CONSTRUCTING AN OPTIMAL PORTFOLIO USING SHARPE'S SINGLE INDEX MODEL WITH SPECIAL REFERENCED TO NIFTY -50

A PROJECT

Submitted By

SANGEETHA.K (211291601083)

SARANYA.P (211291601085)

SHABARNA.S (211291601086)

SHALINI.S (211291601087)

SHESHATRI.T (211291601088)

SINDHUJA.S (211291601089)

SREE VIGNESH.S (211291601090)

Under the Guidance of

Dr.N.Kogila MFM,MBA,M.Phil,Ph.D,SET

Submitted in practical fulfilment of the requirements for the award of the Degree of

BACHELOR OF COMMERCE

Submitted to

Department of Commerce , School of Social Sciences and Humanities

B.S. Abdur Rahman Crescent Institute of Science and Technology

(Deemed to be University)

Vandalur, Chennai-600048

B.S. Abdur Rahman ™ Crescent Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956

MAY 2024

DECLARATION

We hereby declare that the project entitled "**CONSTRUCTING AN OPTIMAL PORTFOLIO USING SHARPE'S SINGLE INDEX MODEL WITH SPECIAL REFERENCED TO NIFTY -50**" submitted by Sangeetha.K (211291601083), Saranya.P (211291601085), Shabarna.S (211291601086), Shalini.S (211291601087), Sheshathri.T (211291601088), Sindhuja.S (211291601089), Sree vignesh.S (211291601090) to the Department of Commerce, B.S. Abdur Rahman Crescent Institute of Science and Technology, Chennai, is our original work. The project has not been previously used for the award of any degree, diploma, associateship, fellowship, or any other similar title from any University or Institution.

The material borrowed from other sources and incorporated in the project has been duly acknowledged.

We understand that ourselves could be held responsible and accountable for plagiarism, if any, detected later on.

Date:

Signature of the Students

1. SANGEETHA.K

2. SARANYA.P

3. SHABARNA.S

4. SHALINI.S

5. SHESHATHRI.T

6. SINDHUJA.S

7. SREE VIGNESH.S

B.S. Abdur Rahman ™
Crescent
Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956

CERTIFICATE

This is to certify that the project entitled ' **CONSTRUCTING AN OPTIMAL PORTFOLIO USING SHARPE'S SINGLE INDEX MODEL WITH SPECIAL REFERENCED TO NIFTY -50'** submitted by Sangeetha (211291601083), Saranya (211291601085), Shabarna (211291601086), Shalini (211291601087), Sheshatri (211291601088), Sindhuja (211291601089), Sree vignesh (211291601090) is a bonafide research work for the partial fulfillment of the requirements for the award of the degree of Bachelor of Commerce at the Department of Commerce, B.S. Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai. To the best of our knowledge, the project has not been used previously for the award of any degree, diploma, associateship, fellowship, or any other similar title from any University or Institution.

Place:

Date:

Signature of the

Project Guide

Signature of the

Head of the Department

Signature of the

External Examiner

ACKNOWLEDGEMENT

We would like to express our gratitude to **B. S. Abdur Rahman Crescent Institute of Science and Technology** for including capstone project as a six-credit course which as provided an opportunity to gain theoretical knowledge and practical experience.

We wish to register my heartfelt gratitude to **Dr. N. Kogila** , for encouragement, support and guidance given throughout the project.

We indebted to our **Dr.Ayub Khan Dawood Dean, SSSH and Dr.K. Soundarapandiyan**, Associate Professor & HOD in the Department of Commerce for timely suggestions, healthy criticisms and great words of motivation.

Sincere thanks to project co-ordinator **Mr. Prakash**.

We extend our sincere thanks to our class advisor **Mr. S. Asan Bawa**, Assistant Professor in the Department of Commerce, for his encouragement.

Finally, thank our beloved **Parents** who continuously supported throughout the project.

Sincerely,

SANGEETHA.K (211291601083)

SARANYA.P (211291601085)

SHABARNA.S (211291601086)

SHALINI.S (211291601087)

SHESHATRI.T (211291601088)

SINDHUJA.S (211291601089)

SREE VIGNESH.S (211291601090)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF CHARTS

ABSTRACT

The creation of an ideal portfolio has grown more difficult in recent years, for making wise investing decisions; an investor has to have a solid understanding of security analysis and portfolio theory. The primary goal of this study is to use the Sharpe Single Index Model (SIM) to build an ideal portfolio for the Indian Market. Sharpe Single Index Model (SIM) is preferred over the Markowitz Model because it takes fewer inputs and is simpler to compute. Investors are always looking to take risks and put their money into various investment products in order to earn a decent return. They usually invest their savings in the highly volatile stock Market. This volatility is referred to as the risk of the market, and in order to protect investors from these volatilities, the stock market has developed a new concept called a portfolio. With a portfolio, investors have the opportunity to lower their risk by dividing their total investment into a group of securities. Maximizing returns with the least amount of risk is a key factor for any investor to consider when selecting stocks for a portfolio. This research paper main goal is to use the Sharpe Single Index Model to build an ideal portfolio out of equities that are listed on the NSE Nifty 50. For the aim of this study, Yearly data for NSE Nifty 50 stocks from 1st January 2019 to 31st December 2023 have been taken into account.

CHAPTER 1

Introduction

INTRODUCTION:

Investment in financial terms refers to “employ of funds in monetary assets” in which the return is estimated over a period of time either in the form of interest or dividend or capital appreciation of stock. While, the return estimated is to be realizing in the future, there is always a component of uncertainty. This uncertainty is termed as risk. Risk and Return are considered to be the two faces of investment in a coin and so, the investors analyze both these factors while taking investment decision. It is critical for the investors, issuers and market makers to understand the dynamics of the capital market (Archana & Lakshmi, 2019). There are various category of investors based on their risk taking attitude, such as high risk avoiders, medium risk avoiders and low risk avoiders. Investment in individual security is always riskier. Hence, the saying “Do not Put all your eggs in One Basket” (Warren Buffet, 2015). Thus, people intend to diversify their risk by investing in more than one security or a group of securities, which is known as a “Portfolio”. Portfolio helps in diversifying the risk, as more number of securities added to a portfolio helps in maximizing return. Constructing a portfolio is a challenging, complex and intricate task. Before, attempting to build a portfolio, every Investor is required to be decisive on vital things such as the amount of investable funds, duration of investment, objective of investment, attitude towards risk and return etc.

A portfolio is a collection of investment tools such as stocks, bonds, gold, and cash, and so on depending on investors’ needs. William Sharpe, the Modern Portfolio Theory reveals the maximization of returns through a mix of different securities. This theory tells us that risk can be decreased by combining low-risk securities with those of high risk. Several studies have shown that the most important decision when constructing a portfolio is asset allocation. This means making sure the portfolio has the right mix of assets to suit investors’ circumstances, investment aims, and attitude to risk.

In the modern world, different range of investment opportunities exists namely postal savings, bank deposits, gold, real estate, mutual funds, equity shares, preference shares, and bonds and so on. However, investment in the share market i.e., equity share and preference share play a vital role in the mindset of

aggressive investors. The primary objective of the investment is to get maximum returns from investment in the future period. Hence, investors are willing to take high-risk security to get maximum return from the investment. The selection of suitable security in share market with the right combination of risk and return is very difficult for the investor. To select the optimum portfolio for the investor Sharpe Single Index model exist. Henceforth, the researcher has taken an attempt to study the construction of an optimal portfolio using Sharpe's single index model in NSE Nifty 50 index stocks.

RESEARCH BACKGROUND:

Portfolio performance analysis is to assess how well the investment plan is meeting its goals as well as the degree to which investment managers are adding value in carrying out the investment plan. In making the assessment, we need a clear statement of the plan's goals to provide a guideline around which results can be measured.

To evaluate managers, we need an understanding and explicit statement of the critical elements of the investment process to develop a framework for judging where and to what extent portfolio managers have enhanced value for the plan. A measure that is basic to the performance appraisal process is the rate of return earned on the assets employed over a period of time. This return should be time weighted to adjust for any cash flows in or out of the plan over the period. This calculation become complex and tedious where there are significant flows of cash. Prior to the year 1970s, there was no standard for computing returns even now calculated returns do not meet the time weighted or other standards in many instances.

Though managers can be evaluated by comparing rates of return earned over a period we also need to consider risk. We have seen that there is a risk- return relationship that is basic to capital markets. In assessing whether a manger is adding value, we need to determine to what extend returns were more or less than commensurate with risk. Capital market theory provide an explicit

framework - Security Market Line - and measure – beta and standard deviation - for making such risk adjustments to return.

Beginning in the mid- 1960s and continuing on to the present, academics have developed, refined, and empirically demonstrated the application of capital market- based methods of assessing the performance of portfolio managers. Following along with this development, investment management consultants have integrated risk adjustment procedure into their appraisal system for evaluating the performance of managers in their comparison universe. Most, recently performance evaluation services that reports to a wide range of institutional and individual investor clientele are including capital market based measures in their performance appraisal reports.

In this study we describe approaches to portfolio construction and analysis as well as performance evaluation of portfolio of the companies by sector wise listed in NSE Nifty 50 index for constructing an optimum portfolio and evaluate the performance of the sectors to offer investment option to investors.

BROAD AREA OF RESEARCH:

Finance – Investment Management – Portfolio construction.

SPECIFIC RESEARCH TOPIC:

“Constructing an Optimal Portfolio Using “Sharpe’s Single Index Model”.

STATEMENT OF PROBLEM:

“Stock market is an ocean, where dealing in stock market is just sailing in a ship without a compass”. Investing one’s hard earned money is indeed an onerous task as one has to make a prudent decision by taking several factors into account. There may be a wide variety of investment avenues available in today’s investment world but the reliability of each one of them is quite uncertain. This

uncertainty is termed risk in finance parlance. All investors invest in multiple securities, rather than one security, there must be some benefits in investing in a portfolio of securities that is risk in the portfolio securities are diversified. The investment in several securities reduced the risk of the investment. The appropriate selection of securities can assure good return to investors and can also help to reduce the losses. Many studies have been conducted to construct portfolio and analyze its performance in the stock markets world wide including India. Especially they have conducted in BSE 100 index and NSE Nifty and Nifty junior indices. There was very few study undertaken to construct portfolio for NSE Nifty 50 companies sector wise. Thus, the present study is an attempt to analyze the risk and return of the companies sector wise listed in NSE Nifty 50 index for constructing an optimum portfolio and evaluate the performance of the sectors to offer investment option to investors.

NEED FOR THE STUDY:

Constructing a portfolio is similar to that of constructing a house; both require determination of the needs and the available resources and matching the available resources with the requirement. Portfolios are used to set off risk against the return by investing in a group of securities. With respect of portfolio construction and evaluation, many studies have been conducted in the developed countries and also in India, especially in NSE and BSE index. The Previous studies widely constructed the portfolio construction and performance evaluation using very small samples and monthly and weekly data. No one has to undertake study in Portfolio Construction in NSE Nifty 50 index by sector wise. Hence the present study constructed a portfolio for the sectors in NSE Nifty 50 index by using Sharpes's single index model and evaluates performance of each sector and offers the suggestions to investors for investment.

OBJECTIVES OF THE STUDY:

The following are the objectives of the present study.

1. To highlight the Theoretical Background of Sharpe's Single Index Model.
2. To analyze the Risk and Returns of NSE Nifty 50 Securities.
3. To construct Optimal Portfolio of Selected Securities Using Sharpe's Single Index Model.
4. To determine the Proportional Investment to be made in each Selected Securities.
5. To study the relative market performance for the company's constituent to NIFTY 50 Index for the last 5 years.
6. Construction of an optimal portfolio empirically using the Sharpe's Single Index Model.
7. Determine the proportion of investment to be made in each of the selected stocks.
8. Identify the risk and return of the portfolio hence built.

SCOPE OF THE STUDY:

There are many scopes for doing further research in this area.

1. The further study can be build in all other index.
2. The researcher can make a study in other stock Exchanges.
3. The upcoming researchers can also extend their study to the global markets.
4. The forthcoming examiner may extend the study period of the research.

