



## “A STUDY ON PERFORMANCE EVALUATION OF A PORTFOLIO CREATED USING SHARPE METHOD”

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**Abstract:** The study focus on the portfolio construction using sharpe index model with the selected securities of NSE. For calculating the portfolio of securities Nifty 50 index is taken. The time period is one year from 1<sup>st</sup> January 2020 to 30<sup>st</sup> June 2020. By using the Sharpe's cut off method we get the three securities as one portfolio.

### I. Introduction:

A portfolio is a collection of investment tools that include stocks, shares, mutual funds, bonds, and cash and so on depending on the investor's income, budget and convenient time frame. The art of selecting the right investment policy for the individuals in terms of minimum risk and maximum return is called as portfolio management. The portfolio management process takes into consideration, diversification, and level of risks, maturity and period of investment. It is difficult to identify the good security or construct the portfolio for higher return.

Model of portfolio managements

1. Sharpe's single index model: This model was developed by William Sharpe in 1963. The expected return and variance of indices which may be one or more and related to economic activity. It measures the portfolio excess return over the sample period by the standard deviation of returns over that period. Sharpe ratio measure the effectiveness of manager in diversifying the total risk.

$$\text{Formula for sharp index model} = \frac{(R_m - R_f)}{\sigma}$$

2. Treynor Model: The Treynor Index measures the risk-adjusted performance of an investment portfolio by analyzing a portfolio's excess return per unit of risk. The measure of market risk used is beta, which is a measure of overall market risk or systematic risk. The higher the Treynor ratio the excess return being generated by the portfolio. The index was developed by economist Jack Treynor.

$$\text{Treynor model} = \frac{(R_m - R_f)}{\beta}$$

3. **Jensen Model:** The Jensen measure or Jensen's alpha, is a risk-adjusted performance measure that represents the average return on a portfolio or investment, above or below that predicted by the capital asset pricing model (CAPM), given the portfolio's or investment's beta and the average market return. This metric is also commonly referred to as simply alpha.

$$\text{Jensen model} = R_p - [R_f + (R_m - R_f)\beta]$$

## II. Objectives

Performance evaluation of a portfolio created using Sharpe method

## III. Problem statement

On the basis of current situation (covid- 19) investor want maximum return with baring lowest risk. There are so many company's which are in loss. The investors are in dilemma that how to decide the proportion of investment to be made in each stock or in which sector they can invest so they earn maximum return. By using Sharpe, Jensen, Treynor and Fama model investor can construct the optimal portfolio from NSE.

## IV. Hypothesis

- H<sub>0</sub> There is no significant difference between in performance of Sharpe portfolio and market portfolio.
- H<sub>1</sub> There is significant difference between in performance of Sharpe portfolio and market portfolio.

## V. Research methodology

**Research design:** Research design is a broad frame work that states the total pattern of conducting research project. It contains the blue print of the research which includes calculation, analysis, interpretation and result.

**Sources of data:** Information was collected from the records and published annual reports of the company, web sites and Journals from www.nseindia.com.

**Data collection method:** Secondary data is used for the study.

**Population:** 50 companies

**Sampling techniques:** Sharpe portfolio method

**Time frame:** for the study we take data of the six months (1<sup>st</sup> January 2020 to 30<sup>st</sup> June 2020) of Nifty 50.

## VI. Literature review

**Keerti Jain and Neeti Mathur (2019)** had done research on Classification and Predictive Analysis of the Stocks Listed with NIFTY50. Objective of their research was to calculate the average return, risk and beta of the constituent stocks of Nifty 50 during year 31.03.2016 to 31.03.2019. It is found that risk and beta are not significantly correlated with returns of the share. Fifty constituent stocks of Nifty50 have been classified based on risk, return and beta into five clusters. Each cluster contains similar stocks based on their risk-return profile.

**RuchiNityanandPrabhu (2018)** Risk & return analysis of Nifty stock in Indian capital market. In this research she calculates standard deviation, covariance, Coefficient of correlation and beta for calculation of risk and return. She found that From the Betas of 50 stocks, it is found that some stocks move in the opposite direction to the market, some stocks move along with the market, some stocks are less volatile compared to the market and some stocks are more volatile compared to the market.

