



A STUDY ON RISK AND RETURN ANALYSIS USING MARKOWITZ MODEL AND SHARPE RATIO

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ABSTRACT

The current study investigates the study on risk and return analysis using method Markowitz model and Sharpe ratio. This empirical paper is undertaken to prove that by applying Markowitz model and Sharpe ratio an individual can construct a portfolio of selected stocks data from Banking Sectors listed in National Stock Exchange (NSE) to analyse the risk and return for the investment made by the investors. The study is based on the Descriptive Research Design to have the clear-cut data requirements; the Secondary Data have been taken for this research. The sample size taken for the construction of portfolio is 10 Banks (5 Banks from Public sector and other 5 Banks from Private sectors) from Indian Stock Market listed in NSE, time period for this study is taken 2013 to 2017 of last five years data. The results of the present study is that all the 10 banks have performed appropriately well by create a portfolio which is diversified because each security contain the 10.0 weight but after change the proportion of security, portfolio become optimum with good return at average risk.

KEYWORDS : Expected Returns, Risk and Return, Variance, Covariance, Optimum Portfolio, Standard Deviation, Risk-free rate, Sharpe Ratio.

I. INTRODUCTION

Investment is one type of activity which is purchased by an individual to generate returns or any mechanism used for generating future growth income. Investment is very crucial decision concerned by the investor, an investor must need to have accurate knowledge about the stock exchange market to analyse the security and portfolio theory.

In investing risk and return are highly correlated increased potential returns on the investment as usual go hand-in-hand with increased risk. There is no guarantee that individual person will actually get a higher return by accepting more risk.

First investors need to understand the clear concept of risk and return so that individual can select the investment for the portfolio that provide a comfortable level of risk and return which can be diversified to spread the risk.

To analyse the risk and return two methods is used Markowitz model and Sharpe ratio, this methods is introducing new concept of risk measurement and adjusted the returns. Analysis of risk and return and their inter-relationships the statistical analysis for measurement of risk and mathematical programming for selection of assets in a portfolio in an efficient manner. The markowitz model and the sharpe ratio gives the idea about the optimal portfolio that has high expected return and the low risk by selecting the proportion or weights to the securities. It can get insights from the role of risk free rate of return and its affect the overall expected return and the risk in the market and help investors for the decisions about to investment on proportion based.

Problem Statement:

To analyse the risk and return using Markowitz and Sharpe Single Index Model – A Study of Selected Stocks from NSE.

OBJECTIVES OF THE STUDY:

1. To construct an optimal portfolio by selecting maximum profitable security.
2. To analyse the portfolio risk and portfolio return of selected stocks listed in NSE.
3. To identify the expected return of optimal portfolio.
4. To calculate the proportion of investment to be made into each security.

II. LITERATURE REVIEW

1. Rajan Bahadur Paudel, Sujan Koirala (2006) – “Analysing the Application of Markowitz and Sharpe Models in Nepalese stock market with the objective of study to test whether or not Markowitz and Sharpe Models of portfolio selection offer better investment alternatives to Nepalese investors, sample size of 30 stocks traded in Nepalese stock market. Statistical tools used Standard Deviation, Beta, Co-relations, Cut-off point. The results of their study suggested that the application of these elementary models developed about a half century ago offer better options for making decisions in the choice of optimal portfolios in Nepalese stock market.

2. Dr.Chetna Parmar (2014) conducted a study on Portfolio selection using Min-Max approach; SELECTED BANK IN INDIA: MARKOWITZ MODEL with the objectives study to analyse overall portfolio risk to take decision for diversification. Sample size from sample universe, researchers has selected 2 banks from private sector and 1 bank from public sector: HDFC Bank, ICICI Bank, SBI Bank. Collected data was analysed using statistical tools like Chi-square test. The researcher concluded that co efficient of correlation between banks must be positive return with minimize total portfolio risk. Markowitz model also focus on how to set efficient frontier with diversification of portfolio and reached line have positive correlation between scrip's.

3. Mr.Suresh A.S, Ms.Harshitha N (2017) conducted a study on Comparison of returns and risk using Markowitz and Sharpe's Model with the objective to compute the portfolio risk and return and identify the deviation as per Markowitz model and Sharpe's Single Index Model. Sample size used 21 securities. Statistical tools used Standard Deviation, beta, correlation. The study concluded that Sharpe Model is best suited to calculate portfolio risk as Markowitz model requires the computation of covariance's between stocks to identify the risk of portfolio and more the number of stocks more the pain to identify the covariance. This drawback has led to use of Sharpe's Single Index Model to compute the portfolio risk.

4. Joel Allen Rodrigues, Dr. Suresha B (2018) conducted a study on risk and return in building optimal portfolio using Markowitz model and its relevance in current scenario. The objective was to construct a portfolio, to guide the investors with an investment opportunity that reaps them maximum returns and to find the relevance of Markowitz model. Sample size used for the study is 25 companies listed in NSE. Data was analysed using tools like Covariance,

Standard Deviation. The researcher concluded that it is evident from the study that Markowitz model helps in building a portfolio with higher returns for a given level of volatility and also in diversifying the investments.