CHAPTER 2

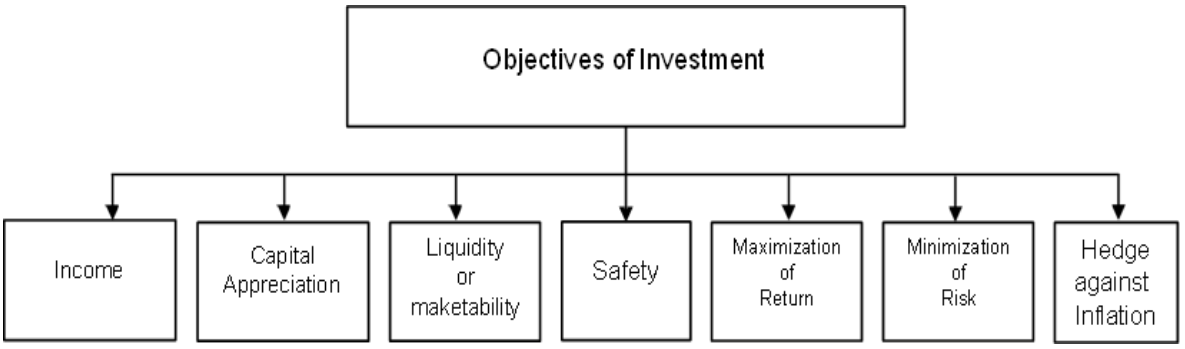
Literature Survey

LITERATURE SURVEY

INVESTMENT:

An investment is an asset or item acquired with the goal of generating income or appreciation. Appreciation refers to an increase in the value of an asset over time. When an individual purchases a good as an investment, the intent is not to consume the good but rather to use it in the future to create wealth. An investment always concerns the outlay of some resource today- time, effort, money, or an asset in hopes of a greater payoff in the future than what was originally put in. For example, an investor may purchase a monetary asset now with the idea that the asset will provide income in the future or will later be sold at a higher price for a profit. The act of investing has the goal of generating income and increasing value over time. An investment can refer to any mechanism used for generating future income. This includes the purchase of bonds, stocks, or real estate property, among other examples. Additionally, purchasing a property that can be used to produce goods can be considered an investment. In general, any action that is taken in the hopes of raising future revenue can also be considered an investment. For example, when choosing to pursue additional education, the goal is often to increase knowledge and improve skills. The upfront investment of time attending class and money to pay for tuition will hopefully result in increased earnings over the student's career. Because investing is oriented toward the potential for future growth or income, there is always a certain level of risk associated with an investment. An investment may not generate any income, or may actually lose value over time. For example, a company you invest in may go bankrupt. Alternatively, the degree you investing time and money to obtain may not result in a strong job market in that field. An investment bank provides a variety of services to individuals and businesses, including many services that are designed to assist individuals and businesses in the process of increasing their wealth. Investment banking may also refer to a specific division of banking related to the creation of capital for other companies, governments, and other entities. Investment banks underwrite new debt and equity securities for all types of corporations, aid in the sale of securities, and help to facilitate mergers and acquisitions.

II) OBJECTIVES OF INVESTMENT:



OBJECTIVES OF INVESTORS:

People make investment for a variety of purpose. The objective of investments should be clearly understood before initiating the process of investment. The objectives may be income, capital appreciations or a future provision for contingencies such as marriage, death, birth etc. provision for retirement and accidents could be carried by contractual obligations like insurance and contribution to Provident Fund and Pension Funds. A certain amount of saving needs to be kept as cash or in deposit to facilitate daily transactions for purchase and sale. While cash earns on interest, saving deposits with banks earn 5-6% on accounts when the rate of inflation is 8- 10%. This rate of return of 5-6% will provide only a negative return to investors. Therefore, the amount kept in the form of cash and deposit with bank, etc. should, normally be bare minimum. The rest of the amount should be spread in various investment avenues, earing higher return than the normal inflation rate.

The main objectives sought to be fulfilled by the investors are:

1) Income
2) Capital appreciation
3) Liquidity or marketability
4) Safety or security
5) Maximization of return
6) Minimization of risk
7) Hedge against inflation

The investors would like to earn as much return as possible with the minimum possible risk. It is natural and economically rational behavior. Further, if savings are kept in the form of cash, it will be a barren investment without earnings. It also loses it value to the extent of risk in prices. A continuous rise in prices or inflation erodes the value of money. Saving are invested to provide a hedge or protection against inflation. If investment cannot earn a rate of return more than inflation rate, the real rate of rate will be negative. Thus, if the average inflation rate is 8 percent the investment should earn more than 8 percent return in order to induce the savings to flow into investment. The investor receives his income from the dividend or yield or interest. The Capital appreciation arises on account of increase in the market value of the securities held. The liquidity and safety of an investment will depend upon the market availability and the credit worthiness of the borrower namely the comparing or the issue of the securities. These characteristics vary between assets and securities and are reflected in the risk return patterns of these assets as securities. An investor is also concerned in having a tax plan to reduce his tax commitments so as to minimize the take home income. For this purpose, each investor should specify his income bracket, his liabilities and his preference for tax planning. The investment avenues have certain characteristics of risk and return and also of tax concessions attached to them. These tax provisions as such can influence the investors in a significant manner as these provisions will alter the risk return scenario of investment alternatives. It is, therefore, necessary that all these avenues should be assessed in terms of yields, capital appreciation, liquidity, safety and tax implications. The investment strategy should be based upon the above objectives, after a thorough study of the goals of the investors, in the background of characteristics of investment avenues.

III) INVESTMENT AVENUES:

a) REAL ASSETS:

1. MUTUAL FUND:

Annualized Return If selecting, annualized returns policy then the measure of an increasing the value of your investment fund on the basis of annual return, for example, you have invested Rs.2 lakhs in an Mutual Fund scheme. In a period of three years,

your investment has growth of Rs.2.8 Lakhs. In this Scenario, the absolute return of your investment is 40%, But because the effect of annualized return is calculated on compounding therefore the return should be 11.99%.

Total Return: - It referring that actual return which you will accruing from the investment. It includes both capital gain and dividend. For example, let's assume you have investment Rs 1 lakh in Mutual Fund Schemes, and the Net Asset Value is Rs.20. From when you purchase the investment of Rs.1 Lakh and the net asset value of Rs.20, It indicates that you purchased 5000 units. After some years later, Net Asset Value of Mutual Fund Scheme Investment Increased by Rs.22 and the value of units will be increased by Rs.1.1 Lakh, that means (5000units x Rs.22 per unit) which indicates that you earn capital gain Rs 10,000 from your Investments. Now in this Scenario dividend is declared by the company of Rs.2 per unit over the year, overall Rs.10,000 dividend paid to Investors Rs. 10,000(5,000units x Rs. 2 per unit), Therefore your total earning shall be Rs.10,000 + Rs.10,000=Rs.20,000(Dividend + Capital Gains amount) which means you earning total 2 returns.

2. EQUITY (STOCK MARKET):

Equity Value is also called market capitalization, which is the total-sum values of the shareholders made available for the business and can be calculated by multiplying the market value per share by the total number of shares outstanding. It is the very main key for a businessowner especially when he makes a strategy to sell out his business as it gives a good calculation of what the seller of business would receive after the debt has been paid.

3. BANK:

Banks are a financial institute licensed to receive deposits and provide loans. Banks might also give financial help and financial services such as wealth management planning, currency exchanges, and safe deposits. There are several different banking sectors such as retail banks, commercial and corporate banks, and saving banks. In

many countries all over the world, banks are regulated by the central bank and national governments.

4. FIXED DEPOSIT:

Fixed deposit is one of the major investment avenues. Most people prefer to invest money in FDs over equities as the former is safe. The amount returned from the bank FD is a fixed amount and known at the time of investing unlike in case of equity. There are various Fixed Deposit schemes they are also called as term deposits. It is because money is deposited with a bank for a fixed predetermined time value or term.

5. MONEY MARKET FUNDS:

Money market funds work like a typical mutual fund. They issue redeemable units or shares to investors, and they are mandated to follow the guidelines drafted by financial regulators (for example, those set by the U.S. Securities and Exchange Commission). A money market fund may invest in the following types of debt-based financial instruments:

- Bankers' Acceptances (BA) short-term debt guaranteed by a commercial bank
- Certificates of deposit (CDs) bank-issued savings certificate with short-term maturity
- Commercial paper unsecured short-term corporate debt
- Repurchase agreements (Repo) short-term government securities
- U.S. Treasuries short-term government debt issues.

Returns from these instruments are dependent on the applicable market interest rates, and therefore, the overall returns from the money market funds are also dependent on interest rates.

6. POST OFFICE INVESTMENT-SAVINGS SCHEMES:

The Post Office Saving Schemes include several reliable products and offer risk-free investment returns. Around 1.54 lakh post offices spread all over the country operate these schemes. For example, the government operates the PPF scheme via 8200 public

sector banks and post offices in each city. These investments are government-backed and thus provide guaranteed returns. Investments in post office schemes help to create a corpus for emergency purposes and achieve goals. They also offer tax benefits up to Rs.1.5 lakh under Section 80C of the Income Tax Act.

7. PUBLIC PROVIDENT FUND:

Public Provident Fund (PPF) scheme is a long-term investment option that offers an attractive rate of interest and returns on the amount invested. The interest earned and the returns are not taxable under Income Tax. One has to open a PPF account under this scheme and the amount deposited during a year will be claimed under section 80C deductions.

8. GOVERNMENT SECURITIES:

Government securities are debt instruments of a sovereign government. They sell these products to finance day-to-day governmental operations and provide funding for special infrastructure and military projects. These investments work in much the same way as a corporate debt issue. Corporations issue bonds as a way to gain capital for buying equipment, funding expansion, and paying off other debt. By issuing debt, governments can avoid hiking taxes or cutting other areas of spending in the budget each time they need additional funds for a project.

After issuing government securities, individual and institutional investors will buy them to either hold until maturity or sell to other investors on the secondary bond market. Investors buy and sell previously issued bonds in the market for a variety of reasons. They may be looking to earn interest income from the bond's periodic coupon payments or to allocate a portion of their portfolio into conservative risk-free assets. These investments are often considered risk- free because when it comes the time for redemption at maturity, the government can always print more money to satisfy the demand.

b) FINANCIAL ASSETS:

1. CONVERTIBLE ISSUES:

Convertible issues offer investors a hybrid security - a bond that can be converted into a set amount of equity in the issuing company. Sometimes there will be a set date or

dates for conversion, with other bonds it may be open season all the time. Some bonds can be converted only at maturity as an alternative to receiving back the original value of the bond. In all cases, the bond will pay a dividend in the normal way up to the moment of conversion, at which point the investor will be holding a share. Conversion is attractive if the shares are riding high, but not if the opposite is the case.

2. ZERO CUPON BONDS:

Zero Coupon Bond, also known as the discount bond, is purchased at a discounted price and does not pay any coupons or periodic interests to the fundholders. Money invested in Zero Coupon Bond does not generate a regular interest during the tenure. The annual returns on the principal amount are included in the face value and paid to the investor at the time of maturity. Therefore, the investors get a lump sum at the end of the tenure. There are two types of Zero-Coupon Bonds, which are corporate Zero-Coupon bonds and Government Zero Coupon bonds.

3. NON-VOTING SHARES:

A non-voting share is a share in the capital of a company that belongs to a class that has no voting rights. This is distinct from, for example, an ordinary share which gives the shareholder standard rights to vote at shareholder meetings in proportion to their shareholding. Upon issuing shares to a shareholder, the subscription documents and share certificate will specify the class of shares.

4. SECURED PREMIUM NOTES (SPN) WITH DETACHALE WARRENTS:

Secured premium notes (SPNs) are financial instruments which are issued with detachable warrants and are redeemable after certain period. SPN is a kind of non-convertible debenture (NCD) attached with warrant. It can be issued by the companies with the lock-in-period of say four to seven years. This means an investor can redeem his SPN after lock-in-period. SPN holders will get principal amount with interest on installment basis after lock in period of said period. However, during the lock in period no interest is paid. Thus, SPNs are nothing but a share warrant which are only issued by the listed companies after getting the approval from the central government. SPN is a hybrid security i.e. it combines both features of equity and debt products.

5. NON-CONVERTIBLE DEBENTURES:

Non-convertible debentures fall under the debt category. They cannot be converted into equity or stocks. NCDs have a fixed maturity date and the interest can be paid along with the principal amount either monthly, quarterly, or annually depending on the fixed tenure specified. They benefit investors with their supreme returns, liquidity, low risk and tax benefits when compared to that of convertible debentures.

6. DEEP DISCOUNT BONDS:

A deep-discount bond is a bond that sells at a significantly lesser value than its par value. In particular, these bonds sell at a discount of 20% or more to par and has a yield that is significantly higher than the prevailing rates of fixed-income securities with a similar profile. These high- yield or junk bonds tend to have low market prices due to underlying concerns about the issuers ability to repay interest or principal on the debt. This is not always the case however, as zero- coupon bonds will often begin trading at a deep-discount even if the issuer is very highly rated in terms of credit quality.

7. OPTION BONDS:

A bond option is a contract in which the underlying asset is a bond. Like all standard option contracts, an investor can take many speculative positions through either bond call or bond put options. In general, all options, including bond options, are derivative products that allow investors to take bets on the direction of underlying asset prices or to hedge certain asset risks within a portfolio.

8. EASY EXIT BONDS:

Easy Exit Bonds are bonds that provide liquidity and easy exit route to the investor by way of redemption where investors can get ready encashment in case of need to withdraw before maturity. Easy exit bond enables the small investors to encash the bond at any time after 18 months of its issue and hereby paving a way for an easy exit. It has a maturity period of 10years with a call option with a face value. This instrument covers both bonds which provide liquidity and an easy exit route to the investor by way of redemption or buy back where investors can get ready encashment in case of need to withdraw before maturity.

9. PAY-IN-KIND BONDS:

Pay-in-kind bonds are bonds that pay interest in additional bonds rather than in cash. The bond issuer incurs additional debt to create the new bonds for the interest payments. Original bond is called as parent bond and bonds issued for payment of interest are called as baby bonds.

