

SHARP INDEX MODEL AND ITS UTILITY IN PORTFOLIO OPTIMIZATION AND ALLOCATION OF FUNDS IN STOCKS

Syed Mohammad Faisal 

Assistant Professor, Department of Accounting & Finance, Faculty of Administrative Sciences,
Community College, Jazan University, Kingdom of Saudi Arabia
faisalsharar786@gmail.com

Omar Abdullah Al Aboud

Assistant Professor, Department of Accounting & Finance, Faculty of Administrative Sciences,
Community College, Jazan University, Kingdom of Saudi Arabia

Abstract

In this modern scenario merely salaried or in some cases business income is not sufficient to fulfillment of needs in order to lead peaceful life so one needs to look investment options in an economic system of concerned country. There are multiple investment options available depending upon their Risk & Return attitude. In this paper we have made an attempt to explore investment options in share market by creating optimal portfolio by using Sharp Index Theory and its model where maximum returns can be obtained by minimized risks in creating portfolio and also we have shown that up to what extent an investor should allocate and diversify funds to have sound returns on the basis of their basket of securities. In this paper we have also shown the characteristics of BETA that measures systematic risk and expected return, variances and many other mathematical models have been shown to explore various risk and return of share market indexes and individual securities and interrelated equations. For that we created portfolio of some assumed securities and formed an index and interpreted their results in the end of the paper.

Keywords: *Portfolio, Expected Return, Excess to return Beta ratio Variance, Optimal Portfolio, Beta, Scrip, Market Index, Systematic Risk, Share Market, Portfolio Diversification, Investment*

INTRODUCTION

Every investor has two basic instincts either he is risk taker or risk averse. If investors are risk averse then they need to keep themselves away from share market investments and look for some investments where they stand chance to get assured returns from the market like Fixed Deposits , Bonds, Life Insurance Policies or Mutual Funds of lowest risk like debts and tax savings etc.

And if investors want to multiply their returns and interested to explore investments with higher returns then they need to look into share market that give them to chance to yield higher returns but with many risk factors.

It is not essential that those invest in share market fall in risk taking always but sometimes they create portfolio of securities to diverse their risks and expect returns from their portfolio with some risks factors as their most of the investment is found to be in securities (shares). To minimize risk and getting good returns from their investments they create diversified portfolio depending upon their risk (Beta) and historical returns.

Sharp hence gave investors to select best portfolio to get adequate returns and also gave theory to decide about their investment ratios in each scrip. The method given by Sharp also stresses to the theory of Portfolio Optimization that is an important part of Portfolio Selection that means it facilitates to select a set of scrips out of the optimum Portfolio that provides highest returns with lowest risks involved by many factors.

Share market is often so volatile that is why it is essential to know the significance of Sharp Index Model to avoid and prevent losses and to earn highest returns with lowest risks.

Sharp's model is just an extension of Markowitz' method of Portfolio Diversification. Sharp simplified the process of Markowitz Model by reducing many complexities in substantial manner. He further quoted while giving his theory that all securities in an index all related to each other and depend upon index return as a whole.

Sharp thus improved the methods and theories given by Markowitz also stated that expected returns and variance of indexes that may be one or more and are related to economic activity.

Objectives of Study

- To know Beta that measures systematic risk.
- To find out excess to return beta ratio.
- To do Risk and Return analysis of selected index i.e. NASDAQ
- To do ranking the stocks in the portfolio

In his Portfolio Optimization Model Sharp gave practical approach of knowing Beta that measures systematic risk and gave interpretations as mentioned below.

- $\beta > 1$ In this condition the stock is too volatile and risky than the market.**
- $\beta < 1$ In this condition the stock is less or least risky as compared to market.**
- $\beta = 1$ In this condition the stock and market movements are considered same.**

Apart from knowing β and its impact on the portfolio returns Sharp stated to ascertain Risk Free Rate of Return (R_f), Variance in the market σ_m^2 , Variance σ_e^2 that is unsystematic risk in the market, Expected Return on stock i (R_i).

Deriving the Sharp Single Index Model

So far only the Sharpe single-index model has been utilized to study the return of a single security i as determined by its relation to the returns on a market index. Now consider the return of a portfolio composed of n securities. The return of a portfolio of n securities is the weighted summation of the individual returns of the securities. As given by mentioned below

$$E(R_p) = \sum X_i E(R_i), \text{ where } i = 1 \text{ to } n$$

Where, R_p is the rate of return on a portfolio in the time t and

X_i is the average associated with the security i

This equation indicates that the return of a portfolio may be decomposed into the summation of the weighted returns peculiar to the individual securities and the summation of the weighted adjusted return on the market index.

