ANALYSIS OF NSE NIFTY 50 STOCKS BASED ON SHARPE'S SINGLE INDEX MODEL

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ABSTRACT

The study aims to examine the optimum portfolio selection from the selected stocks of the NSE NIFTY 50 Index stocks. For analysis, researchers have selected top 20 stocks based on Free Float Market capitalization. The data collected for this study are daily open, high, low and closing prices of selected stocks and NIFTY 50 index. The sample included for the study extends from 1st April 2015 to 31st March 2020. The empirical findings of the study 4849reveal that investment should be made in NESTLEIND, HINDUNILVR and ASIAN PAINT stocks 7with a proportion of 45.05%, 33.14%, and 21.81% respectively, because the companies selected for the investment show positive growth and will continue to do so in the years to come.

Keywords: Sharpe's Single Index, NSE NIFTY 50, Excess Beta Ratio, Cut-off Point

INTRODUCTION

The term investment refers to the process of earning income or appreciation of capital by sacrificing present consumption. The risk and return are indicating the investment attribute. The risk-return indicates that the potential return rises with an increase in risk. Similarly, the potential return declines with a reduction in risk. In India, a greater number of investment avenues are there, namely Deposits, Postal schemes, Insurance, Real estates, gold and share market. A great number of investment avenues exist for those who wish to invest in share markets. However, investments in share market come with their risks

"The portfolio risk can be reduced by the simplest kind of diversification. Portfolio means the group of assets an investor owns. These assets may vary from stocks to different types of bonds. Sometime, the portfolio may consist of securities from different industries. When different assets are added to the portfolio, the total risk tends to decrease. In the case of

common stocks, diversification reduces the unsystematic risk or unique risk. Analysis opines that if 15 stocks are added to the portfolio of an investor, the unsystematic risk can be reduced to zero. But at the same time, if the number exceeds 15, additional risk reduction cannot be ensured. However, diversification cannot reduce systematic risk." (Punithavathy Pandian 2018).

The researchers aim to select the optimum portfolio by using Sharpe's single index model, developed by William Sharpe in 1963 and is used commonly in the finance industry. This is a model not only used to select suitable securities in a portfolio, but also to analyze the risk and return of the very same portfolio. The following are steps involved in finding out the optimal portfolio: the first, one needs to find out the excess return to the beta ratio for the selected stock's; second, one needs to rank the selected stocks based on highest to the lowest beta ratio; the third, one needs to compute Cut off point for all stocks according to the rank order; the fourth, to mark the cut-off values at the point of decline after a particular Ci and that point will be taken as the cut-off point; and, finally, the proportion of investment of each stock is to be identified for optimal portfolio stock. (Punithavathy Pandian 2018)

REV9IEW OF LITERATURE

The study by **P Varadharajan and P Vikkraman (2011)** constructs an optimal portfolio that maximizes the overall return and minimizes the risk associated with the individual stocks using the Sharpe Single Index Model. The greatest proportion of investment of about 35% is made in GTL Ltd. which has the lowest beta value of 0.4938 among all the stocks included in the portfolio. The portfolio is diversified as the stocks belong to companies of different types. An optimum investment is thus made in Oil and Gas, Banking, Steel, IT and Telecommunications.

Tanuj Nandan and Nivedita Srivastava (2017) constructed an optimal portfolio for 50 stocks of Nifty 50 Index. Majority of the stocks who are part of the optimal portfolio are from the banking sector. This indicates that the financial sector is growing rapidly and stocks of the financial sector are providing consistent and assured returns.

Yudhia Mulya and Herdiyana (2018) found that the most active trading volume portfolio comprised more stocks than the largest market capitalization portfolio. The optimal portfolios also showed that each group of stocks has different sector orientation in terms of sector weights. Property and real estate sector has the maximum proportion of the largest

market capitalization portfolio, while the mining sector has the maximum proportion in the most-active trading volume optimum portfolio.

In **Murthy (2018),** the study revealed that only tow company stocks constitute the optimum portfolio and these are Vedanta and Tata steel with an ideal proportion of investment of 86.37% and 13.62% respectively. The proportion of investment in each of the stock may change time to time hence the constructed optimal portfolio is subject to change.

Elsewhere, in **Nazneenaara Rafik Shaikh and Vijay Gondaliya (2019),** the study exposed the characteristics such as returns in association with the systematic and unsystematic risk of selected stocks were analyzed. The analyses concluded that the four stocks (i.e. 56% in Hindustan Unilever, 28% in Bajaj finance, 7% in HCL tech, and 9% in Reliance.) with the suggested proportion of investment can be beneficiary for an individual investor, financial planner or financial advisor are preferable in the construction of an optimal portfolio and thereby to spread the availability of funds.