10. SPLIT CUPON BONDS:

Split Coupon Bond begins as a zero-coupon bond paying no interest and converts to an interest paying bond on a future date. A split coupon bond is also known as a zero-coupon convertible bond. Split Coupon Bond is usually issued by companies and corporations who don't want to pay out cash interest for the first few years of a bond's life. For example, a 10-year split coupon bond might pay no interest for the first 5 years and then transforms into a fixed-coupon bond that pays 11% interest for the remainder of its life. This hypothetical bond is designated "0/11", meaning it starts as a zero-coupon security and later becomes an 11% interest-bearing bond. Investors find such a bond attractive because it allows them to lock in a reinvestment rate for several years, where they will receive cash interest at a future date.

11. FLOATING RATE BONDS AND NOTES:

Some bonds pay an interest rate that varies and is typically adjusted periodically according to an index tied to short-term T-bills or money markets. Such bonds offer protection against future increases in interest rates, and in exchange their yields are typically lower than those of comparable fixed-rate bonds. Floating rate bonds are bonds that have a variable coupon equal to a money market reference rate (e.g. LIBOR) plus a quoted spread. It is a bond where a coupon rate is indexed to a benchmark interest rate. Possible benchmark rates include US Treasury rates, LIBOR, prime rate, municipal and mortgage interest rate indexes. In floating rate bonds interest amount fluctuates in step with the market interest rates.

12. CLIP AND STRIP BONDS:

Clip & strip bonds also referred to as coupon notes, split the principal & coupon portions of a bond issue and two separate coupon instruments are sold to the investors. Principal portion sold as 'Deep discount bond', where Gain = Purchase price – Par

value Stripped coupon portion sold as 'Zero coupon bonds', where Gain = Face value – discounted value.

13. DISASTER BONDS:

These are issued by companies and institutions to share the risk and expand the capital to link investors return with the size of insurer losses. The bigger the losses, the smaller the return advice-versa. The coupon rate and the principal of the bonds are decided by the occurrence of the casualty of disaster and by the possibility of borrower's defaults. Disaster Bonds is a debt instrument in which rate of interest is not fixed. The rate of interest or return to investor will depend upon the risk or occurrence of casualty or disaster. If there is disaster: Investor will get low return. If there is no disaster: Investor will get high return.

14. DUAL CONVERTIBLE BOND:

A dual convertible bond is convertible into either equity shares or preference shares or debentures, at the option of the investor. A dual convertible bond is convertible into:

- Equity shares or
- Fixed interest rate debentures/preference shares at the option of the lender.

Depending on the prospects of the project during the conversion period, the lender may exercise either of the options. The fixed interest rate debenture may have certain additional features including higher rate of interest distinct from the original debt instrument.

15. STEPPED COUPON BONDS:

Stepped Coupon Bonds is callable bond issued with a low coupon rate that gradually increases (step-up) over the life of the bond. The increase occurs at regular intervals stated in the bond indenture. Such bonds are also called dual coupon bond, rising-coupon security, Step-up coupon security. Under stepped coupon bonds, the interest rate is stepped-up during the life of the bond. The main advantage to the investor is the attraction of higher rate of interest in case of general rise in interest rates.

IV) INVESTMENT PROCESS:

The process involves careful and stage-based analysis of all investment proposals

coming to the Investment Manager. The process helps investment team quickly scrutinize all investment proposals and then concentrate on selected few promising investment opportunities which is then studied in detail before making an actual investment decision. The investment decision making process to be adopted is a multi-stage process.

1. DETAILED EVALUATION:

The Investment Manager will discuss the selected cases and if found worth pursuing, the investment team will first check the necessary details of the proposed Investee Undertaking and its promoters to satisfy itself that the proposed investment satisfies the norms The team will then discuss and make detailed analysis of various aspects of investment proposal based on the detailed business plan and financials to be submitted by the Investee Undertaking and will make further interaction / request more information from the promoters, the top management of the Investee Undertaking to understand their expectation from the business and investment .The process will generally include a visit to the place of business of the Investee Undertaking in order to understand and observe the things on ground. The most important aspect which will be evaluated in detail at this stage is entrepreneurial qualities of the promoter(s) of the Investee Undertaking. Detailed study will help the investment team to identify any pitfalls in the investment proposal / business plan which will make investment unattractive.

2. DEAL NEGOTIATION:

In case the investment proposal is found suitable after the detailed study, the same will be placed before the senior members of investment team. At this stage valuation of the company, structure of the proposed investment, exit options, exit time frame and other terms and conditions for the proposed investment to be incorporated into the shareholders and share subscription agreements will be discussed and negotiated with the promoter(s) of the proposed Investee Undertaking. These terms will be negotiated to secure all reasonable investor rights in including veto rights, board representation, information rights and mechanism, liquidation preference, exit mechanisms, etc. However, these terms of investment will be subject to approval / modifications by the Investment Committee.

3. APPROVAL FOR INVESTMENT:

Based on the detailed study and negotiations held with the promoters of the company, the investment team shall prepare an investment memorandum and submit it to the Investment Committee. At the time of the meeting, the Investment Manager will brief members of the Investment Committee about the rationale for the proposed investment, the potential benefits from the investment, special features and characteristics of the proposed investment proposal and also the most likely divestment mechanism. Thereafter, Investment Committee will interact with the promoter and the senior management team of the potential Investee Undertaking to make their first-hand assessment of the entrepreneur and the senior management team. If required, the proposal may be brought to the Investment Committee again after modifications, if any. Based on their assessment and discussions on the proposals, members of the committee will make the final decisions about the investment proposal and also the terms and structure of the investment, which will be binding on the Investment Manager.

4. DUE DILIGENCE PROCESS AND DOCUMENTATION:

Prior to making any investment, detailed legal and financial due diligence of the proposed Investee Undertaking shall be carried out by a qualified firm to ensure and verify the following (an indicative description only)

(i) Basic legal compliance to ensure proper structuring of the proposed investment and availability of necessary regulatory and legal permissions / approvals for running of existing and proposed business, existence of any litigations / court cases etc.

(ii) Background checks and verifications of the documents like analysis of accounting policies, financial statements, tax compliance etc.

Documentation will be prepared by the legal consultant of the WB Fund after receipt of satisfactory due diligence report or after sorting out issues brought out in the due diligence report. Investment Manager will reserve the right to suitably modify the terms and structure of proposed investment to address the issues raised in due diligence report or can even cancel the approved investment with approval from Investment Committee whose decisions on such proposals shall be binding & final.

5. INVESTMENT IN THE INVESTEE UNDERTAKING:

After the due diligence process is complete, the company and promoters will execute

all the documents stipulated under the terms of investment and comply with the condition's precedent to the investment. Once, all such conditions are compiled with by the company and the promoters, the WB Fund will make investments as per the requirement of the Investee. Undertaking and by way of subscription to the instruments as stipulated in the terms of investment.

6. NURTURING AND MONITORING THE INVESTMENT:

The Investment Manager maintains a close relationship with the company and provide necessary assistance especially in the areas like putting processes and systems in place, implementation of IT systems, preparing future business projections and appointing a suitable consultant for HR policies for employees to enhance productivity and profitability. For the purpose, Investment Manager will adopt the policy of regular meetings including participating at the board meetings and other review meeting and review of business achievements at quarterly or monthly interval as per the assessment of the need.

7. EXITS:

A key part of the investment strategy shall be to develop a clear plan for the divestment in consultation with the entrepreneur / promoter commensurate with the investment horizon. Exit alternatives generally include, but are not limited to:

Sale of investor's stake to another venture capital / private equity fund Sale of company / investor's stake to a strategic buyer

Buyback of investor's stake by entrepreneur / promoter / company Initial Public Offering (IPO).

V) PORTFOLIO:

Investing in securities such as shares, debentures and bonds is now considered some of the best avenues for investing one's savings, It is indeed rewarding, but involve a great deal of risk and calls for scientific knowledge as well as artistic skill the part of portfolio manager or investor.

Most investors want to invest in a group of securities rather than one single security, such group of securities held together as an investment is known as 'Portfolio'. Creation

of portfolio helps to reduce without sacrificing return. The process of blending together the broad asset class, as to obtain optimum return with minimum risk is called Portfolio Construction.

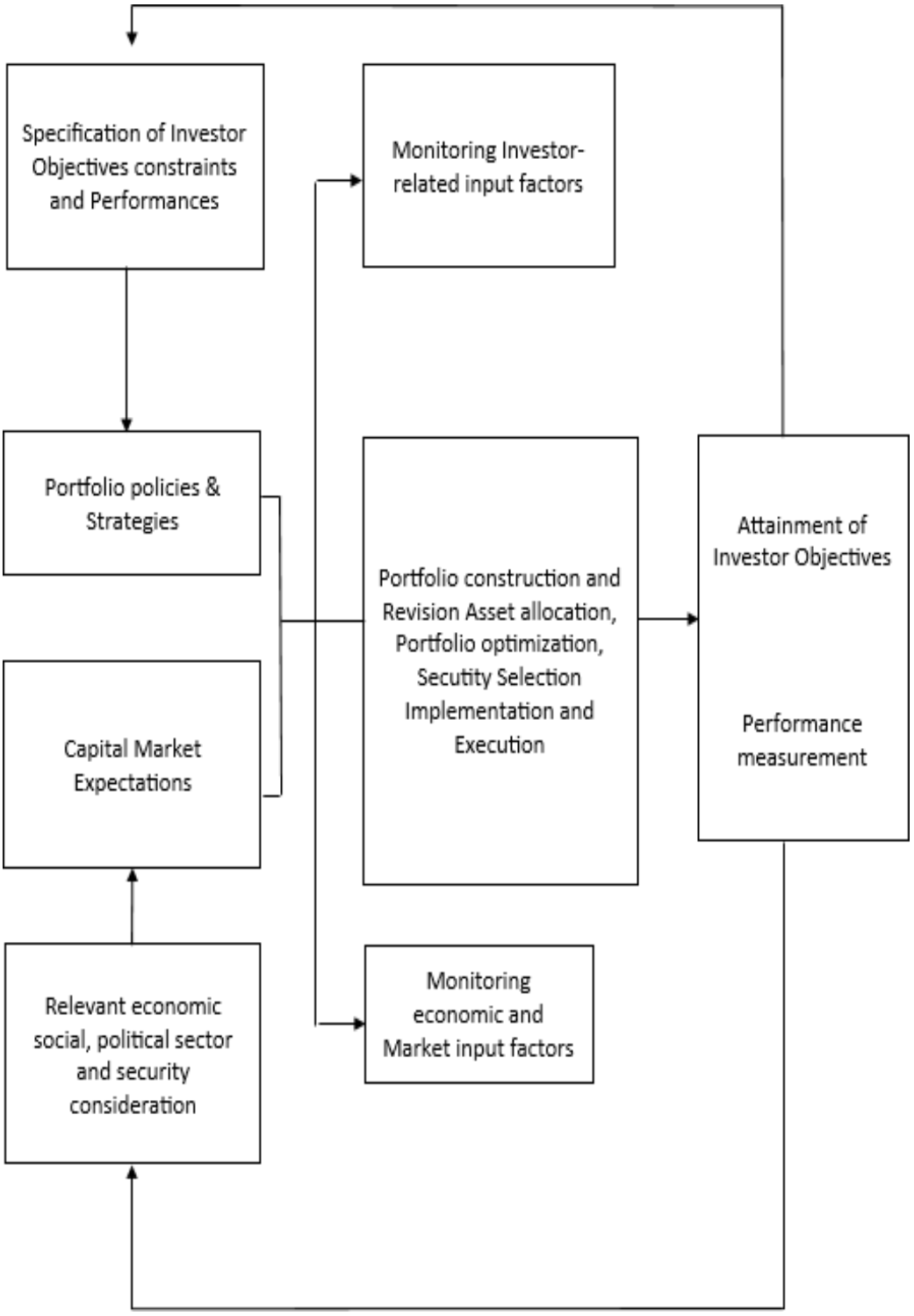
Diversification of securities gives the assurance of obtaining the anticipated return portfolio. The principle behind it is that if the investment is done in several securities the risk will be diversified and minimized. The loss in one security will be compensated gain in another. Keeping investment in one security may lead to, greater likelihood the actual return somewhat different from that of the expected return. Hence, it

a) PORTFOLIO MANAGEMENT:

It is a dynamic and flexible concept and involves continuous and systematic analysis, judgement and operation. It comprises all process involved in creation & maintenance of an investment portfolio. It makes use of analytical techniques of analysis and conceptual theories regarding rational allocation of funds.

1. It involves construction of portfolio taking into account investors objectives, constraint, preferences for risk and return and tax liability.
2. It involves that portfolio is reviewed and adjusted from time to time in tune with the market conditions.

The evaluation of portfolio performance is to be done by the manager in terms of targets set for risk and return and changes in the portfolio are to be affected to meet the changing of conditions.


