22	0.24
Tata	-0.02	0.50	0.38	-0.01
Portfolio return				0.23
Portfolio variance				7.05
Portfolio risk				2.65

Portfolio return = $(0.48 \times 0.50) + (-0.02 \times 0.38)$

Portfolio risk = 2.65

Beta, β of portfolios

$\beta_p = (\beta_x \times W_x) + (\beta_y \times W_y)$

Where,

β_p = Beta of the portfolios

β_x & β_y = Beta of stock 1 & stock 2 respectively

W_x & W_y = Weightage of stock 1 and stock 2 respectively

Portfolio	Stock combination	β_x	W_x	β_y	W_y	β_p	Results
1	SBI & HDFC	1.90	0.50	1.33	0.50	1.61	Aggressive
2	SBI & Infosys	1.90	0.50	0.63	0.50	1.26	Aggressive
3	SBI & Wipro	1.90	0.50	-0.50	0.50	0.70	Conservative
4	SBI & Bajaj	1.90	0.50	0.002	0.50	0.95	Conservative
5	SBI & Tata	1.90	0.50	-0.003	0.50	0.94	Conservative
6	HDFC & Infosys	1.33	0.50	0.63	0.50	0.97	Conservative
7	HDFC & Wipro	1.33	0.50	-0.50	0.50	0.44	Conservative
8	HDFC & Bajaj	1.33	0.50	0.002	0.50	0.66	Conservative
9	HDFC & Tata	1.33	0.50	-0.003	0.50	0.65	Conservative
10	Infosys & Wipro	0.63	0.50	-0.50	0.50	0.06	Conservative
11	Infosys & Bajaj	0.63	0.50	0.002	0.50	0.31	Conservative
12	Infosys & Tata	0.63	0.50	-0.003	0.50	0.39	Conservative
13	Wipro & Bajaj	-0.50	0.50	0.002	0.50	-0.24	Conservative
14	Wipro & Tata	-0.50	0.50	-0.003	0.50	-0.25	Conservative
15	Bajaj & Tata	0.002	0.50	-0.003	0.50	0.10	Conservative

When,

$\beta_p > 1$ = Aggressive, $\beta_p = 1$ = Moderate, $\beta_p < 1$ = Conservative

Return, Risk and Beta of the portfolios

Portfolio	Stock Combination	Return	Risk	Beta
1	SBI & HDFC	0.50	6.54	1.61
2	SBI & Infosys	0.37	5.84	1.26
3	SBI & Wipro	0.62	6.70	0.70
4	SBI & Bajaj	0.29	5.73	0.95
5	SBI & Tata	0.049	4.43	0.94
6	HDFC & Infosys	0.775	5.30	0.97
7	HDFC & Wipro	0.025	6.20	0.44
8	HDFC & Bajaj	0.695	5.23	0.66
9	HDFC & Tata	0.445	3.18	0.65
10	Infosys & Wipro	0.89	5.48	0.06
11	Infosys & Bajaj	0.56	4.55	0.31
12	Infosys & Tata	0.31	2.60	0.30
13	Wipro & Bajaj	0.81	5.42	-0.24
14	Wipro & Tata	0.56	3.21	-0.25
15	Bajaj & Tata	0.23	2.65	0.10

Portfolio performance evaluation

Sharpe's Performance Index

Sharpe's Index = $(R_p - T) / SD$

Where,

R_p = Return of portfolio T = Risk free return, SD = Standard deviation

Here, risk free rate is 7.5% per annum i.e., 0.63% per month

Portfolio	Stock combination	RP	T	SD	Sp	Rank
1	SBI & HDFC	0.50	0.63	6.54	-0.01	8
2	SBI & Infosys	0.37	0.63	5.84	-0.04	10
3	SBI & Wipro	0.62	0.63	6.79	-0.001	6
4	SBI & Bajaj	0.29	0.63	5.73	-0.05	12
5	SBI & Tata	0.049	0.63	4.43	-0.13	14
6	HDFC & Infosys	0.775	0.63	5.30	0.02	4
7	HDFC & Wipro	1.025	0.63	6.20	0.06	1
8	HDFC & Bajaj	0.695	0.63	5.23	0.01	5
9	HDFC & Tata	0.445	0.63	3.18	-0.05	11
10	Infosys & Wipro	0.89	0.63	5.48	0.04	2
11	Infosys & Bajaj	0.56	0.63	4.55	-0.01	7
12	Infosys & Tata	0.31	0.63	2.60	-0.12	13
13	Wipro & Bajaj	0.81	0.63	5.42	0.03	3
14	Wipro & Tata	0.56	0.63	3.21	-0.02	9
15	Bajaj & Tata	0.23	0.63	2.65	-0.15	15

A Portfolio with highest Sharpe's Index, is best compared to other Portfolios, which can be ranked according to that.