Aloysius Edward J and Jagadish K K (2020) constructed an optimal portfolio choosing top twenty bank stocks in terms of market capitalization. It was found in their study all the7748 five banks were private sector banks whose returns were relatively high and the risk was low compared to public sector banks under study. It indicated that stock prices of public sector banks which were under the merger plan are highly volatile. There are micro, macro and other general economic indicators which affect the stock returns and their selection. These factors should also be considered while selecting securities for the optimal portfolio.

OBJECTIVES OF THE STUDY

The overall objective of the study is to construct an optimum portfolio selection from the selected stocks of the NSE NIFTY 50 Index stocks. The following are more specific objective they are:

1. to assess the stock performance based on the excess return to the beta ratio by using Sharpe’s Single Index Model; and
2. to identify the proportion of investment into each of the stock of the optimal portfolio stock.

METHODOLOGY OF THE STUDY

This study evaluates the optimum portfolio construction in equity stocks by using Sharpe's Single Index Model. To that end, the researchers have chosen the NSE NIFTY 50 Index. It represents the 50 most liquid and financially sound companies which trade on the National Stock Exchange (NSE). It is the benchmark index of NSE and key sectors of the Indian economy constitute the NIFTY 50 index. The researcher has selected top 20 stocks based on Free Float Market capitalization. The data collected for this study are daily open, high, low and closing prices of selected stocks and NIFTY 50 index. Instead of using the closing price itself, the researcher used the average of these four prices. "The majority of prior researchers have used only closing prices as if trading is done only at the closing price, rather the average of these four prices can yield better results as it can control volatility up to some extent" (Shilpa Lodha *et al.*,). The data have been collected from the official website of National Stock Exchange i.e., www.nseindia.com. The sample includes the study from 1st April 2015 to 31st March 2020.

TOOLS USED FOR THE STUDY

RETURN

The daily returns are calculated as follow;

Return of the day = LN (Today closing price / Yesterday closing price) *100

RISK-FREE RATE OF RETURN (RF)

The risk-free rate of return is the required rate of interest in risk-free investment. This study used 364 days of Treasury bills rate for the risk-free rate of return. It has been taken to be the T-bill rate at 4.9%.

BETA

Beta is a key tool to quantify the systematic risk of an individual stock with comparison to the unsystematic risk of the whole market. If the beta values fall on 1, the stock price moves with the market conditions, If the beta value exposes less than 1 means that the stock is less volatile than the entire market. If the beta reveals more than 1 means that the stock price is more volatile than the entire market.

$$\beta = \frac{Covariance\ (R_e, R_m)}{Variance\ (R_m)}$$

Here: Covariance = quantity of a stock's return comparative to the market

Variance = Measure the market moves relative to its mean

R_e = Stock return and R_m = Market return

EXCESS RETURN TO BETA RATIO

The excess return to beta ratio is calculated as follow;

= (Rn-Rf)/ β

Where, Rn= the expected return on the stock,

Rf = the return on a riskless investment,

β= systematic risk of an individual stock with comparison to the unsystematic risk of the whole market.

CUT-OFF POINT

The Cut-off Point is calculated as follow;

$Ci = (\sigma^2 m * \sum((Rn-Rf)\ \beta/)/\sigma 2ei) / 1+ \sigma^2 m * \sum \beta\text{^}2/\sigma 2ei$

Where e = security variance

m = market variance

THE PROPORTION OF INVESTMENT OF EACH STOCK

$X_i = Zi/\Sigma Zi$

Where Zi= βi^2/σ^2ei (Rn-Rf/β-C)

DATA ANALYSIS AND INTERPRETATION

The purposes of this section to analyses the data and evaluate the optimum portfolio construction by using Sharpe Single index model. First, the ranking of the selected stocks based on highest to the lowest beta ratio will be presented. Secondly, the cut-off value of for each stock will be presented. Third, Construction of optimal portfolio will be presented based on proportion.