Specification of Investor Objectives constraints and Performances
Monitoring Investor-related input factors
Portfolio policies & Strategies
Capital Market Expectations
Portfolio construction and Revision Asset allocation, Portfolio optimization, Secutity Selection Implementation and Execution
Attainment of Investor Objectives
Performance measurement
Relevant economic social, political sector and security consideration
Monitoring economic and Market input factors

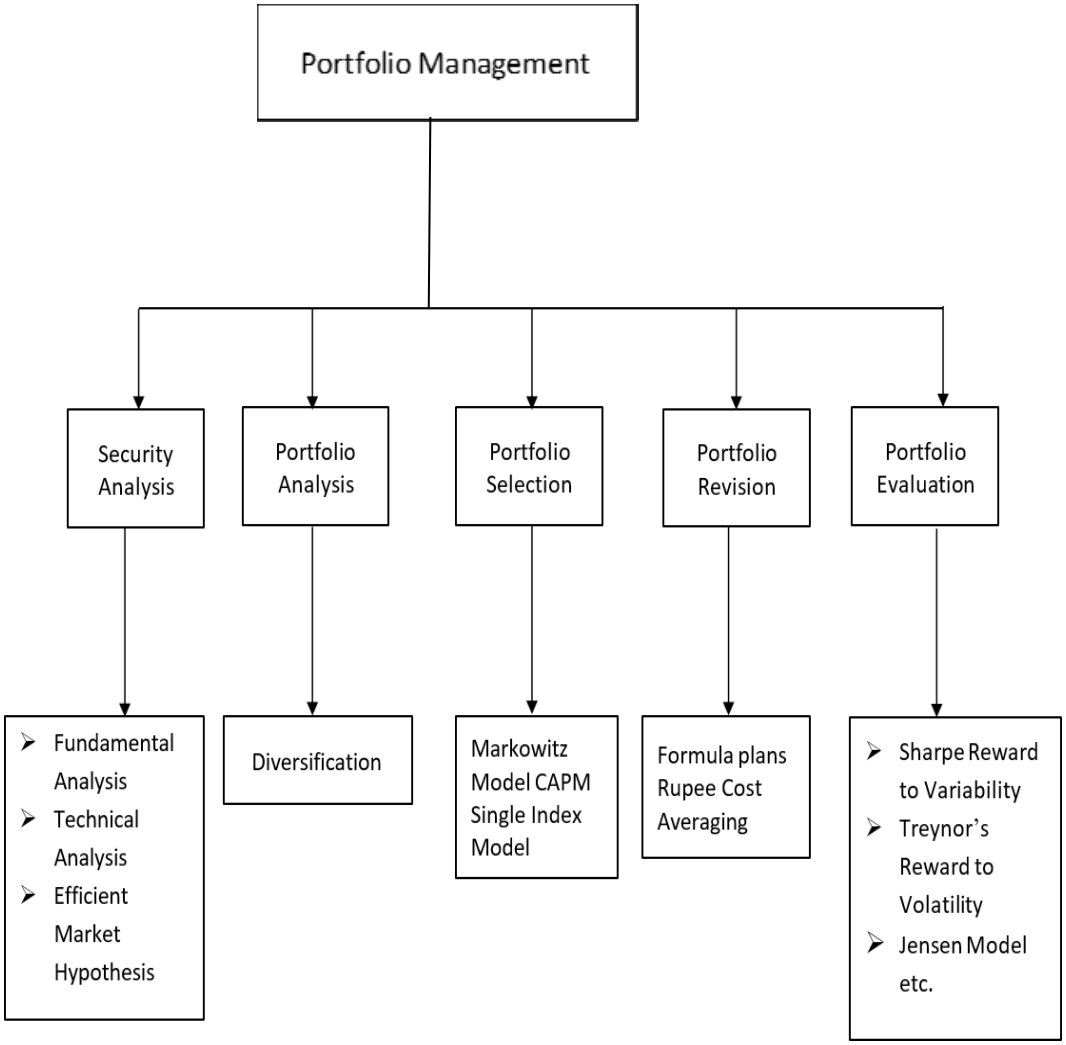
b) OBJECTIVES OF PORTFOLIO MANAGEMENT:

The objective of portfolio management is to invest in securities in such a way that one maximizes one's returns and minimize risk in order to achieve one's investment objective.

The specific objectives of portfolio Management are as follows.

1. Safety of investment. It is priority consideration while making investment. Other considerations like income, growth etc. come into picture only after safety on one's investment is assured. Investment safety means minimization of risks. There is no such thing a zero-risk investment. But one should minimize the overall risk or bring into an acceptable level by developing a balanced and efficient portfolio.
2. Stable current returns. Once the safety of investment is assured, the portfolio should yield a steady current income. The current income means dividend or interest. The current income at least should match opportunity cost of funds of investor.
3. Appreciation of value of capital. A good portfolio should appreciate in value in order to protect the investor from any erosion in purchasing power due to inflation. Therefore, while selecting securities, some securities in portfolio, should be such that they tend to appreciate in real value after adjusting for inflation.
4. Marketability. A good portfolio must consist of investment which can be marketed without difficulty. If there are too many unlisted shares or inactive share in one's portfolio, he will face the problem in liquidating or enchasing them, or in switching from investment to other. It is therefore practical to invest in companies listed on major stock exchanges, and are actively traded.
5. Tax planning. Tax is an important variable in total investment planning. Therefore, a good portfolio should enable its owner to enjoy a favourable tax shelter. The portfolio should be developed, considering, not only income tax, but also capital gains tax.

c) PROCESS OF PORTFOLIO MANAGEMENT:



1. SECURITY ANALYSIS:

Large number of securities such as Equity shares, debentures, Bonds, Deep discount bonds, zero coupon bonds, Flexi bonds, Global depository Receipts (GDRs) etc. are available for investment. From these securities, the investor has to choose those securities which he considers worthwhile to be included in investment portfolio. This calls for detailed analysis of available securities. Security analysis consists of examining the risk return characteristics of individual securities. The basic objective of security analysis is to find out whether the security over-priced or underpriced, because basic strategy in securities investment is to buy under- priced securities and sell over-priced securities. Security analysis involves three approaches:

✓ Fundamental Analysis

✓ Technical Analysis

✓ Efficient market Hypothesis

2. PORTFOLIO ANALYSIS:

A portfolio is happy blending of securities, to maximize return and minimize risk. Investors resort to diversification i.e. they attempt to spread risk by not putting all their eggs into one basket. Security analysis provides the investor with set of desirable securities, and from these securities, large number of portfolios can be constructed with their own risk and return characteristics. The return is calculated mathematically and risk statistically. Hence portfolio analysis consists of identifying the range of possible portfolio that can be constituted from given set of securities and calculating their return and risk for further analysis.

3. PORTFOLIO SELECTION:

Refers to the process of selecting efficient portfolio. 'An efficient portfolio' is one which is expected to yield the highest return for a given level of risk or lower risk for given level of return. Harry M Markowitz Model provide conceptual framework and analytical tool for determining optimum portfolio.

4. PORTFOLIO REVISION:

Refer to adjustment of composition of portfolio due to changes in market prices, reassessment of companies and portfolio beta. Constant market changes necessitate readjustment of portfolio, from time to time, in order to keep investment effective. This involves purchase and sale of equity, bonds in turn result in change in Beta and duration.

Basically, there are two techniques of portfolio revision.

✓ Formula Plans

✓ Rupee Cost Averaging

5. PORTFOLIO EVALUATION:

It is the process which is concerned with assessing the performance of portfolio over a selected period of time, in terms of return and risk. This process involves measurement of actual return, realized from portfolio and the risk born by the portfolio, over the period of investment. It is necessary to judge, whether the objective of investment have

been properly achieved. It also provides mechanism for identifying weakness in the investment process and for improving this weakness.

d) PORTFOLIO CONSTRUCTION:

Portfolio construction refers to allocation of funds among variety of financial assets open for investment. Portfolio theory concern itself with principle governing such allocation. The objective of this theory is to elaborate such principles in which risk can be minimized and return can be maximized.

APPROACHES IN PORTFOLIO CONSTRUCTION:

There are basically two approaches in the construction of portfolio of securities.

1.Traditional Approach

2.Modern Approach

1.Traditional Approach:

In this Approach, investors need in terms of income and capital appreciation is evaluated and appropriate securities are selected to meet the needs of investor. The common practice in traditional approach in to evaluate entire financial plan of individual.

It deals with mainly two major decisions.

(a)Determining the objective of the portfolio.

(b)Selection of securities to be included in the portfolio.

The above two decisions involve six steps to be followed:

1.Analysis of constraints of investor.

2.Formulation of objectives.

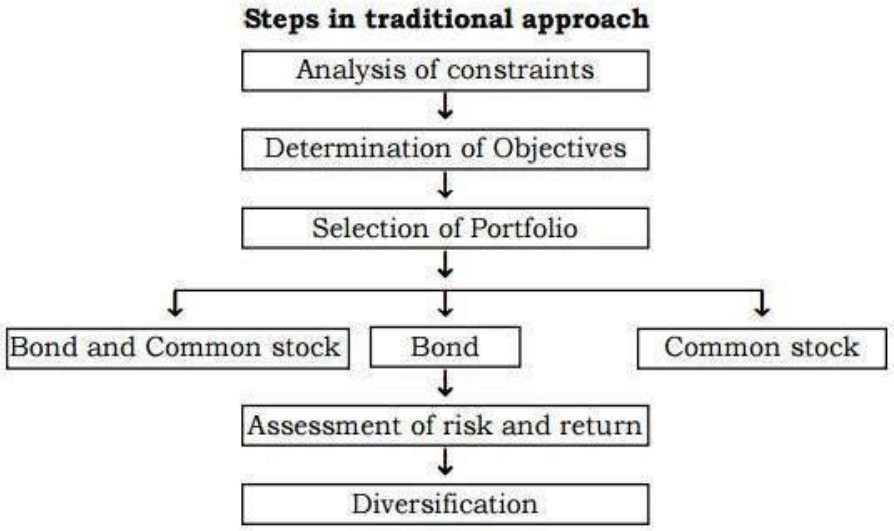
3. Then based on these objectives, selection of securities.

4. Study of risk & return of security.

5. Assigning of weights to securities like Bonds, Stocks, Debentures.

6.Diversification.

This can be explained with help of flow chart as given below.



2.Modern Approach:

If involves construction of portfolio so as to maximize the expected return for given level of risk. It views Portfolio Management in terms of expected return and the risk associated with obtaining the expected returns. Statistical analysis is used for measurement of risk and Mathematical programming for selection of Assets in portfolio in efficient manner. Harry M. Markowitz is credited with developing the first modern portfolio model. An 'Efficient Portfolio 'is one which is expected to yield the highest return for a given level of risk or lowest risk for a given level of return.

REVIEW OF LITERATURE:

William Sharpe (1966) proposed a Single Index model which simplifies the process of selecting an optimal portfolio. The Single Index model compares each security returns to the market index. This model reduces the burden of calculations in comparison to Markowitz's model. Due to the simplicity of this model, many researchers have used Sharpe's Single Index model to examine optimal portfolio. This research used historical data of stocks of companies .The adjusted closing price of the stocks was extracted from the website of National Stock Exchange (NSE) and yahoo

finance portal. The weekly data of stock prices was collected for a period of five years i.e. 01-01-2016 to 31-12-2020 (261 weeks). The risk-free rate is assumed to be 3.70% which is the yield on 364-daytreasury bill as on 26th March 2021(available on RBI website).

Kwok Wai Yu, Xiao Qi Yang, and Heung Wong (2007) conducted a study on **"portfolio improvement using the Sharpe Index Model"**. This study proposed that a portion of the portfolio value should be invested in some other assets for portfolio management. Using the Sharpe rule, it can be determined that new stocks are worthy to the old portfolio if they satisfy a condition, in which the average return rate of these stocks is greater than the return rate of the old portfolio multiplied by the sum of the elasticity of the Value at Risk.

Niranjan Mandal (2013) on the topic of **"Sharpe single index model and to construct an optimal portfolio"** empirically using this model. BSE Sensex is taken as the market Performance Index. Daily indices along with daily prices of21 sampled Securities for the period of April 2001 to March 2011. To construct an excess return to beta ratio is optimal Portfolio whose greater than the cut- off rate.

Radhika Desai and Manisha Surti (2013) on the topics of **"Optimum Portfolio Construction Sharpe single index"**. A Portfolio should possess minimum risk and maximum return. In this research we construct Sharpe Single Index optimum portfolio by using data to fitty Companie CNX NSE Nifty Index for Period of 2010-2012.

Thang jam Ravichandra (2014) have conducted a study on **"Optimal Portfolio Construction With Nifty Stocks"**. This paper endeavours to build an ideal portfolio by utilizing Sharpe's Single index model. The everyday information for all the stocks and list for the period of April 2008 to December 2013 has been gathered. This proposed model defined a special cut off point (Cutoff rate of return) and chooses stocks having overabundance of their normal return over risk free rate of return surpassing this cut-off point.

Pavan Kumar Mantha and Srinivasa Rao (2015) have conducted a study on **"Portfolio Management"**. Portfolio Management directs the selection of new product development projects with the goal of maximizing profitability, maintaining balance, and aligning with enterprise strategy. Led by senior management or a Product Committee, the process involves creating a product strategy, considering resource

constraints, and evaluating projects based on factors like profitability, investment requirements, and risks. Decision-making factors include risk versus profitability and long-term versus short-term goals. Various techniques, such as heuristic models, scoring, and visual mapping, support the process, evolving from early emphasis on financial returns to later inclusion of strategic alignment.

Tanuj and et al (2017) constructed a portfolio using NSE Nifty 50 stocks. In this study it was found that they used Sharpe's Single Index Model to construct a portfolio in this study the authors found that out of 50 stocks considered for study, only 24 stocks are chosen for inclusion in optimal portfolio. Out of 24 stocks selected, the maximum number of stocks is from the banking sector. Stocks of SBI, PNB, IndusInd bank, ICICI bank and Axis Bank are a part of optimal portfolio. Systematic risk is less than Unsystematic risk in Single Index Model. It can be reduced through diversification.