Thus the portfolio may be viewed as a combination of n basic securities and a weighted adjusted return from an investment in the market index.

$$\begin{aligned} R_{pt} &= \sum x_i (a_i + b_i R_{it} + e_{it}) \\ &= \sum x_i (a_i + e_{it}) + \sum x_i (b_i R_{it}) \\ &= \sum x_i a_i + \sum (x_i b_i) (R_{it}) + \sum x_i e_{it} \end{aligned}$$

Where $i = j = 1$ to n

And thus the variance can be derived in the following equation as mentioned below;

$$\sigma_{ij} = E[(R_{it} - r_i)(R_{jt} - r_j)]$$

$$E[((a_i + b_i R_{it} + e_{it}) - (a_j + b_j r_i)) \times ((a_j + b_j R_{it} + e_{jt}) - (a_j + b_j r_i))]$$

Sharpe's Portfolio Optimization Theory

Although there is a mathematical model to determine Optimal Portfolio yet it is essential to first know the relevance of Shape's Excess Return to Beta Ratio that measures the desirability of any stock to be included in the optimal portfolio. It is defined as mentioned below:

$$(R_i - R_f) / \beta_i$$

Where, R_i = Expected return on stock i

R_f = Risk free rate of return

β_i = Systematic risk involved in the security i

Creation of Optimal Portfolio of Securities

To include in the Optimal Portfolio stocks are thus ranked on the basis of excess return to beta ratio as mentioned above. The more excess to return beta ratio the more is the desirability of the stock or security to be included in the portfolio. The following data are required to determine the Optimal Portfolio:

R_i – Expected Return on Stock i

R_f – Risk Free Rate of Return which we assume as 6% to see economic conditions of assumed country say USA.

And, β_i is how volatile of stock i as compared to market index (Systematic Risk)

Other data we have calculated from the index NASDAQ, USA like Return on Stock from the historical prices in the month of December; 2016 as mentioned below:

Stocks	(R_i)%	β_i	<u>($R_i - R_f$)</u>	($R_i - R_f$) / β_i	Rank
Sirius XM Holdings	8.5	1.07	2.5	2.336	6
Cisco Systems, Inc.	7.4	1.26	1.4	1.111	9
Apple Inc.	9.1	1.42	3.1	2.183	7
Micron Technology	7.4	1.93	1.4	0.725	10
Facebook, Inc	11.7	0.40	5.7	14.25	1
Microsoft Corporation	10.1	1.29	4.1	3.178	5
Frontier Communications Corporation	14.2	0.67	8.2	12.23	2
Zynga Inc.	9	0.34	3	8.823	4
Velocity Shares	11.5	2.60	5.5	2.115	8
Intel Corporation	16.5	1.05	10.5	10	3

Source https://www.google.co.in/#q=beta%2Bof%2Bintel%2Binc**

After ranking on the basis of Excess to Beta Return Ratio we create our optimal portfolio. If we have to choose any 5 stock out of them then as per their rank we select that stock and invest accordingly. See the table below.

Stocks	(Ri)%	β_i	$(R_i - R_f)$	$(R_i - R_f) / \beta_i$	Rank
Facebook, Inc	11.7	0.40	5.7	14.25	1
Frontier Communications Corporation	14.2	0.67	8.2	12.23	2
Intel Corporation	16.5	1.05	10.5	10	3
Zynga Inc.	9	0.34	3	8.823	4
Microsoft Corporation	10.1	1.29	4.1	3.178	5

CONCLUSION AND SCOPE FOR FURTHER RESEARCH

In terms of our initial goals in this paper we have successfully shown the use of Sharpe's Index Model in doing ranking of stocks in the portfolio that an investor creates. We have shown in our concise but relevant research that how optimal portfolio of these 5 stocks were chosen that can provide highest return with lowest possible risk involved in the concerned stock and invests money in such portfolio as per the rank given on the basis of Excess Return to Beta Ratio.

This study given by Sharpe gained much popularity than the theory given by Markowitz. Currently all stock analysts and rational investors apply Sharpe's Index Model to create Optimal Portfolio and also allocate funds in different stocks according to their ranking in the portfolio.

Many Asset Management Companies and Portfolio Management Companies use Sharpe's Index Model as an advanced tool to create optimal portfolio and thus allocate funds into them.

Due to certain limitations as mentioned in this paper like only 10 scripts were taken initially in the portfolio and the entire study was based on doing ranking and thus creating optimal portfolio hence it might raise many questions about the large data and their cutoff points to be included in the portfolio therefore it is just a beginning of more extensive research in this area to be carried with further scope and research.

In this paper we have made an attempt to create optimal portfolio by just doing ranking of scripts on excess to return Beta ratio and left further scope of study by calculating Cutoff ratio and thus allocating funds in that portfolio in order to get positive returns with minimized risks.