TABLE 1.1

RANKING OF THE SELECTED STOCKS BASED ON HIGHEST TO THE LOWEST BETA RATIO

Securities	R_i	B	σ^2_{ei}	Ri-Rf/β	Rank
NESTLEIND	84.42	0.48	5.73	164.18	1
HINDUNILVR	94.20	1.06	6.20	84.18	2
ASIANPAINT	70.65	1.01	5.22	65.03	3
RELIANCE	28.10	0.68	1.45	34.01	4
HDFC	20.38	0.72	9.96	21.39	5
MARUTI	15.86	1.10	2.04	9.95	6
BHARTIARTL	8.31	0.86	3.26	3.97	7
ICICIBANK	1.76	1.12	6.18	-2.82	8
KOTAKBANK	-1.59	1.43	3.48	-4.55	9
TCS	-33.04	1.52	47.67	-24.99	10
HDFCBANK	-18.28	0.81	3.29	-28.46	11
AXISBANK	-39.68	1.35	3.72	-33.09	12
SBIN	-33.39	1.09	2.29	-35.02	13
HCLTECH	-76.53	1.24	3.67	-65.62	14
BAJFINANCE	-62.56	0.84	1.85	-80.14	15
INFY	-120.94	1.41	3.51	-89.43	16
ITC	-67.67	0.66	1.97	-109.24	17
LT	-76.29	0.58	6.07	-140.93	18
WIPRO	-117.39	0.51	6.05	-241.18	19
SUNPHARMA	-234.83	0.77	7.92	-311.28	20

Source: Author own calculations

The ranking of the selected stocks based on highest to the lowest beta ratio is presented in table 1.1. It is clear that NESTLEIND stocks produced the maximum excess return to the beta ratio (164.18) and followed by HINDUNILVR (84.18) ASIANPAINT (65.03) and so on. The lowest excess return to beta ratio is SUNPHARMA (-311.28), WIPRO (-241.18), SBI (-140.93) and so on. Moreover, 50 per cent of the stocks are found to have their beta value less than 1 which indicates that less volatile than the market. Therefore, the investors who are preferring fewer risk securities they can invest in those securities.

TABLE 1.2
CALCULATION OF CUT-OFF POINT VALUE

Securities	$(R_i-R_f)\beta/\sigma^2_{ei}$	$\Sigma(R_i-R_f)\beta/\sigma^2_{ei}$	$\sigma^2_m*\Sigma(R_i-R_f)\beta/\sigma^2_{ei}$	β^2/σ^2_{ei}	$\Sigma\beta^2/\sigma^2_{ei}$	$1+\sigma^2_m*\Sigma\beta^2/\sigma^2_{ei}$	Ci
NESTLEIND	28.67	28.67	22.13	0.04	0.04	1.03	21.45
HINDUNILVR	13.57	42.25	32.61	0.18	0.22	1.17	27.83
ASIANPAINT	12.46	54.71	42.22	0.20	0.42	1.32	31.92
RELIANCE	23.38	78.09	60.26	0.32	0.74	1.57	38.39
HDFC	2.15	80.24	61.92	0.05	0.79	1.61	**38.45**
MARUTI	4.88	85.11	65.69	0.60	1.39	2.07	31.73
BHARTIARTL	1.22	86.33	66.63	0.23	1.61	2.24	29.69
ICICIBANK	-0.46	85.87	66.27	0.20	1.81	2.40	27.62
KOTAKBANK	-1.31	84.57	65.27	0.58	2.40	2.85	22.89
TCS	-0.52	84.04	64.86	0.05	2.45	2.89	22.46
HDFCBANK	-8.65	75.40	58.19	0.20	2.65	3.04	19.12
AXISBANK	-8.89	66.51	51.33	0.49	3.14	3.42	15.01
SBIN	-15.32	51.19	39.50	0.52	3.66	3.82	10.33
HCLTECH	-17.87	33.32	25.72	0.42	4.08	4.15	6.20
BAJFINANCE	-43.37	-10.05	-7.75	0.38	4.46	4.44	-1.75
INFY	-25.51	-35.55	-27.44	0.56	5.03	4.88	-5.62
ITC	-55.56	-91.11	-70.32	0.22	5.25	5.05	-13.92
LT	-23.22	-114.34	-88.24	0.05	5.31	5.09	-17.32
WIPRO	-39.84	-154.17	-118.98	0.04	5.35	5.13	-23.21
SUNPHARMA	-39.30	-193.47	-149.31	0.07	5.42	5.19	-28.80