Subhodeep and Ajay Kumar (2018) conducted a study on **"constructing an optimal portfolio using stocks listed in NIFTY 50"**. The author found that out of 50 stocks considered for the study, only 6(Six) stocks are chosen for inclusion in the optimal portfolio. The Tata Motors securities have the highest beta value which indicates it is highly volatile. This will help the investors as a guiding record in the future and help them to make appropriate investment decisions.

Ajay Kumar Patel, Subhodeep Chakraborty (2018) have conducted a study on **"Construction of Optimal Portfolio Using Sharpe's Single Index Model and Markowitz Model: An Empirical Study on Nifty50 Stocks"**. In this research, all 50 stocks of NSE NIFTY 50 Index are taken into consideration and &Weekly data of all these stock for the period of September 14,2016 to September 15.2017 have been considered which further converted into annually. Further the proportion of investment of each 50 stock in the optimal portfolio was also calculated and along with risk and return of the selected stock are also been calculated.

V.H. Ramasubramanian (2019) On the topic of **"A study On construction of optimal Portfolio using single index model"**. The study is for 50 companies listed in NSE Where risk and return is determined and based on the cut off point the Selected 10 companies Portfolio construction. The data is collected from the NSE and Yahoo Finance website 50 listed companies for 5 Year.

Nazneenaara Rafik Saikh (2019) has conducted a study on **"To Construct an Optimum Portfolio using Sharpe's Single Index Model- A Study of Selected Stocks from NSE"**. The study focuses to build an optimal portfolio of selected nifty50 companies by applying Sharpe Single Index Model .In this analysis sample of top twenty companies of nifty50 listed Stocks has been considered based on 18th December 2018 Market capitalization. The daily closing share prices of the securities from December 2017 to November 2018 have been used in the study. The study resulted that the 4 stocks (i.e. HUL, Bajaj finance, HCL tech, and Reliance.) are the most beneficiary among them.

Lijuan Wang & Chunyan He (2020) have conducted a study on **"Research on Portfolios in ESL/EFL Context"**. The article highlights the importance of portfolios in the instruction and evaluation of language skills, specifically within ESL/EFL settings. It underscores their role in providing genuine materials, enhancing learner engagement, and encouraging self-reflection. The review primarily delves into empirical research, exploring topics such as portfolio assessment in writing, autonomy promotion, and the integration of e-portfolios .In conclusion, it recognizes the benefits of portfolios in language learning, acknowledges assessment challenges
,and proposes potential avenues for future research.

Dr. Archana H N, Srilakshmi D. (2020) have conducted a study on **"building an optimal portfolio using Sharpe's single index model: an empirical study with reference to Indian capital markets."** This study focuses to build an optimal portfolio by using Sharpe's Index Model. The research consists the data of Indian stock exchange BCE. Stock prices from 1st jan 2019 to 31st dec 2019 have been considered for the study. From total 21 companies 10 are those which gives positive cut off. Which are included in the portfolio.

Sourabh Sharma (2020) have conducted a study on **"optimal portfolio construction using Sharpe index model on nifty50 10 years- consistent securities"**. In this research, the scrips that have managed to constantly be a part of the NIFTY50 Index for the period of April 2011 to March 2021 have been taken into consideration. This method herein leverages the excess returns to beta ratio tool to formulate the cut-off point. This research shows the proportion of investment to be

made in each selected security is done basis their beta, excess returns to beta, unsystematic risk and the cut-off point.

Ujjwala Chitre, Yogesh Puri (2021) have conducted a study on **"optimal portfolio construction using Sharpe index model on nifty50 10 years-consistent securities".** NIFTY50 Index for the period of April 2011 to March 2021 have been taken into consideration. The proposed method herein leverages the excess returns to beta ratio tool to formulate the cut- off point. Those securities with greater excess returns to beta than the cut- off point ultimately form the portfolio.

Sarvamangala K J, G Sudarsana Reddy (2022) have conducted a study on **"Construction of Optimal Portfolio using Sharpe's Single Index Model"**. This study focuses on constructing an optimal portfolio using Sharpe's single index model based on four years of monthly closing prices from select companies on BSE Limited. The optimal portfolio comprises six stocks: Avenue Super marts Ltd (32.82%), Nestle India Ltd (22.64%), Adani Power Ltd (14.94%), Dr. Reddy's Laboratories Ltd (9.54%), Asian Paints Ltd (14.28%), and Titan Company Ltd (5.77%). This combination aims to maximize returns for a given level of risk in the equity market.

Uma. K (2023) have conducted a study on **"an emparical study on construction of optimal portfolio using Sharpe's single index model for nifty 50 stocks".** Monthly data for NSE Nifty 50 stocks from 1st August 2017 to 31st July 2022 have been taken into account. This study reveals that only eight companies out of 50 are suitable for portfolio construction, by using Sharpe's Single Index Model.

Neha Prajapati (2024) have conducted a study on **"a study on construction of an optimal equity portfolio of nifty50 securities"**. This study focuses to build an optimal portfolio by using Sharpe's Index Model. This research founded that out of 50 companies only 8companies qualify to enter the cut-off point (C*) using Sharpe's single index model. Out of 8 companies tata steel ltd. Consists of the highest weightage that shows 49% of amount need to be invested in the tata steel ltd security. it is concluded that 42 securities are excluded and 8 companies are included in the portfolio with respective proportion of investments.

S. Sangeetha, K. Madane, J. Muralitharan have conducted a study on **"Building an Efficient Portfolio Using Sharpe's Single Index Model (An Empirical Study with Reference to Nifty 50)"**.This research focuses on constructing an optimal portfolio using Sharpe's Single Index Model (SIM) for simplicity and efficiency. The study identifies 42 bullish stocks with consistent positive returns, while 8 stocks exhibit a negative trend. The Optimal Portfolio consists of 12 stocks above the cutoff rate, revealing 10 stocks with progressive intrinsic value despite a downturn in the Nifty 50 due to the COVID-19 crisis, notably in the pharmaceutical field.

Aditi Bhatt have conducted a Study on **" Study on Optimum Portfolio Construction Using Sharpe Single Index Model form Nifty50"**. This study focuses on constructing an optimal portfolio using Sharpe's Single Index Model for 30 selected securities from NSE. Analysing monthly closing prices from April 2011 to March 2016, the model determines a cut-off rate based on excess return to beta ratio. Only 6 companies are selected for the optimal portfolio, with proportions of investment calculated using factors like Beta, Unsystematic Risk, and Excess return to beta ratio relative to the cut- off rate. The aim is to make informed investment decisions by balancing risk and return.

Madhuri Dhanrjbhai Lohana, Dhruvilkumar Sharma, Dr. Purvi Derashri have conducted a study on **"A Study of Diversification Application in Portfolio Management"**. Portfolio management entails organizing and overseeing investments to match an investor's goals and risk tolerance. Institutions prioritize this process to optimize portfolios, employing diverse strategies and investment vehicles such as equity, mutual, and borrowed funds. The main objectives include establishing investment criteria, setting goals, and adjusting to market conditions for effective management.

CHAPTER 3

Research Methodology

RESEARCH METHODOLOGY

NIFTY 50 is an index that consists of 50 companies on the basis of market capitalization. It is representative of the different sectors in the country. Out of the 50 securities we have here considered those companies only that have been a part of this index for the complete five years period.

Category	Methodology
Research Design	Descriptive Quantitative
Sources of Data	Yahoo Finance
Sample Size	NIFTY 50 Stock

LIMITATION:

The study's shortcomings are as follows:

- The study's sole source of information is secondary data.
- The study's findings might not be applicable to all situations.
- Due to the time limit only, five years monthly data from 1 - 01 - 2019 to 31- 12 -2023, have been taken.

CHAPTER 4

Data Analysis and Interpretation

DATAANALYSIS AND INTERPRETATION

CONCEPTUAL FRAMEWORK OF SHARPE'S INDEX MODEL:

Unlike Markowitz's model, this simplified model states that by comparing the return of individual securities with a single index like the 'Market Index', the relationship existing between each pair of securities can be determined indirectly. The requirements of large data inputs and tedious calculation requirements in the Markowitz model is largely reduced (Mandal, 2003). SIM needs only (3n+2) bits of information or simply each security's Alpha and Beta estimates. For SIM, the variance of the market index, each security's expected return, and unsystematic risk also need to be assessed. It has become more popular as compared to Markowitz Model due to its simplicity.

BUILDING AN IDEAL PORTFOLIO USING THE SHARPE'S INDEX MODEL:

Fischer and Jordan (1995), state that stocks to be included in the optimal portfolios are determined on the basis of their 'Excess return to beta ratio. As per the rule of ranking, the security that has the highest 'excess return to beta ratio 'will be placed in the first position, followed by the security with the second highest beta ratio, and so on and so forth. Thereafter a cut-off point will be calculated and all the stock whose 'excess return to beta ratio is above the cut-off point is included in the portfolio.

DETERMINANTS OF THE SHARPE SINGLE INDEX MODEL:

The following assumptions are constructed in order to support Sharpe's Single Index Model:

1. All investors have similar expectations.
2. An even holding period is used in estimating risk and return for each security.

3. The price movements of one security in relation to another security will not depend largely upon the nature of those two securities alone. They may also reflect a greater influence that might have cropped up as a result of the general business and economic conditions of the nation.

4. The relation between each security occurs only through their individual influences along with some indices of business and economic activities but not other factors.

5. The indices, to which the returns of each security are correlated, are probable to be some securities market proxy.

TOOLS USED FOR THE STUDY:

5.1. RETURN (RI):

The yearly return of stocks is calculated using the below formula:

Where, **Ri = (R2–R1)/R1*100**

R2 = adjusted closing price of month 2,

R1 = adjusted closing price of month 1 and, Ri= Return of individual stock.

5.2. RISK-FREE RATE OF RETURN (Rf):

The Risk-free rate of return is the required return on a risk-free asset. This study used 365 days of Treasury bills for a risk-free rate of return.

5.3. BETA β):

Beta refers to the statistical tool used to measure the volatility of the stock market. A beta coefficient is a measure of the volatility or systematic risk of an individual stock in comparison to the unsystematic risk of the entire market. If the beta value shows 1, the security's price moves with the market. If the beta value is less than 1, means that the security is theoretically less volatile than the market. If the beta value is more than 1 means that the security's price is theoretically more volatile than the market:

β = Covariance (Ri, Rm) / Variance (Rm)

Covariance = measure of a stock's return relative to that of the market

Variance = Measure of how the market moves relative to its mean

Ri= Expected return of individual security

Rm= Return of market index

5.4. EXCESS RETURN TO BETA RATIO (RI – Rf/βi):

The stocks are ranked in descending order as per the beta ratio RI – Rf/βi. This is the equation for ranking Stocks in the order of their return adjusted for risk. The method involves selecting a cut-off rate for the inclusion of securities in a portfolio. For this purpose, the excess return to the Beta ratio given above has to be calculated for each stock and ranked from highest to lowest. Then only those securities which have RI – Rf/β, greater than a cut-off point, fixed in advance can be selected. The basis for finding the cut-off Rate Ci is as follows: For a portfolio of I stocks, Ci is given by the cut-off rate.

The excess return is the difference between the individual security return and the risk-free rate of return offered on government security such as Treasury bills. The study takes into account one year or 364-day Treasury bill rate, which is 0.07* as the risk-free rate of interest/return. Excess return to beta measures the additional return earned for bearing risk per unit. The excess return to beta ratio is calculated as follow;

Where, Excess Return to beta ratio **= (Ri-Rf) /βi**

Ri=The expected return on the security i,

Rf= Risk free rate of return

βi= Systematic risk of an individual stock in comparison to the unsystematic risk of the entire market or beta co-efficient

5.5. a) SYSTEMATIC RISK:

The variance explained by the index is referred to as systematic risk.

Systematic risk = **β2 x Variance of the market Index**

= **βi2. σm2**

5.5. b) UNSYSTEMATIC RISK:

The unexplained variance is called residual variance or Unsystematic risk. It is the distinction between systemic risk and overall risk. This is how the unsystematic risk is determined: The unsystematic risk is calculated as follows:

Where, Unsystematic Risk = Total variance –Systematic risk

$$ei^2 = \sigma i^2 - \beta i^2 \sigma m^2$$

σei^2 = Unsystematic risk of the portfolio

σi^2 = Variance of the individual stock

βi^2 = Systematic risk

σm^2 = Variance of the market index

5.5.c) TOTAL RISK:

Total risk = Systematic risk + Unsystematic risk

= **βi2. σm2+ ei2**

5.6. STANDARD DEVIATION:

The standard deviation calculates a security's overall risk. The term "standard deviation" refers to the variance's square root.