Furthermore this study can be extended by doing comparative analysis with Markowitz Analysis and other theories and models like CAPM (Capital Asset Pricing Model) and provides vast scope to use Sharpe's Index Theory and Model for further research in the same area by exploring Portfolio Return, Portfolio Risks and Market Returns etc.

REFERENCES

- Hal Varian (1993), A portfolio of Nobel Laureates: Markowitz, Miller and Sharpe, The journal of Economic perspectives, issue 7 , vol. 1
- Gupta, R., & Basu, P.K. (2008). Portfolio optimization in the Indian stock market : Industry sector analysis. Delhi Business Review, 9 (1), 21-30.
- Dileep, S. & Kesava Rao, G.V. (2013), “ A Study on Sustainability of William Sharpe’s Single Index Model”, IJAMBU,1 (1), pp: 48-54.
- Baumol, W.Panzer, J. and Willing, R., (1982), contestable markets and the theory of Industrial structure.
- Varadharajan, P., & Vikkraman, P. (2011a). A study on construction of equity portfolio (oil, IT, steel, and banking stocks) with reference to the Sharpe index model. International Journal of Research in Commerce, IT and Management, 1 (5), 38-43.
- Graham, M.G., (1988), Stability and Competition in intermodal construction: Finding a balance, Construction policy and management 25: Pp. 129-135.
- Merton, R.C., (1991), theory of rational option pricing, Bell journal of Economics and Management Science, 4(1), Pp. 141-149.
- Yeo, K.T and Qui,F., (2003), The Value of Management flexibility- A real option approach to Investment evaluation, International journal of Project Management,1(4) Pp. 243-250.
- Saravanan, A., & Natarajan, P. (2012). Optimal portfolio construction with Nifty stocks (An analytical prescription for investors). Advances in Management, 5 (8), 47-53.
- P.R. Swarup, Director General, Construction Industry Development Council, India, Pp. 2-3
- Markowitz, H. (1952). Portfolio selection. The Journal of Finance, 7 (1), 77-91. DOI: 10.1111/j.1540-6261.1952.tb01525.x.
- Meenakshi Rani, Sarita Bahl Dr (2012), Optimal portfolio selection with or without the procedure of short sales, Asian journal of research in business economics and management, Vol2, Issue 7
- Hopkins Robert and Michael Acton, (1999), where does the return come from? Using the risk - Adjustment performance measure in Real Estate, Real Estate Finance, Vol. 16, Issue 2
- Wong, W.- K., Agarwal, A., & Du. (2005). Financial integration for India’s stock market : A fractional co-integrational approach (Departmental Working Papers, WP 0501). Department of Economics, National University of Singapore.
- Dileep, S. & Kesava Rao, G.V. (2013), “ A Study on Sustainability of William Sharpe’s Single Index Model”, IJAMBU,1 (1), pp: 48-54.
- Gopalakrishna Muthu, M. (2014), “Optimal Portfolio Selection using Sharpe’s Single Index Model”, Indian Journal of Applied Research, 4(1), pp: 286-288.
- Kumar, Arun S. S. and Manjunatha K. (2013), “ A Study on Construction of Optimal Portfolio using Sharpe’s Single Index Model”, International Journal of Research in Commerce, IT and Management, 3 (4), pp: 88-98.
- Varadarajan, P. & Ganesh (2012), “Construction of Equity Portfolio of Large Cap Companies of Selected Sector in India with reference to the Sharpe Index Model”, International Journal of Physical and Social Sciences, 2 (1), pp: 37-50.
- Mandal, Niranjan (2013), “Sharpe’s Single Index Model & its Application to Construct Optimal Portfolio: An Empirical Study”, Great Lake Herald, 7 (1), pp: 1-19.
- Harry Markowitz (March 1952), Portfolio Selection, The Journal of Finance, Vol7, No.1, pp. 77
- Siu han Wang (2008), Modern Portfolio Theory Tools A methodological Design a d Application, University of Witwatersrand

Andrade, Pratiba Jenifer (2012), "Construction of Optimal Portfolio of Equity, using Sharpe's Single Index Model: A Case Study of IT Sector", *International Journal of Applied Financial Management Perspectives*, 1(2), pp: 86-88.

Tripathy, Sasikantha (2011), "Forecasting through Single Index Model: A Study on Selected Indian Banks", *DRIEMS*, 1 (1), pp: 8-13.

Debasish, Sathya Swaroop and Khan, Jakki Samir (2012), "Optimal Portfolio Construction in Stock Market: An Empirical Study on Selected Stocks in Manufacturing Sector of India", *International Journal of Business Management*, 2(2), pp: 37-44.

Hendrik Scholz, (2007), Refinements to the Sharpe Ratio: Comparing alternatives for bear markets, *Journal of Asset Management*, Vol 7, Issue 5.