III. RESEARCH METHODOLOGY

The study is to analyse the risk and return using Markowitz model and Sharpe ratio. There is need for the study as banking sector in India is most desired sector with high expected return against the risk associated. Hence investors need to understand the risk and return involved in the investment. The study is based on descriptive research design because in this research design the specific objectives and clear cut- data Requirements. The secondary data has been taken for this research is from various sources like internet, journals and other publications. The stock prices and market index were collected from the national stock exchange, with sample of 10 banks listed in national stock exchange from 2013 to 2017 for construction of portfolio. The statistical tools used in the study are mean return, standard deviation, variance co-variance matrix, Sharpe ratio.

IV. INTERPRETATION AND ANALYSIS

A. Expected Return

Graph 1: Table of expected return



The graph above represents the annual return of securities where axis, HDFC and ICICI was observed with similar level of up's and down's return in securities around 25%, with a considerable like in the graph due to high return of yes bank above 90% this is indicating the higher return in this graph with the higher level of risk is also associated. After that in the graph sharp down with the lowest return of bank of India around 2% with a slight hike in the returns of SBI around 20%. So, these graph ultimately represent the ups and downs in returns with the level of risk is associated with it in different securities.

B. Variance Co-variance Matrix

The variance-covariance matrix is to determine the covariance's direction of a linear relationship between two variables but here we have value in terms of different securities. When two same stocks interact with each other's that is become variables and remains are covariance.

Here, maximum variance is for YES Bank that is 2.298% means this stock is very riskier stock, while HDFC Bank having minimum variance that is 0.0315% only so that it will called as less risky, it is good security, if investor interested in hedging. Where all other stocks was observed with moderate level of variance co-variance matrix the highest variance was of YES Bank which was relatively much higher indicating with the highest level of risk associated. There is no variance among these securities hence two or more securities can be included in a single portfolio.

C. Risk and Return Analysis

Table 1: Average Monthly Return and Variance

Particulars	Average Monthly Return	Monthly Variance
Axis Bank	1.96%	0.84%
HDFC Bank	2.11%	0.27%
ICICI Bank	1.87%	0.87%
YES Bank	7.60%	19.49%
KOTAK Bank	2.11%	0.31%
Bank of Baroda	1.46%	1.24%
Bank of India	0.13%	2.30%

Canara bank	0.85%	1.80%
SBI bank	1.87%	1.02%
Vijaya bank	1.31%	1.07%

From the above table represents the Bank's average monthly return and its monthly variance, the highest average monthly return was provided by the security of YES Bank return was 7.60% followed by the stocks of HDFC and Kotak with 2.11% each respectively.

Whereas the lowest return was generated by BOI which was only 0.13% with next lowest CANARA Bank at 0.85% respectively. Along with highest return highest level of risk was also associated with YES Bank as high as 19.49% followed by 2.30% by BOI much lower as compared to YES Bank.

HDFC and Kotak Bank appeared to safest among others with the lowest rate of variance 0.27% and 0.31% respectively. From the above calculation of return and variance its is suggested for investor to invest in YES Bank security if they are not risk averse and for risk averse investor HDFC and Kotak Bank are more Favourable security to investing.

Investor is suggested to invest in YES Bank if he/she is ready to take higher risk to get a higher return whereas another option for investor is to invest in HDFC And Kotak Bank as these banks carry the lowest risk.

Table 2: Average Annual Return and Variance

Particulars	Average Annual Return	Annual Variance
Axis Bank	23.50%	10.04%
HDFC Bank	25.26%	3.21%
ICICI Bank	22.42%	10.45%
YES Bank	91.15%	233.90%
KOTAK Bank	25.33%	3.70%
Bank of Baroda	17.57%	14.85%
Bank of India	1.61%	27.55%
Canara Bank	10.25%	21.62%
SBI Bank	22.44%	12.23%
Vijaya Bank	15.76%	12.82%

From the above table represents the bank's average annual return and its annual variance, the highest average monthly return was provided by the security of YES Bank return was 91.15% followed by the stocks of Kotak with 25.33% respectively.

Whereas the lowest return was generated by BOI which was only 1.61% with next lowest Canara at 10.25% respectively. Along with highest return highest level of risk was also associated with YES Bank as high as 233.90% followed by 27.55% by BOI much lower as compared to YES Bank. HDFC Bank and Kotak appeared to safest among others with the lowest rate of variance 3.21% and 3.70% respectively.

Investor is suggested to invest in YES Bank if he/she is ready to take higher risk to get a higher return whereas another option for investor is to invest in HDFC And Kotak Bank as these banks carry the lowest risk.