Where, $$\sigma i = \frac{\text{SQRT } (R_i - \bar{\imath})}{n-1}$$

σi = Standard deviation of individual security

Ri = Expected return of individual security

R ī = Mean return of individual security

n = Number of observations

5.7. MARKET VARIANCE:

A variance is a tool used to measure the volatility of the stock market. The higher the variance, the higher the volatility of the stock market and vice versa, the market variance is calculated from the following formula

Where, $$\sigma m^2 = \frac{(Rm - \bar{m})}{n - 1}$$

σm^2= Variance of Market index return

Rm = Expected return of Market index

R $\bar{m}$ = Mean return of Market index.

n = Number of observations

5.8. A) CUT OFF RATE BY USING SHARPE INDEX MODEL: Cut off rate is calculated by using the following formula. The Cut-off Point is calculated as follow;

Where, $$Ci = \frac{\sigma m^2 * \Sigma (R_i - R_f) * \beta i / \sigma^2 ei}{1 + \sigma m2 * \Sigma \beta i^2 / \sigma ei^2}$$

R_i = Expected return of individual stock

R_f = Risk free rate of return

βi = Systematic risk of individual stock

σm^2 = Variance of the market index

σei^2 = Unsystematic security variance risk

5.9. B)PROPORTION OF INVESTMENTS IN EACH INDIVIDUAL SECURITY: it is a part of the portfolio is calculated using the following formula:$\mathbf{W_i = Z_i / \sum Z_i}$

Where, $\mathbf{Z_i = \beta i^2/\sigma^2 ei\ (R_i - R_f/\beta - C)}$

$\mathbf{X_i}$ = Proportion of investment in individual security

$\mathbf{R_i}$ = Expected return of individual security

$\mathbf{R_f}$ = Risk free rate of return βi = Systematic risk

C = Cut off point

$\mathbf{\sigma ei^2}$= Unsystematic risk

5.10. PORTFOLIO RETURN AND RISK: Portfolio return and risk is calculated by using the following formula:

(A) Portfolio Return: Rp = αp + βp Rm

Where, $\mathbf{\alpha p = \sum xi\alpha i}$

$\mathbf{\beta p = \Sigma xi\beta i}$

Rp = Portfolio Return

αi = Specific return of an individual security

βi = Beta coefficient of an individual security

Rm = Return of Market Index

(B) Portfolio Risk:

Where, $\mathbf{\sigma p2 = \beta 2\ \sigma m2 + \Sigma xi2\ \sigma 2ei}$

σp2 = Portfolio Variance

β = Beta coefficient

σm2 = Market variance

xi = Proportion of investment in individual security
σ2ei = Unsystematic risk

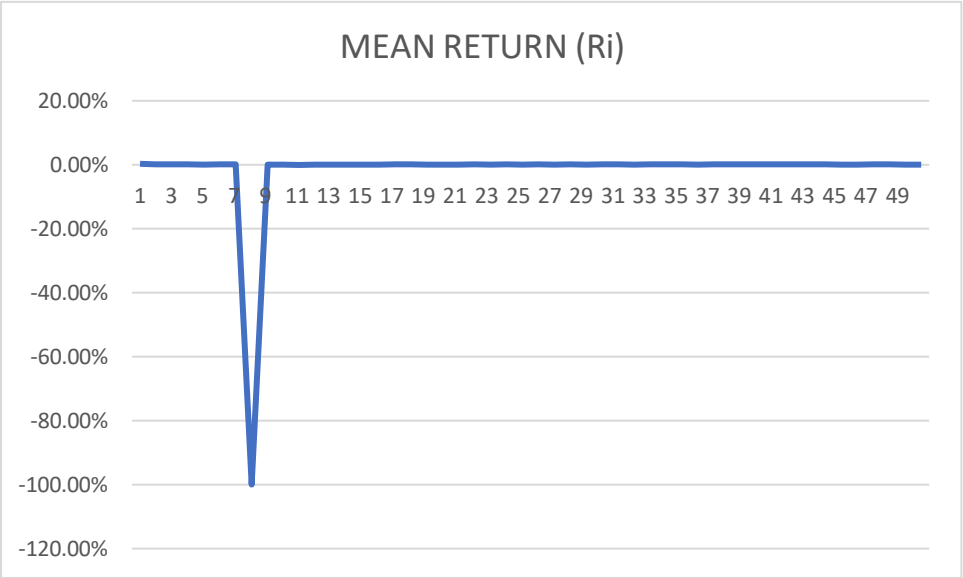
The tools used to analyze the risk parameters such as β of each stock, Sharpe's Single Index Model, and unsystematic and systematic risk, stock return, are computed. The yearly mean return of all individual stock was calculated using Excel. The monthly return is then converted into an annual return by using the excel formula, i.e., = [(1 + Monthly mean) ^12] – 1. For the risk-free rate of return 365 days T-bills: 0.07* is taken from the RBI website and for Market risk variance of Nifty 50 is been calculated. Beta, Unsystematic Risk, Systematic Risk, and Cut-off point are also calculated by using Excel. The securities' "Excess Return to Beta" has also been determined. A number of financial and technical tools have been used for analyzing data.

Table 1: Showing the Ranking of Stocks based on Excess Return to Beta Ratio

S.NO	COMPANY NAME	MEAN RETURN	RISK FREE RETURN	EXCESS RETURN	VARIANCE	MARKET RISK	BETA	SR	USR	SHARPE SINGLE INDEX	RANK
		(Ri)	(Rf)	(Ri-Rf)	σ2	σ2m	(β)	(β2 σ2m)	(σei2)	(Ri-Rf/β)	
1	ADANIENT	0.30%	7.10%	-6.80%	0.12%	0.17%	-4.07%	0.03%	0.08%	174.72%	11
2	ADANIPORTS	0.11%	7.10%	-6.99%	0.06%	0.61%	4.48%	0.13%	-0.07%	-158.23%	41
3	APOLLO HOSPITAL	0.15%	7.10%	-6.95%	0.05%	0.48%	-5.33%	0.11%	-0.06%	133.43%	12
4	ASIAN PAINT	0.09%	7.10%	-7.01%	0.03%	0.26%	-6.61%	0.07%	-0.04%	107.44%	18
5	AXIS BANK	0.07%	7.10%	-7.03%	0.05%	0.52%	-9.37%	0.16%	-0.10%	75.88%	29
6	BAJAJ AUTO	0.10%	7.10%	-7.00%	0.03%	0.27%	-5.48%	0.06%	-0.03%	129.69%	14
7	BAJAJ FINSERV	0.11%	7.10%	-6.99%	2.47%	0.58%	0.02%	0.01%	0.05%	-46890.02%	50
8	BAJFINANCE	-99.97%	7.10%	-107.07%	0.14%	0.21%	-0.15%	0.01%	0.03%	71715.85%	1
9	BHARTIARTL	0.04%	7.10%	-6.98%	0.12%	0.17%	-4.01%	0.03%	0.06%	176.19%	10
10	BPCL	-0.01%	7.10%	-7.11%	0.13%	0.19%	-8.67%	0.05%	0.08%	82.02%	27
11	BRITANNIA	-0.02%	7.10%	-7.12%	0.11%	0.15%	-1.49%	0.02%	0.04%	478.45%	6
12	CIPLA	0.01%	7.10%	-7.09%	0.11%	0.16%	-1.84%	0.02%	0.05%	385.82%	8
13	COALINDIA	0.01%	7.10%	-7.09%	0.12%	0.18%	-10.45%	0.06%	0.08%	67.80%	30
14	DIVISLAB	0.02%	7.10%	-7.08%	0.12%	0.17%	-0.57%	0.01%	0.04%	1243.15%	2
15	DRREDDY	0.08%	7.10%	-7.02%	0.03%	0.04%	-6.97%	0.01%	0.02%	100.70%	20
16	EICHERMOT	0.07%	7.10%	-7.03%	0.04%	0.06%	-2.25%	0.01%	0.02%	311.70%	9
17	GRASIM	0.10%	7.10%	-7.00%	0.04%	0.06%	-12.21%	0.02%	0.03%	57.33%	32
18	HCLTECH	0.12%	7.10%	-6.98%	0.03%	0.04%	-5.91%	0.01%	0.02%	118.18%	15
19	HDFCBANK	0.05%	7.10%	-7.05%	0.03%	0.04%	4.38%	0.01%	0.02%	-160.96%	42
20	HDFCLIFE	0.06%	7.10%	-7.04%	0.04%	0.06%	1.76%	0.01%	0.02%	-399.14%	45
21	HEROMOTOCO	0.05%	7.10%	-7.05%	0.04%	0.06%	-5.33%	0.01%	0.02%	132.31%	13
22	HINDALCO	0.12%	7.10%	-6.98%	0.07%	0.10%	-12.75%	0.03%	0.05%	54.77%	34
23	HINDUNILVR	0.05%	7.10%	-7.05%	0.02%	0.03%	-1.60%	0.00%	0.01%	440.09%	7
24	ICICIBANK	0.10%	7.10%	-7.00%	0.04%	0.06%	-1.26%	0.01%	0.02%	554.50%	4
25	INDUSINDBK	0.05%	7.10%	-7.05%	0.10%	0.99%	15.04%	0.38%	0.28%	-47.14%	37
26	INFY	0.10%	7.10%	-7.00%	0.04%	0.06%	-1.26%	0.01%	0.02%	554.50%	5
27	ITC	0.07%	7.10%	-7.03%	0.03%	0.04%	-7.81%	0.01%	0.02%	90.00%	22

28	JSWSTEEL	0.12%	7.10%	-6.98%	0.06%	0.08%	-6.41%	0.02%	0.03%	108.89%	17
29	KOTAKBANK	0.05%	7.10%	-7.05%	0.03%	0.05%	-7.74%	0.01%	0.02%	91.06%	21
30	LT	0.09%	7.10%	-7.01%	0.03%	0.05%	1.21%	0.01%	0.01%	-576.86%	47
31	LTIM	0.13%	7.10%	-6.97%	0.05%	0.07%	4.82%	0.02%	0.03%	-144.55%	40
32	MARUTI	0.05%	7.10%	-7.05%	0.04%	0.06%	10.92%	0.02%	0.03%	-64.56%	38
33	MOM. F	0.14%	7.10%	-6.96%	0.17%	0.24%	12.22%	0.09%	0.12%	0.12%	36
34	NESTLEIND	0.09%	7.10%	-7.01%	0.02%	0.03%	4.17%	0.01%	0.01%	-168.20%	43
35	NTPC	0.11%	7.10%	-6.99%	0.03%	0.05%	1.32%	0.01%	0.01%	-529.91%	46
36	ONCG	0.08%	7.10%	-7.02%	0.06%	0.08%	-15.44%	0.03%	0.04%	45.45%	35
37	POWERGRID	0.10%	7.10%	-7.00%	0.03%	0.04%	-5.93%	0.01%	0.02%	118.13%	16
38	RELIANCE	0.09%	7.10%	-7.01%	0.04%	0.05%	-11.35%	0.02%	0.03%	61.74%	31
39	SBILIFE	0.09%	7.10%	-7.01%	0.03%	0.05%	0.19%	0.00%	0.01%	-3628.48%	49
40	SBIN	0.09%	7.10%	-7.01%	0.05%	0.07%	-6.88%	0.02%	0.03%	101.86%	19
41	SUNPHARMA	0.11%	7.10%	-6.99%	0.03%	0.05%	-1.19%	0.00%	0.01%	587.21%	3
42	TATA	0.15%	7.10%	-6.95%	0.04%	0.05%	-0.32%	0.00%	0.01%	-122.79%	39
43	TATA MOTOR	0.17%	7.10%	-6.93%	0.09%	0.86%	0.67%	0.15%	0.12%	-1034.33%	48
44	TATASTEEL	0.12%	7.10%	-6.98%	0.06%	0.57%	-8.35%	0.17%	0.10%	83.59%	25
45	TCS	0.08%	7.10%	-7.02%	0.02%	0.03%	-12.62%	0.01%	0.01%	55.63%	33
46	TECHM	0.08%	7.10%	-7.02%	0.04%	0.06%	-8.08%	0.02%	0.03%	86.88%	24
47	TITAN	0.13%	7.10%	-6.97%	0.04%	0.06%	2.39%	0.01%	0.02%	-291.63%	44
48	ULTRACEMCO	0.10%	7.10%	-7.00%	0.03%	0.04%	-8.02%	0.01%	0.02%	87.28%	23
49	UPL	0.04%	7.10%	-7.06%	0.05%	0.07%	-8.70%	0.02%	0.03%	81.15%	28
50	WIPRO	0.07%	7.10%	-7.03%	0.03%	0.04%	-8.49%	0.01%	0.02%	82.80%	26

Chart 1.1- Mean Return



INTERPRETATION

As proposed by Sharpe, stocks that have negative returns should be ignored for selection in optimal portfolios. The securities on the basis of their returns are ranked from (highest to lowest) for selection. Fischer and Jordan (1995) state that stocks to be included in the optimal portfolios are determined on the basis of their 'excess return to beta ratio.' As per the rule of ranking, the security that has the highest 'excess return to beta ratio 'will be placed in the first position, followed by the security with the second highest beta ratio, and so on and so forth. But here we have every stock giving negative returns so, out of 50 companies only top 10 companies are taken into consideration. They are (BAJFINANCE, DIVISLAB, SUNPHARMA, ICICIBANK, INFY, BRITANNIA, HINDUNILVR, CIPLA, EICHERMOT, BHARTIARTL).