**Dr. NallaBalaKalyan and S MD Salman (2017)** had done research on Evaluation of Portfolio Analysis on Selected Securities of NSE in India. Objective of this research was to study the selected securities risk and return and relation between risk and return. They collect the Primary Data: Primary data are generated through personal investigation on the companies. Secondary Data: The secondary information was collected from the records and published annual reports of the company, web sites, Magazines, Books, newspapers and Journals etc. they take data from July 2016 to June 2017 to calculate average return. They found that risk level of the stocks depends on the individual performance of the company, not sector wise performance. They also found that stocks with similar sector might get positive correlation but results show that some sectors like IT had negative correlations and as well as no correlation. Pharma sectors indicate no correlations exist among them but Automobiles and Cement sectors indicate the positive correlations exist among them.

**DrKavithaLal and Dr S.R. SubbaRao (2016)** had research on Selecting an Optimal Portfolio for Investment in Stocks in India: A Sectorial Approach. In this research they found that Investment of funds in a portfolio of stocks enables investors to spread risk by diversification. Sharpe single index model has simplified the process of constructing the optimal portfolio by relating the return in a security to a single market index. Out of the 11 sectors, five are included in the optimal portfolio, with a major proportion of investment in pharma sector stocks followed by the other four. It has practical significance in terms of the methodology used and calculations made. With this approach, an optimum portfolio of sectors can be constructed for investment in the related equity stocks

**Saravanan A. and Natarajan P. (2011)** had done research on Optimal Portfolio Construction with Nifty Stocks. They take from 1st April 2006 to December 2011. This study takes all the 50 shares which are part of NSE NIFTY as market index. They found that Out of 50 companies taken for the study, 6 companies are showing negative return and the other 44 companies are showing positive returns. Out of 50 companies, 24 companies where market beta is above 1, show that the investments in these stocks are outperforming than the market.

## VII. Data Analysis and Interpretation

## CALCULATION OF PORTFOLIO FROM 1/1/2020 TO 31/6/2020

Table 1: Calculation of excess returns to beta

SECURITY NO	NAME OF THE SECURITIES	MARKET RETURN	EXCESS RETURN	BETA	UNSYSTEMATIC RISK	EXCESS RETURN TO BETA
1	NESTLEIND	15.89	8.89	0.12	1.35	76.55
2	CILPA	33.11	26.11	0.43	2.40	60.94
3	DRREDDY	36.98	29.98	0.52	2.17	57.28
4	DIVISLAB	23.52	16.52	0.71	2.10	23.38
5	BRITANNIA	18.36	11.36	0.85	2.30	17.50
6	BHARTIARTL	22.76	15.76	0.65	2.11	18.64
7	HINDUUNILVR	12.95	5.95	0.66	2.05	9.08
8	SHREECEM	13.13	6.13	0.88	1.99	6.99
9	SUNPHARMA	9.24	2.24	1.11	1.89	3.32
10	RELIANCE	12.26	5.26	0.67	2.41	4.73
11	HEROMOTOCO	3.75	-3.25	0.95	2.39	-3.41
12	INFY	0.13	-6.87	0.74	1.98	-9.28
13	HCLTECH	-2.20	-9.20	1.02	1.80	-12.81
14	ULTRACEMCO	-4.10	-11.10	0.93	2.78	-10.85
15	M&M	-4.17	-11.17	0.72	1.92	-11.99
16	TCS	-3.96	-10.96	0.84	2.35	-17.41
17	ASIANPAINT	-5.74	-12.74	1.14	2.30	-17.02
18	ADANIPTS	-6.55	-13.55	0.75	1.88	-16.22
19	HDFCLIFE	-11.88	-18.88	0.63	1.95	-16.51
20	GRASIM	-17.02	-24.02	1.35	2.16	-17.83
21	HDFCBANK	-16.48	-23.48	1.16	1.43	-20.17
22	BAJAJ-AUTO	-11.21	-18.21	1.06	2.36	-23.21
23	SBILIFE	-16.43	-23.43	0.78	2.11	-22.17
24	POWERGRID	-8.24	-15.24	1.12	2.10	-28.89
25	KOTAKBANK	-19.45	-26.45	1.17	2.38	-23.59
26	MARUTI	-20.86	-27.86	1.42	1.89	-23.75
27	GAIL	-15.86	-22.86	1.60	2.98	-27.26
28	HDFC	-27.43	-34.43	0.84	2.93	-24.24
29	BAJAJFINANCE	-33.20	-40.20	0.53	2.14	-25.06
30	EICHERMOT	-18.57	-25.57	1.52	2.68	-31.06
31	TITAN	-20.48	-27.48	1.03	2.70	-30.47
32	WIPRO	-10.89	-17.89	1.23	2.15	-37.66
33	BPCL	-23.98	-30.98	1.39	1.76	-29.95
34	JSWSTEEL	-30.05	-37.05	0.90	2.30	-30.11
35	BAJAJFINSV	-37.95	-44.95	0.82	2.47	-29.62
36	ICICIBANK	-34.90	-41.90	1.25	2.39	-30.13
37	HINDALCO	-32.36	-39.36	1.16	2.39	-31.43
38	TATASTEEL	-30.93	-37.93	1.01	1.99	-32.75
39	NTPC	-19.53	-26.53	0.94	2.91	-36.89
40	L&T	-27.88	-34.88	0.72	2.21	-34.46
41	UPL	-27.32	-34.32	0.48	2.14	-36.40
42	AXISBANK	-46.13	-53.13	1.39	2.89	-38.35
43	ITC	-18.42	-25.42	1.81	5.27	-46.32
44	SBIN	-46.68	-53.68	1.25	2.07	-42.78
45	INDUSINDBK	-68.60	-75.60	0.55	2.53	-41.70
46	IOC	-32.24	-39.24	0.79	1.94	-49.98
47	TECHM	-29.06	-36.06	1.07	2.80	-53.31