D. Create Portfolio by giving Equal and Different Weightage to each Security

Table 3: Equal Weightage Portfolio

Particulars	Weights
RISK FREE RATE	5%
Axis Bank	0.10
HDFC Bank	0.10
ICICI Bank	0.10
YES Bank	0.10
Kotak Bank	0.10
Bank of Baroda	0.10

Bank of India	0.10
Canara bank	0.10
SBI Bank	0.10
Vijaya Bank	0.10
SUM	1.00
Expected Return	25.53%
Standard Deviation	23.328%
Sharpe Ratio	0.008801

From the above table represents the equal weightage portfolio to each securities, when securities have the equal weights at that time the portfolio have the expected return of 25.53%. The portfolio faces the risk from data of the standard deviation is 21.83%. The difference between them is around 3.7% or something which is not advisable for investor to invest. The attractiveness level of the securities is on the basis of Sharpe ratio is around 0.941 for investment.

So, the above condition indicate at the time of the equally assign weights assigning to the securities.

Table 4: Different Weightage Portfolio

Particulars	Weights
Axis Bank	-
HDFC Bank	-
ICICI Bank	-
YES Bank	0.45610
KOTAK Bank	0.45590
Bank of Baroda	-
Bank of India	0.01310
Canara Bank	0.02290
SBI Bank	-
Vijaya Bank	0.05200
SUM	1.00
Expected Return	54.21%
Standard Deviation	22.49%
Sharpe Ratio	0.021881605

From the above table presents the investors aim is maximizing the Sharpe ratio and construct the optimal portfolio.

The data of weights indicate that for the securities proportion around 45.61% of investment in the security YES Bank and second one is Kotak Bank around 45.59% of investment. The maximization of sharpe ratio for the given security is 2.18% its almost double than the equal weights assign to them. The expected returns is almost 54% level and risk of the portfolio can be maintain to the level of 22%. The changes level when we compare the equal weights assign portfolio and this optimal portfolio the changes is around 28 % in both the risk and return level.

So, that above data for the construction of optimal portfolio and the maximizing sharpe ratio for the attractiveness of securities of the investors.

V. FINDINGS

From the study of risk and return analysis, many factors affecting like market risks, portfolio risk, riskier assets, etc. But the selection of the smart securities from the portfolio of 10 selected banks from banking sector is very crucial, with the good decisions in every portfolio.

- From the variance co-variance matrix analysis it is found that maximum variance is for the YES Bank that is 2.298%, that means this stock is much riskier than the other remaining 10 stocks. Whereas the HDFC Bank having the minimum variance that is 0.031%. It is found that it is good security.
- From the 10 company's in portfolio, it is found that highest average monthly return was having top 3 companies is YES

Bank, HDFC Bank and Kotak Bank their return is respectively 7.60%, 2.11% and 2.11%; the high risk included securities are YES Bank, Bank of India, and Canara Bank the average monthly variance are respectively 19.49%, 2.30% and 1.80%. So investor can invest in YES Bank for high return and high risk is associated too.

- From the 10 company's in portfolio, it is found that highest annual return was having top 3 companies is YES Bank, Kotak Bank and HDFC Bank their return is respectively 91.15%, 25.35% and 25.26%; the high risk included securities are YES Bank, Bank of India, and Canara Bank the annual variance are respectively 233.90%, 27.55% and 21.62%. So investor can invest in YES Bank for high return and high risk is associated too.
- From the equal weightage portfolio, the expected return is 25.53% and the standard deviation is 23.328%. It is found that return is high in equal weightage and risk is little bit less so investors can invest in this equal weightage security to get a high return with less risk is associated too.
- From the optimum portfolio weightage, the expected return is 54.21% and the standard deviation is 22.49%. It is found that return is high in optimum portfolio it is more than double from the equal weightage portfolio and also it has the maximizing the sharpe ratio is 2.18% in optimum portfolio and in equal weightage portfolio sharpe ratio is 0.88% means difference is 1.3%.

VI. CONCLUSION

From this research the findings of the study it is concluded that in this era of acceptance people are still inclined towards low risky and traditional avenues as investors were found to be risk averse as this still prefer to invest in low risk associated investment avenues. In this research, the overall portfolio performance is very good. Portfolio is also diversified because each security contain the 10.0 weight but after change the proportion of security, portfolio become optimum with good return at average risk. With the consequences of portfolio, how much investors should have to invest in each security with which proportion is also to take good decisions. But, most crucial thing in portfolio is to selection of securities and how much to invest (proportion). How the optimum portfolio can be constructed and it can be diversified the risk by selecting the securities from the different 10 banks securities. The Markowitz and the Sharpe model gives the idea about the optimal portfolio that has high expected return and the low risk by selecting the proportion or weights to the securities. From this models the investors can check and verified the each securities on the bases of the previous performance and they can diversified the risk of individual securities when they adds that stocks in their portfolio. This models helps the investors to whether to invest or not, and also it helps the investors for the identities the attractiveness of the portfolio with the returns and risk data of the securities.

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