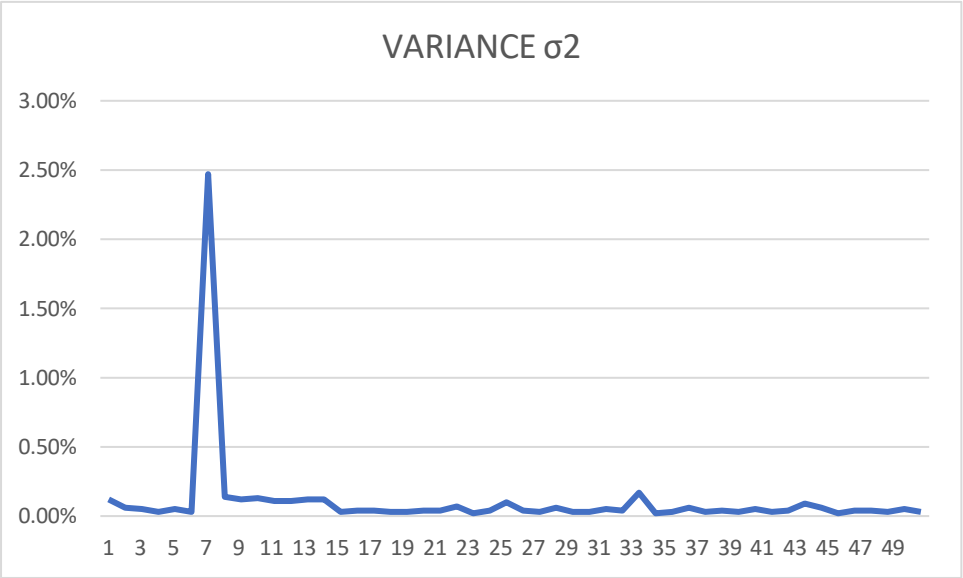
The above table shows the excess return to the beta ratio of the sample companies. After calculating the ratio, ranks are allotted to sample companies on the basis of their ratio.

Table 2: Showing the Computation of Cut off rate using Sharpe's Single Index Model

S.NO	COMPANY NAME	SHARPE SINGLE INDEX	EXCESS RETURN TO BETA	CUMULATIVE	N	BETA/USR	CUMULATIVE	D	CUT OFF RATE
		(Ri-Rf/β)	(Ri-Rf) *β/ σei2	∑(Ri-Rf) * β / σei2	(σm^2) Σ (Ri-Rf) * βi /σei^2	β2/ σei2	∑β2/ σei2	1+(σm^ 2) Σβi^2)/ σei^2	Ci
1	BAJFINANCE	71715.85%	477.65%	477.65%	690.67%	-446.12%	-446.12%	-545.08%	-126.71%
2	DIVISLAB	1243.15%	105.21%	582.85%	842.79%	-1485.63%	-1931.75%	-2693.27%	-31.29%
3	SUNPHARMA	587.21%	669.72%	1252.57%	1811.19%	-9575.65%	-11507.40%	-16539.47%	-10.95%
4	ICICIBANK	554.50%	510.34%	1762.90%	2549.12%	-7295.58%	-18802.98%	-27088.72%	-9.41%
5	INFY	554.50%	510.34%	2273.24%	3287.06%	-7295.58%	-26098.55%	-37637.97%	-8.73%
6	BRITANNIA	478.45%	238.54%	2511.78%	3631.99%	-3351.61%	-29450.16%	-42484.32%	-8.55%
7	HINDUNILVR	440.09%	1197.38%	3709.16%	5363.37%	-16980.81%	-46430.97%	-67038.23%	-8.00%
8	CIPLA	385.82%	266.79%	3975.95%	5749.15%	-3760.87%	-50191.84%	-72476.37%	-7.93%
9	EICHERMOT	311.70%	765.03%	4740.98%	6855.36%	-10886.02%	-61077.85%	-88217.32%	-7.77%
10	BHARTIARTL	176.19%	442.63%	5183.61%	7495.39%	-6271.48%	-67349.33%	-97285.75%	-7.70%
11	ADANIENT	174.72%	327.21%	5510.82%	7968.53%	-4809.13%	-72158.46%	-104239.65%	-7.64%
12	APOLLO HOSPITAL	133.43%	-614.22%	4896.60%	7080.38%	8835.20%	-63323.26%	-91464.14%	-7.74%
13	HEROMOTOCO	132.31%	1682.44%	6579.04%	9513.15%	-23876.94%	-87200.21%	-125989.71%	-7.55%
14	BAJAJ AUTO	129.69%	-1108.34%	5470.69%	7910.51%	15837.03%	-71363.17%	-103089.68%	-7.67%
15	HCLTECH	118.18%	2295.51%	7766.20%	11229.77%	-32872.97%	-104236.14%	-150623.31%	-7.46%
16	POWER GRID	118.13%	2420.93%	10187.13%	14730.38%	-34580.96%	-138817.09%	-200626.67%	-7.34%
17	JSWSTEEL	108.89%	1340.93%	11528.07%	16669.35%	-19210.36%	-158027.46%	-228404.46%	-7.30%
18	ASAIN PAINT	107.44%	-1157.20%	10370.87%	14996.07%	16508.51%	-141518.95%	-204533.50%	-7.33%
19	SBIN	101.86%	1703.15%	12074.02%	17458.79%	-24290.44%	-165809.39%	-239656.98%	-7.28%
20	DRREDDY	100.70%	3003.19%	15077.21%	21801.34%	-42784.04%	-208593.43%	-301521.82%	-7.23%
21	KOTAK BANK	91.06%	2546.19%	17623.41%	25483.08%	-36123.20%	-244716.63%	-353755.22%	-7.20%
22	ITC	90.00%	3190.29%	20813.70%	30096.18%	-45372.55%	-290089.18%	-419363.00%	-7.18%
23	ULTRACEMCO	87.28%	2924.83%	23738.52%	34325.42%	-41783.24%	-331872.42%	-479780.70%	-7.15%

24	TECHM	86.88%	2212.44%	25950.96%	37524.56%	-31516.21%	-363388.63%	-525352.50%	-7.14%
25	TATASTEEL	83.59%	585.04%	26536.00%	38370.52%	-8381.70%	-371770.33%	-537472.26%	-7.14%
26	WIPRO	82.80%	3063.31%	29599.32%	42800.01%	-43574.89%	-415345.22%	-600480.65%	-7.13%
27	BPCL	82.02%	735.85%	30335.17%	43864.03%	-10344.19%	-425689.41%	-615438.15%	-7.13%
28	UPL	81.15%	1880.89%	32216.05%	46583.75%	-26641.43%	-452330.85%	-653961.11%	-7.12%
29	AXIS BANK	75.88%	-634.34%	31581.72%	45666.52%	9027.79%	-443303.05%	-640907.11%	-7.13%
30	COALINDIA	67.80%	892.19%	32473.90%	46956.60%	-12590.77%	-455893.83%	-659113.11%	-7.12%
31	RELIANCE	61.74%	3105.86%	35579.77%	51447.61%	-44337.13%	-500230.95%	-723223.68%	-7.11%
32	GRASIM	57.33%	2916.46%	38496.22%	55664.75%	-41658.41%	-541889.36%	-783460.89%	-7.10%
33	TCS	55.63%	6181.74%	44677.96%	64603.42%	-88059.00%	-629948.37%	-910792.40%	-7.09%
34	HINDALCO	54.77%	1864.68%	46542.64%	67299.70%	-26708.29%	-656656.65%	-949412.03%	-7.09%
35	ONGC	45.45%	2593.85%	49136.49%	71050.35%	-36952.70%	-693609.35%	-1002844.87%	-7.08%
36	MOM. F	0.12%	-711.21%	48428.28%	70021.96%	10212.32%	-683397.03%	-988078.06%	-7.09%
37	INDUSINDBK	-47.14%	-380.05%	48045.23%	69472.41%	5393.15%	-678003.88%	-980279.68%	-7.09%
38	MARUTI	-64.56%	-2847.72%	45197.51%	65354.66%	40388.75%	-367615.13%	-921878.38%	-7.09%
39	TATA	-122.79%	213.06%	45410.56%	65662.74%	-3066.24%	-640681.37%	-926312.10%	-7.09%
40	LTIM	-144.55%	-1249.90%	44160.66%	63855.41%	17943.99%	-622737.38%	-900365.46%	-7.09%
41	ADANIPORTS	-158.23%	477.88%	44638.54%	64546.41%	-6840.11%	-629577.49%	-910256.12%	-7.09%
42	HDFCBANK	-160.96%	-1958.94%	42679.61%	61713.83%	27805.54%	-601771.95%	-870049.88%	-7.09%
43	NESTLEIND	-168.20%	-2566.85%	40112.75%	58002.21%	36603.20%	-565168.75%	-817122.41%	-7.10%
44	TITAN	-291.63%	-880.83%	39231.92%	56728.56%	12637.41%	-552531.34%	-798848.97%	-7.10%
45	HDFCLIFE	-399.14%	-724.67%	38507.25%	55680.70%	10297.21%	-542234.13%	-783959.41%	-7.10%
46	NTPC	-529.91%	-722.15%	37785.10%	54636.48%	10330.66%	-531903.47%	-769021.49%	-7.10%
47	LT	-576.86%	-676.48%	37108.62%	53658.30%	9656.92%	-522246.55%	-755057.79%	-7.11%
48	TATAMOTORS	-1034.33%	-40.06%	37068.56%	53600.38%	578.03%	-521668.52%	-754221.97%	-7.11%
49	SBILIFE	-3628.48%	-166.44%	36902.12%	53359.71%	2373.60%	-519294.92%	-750789.79%	-7.11%
50	BAJAJ FINSERV LIMITED	-46890.02%	-1.97%	36900.15%	53356.86%	28.23%	-519266.69%	-750748.97%	-7.11%

Chart 2.1- Variance:



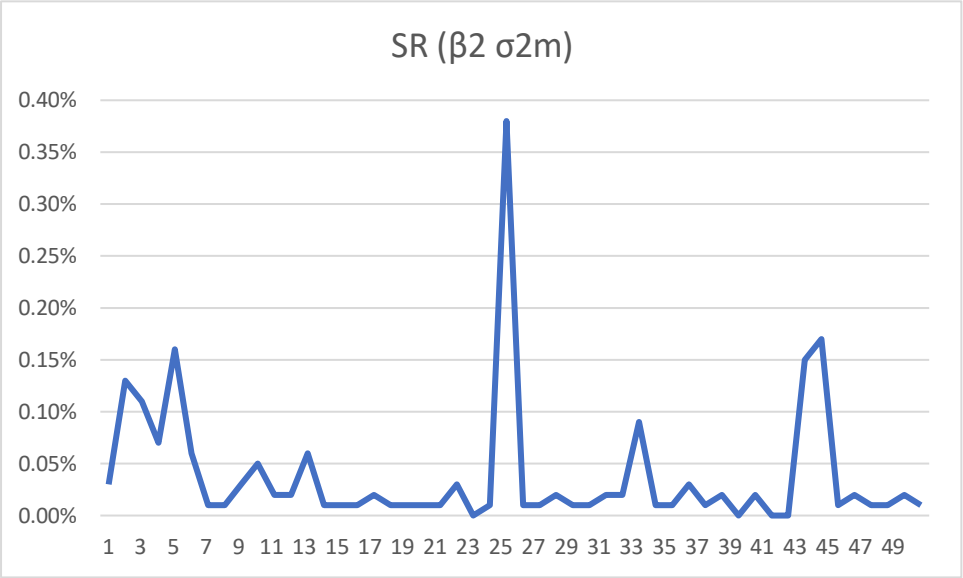
INTERPRETATION:

The above table shows the cut-off (ci) of the sample companies selected. The cut-off values go on increasing from -126.71% to -7.70% . Therefore, the value-7.70% is considered as the cutoff point i.e., Ci =-7.70%. The securities which appear after the cut-off value will not be considered for the construction of an optimal portfolio. The securities which have a value of the cut- off point (Ci) more or equal to the cut-off point will only be selected for the construction of an optimal portfolio. The Proportional Investment to be made into each Security.

Table 3: Showing the Proportional Investment to be made into each Security

SI NO	COMPANY NAME	BETA/USR	CUT OFF RATE	Zi	Xi	Xi PROPORTION OF EACH STOCK
1	BAJFINANCE	-4.46119	-0.07705	-282.0395841	0.35%	0.35
2	DIVISLAB	-14.8563	-0.07705	-219.0612822	0.27%	0.25
3	SUNPHARMA	-95.7565	-0.07705	-9845.704682	12.15%	12
4	ICICIBANK	-72.9558	-0.07705	-5778.662523	7.13%	7
5	INFY	-72.9558	-0.07705	-5778.662523	7.13%	7
6	BRITANNIA	-33.5161	-0.07705	-1286.008466	1.59%	2
7	HINDUNILVR	-169.808	-0.07705	-33319.46938	41.13%	41
8	CIPLA	-37.6087	-0.07705	-1710.508364	2.11%	2
9	EICHERMOT	-108.86	-0.07705	-15281.08875	18.86%	19
10	BHARTIARTL	-62.7148	-0.07705	-7505.371087	9.27%	9
TOTAL					**0.907349**	**99.6**

Chart 3.1- Systematic Risk:

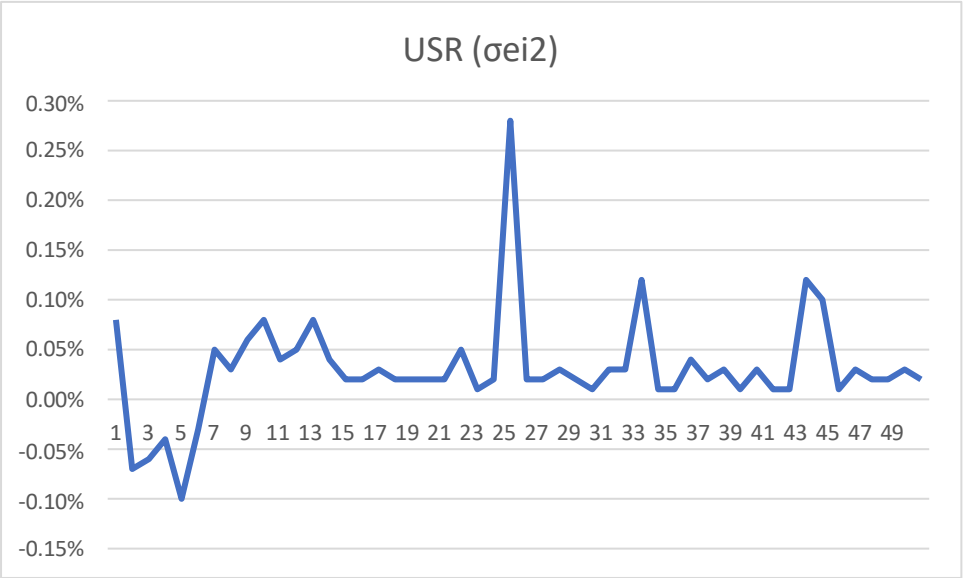


INTERPRETATION: The above table represents the proportion of investment to be made in each security. The ten securities ranking from 1 to 10 are selected for the construction of an optimal portfolio.

