Analysis of Nepalese Companies

(With Reference to Ten Listed Companies)

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RECOMMENDATION

This is to certify that the thesis

Submitted by:

Arjun Shrestha

Entitled:

Beta Analysis of Nepalese Companies

has been prepared as approved by this Department in the prescribed format of the Faculty of Management. This thesis of forwarded for examination.

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And found the thesis to be the original work of the student and written according to the prescribed format. We recommend the thesis to be accepted as period fulfillment of the requirement for the degree of

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DECLARATION

I hereby declare that the work reported in this thesis entitled " Beta Analysis or Nepalese Companies" submitted to office of Dean, Faculty of Management, Trubhuvan University, is my original work done in the form of partial fulfillment of requirements for the Master's Degree in Business Studies (MBS) under the supervision of Associate Professor Shree Bhadra Neupane of Shankar Dev Campus.

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ABBREVIATIONS

AGM	Annual General Meeting
BBCL	Bishal Bazar Company Limited
CIT	Citizen Investment Trust
CML	Capital Market Line
CAPM	Capital Assets Pricing Model
CV	Coefficient of Variation
DPS	Dividend Per Share
eq^{n}.	Equation
HGICL	Himalayan General Insurance Company Limited
MPS	Market Price of Share
NSBI	Nepal SBI Bank Limited
NIBL	Nepal Investment Bank Limited
NFSC	Nepal Finance and Saving Company Limited
NEPSE	Nepal Stock Exchange
n.p.	no place of publication
RRR	Required Rate of Return
SHL	Soaltee Hotel Limited
STL	Salt Trading Company
SML	Security Market Line
SD	Standard Deviation
UNL	Nepal Unilever Limited
UICL	United Insurance Company Limited
Vol.	Volume

CHAPTER I
INTRODUCTION

1.1 General Background

The deregulation and globalization of financial markets in conjunction with advance financial know-how have caused risks to become more varied and complex, making businesses highly dependent on the quality or risk management for their success. Given this situation and being acutely aware of the important of being able to accurately identify and analyze the location and extent of risk and to manage it appropriately, the financial companies and systems and risk management capability. By doing so, everybody aims to ensure sound management and stable earnings. Establishing an adequate risk management structure and processes to control risks involved in various products and lines of business has become an important issue for a safe and sound institution.

With the innovation of financial liberalization, deregulation of interest rates and other reforms, there has been a virtual transaction from "price-takers" to "Price-makers" in the loan market. Hence, risk-evaluation in financial sectors is of great importance. Therefore, Nepalese financial companies and institutions are continuing to strengthen their systems and procedures to ensure that risks are accurately their systems and procedures to ensure that risks are accurately identified and assessed. In this regard, the financial institutions must have an explicit strategy supported by organizational changes, risk measurement techniques, fresh credit processes and systems.

The risk ness of an investment depends on the volatility of its returns. An investment is considered risky if it is accompanied by high volatile returns. Hence a rational investor prefers highly rate of return at the minimum level of risk. Theoretically, an investor who loves risk is a risk seeker and thereby prefers higher return with higher risk and an investor who does not prefer risk is known as risk averter and thereby prefers less risky investment with lower return.

The study on risk and return on common stock investment, therefore, occupies an important role in the development of stock market. "To maximize share price, the financial manager must learn to assess two key determinants: risk and return. Each financial decision presents certain risk and return characteristics, and the unique combination of the characteristics has an impact on share price. Risk can be viewed as it relates either to single asset or to portfolio – a collection or group of assets." *(Gitman, 2001: 236-237) Henderson, Trennepohl and wert (1984: 2)* have stated that the study of finance is not complete without return associated with common stock investment. However there are various types of financial assets to be invested.