48	TATAMOTORS	-46.93	-53.93	0.68	2.27	-50.40
49	ONGC	-36.82	-43.82	0.71	2.87	-61.50
50	COALINDIA	-37.14	-44.14	0.53	2.43	-83.29

Table 2: Calculation of cutoff point

SECURITY NO	NAME OF THE SECURITIES	$(R_m - R_f)$	$(R_m - R_f)\beta_{im}$	$\sum \frac{(R_m - R_f)\beta_{im}}{\sigma_{e_i}^2}$	$\frac{\beta_{im}^2}{\sigma_{e_i}^2}$	$\sum \frac{\beta_{im}}{\sigma_{e_i}^2}$	C
		$\beta_{im}$	$\sigma_{e_i}^2$				
1	NESTLEIND	76.55	0.77	0.77	0.01	0.01	3.12
2	CILPA	60.94	4.66	5.43	0.08	0.09	16.82
3	DRREDDY	57.28	7.23	12.66	0.13	0.21	28.19
4	DIVISLAB	23.38	5.56	18.22	0.24	0.45	26.52
5	BHARTIARTL	17.50	3.50	21.72	0.20	0.65	24.49
6	BRITANNIA	18.64	5.79	27.51	0.31	0.96	22.97
7	HINDUUNILVR	9.08	1.90	29.41	0.21	1.17	20.90
8	SHREECEM	6.99	2.71	32.12	0.39	1.56	17.90
9	RELIANCE	3.32	0.63	32.74	0.19	1.75	16.51
10	SUNPHARMA	4.73	3.09	35.84	0.65	2.40	13.59
11	HEROMOTOCO	-3.41	-1.30	34.54	0.38	2.78	11.45
12	INFY	-9.28	-2.57	31.97	0.28	3.06	9.71
13	ULTRACEMCO	-12.81	-3.44	28.53	0.27	3.33	8.01
14	M&M	-10.85	-6.31	22.22	0.58	3.91	5.36
15	HCLTECH	-11.99	-3.74	18.48	0.31	4.22	4.15
16	ADANIPTS	-17.41	-3.54	14.94	0.20	4.42	3.21
17	HDFCLIFE	-17.02	-5.07	9.87	0.30	4.72	1.99
18	ASIANPAINT	-16.22	-4.82	5.05	0.30	5.02	0.96
19	TCS	-16.51	-9.39	-4.34	0.57	5.59	-0.74
20	GRASIM	-17.83	-14.98	-19.32	0.84	6.43	-2.90
21	HDFCBANK	-20.17	-19.10	-38.42	0.95	7.37	-5.05
22	SBILIFE	-23.21	-6.77	-45.19	0.29	7.66	-5.72
23	BAJAJ-AUTO	-22.17	-10.49	-55.69	0.47	8.14	-6.65
24	KOTAKBANK	-28.89	-3.76	-59.44	0.13	8.27	-6.99
25	MARUTI	-23.59	-14.12	-73.57	0.60	8.87	-8.08
26	HDFC	-23.75	-13.73	-87.30	0.58	9.45	-9.02
27	BAJAJFINANCE	-27.26	-6.54	-93.84	0.24	9.69	-9.46
28	GAIL	-24.24	-25.88	-119.72	1.07	10.75	-10.89
29	POWERGRID	-25.06	-21.64	-141.36	0.86	11.62	-11.93
30	BAJAJFINSV	-31.06	-8.52	-149.88	0.27	11.89	-12.36
31	BPCL	-30.47	-10.77	-160.65	0.35	12.24	-12.87
32	JSWSTEEL	-37.66	-3.97	-164.62	0.11	12.35	-13.08
33	ICICIBANK	-29.95	-11.87	-176.50	0.40	12.75	-13.59