Table 4: Showing the Portfolio Variance of Companies

SI NO	COMPANY NAME	SYSTEMATIC RISK (β2 σ2m)	UNSYSTEMATIC RISK (σei2)	TOTAL RISK (β2 σ2m) + (σei2)
1	BAJFINANCE	0.0000792	0.000334664	0.000414
2	DIVISLAB	0.000126385	0.000383406	0.00051
3	SUNPHARMA	4.941643405	0.000124382	0.000174
4	ICICIBANK	6.968681505	0.000172915	0.000243
5	INFY	6.968688405	0.000172915	0.000243
6	BRITANNIA	0.000186281	0.000443847	0.00063
7	HINDUNILVR	4.036112105	9.435583205	0.000135
8	CIPLA	0.000216584	0.000488876	0.000705
9	EICHERMOT	9.650263305	0.000207108	0.000304
10	BHARTIARTL	0.000343575	0.000638749	0.000982
TOTAL RISK VARIANCE				**0.004339**

Chart 4.1-Unsystematic Risk:

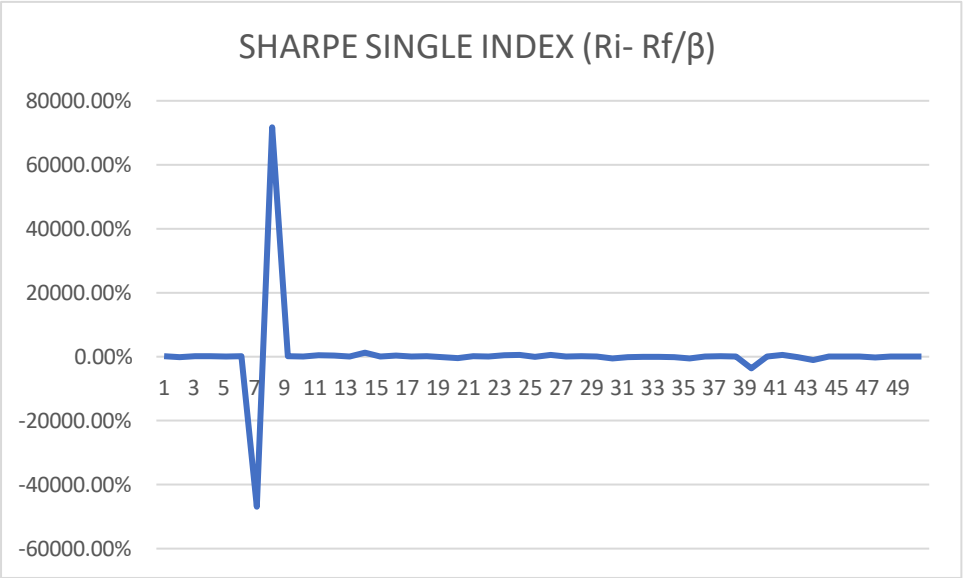


INTERPRETATION: Portfolio variance is a gauge of a portfolio's return dispersion. It is the total of a portfolio's real returns for a specific time period. Investing in a portfolio of these securities, investors can anticipate variance or variability in return of 0.0004339 considering market situations. The percentage of funds to be invested in each security is presented in the following diagram.

Table 5: Showing the Calculation of Portfolio Returns of the Companies

SI NO	COMPANY NAME	MEAN RETURN	WEIGHTS	PORTFOLIO RETURN
1	BAJFINANCE	0.999668951	0.003481687	34.81%
2	DIVISLAB	0.000183949	0.002704241	0.00%
3	SUNPHARMA	0.001060441	0.121542041	1.29%
4	ICICIBANK	0.001048622	0.071335721	0.75%
5	INFY	0.001048622	0.071335721	0.75%
6	BRITANNIA	-0.000172551	0.015875359	-0.03%
7	HINDUNILVR	0.000486363	0.411318078	2.00%
8	CIPLA	6.113452305	0.021115673	0.01%
9	EICHERMOT	0.000723895	0.1886401	1.37%
10	BHARTIARTL	0.000421721	0.09265138	0.39%
TOTAL PORTFOLIO RETURN				41.34%

Chart 5.1- Sharpe Single Index:



INTERPRETATION: The above table represents that Portfolio investment is based on the basic assumption that investing in a basket of securities, not in individual company shares. Here investor having the above stocks in his/her portfolio can expect an overall return of 41.34%.

RANKING BASED ON OPTIMAL PORTFOLIO:

S.NO	SELECTED COMPANIES	RANK
1	BAJFINANCE	1
2	DIVISLAB	2
3	SUNPHARMA	3
4	ICICIBANK	4
5	INFY	5
6	BRITANNIA	6
7	HINDUNILVR	7
8	CIPLA	8
9	EICHERMOT	9
10	BHARTIARTL	10

CHAPTER 5

Findings, Suggestion and Conclusion

FINDINGS, SUGGESTIONS AND CONCLUSION

SUMMARY OF FINDINGS:

• It was found that out of 50 stocks considered for this study, the stocks of only 10 companies can be chosen for inclusion in optimal portfolio. The 'excess return to beta ratio of only 10 stocks was above the calculated cut-off rate of -7.70% . They are Bajfinance, Divislab, Sunpharma, Icicibank, Infy, Britannia, Hindunilvr, Cipla, Eichermot, Bhartiartl.

• The return from IndusInd Bank has the highest beta value of 15 % which means it is highly volatile in nature. Mom.F, Maruti, Ltim, Adani sports and special economic zone limited, Hdfcbank, Nestleind, Titan, Hdfclife, Ntpc, Lt. have beta values greater than 1 i.e., they are also volatile.

• Dr. Reddy's Labs having the lowest beta value of -15 % which means it is less volatile. The cut-off values go on increasing from-126.71% to -7.70% . Based on the Cut-off values Ten companies were selected.

• Cut-off rate as per Sharpe's Single Index Model is -7.70% , stocks above the cut-off rate such as Bajaj finance, Divis lab, Sun pharma, Icici bank, Infy, Britannia, Hindu nil vr, Cipla, Eichermot , Bhartiartl. Have been selected as Optimal ones for Portfolio Construction.

• Proportion of investment to be made in each company is as follows, (0.35 %) Bajaj finance, (0.25%) Divislab, (12%) Sun pharma, (7 %) Icici bank, (7 %) Infy, (2 %) Britannia, (41b%) Hindu nil vr ,(2 %) Cipla (19 %)Eichermot and (9 %)Bhartiartl. Portfolio Return and Risk with combination of securities selected as per Sharpe's Single Index Model is 0.004339 and 41.34%respectively.

SUGGESTIONS OF THE STUDY:

1. The investors first should set their investment goal. After that they have to select the stocks and option according to their goals and return earning needs.
2. It is necessary for the investors to study the performance of the securities in terms of the risk and returns before investing.
3. Investing in sectors like Pharmaceutical and Private bank Sector is safer for the investors as these are of more defensive in nature.
4. To minimize the risk, investing in combination of securities is better than investing in single securities.
5. The present study suggests a combination of securities that give high rate of returns at minimum level of risk for the investors who wish to make an optimal portfolio.
6. The securities in the optimal portfolio are from various industrial sectors. If establishes the point that diversification into different industrial sector alone would minimize the risk and maximize the return.
7. Accounting based information should also be taken into account while analyzing the risk and returns of the securities.
8. The investors, in order to reduce the risks, can invest in the combination of the securities rather than invest in a single security.
9. The investors should examine the past performance of the securities irrespective of their yield over the years.
10. It is necessary for the investor to observe the market trend and the securities responding to the market.
11. This study further suggests that prospective investors may apply the basic minimum analytical tools used in this study for choosing a stock for investment.

CONCLUSION:

The present study has considered a sample of NSE NIFTY 50 Index , based on portfolio construction to investment made in the securities. The influence of portfolio construction has been empirically analyzed. An investor determines or believes the technical analysis and portfolio construction, so that construction to protect the investment is based on portfolio. The effect of portfolio construction activities on the investors are based on the construction. A study of similar nature with large sample size can be undertaken for more comprehensive result.

This study applied Sharpe Single Index Model to generate an efficient combination of securities from amongst sample of shares and has come up with a subsequent investment pattern. The analysis of the portfolio provides the rationale for forming an optimal portfolio of the securities instead of buying only a single security. The overall observation of this study is that the portfolio constructions have been taken over by companies with reputed and good management.

REFERENCE:

Dr. E Rajesh and Ms. V. S. Thanuja (2020) “An Analytical Study on Construction of Optimal Portfolio Using Sharpe's Single Index Model in BSE Sensex Index Stocks”, Think India Journal, ISSN: 0971-1260, Vol-22, Special Issue-21: 742- 752. https://thinkindiaquarterly.org/

Dr. Vaddula V. Krishna Reddy & Dr. T. Suchitra Rani (2020) “Optimal Portfolio Construction Using Sharpe’s Single Index Model – A Study of Select Stocks from Bombay Stock Exchange (BSE)”, Sugyaan, Volume: X, Issue – Ii: Pp. 45-54.

Dr Archana H N And Srilakshmi D (2020) “Building An Optimal Portfolio Using Sharpe’s Single Index Model: An Empirical Study With Reference to Indian Capital Markets”, Journal Of Xi'an University Of Architecture & Technology, ISSN No: 1006-7930 , Volume 12, Issue 8: pp. 1223-1244.

BIBLIOGRAPHY

https://finance.yahoo.com/?fr=sycsrp_catchall

https://www.nseindia.com/

APPENDIX

List of Companies in NSE Nifty – 50 Index

S.NO	Name of the Companies	Sector
1	ADANIENT	Trading – Minerals
2	ADANIPORTS	Port & Port services
3	APOLLOHOSP	Hospital
4	ASIANPAINT	Paints
5	AXISBANK	Private Sector Bank
6	BAJAJ-AUTO	2/3 Wheelers
7	BAJAJFINSV	Holding Company
8	BAJFINANCE	Non Banking
9	BHARTIARTL	Financial Company
10	BPCL	Refineries & Marketing
11	BRITANNIA	Packaged Foods
12	CIPLA	Pharmaceuticals
13	COALINDIA	Coal
14	DIVISLAB	Pharmaceuticals
15	DRREDDY	Pharmaceuticals
16	EICHERMOT	2/3 Wheelers
17	GRASIM	Cement & Cement Products
18	HCLTECH	Software & Consulting
19	HDFCBANK	Private Sector Bank
20	HDFCLIFE	Life Insurance
21	HEROMOTOCO	2/3 Wheelers
22	HINDALCO	Aluminium
23	HINDUNILVR	Diversified FMCG
24	ICICIBANK	Private Sector Bank
25	INDUSINDBK	Private Sector Bank
26	INFY	Software & Consulting
27	ITC	Diversified FMCG
28	JSWSTEEL	Iron & Steel
29	KOTAKBANK	Private Sector Bank
30	LT	Civil Construction
31	LTIM	Software & Consulting
32	M&M	Passenger Cars & Utility Vehicles
33	MARUTI	Passenger Cars & Utility Vehicles
34	NESTLEIND	Packaged Foods
35	NTPC	Power Generation
36	ONGC	Oil Exploration & Production
37	POWERGRID	Power – Transmission
38	RELIANCE	Refineries & Marketing
39	SBILIFE	Life Insurance
40	SBIN	Public Sector Bank
41	SUNPHARMA	Pharmaceuticals

42	TATACONSUM	Tea & Coffee
43	TATAMOTORS	Passenger Cars & Utility Vehicles
44	TATASTEEL	Iron & Steel
45	TCS	Software & Consulting
46	TECHM	Software & Consulting
47	TITAN	Gems Jewellery And Watches
48	ULTRACEMCO	Cement & Cement Products
49	UPL	Pesticides & Agrochemicals
50	WIPRO	Software & Consulting