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A STUDY ON USAGE OF SHARPE'S SINGLE INDEX MODEL IN PORTFOLIO CONSTRUCTION W.R.T NSE IT INDEX

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Abstract

Portfolio management is a vital aspect of decision making process for any investor. It is crucial for the investor to take a call as to where to invest and how much to invest. The present study focuses on constructing the optimal portfolio with the help of Sharpe Single Index model. Sharpe Single index model uses various inputs such as excess return to beta ratio, unsystematic risk, market return and variance etc to construct the optimal portfolio. In present study, portfolio is constructed from IT stocks of NSE IT Index. Montly data is collected from Ten IT companies of NSE IT for the time period of One Year from December 2016 to November 2017. Out of 10 stocks, 5 stocks are selected for investing namely MindTree (32.127%), Infibeam (4.30%), KPIT (17.761%), OFSS (26.117%) and Wipro (19.691%)

Keywords: - Portfolio, Sharpe, Single Index Model

Introduction

William Sharpe conceived and developed the Sharpe's Single Index model for portfolio formulation. Input variables for this model are significantly less than the model proposed by Harry Markowitz. Sharpe' Single Index model primarily presumes that a single factor known as index can explain the co – variance of the security. A particular version uses the market index such as S&P 500 as an independent variable. This model is called the market model. According to the market model, the performance of an asset or a security is related to the performance of the portfolio, which in turn varies as per the beta of the security.

All the securities are initially ranked according to the ratio of their excess return vs

beta according to this model. Further step is computation of a cut – off rate which is then compared with the ratio of excess return to beta to take an investment decision. Finally the proportion of investment to be made in each security comprising the portfolio is determined.

Literature review:

A study named "Optimal Portfolio Construction in Stock Market – An Empirical Study on Selected Stocks in Manufacturing Sectors of India" was undertaken by (Dr. Sathya Swaroop Debasish, 2012). According to this research, any investment decision is highly influenced by risk and return. The researcher employed the Sharpe Single Index model to create a portfolio. The data was gathered from NSE NIFTY and a portfolio was constructed from top 14 stocks. Upon analysis, three stocks "Hero MotoCorp", "Tata Motors" and "Asian Paints" were chosen for portfolio optimization.

Another research undertaken by (Kapil Sen and CA Disha Fattawat, 2014) also focused on Sharpe's Single Index Model and its application in construction and creation of the portfolio. This study inferred that it is far simpler to construct a portfolio using Sharpe's Single Index Model as compared to Mean – Variance Portfolio method formulated by Harry Markowitz.

A research by (Sarker, 2013) titled "Optimal Portfolio Construction: Evidence from Dhaka Stock Exchange in Bangladesh" also applied Sharpe's Single Index model. He employed the model by utilizing monthly closing prices of about 164 companies which were listed on Dhaka Stock Exchange (DSE) between July 2007 and June 2012. He found that seven organizations were giving negative returns and 157 other companies showed positive returns.

Research methodology:

The present study focuses on constructing the portfolio using Sharpe Single Index model. For this purpose, Ten IT companies of NSE IT Index as listed below are selected based on their weight. Monthly return for the last one year from 31st December 2016 to 30th November December 2017 and risk free rate of return is used for the calculation.

MINDTREE

INFIBEAM

KPIT

OFSS

Wipro

TechM

TCS

INFOSYS

HCLTECH

TATAELXSI

Problem statement:

An investor has to make very crucial and important decisions to maximize his returns. He needs to choose the assets/stocks/securities very judiciously and also decide on the quantum of investment to be made in each security. Therefore in this research, the problem faced by investors is which assets/stocks/securities to invest in and the proportion of investment in each security.

Objective:

To make the portfolio of NSE IT Index by using Sharpe Single Index model.

Tools and techniques used for study:

We employ Sharpe's Single Index model for portfolio construction and optimization.

Sharpe Single Index Model Portfolio Construction

Step 1

Ranking the securities based on excess return to beta ratio which is calculated as Ri-Rf/B where Ri means return of the security, Rf stands for risk free rate of return while Bi should be interpreted as systematic risk prevailing in the market. Rf=8%

Table 1: Ranking of securities based on excess Return to beta ratio

Company Name	Mean Return R_I	Beta B	Unsystematic Risk o^2	Excess Return R_I-R_F	(R_I-R_F)/B	Ranking
MINDTREE	0.26428153	0.20	0.05	0.18428153	0.903704613	1
INFIBEAM	0.257951667	0.22	0.39	0.177951667	0.826086272	2
KPIT	0.274407445	0.36	0.10	0.194407445	0.533305481	3
OFSS	0.232398233	0.73	0.04	0.152398233	0.209403869	4
Wipro	0.252869266	0.926578541	0.03565773	0.172869266	0.18656731	5
TechM	0.114829599	0.49	0.06	0.034829599	0.070727769	6
TCS	0.165821924	1.28	0.05	0.085821924	0.067292274	7
INFOSYS	0.108539788	1.39	0.05	0.028539788	0.020528709	8
HCLTECH	-1.58478734	2.05	2.91	-1.667787337	-0.811715557	9
TATAELXSI	0.295109609	-0.22	0.08	0.215109609	-0.995289571	10

Step 2:

Calculating the cut off rate using following formula.