Source: Author own calculation

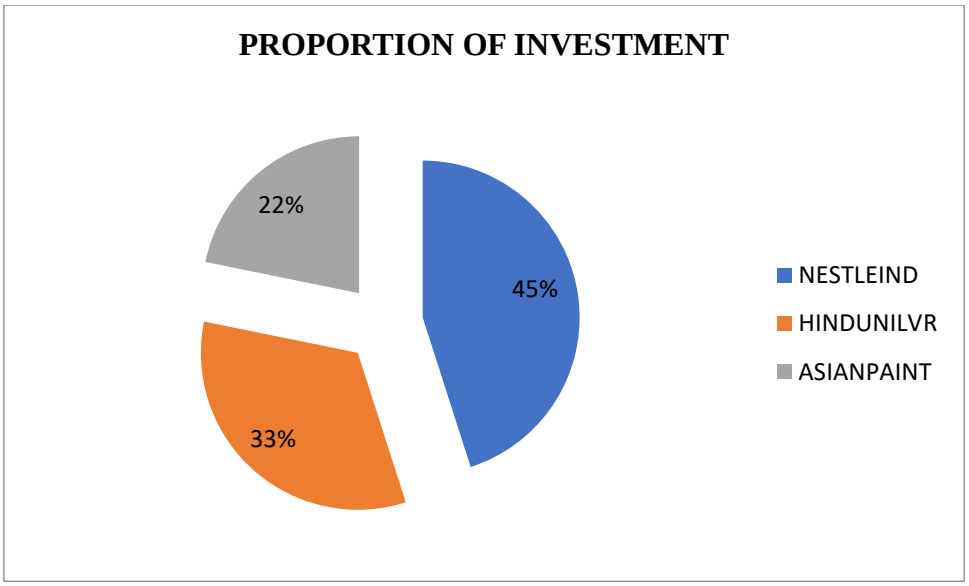
Table 1.2 shows the cut-off value of selected stocks of NSE NIFTY 50 index. Cut off rate C_i is 38.45 which is the highest cumulated value of Ci. Moreover, the cumulated values start to decline after HDFC stock but the excess returns to beta ratio are higher than Ci value up to ASIANPAINT stock. To construct an optimal portfolio, the securities which are the highest ratio of excess return to beta ratio are considered for the optimal portfolio namely NESTLEIND, HINDUNILVR and ASIANPAINT. The securities which are a lower ratio of excess return to beta ratio are not considered for the optimal portfolio.

TABLE 1.3
CALCULATION OF THE PROPORTION OF INVESTMENT OF EACH STOCK

Securities	$Z_i = \beta/\sigma 2_{ei}(R_i-R_f/\beta)-(C_i))$	$X_i = Z_i/\sum Z_i$
NESTLEIND	10.64	45.05%
HINDUNILVR	7.82	33.14%
ASIANPAINT	5.15	21.81%
	23.61	100.00%

Source: Author own calculation

CHART 1.1



Source: Compiled from Excel

Table 1.3 exhibits the Zi values and proportion of investment into each of the stock of the optimal portfolio stock. After identification of optimal portfolio stocks based on the excess return to beta ratio, the proportion of investment into each of the stock of the optimal portfolio stock is to be identified. Hence, the researchers considered the Zi and Xi and values. The proportion of investment into each stock shows the weights on each security of optimal portfolio stock. Among the optimum portfolio stocks, investment should be made in NESTLEIND, HINDUNILVR and ASIAN PAINT stocks with a proportion of 45.05%, 33.14%, and 21.81% respectively, because the companies selected for the investment show positive growth and will continue to do so in the years to come.

MAJOR FINDINGS OF THE STUDY

- It is found out that, NESTLEIND stocks produced the maximum excess return to the beta ratio (164.18) and followed by HINDUNILVR (84.18) ASIANPAINT (65.03) and so on. The lowest excess return to beta ratio is SUNPHARMA (-311.28), WIPRO (-241.18), SBI (-140.93) and so on.
- Moreover, 50 per cent of the stocks are found to have their beta value less than 1 which indicates that less volatile than the market. Therefore, the investors who are preferring fewer risk securities they can invest in those securities.
- The securities which are the highest ratio of excess return to beta ratio are considered for the optimal portfolio namely NESTLEIND, HINDUNILVR and ASIANPAINT.

The securities which are a lower ratio of excess return to beta ratio are not considered for the optimal portfolio.

- It is found out that, among the optimum portfolio stocks, investment should be made in NESTLEIND, HINDUNILVR and ASIAN PAINT stocks with a proportion of 45.05%, 33.14%, and 21.81% respectively, because the companies selected for the investment show positive growth and will continue to do so in the years to come.

CONCLUSION

The researchers attempted to study the construction of an optimum portfolio selection from the selected stocks of the NSE NIFTY 50 Index stocks. The data have been collected from the official website of National Stock Exchange i.e., www.nseindia.com. The sample includes the study from 1st April 2015 to 31st March 2020. The findings of the study reveal that the securities which are the highest ratio of excess return to beta ratio are considered for the optimal portfolio namely NESTLEIND, HINDUNILVR and ASIANPAINT. The securities which are a lower ratio of excess return to beta ratio are not considered for the optimal portfolio. Among the optimum portfolio stocks, investment should be made in NESTLEIND, HINDUNILVR and ASIAN PAINT stocks with a proportion of 45.05%, 33.14%, and 21.81% respectively, because the companies selected for the investment show positive growth and will continue to do so in the years to come. The Sharpe Single Index Model explained the proportion of investment into each of the stock of the optimal portfolio stock. Hence, the study advises the investors should have a birds-eye view on their portfolio and understand the market fluctuations.

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