34	TITAN	-30.11	-21.20	-197.70	0.70	13.45	-14.44
35	EICHERMOT	-29.62	-25.45	-223.15	0.86	14.31	-15.34
36	HINDALCO	-30.13	-33.11	-256.26	1.10	15.41	-16.38
37	TATASTEEL	-31.43	-20.62	-276.89	0.66	16.06	-16.99
38	L&T	-32.75	-18.38	-295.27	0.56	16.63	-17.51
39	UPL	-36.89	-8.63	-303.90	0.23	16.86	-17.78
40	NTPC	-34.46	-17.74	-321.64	0.51	17.37	-18.26
41	WIPRO	-36.40	-11.12	-332.76	0.31	17.68	-18.57
42	AXISBANK	-38.35	-25.47	-358.23	0.66	18.34	-19.28
43	INDUSINDBK	-46.32	-5.51	-363.75	0.12	18.46	-19.45
44	SBIN	-42.78	-32.54	-396.29	0.76	19.22	-20.36
45	ITC	-41.70	-26.01	-422.30	0.62	19.85	-21.03
46	IOC	-49.98	-15.88	-438.17	0.32	20.17	-21.48
47	TATAMOTORS	-53.31	-10.75	-448.92	0.20	20.37	-21.79
48	TECHM	-50.40	-20.61	-469.53	0.41	20.78	-22.35
49	ONGC	-61.50	-10.88	-480.41	0.18	20.95	-22.67
50	COALINDIA	-83.29	-9.63	-490.04	0.12	21.07	-23.00

From the above calculation three securities including in the portfolio are NESTLEIND, CILPA and DRREDDY.

**Table 3: Calculation of Sharp, Treynor, Jensen's and Fama ratio of portfolio**

					Sharpe ratio	Treynor ratio	Jensen's ratio	Fama ratio
Return of portfolio	Risk free rate	Standard deviation	Beta	$(R_m - R_f)\beta$	$\frac{(R_m - R_f)}{\sigma}$	$\frac{(R_m - R_f)}{\beta}$	$R_p - [R_f + (R_m - R_f)\beta]$	$R_p[R_f + \frac{\sigma_p}{\sigma_m}(R_m - R_f)]$
24.05	7	1.49	0.39	2.46	15.996	61.32481	14.6026	6.444819

For calculation of portfolio of Sharpe, Treynor, Jensen's and Fama models are taken .Risk free rate is 7.

A Sharpe ratio is 15.99, Treynor ratio is 61.32, Jensen's ratio is 14.60 and Fama ratio is 6.44.

**Table 4: Calculation of Sharpe and Treynor ratio of Nifty 50**

Return of Nifty 50	Risk free rate	Standard deviation	Beta	Sharp $\frac{(R_m - R_f)}{\sigma}$	Treynor $\frac{(R_m - R_f)}{\beta}$
35.43	7	0.83	1	34.25	28.43



The six month Sharpe ratio of Nifty 50 is 34.25 and Treynor ratio is 28.43. As the Sharpe ratio of Nifty 50 is more than the Sharpe ratio of portfolio it is advisable to invest in Nifty 50.

### VIII. Limitation of the study

- The time period taken for the study is limit up to six months only.
- Data which is taken for the study is secondary data.
- Out of 50 companies only three companies are selected to create the portfolio.
- Due to Corona virus pandemic, there was a sharp fall in market in the first half of the year, and an equally sharp recovery in the second half. This might be the reason for better performance of Nifty compared to our portfolio.

### IX. Conclusion

Investors need the higher return and lower risk. From creating the portfolio you can diversify your risk in to other securities or reduce the risk. For the period of six months Out of 50 companies three companies are in a portfolio. The Sharpe ratio of portfolio is less as compare to the sharp ratio of Nifty. So it is advisable to invest in Nifty. Nestleind, Cilpa and Drreddy are the securities which are in the portfolio.

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