Highest cut off rate will be regarded as C*.

$Ci=(\sigma m2*\Sigma ((Ri-Rf)*Bi)/\sigma ei2)/ (1+\sigma m2*(\Sigma Bi2/\sigma ei2))$

Where, σm2=market variance, Ri-Rf= Market risk Premium, σei2= unsystematic risk

Market variance σm^2 has been calculated on the basis of fluctuations in NSE IT Index from 31st December 2016 to 30th November 2017. σm^2=0.0232

Table 2: Calculation of systematic risk and cut – off rate Ci

Name of the Company	B^2/o^2	B/o^2	$((R_I-R_F)/B)*B^2/o^2$	X=Sum B^2/o^2	Y=Sum $((R_I-R_F)/B)*B^2/o^2$	Cut Off
MINDTREE	0.762676	3.74011	0.689233995	0.762676	0.689233995	0.015778745
INFIBEAM	0.11858	0.55047	0.097957182	0.881256	0.787191177	0.017972505
KPIT	1.338395	3.67153	0.713773296	2.219651	1.500964474	0.033252686
OFSS	14.81487	20.3565	3.102290321	17.03452	4.603254794	0.076781048
Wipro	24.07747	25.9853	4.492068083	41.11198	9.095322878	0.108238385
TechM	4.130602	8.38793	0.292148238	45.24258	9.387471115	0.106480905
TCS	35.01892	27.4581	2.356502693	80.2615	11.74397381	0.095339944
INFOYSYS	35.50831	25.5412	0.728939864	115.7698	12.47291367	0.078600079
HCLTECH	1.445056	0.70458	-1.172974161	117.2149	11.29993951	0.070565803
TATAELXSI	0.612493	-2.8339	-0.60960823	117.8274	10.69033128	0.066504552

Table 3: Selection of Securities. Securities whose ((Ri-Rf)/B)>Ci

Name of the Company	$(R_I-R_F)/B$	Cut Off	Decision
MINDTREE	0.903704613	0.015778745	**Selected**
INFIBEAM	0.826086272	0.017972505	**Selected**
KPIT	0.533305481	0.033252686	**Selected**
OFSS	0.209403869	0.076781048	**Selected**
Wipro	0.18656731	0.108238385	**Selected**
TechM	0.070727769	0.106480905	Rejected
TCS	0.067292274	0.095339944	Rejected
INFOYSYS	0.020528709	0.078600079	Rejected
HCLTECH	0.811715557	0.070565803	Rejected
TATAELXSI	0.995289571	0.066504552	Rejected

Table 4: Proportion of Securities to be invested

	A	B	A*B		
Name of the Company	((Ri-Rf)/B)-C*	B/o2	Zi	Zi/∑Z	%
MINDTREE	0.887925868	3.740114363	3.320944294	0.321271295	32.127%
INFIBEAM	0.808113767	0.55047072	0.444842967	0.04303453	4.303%
KPIT	0.500052795	3.671532734	1.835960205	0.177612529	17.761%
OFSS	0.132622821	20.35647168	2.699732706	0.261174698	26.117%
Wipro	0.078328925	25.98534823	2.035404392	0.196906948	19.691%
		∑Z	10.33688456		

It can inferred from the above analysis that an investor should invest 32.127% in MindTree, 4.30% in Infibeam, 17.761% in KPIT, 26.117% in OFSS and 19.691% in Wipro.

Conclusion:

Sharpe Single index model is a very convenient and crucial for construction of optimum portfolio. The advantage is that this method employs comparatively fewer inputs than Model of Markowitz. Also only one index is used for construction of the portfolio.

Ranking the stocks, finding cut off rate and finding the proportion to be invested. In present study, nine stocks of NSE IT INDEX are used to make an optimal portfolio. Out of these stocks, **investors are advised to invest in five stocks namely 32.127% in MindTree, 4.30% in Infibeam, 17.761% in KPIT, 26.117% in OFSS and 19.691% in Wipro.**

However, the investors should incessantly monitor and track their portfolio due to dynamic nature of the market. Hence it is imperative that investors continuously update their portfolio in consonance with changing market conditions to optimize their returns.

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