

Optimum Portfolio Construction: Sharpe Single Index Model



Management

KEYWORDS :

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ABSTRACT

Wise Investors invest their valued money in bunch of securities rather than in single security because they want to take advantage of diversification of risk and they want to earn maximum return. Bunch of securities is known as Portfolio and this portfolio should possess minimum risk and maximum return. In this research we construct Sharpe single index optimum portfolio by using data of fifty companies CNX NSE Nifty index for period of 2010-2012

Introduction:

Optimum portfolio means grouping the securities which generate maximum return at minimum risk. Generally Portfolio is structure on the basis of individuals risk tolerance capacity, time limit and objectives. Number of security included in portfolio, it may be risky assets or risk free asset and combination of both i.e. risky as well as risk free assets. Securities are share, bond, cash etc. Generation of portfolio will help in diversifying the risk. Diversification means investing total fund in more than one security.

Literature Review:

Hayk Zayimtsyan was conducted research in July 2006 on the topic of "Optimum portfolio structure for Investments in the International Financial Market: The Example of the Central Bank of America". The major focal point of the study was theoretical and practical aspect of portfolio construction. For constructing the portfolio he use Markowitz's mean-variance model.

Suresh Chandra Das and Dr. Bishnupriya Mishra did a research in April 2013 on the topic of "Optimal Portfolio- Does Number of scripts matter?" They use Sharpe Optimal Portfolio technique for portfolio construction. They suggest that analysis of security, portfolios selection and proper management of portfolio will aid in enhancement of investor's awareness regarding trend and changes that present in the market and helps the investor for investment. Also suggest that optimum portfolio aid in minimizing the risk, without compromising return.

Research done by Rachel Campbell, Ronald Huissman and Kees Koedijk in 1999 on the topic of "Optimal portfolio selection in a value-at-risk framework". In their study they develop portfolio selection model. They use US stocks and bond both risky assets in their study and result shows that there is influence of length of time horizon for investment and expected return's non normal characteristics.

Daniel Matilla Garcia conducted research in November 2007 on the topic of "Optimal Portfolio Choice: An Integrated Extreme Risk Management Approach". In his research he constructed portfolio by using five industry index and use integrated model of Extreme Value Theory, GRACH model and Copulas and which permit them to optimize a portfolio minimizing extreme risk .

In year 2003 on the topic of "Diversification and the Optimal Construction of Basis Portfolios" research was conducted by Bruce N. Lehmann and David M. Modest. In their research for constructing basis portfolio they offer a comprehensive examination of the merits of different strategy which is correlated the common factors underlying security returns. And they conclude that increasing number of security will improves basis portfolio performance.

Objectives of the Study:

To construct an optimum portfolio of nifty fifty company for three years period

To evaluate performance of security through constructing a portfolio

To analyze volatility of security

To identify highest and lowest beta securities.

To provide direction to investors regarding performance of securities.

Research Methodology:

In this study we used secondary data and source of data is website of National Stock Exchange and Reserve Bank of India. To create a portfolio systematic risk, unsystematic risk, return and proportion for each selected security are calculated as part of sharpe model. For constructing optimum portfolio fifty companies were selected which were listed on National Stock Exchange and time duration of the study is three years (2010-2012).

Methodology to Construct Portfolio:

Following steps were followed to construct optimum portfolio

1. We find "excess return to beta" ratio for each fifty company. Excess return to beta ratio = $(R_i - R_f) / \beta_i$

Where, R_i = the expected return on stock i

R_f = Risk free rate of return

β_i = Systematic Risk of stock i

2. We arranged all securities in ascending order.

3. We calculate cut off rate (C_i) by using following equation given by Sharpe.

$$C_i = \frac{\sigma_m^2 \sum (R_i - R_f) \beta_i}{1 + \sigma_m^2 \sum \beta_i^2 / \sigma_{ei}^2}$$

σ_m^2 = Variance of market Index

σ_{ei}^2 = Stock's unsystematic risk

4. The point is selected as cut off point after which cumulative value of C_i start declining.

5. Those securities which have value of C_i more or equal to cut off point were selected in optimum portfolio.

6. The proportion for each selected securities are found by using following formula.

$$X_i = Z_i / \sum Z_i$$

Data Analysis and Interpretation:

For the study following fifty companies were selected as sample and all fifty companies are included in Nifty fifty index.

Table No. 1 (List of 50 companies listed on NSE)

ASIANPAINT	ITC	IDFC	PNB	JINDAL
HINDUNIL	CIPLA	SBIN	HINDALCO	HDFC
ULTRACEMCO	GRASIM	BHARTIARTEL	LUPIN	RELINFRA
DR REDDY	HERO HONDA	M&M	INFOSYS	SESAGOA
AMBUJACEM	AXISBANK	RANBAXY	HDFC BANK	WIPRO
ACC	ICICI BANK	TATAMOTORS	JPASSOC	NTPC
TCS	SIEM	L&T	DLF	BPCL
BAJAJAUTO	CAIRN	POWERGRID	RELIANCE	ONGC
BOB	COAL INDIA	MARUTI	TATASTEEL	TATAPOWER
HCL TECH	SUNPHARMA	KOTAKBANK	GAIL	BHEL

Table No. 2(Selected companies for Optimum Portfolio)

Company Name	Beta	(Ri-Rf)/βi	Ci
ASIANPAINT	0.385	236.489	19.711
HINDUNIL	0.414	165.446	33.059
ULTRACEMCO	0.533	137.694	45.723
DR REDDY	0.438	106.640	51.122
AMBUJACEM	0.838	84.598	56.292
ACC	0.704	65.990	57.765
TCS	0.839	65.386	58.966
BAJAJAUTO	0.695	62.371	59.105
BOB	0.938	60.812	59.357
HCL TECH	0.958	59.549	59.381

Securities Indicated in above table are selected for optimum portfolio construction. By following Sharpe Optimum Portfolio Model ten companies were selected among fifty companies. Respective Ci value for each company is calculated and Highest Ci value i.e. Cut-off point found out is 59.381

Table No.3 (Optimum Portfolio for Year 2010-2012)

Company Name	Return (%)	Xi (%)	Return of Portfolio (%)
ASIANPAINT	99.010	33.774	33.440
HINDUNIL	76.464	22.756	17.400
ULTRACEMCO	81.381	19.613	15.961
DR REDDY	54.738	11.565	6.331
AMBUJACEM	78.938	6.646	5.246
ACC	54.437	2.407	1.310
TCS	62.887	2.258	1.420
BAJAJAUTO	51.387	0.365	0.188
BOB	65.031	0.552	0.359
HCL TECH	65.049	0.062	0.041
Total Return on Portfolio			81.696

In Optimum Portfolio for year 2010-2012 ten securities were selected. According to Sharpe model securities are diversified in portfolio. From the above table it is found that ASIANPAINT earn highest return in portfolio i.e. 33.44% and HCL TECH earn lowest return i.e. 0.041%. Total return of the optimum portfolio is 81.696%

Conclusion:

Optimum portfolio carry ten companies out of fifty companies it includes ASIANPAINT, HINDUNIL, ULTRACEMCO, DR REDDY, AMBUJACEM, ACC, TCS, BAJAJAUTO, BOB and HCL TECH. In Optimum Portfolio ASIANPAINT(33.44%), HINDUNIL(17.40%) and ULTRACEMCO (15.96%) are hold majority of proportion. Sharpe Single Index Optimum Portfolio earn 81.696% for the period of three years(2010-2012). Investors can invest in portfolio's securities as it earn superior return.

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