Treynor's Reward to variability Measure

Treynor's Index = $(R_p - T) / \beta_p$

Where,

R_p = Return of the portfolio, T = Risk free rate, β_p = Beta of Portfolio

Here, risk free rate is 7.5% per annum i.e., 0.63% per month

Portfolio	Stock combination	RP	T	β_p	T_p	Rank
1	SBI & HDFC	0.50	0.63	1.61	-0.80	7
2	SBI & Infosys	0.37	0.63	1.26	-0.20	8
3	SBI & Wipro	0.62	0.63	0.70	-0.01	6
4	SBI & Bajaj	0.29	0.63	0.95	-0.35	11
5	SBI & Tata	0.049	0.63	0.94	-0.61	12
6	HDFC & Infosys	0.775	0.63	0.97	0.14	4
7	HDFC & Wipro	1.025	0.63	0.44	0.89	2
8	HDFC & Bajaj	0.695	0.63	0.66	0.09	5
9	HDFC & Tata	0.445	0.63	0.65	-0.28	10
10	Infosys & Wipro	0.89	0.63	0.06	4.33	1
11	Infosys & Bajaj	0.56	0.63	0.31	-0.22	9
12	Infosys & Tata	0.31	0.63	0.30	-1.06	14
13	Wipro & Bajaj	0.81	0.63	-0.24	-0.75	13
14	Wipro & Tata	0.56	0.63	-0.25	0.28	3
15	Bajaj & Tata	0.23	0.63	0.10	-4	15

Jenson's Reward to Risk ratio

Jenson's Index = $T + \beta_p * (ERM - T)$

Where,

ERM = Return of Market Portfolio i.e., Average Return of NSE Index = 1.11

T = Risk free rate, β_p = Beta of Portfolio

Portfolio	Stock combination	RP	ERM	T	β_p	ERP %	Result
1	SBI & HDFC	0.50	1.11	0.63	1.61	1.07	Inefficient
2	SBI & Infosys	0.37	1.11	0.63	1.26	0.90	Inefficient
3	SBI & Wipro	0.62	1.11	0.63	0.70	0.63	Inefficient
4	SBI & Bajaj	0.29	1.11	0.63	0.95	0.75	Inefficient
5	SBI & Tata	0.049	1.11	0.63	0.94	0.75	Inefficient
6	HDFC & Infosys	0.775	1.11	0.63	0.97	0.76	Efficient
7	HDFC & Wipro	1.025	1.11	0.63	0.44	0.51	Efficient
8	HDFC & Bajaj	0.695	1.11	0.63	0.66	0.61	Efficient
9	HDFC & Tata	0.445	1.11	0.63	0.65	0.61	Inefficient
10	Infosys & Wipro	0.89	1.11	0.63	0.06	0.33	Efficient
11	Infosys & Bajaj	0.56	1.11	0.63	0.31	0.45	Efficient
12	Infosys & Tata	0.31	1.11	0.63	0.30	0.44	Inefficient
13	Wipro & Bajaj	0.81	1.11	0.63	-0.24	0.18	Efficient
14	Wipro & Tata	0.56	1.11	0.63	-0.25	0.18	Efficient
15	Bajaj & Tata	0.23	1.11	0.63	0.10	0.35	Inefficient

Portfolio with $R_p > ERP$ = Efficient

Portfolio with $R_p < ERP$ = Inefficient

VIII. FINDINGS AND CONCLUSION

A. Findings

- 1) Among the individual stock calculation, Wipro is the better stock as of 2018-19 with the return 1.14% and risk of 6.21 with the beta -0.50. In terms of returns HDFC is also a best stock with the return 0.91% but the risk is 6.2, where both the companies has the same risk and the beta 1.33. So, Wipro is better option for investors to invest compared to HDFC.
- 2) On the Portfolio construction the combination of Infosys and Wipro has given better return of 0.82% with risk of 0.48 and beta of 0.05. The covariance and correlation of this combination are 35.21 and 0.86 respectively.
- 3) The combination of Wipro and Bajaj has given return of 0.81% with risk of 5.42 and beta of -0.24. The covariance and correlation of this combination are 5.19 and 0.18 respectively.
- 4) The combination of HDFC and TATA has given return of 0.44% with risk of 3.18 and beta of 0.83. The covariance and correlation of this combination are -0.57 and -0.31 respectively.
- 5) The combination of SBI and Bajaj has given return of 0.29% with risk of 5.73 and beta of 0.95. The covariance and correlation of this combination are 18.49 and 0.38 respectively.
- 6) The combination of Infosys and TATA has given return of 0.31% with risk of 2.60 and beta of 1.33. The covariance and correlation of this combination are 0.70 and 0.35 respectively.
- 7) On evaluating Portfolio performance HDFC and Wipro ranks 1st in both Sharpe's and Treynor's Index Infosys and Wipro and also this combination is efficient in Jensen's index.
- 8) Portfolio performance Infosys and Wipro ranks 2nd in both Sharpe's and Treynor's Index HDFC and Wipro and also this combination is efficient in Jensen's index.
- 9) Coming to Jensen's index few combinations are efficient and inefficient.
- 10) Finally, the Portfolio of Wipro & HDFC and Infosys performed well among all the combinations.

B. Conclusion

- 1) The objectives of the study have achieved
- 2) Investors with low risk averse can go for investing in the combination of TATA and Infosys.
- 3) Investors who are aggressive can invest in the combinations of SBI & HDFC and SBI & Infosys.

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