Mahat (1981:25) has stressed that development and expansion of financial markets are essential for the economic growth of the country. Financial markets are helps economic development by mobilizing long term as well as short- term capital needed for the

productive sectors. The financial markets are the places where the financial assets are traded for the purpose of transformation of savings. Sharpe, *Alexander and Bailey (1999: 9)* have made partition of financial market as money and capital markets, primary and secondary markets, and security and non security markets. Money markets typically invoice financial assets that have life span of one year of less, whereas, capital markets typically invoice financial assets that have life span of greaten than one year. *Gitman (2001:33)* has also divided the financial markets into two key parts as money and capital markets.

Security exchange provides the market place in which firms can raise funds through the sale of new securities and purchasers of securities can maintain liquidity by being able to easily resell them when necessary. Bonds, common stock, preferred stock and a variety of other instrument vehicles are all traded on these exchanges. "Stock exchange means any body of individuals whether incorporated of not constituted for the purpose of regulating or controlling the business of buying, selling or dealing in securities." *(Bhall, 2001: 21)*. *Gupta (1978: 325)* has stated that stocks are issued first in the primary market by private and government sectors to meet their long-term capital requirement and they are traded in the secondary market to generate liquidity, profitability, and diversification and risk minimization purposes, which is a mechanism for the mobilization of public savings and channeling them in productive investments.

In the stock market, there is a great importance of demand and supply of stock for stock price fixation process. The price of a given stock is determined exclusively by the interacting forces of supply and demand. The price and volumes of its past transactions are meaningful indications of the probable relationship of future supply and demand. It is likely to encounter in the most important elements in determining the probable decision of the price movements. The supply and demand may be influenced by the rational and irrational factors. The brokers play important roles who act as the purchasers and sellers of securities on behalf of the investors. In the highly developed securities market, there would be the presence of large number of brokers. As a result they are able to buy or sell securities on the investors behalf in a market is an minutes. But, in Nepal, brokers are quite absence and stock market is an infantile stage. Stock market is a financial market which probably has the greatest glamour and is perhaps the least understood. Some observation considers it is a legalized heaven for gambling and many investors consider stock market investing as game in which the sole purpose is picking winners *(Lorie and Dodd, 1985: 23).* There are various inconsistencies and hindrances existed in the way to smooth way of functioning of market not only that institutional bottleneck are hampering the growth of capital but at times the existing imperfect national characteristics phenomenon deeply noted in socio economic system has undermine the proper trading in securities market.

The development of stock market in Nepal started with the establishment of commercial banks in the country besides the informal sectors. The listing of shares in the Stock Exchange Center (SEC) and their trading in the stock market is a recent phenomenon *(Pradhan, 1993: 23)*. Formally stock market development started only after the establishment of Securities Exchange Center in 1984, which was later renamed as Nepal

stock Exchange (NEPSE) Ltd. in 1990 and it brought new dimensions and atmosphere in stock market. (Manandhar, 1998:15-20). Now a days, the numbers of companies have been established and listed their shares in NEPSE Ltd. NEPSE Ltd. has, as a secondary market, provided its trading floor where buying and selling practices of stocks take place with the help of open-out-cry system. The secondary market provides adequate trade off between risk return for investors and also for financial institutions to purchase and sell according to needs and given strategic aims. *(Shrestha, 1988: 10)*

The concept of financial institution in Nepal was introduced when the first financial institution; Nepal Industrial and Development Corporation Center. The IDC was converted in NIDC in 1959 by special charter. Its main purpose was to create market for government securities.

Investment in its broadest sense means the sacrifice of current dollars for future dollars. *Francis (1992:1)* has defined an investment as a commitment of money that is expected to generate additional money. "An investment is a commitment of funds made in the expectation of some positive rate of return. If the investment is properly undertaken the return will be commensurate with the risk the investor assumes." *(Fischer and Jordan, 2000: 2)*. Invertors of common stock are the ultimate owners of associated with ownership. So, the common stock is known as risky security. But what is risk? Risk refers to the set of unique outcomes for a given event which can be assigned probabilities while uncertainty refers probabilities *(khan and Jain, 1992:275)*. Similarly, *Vanhorne (2000:89)* defines risk as a pornography which is hard to define but it will be known if we see it. Investors want to back higher return to invest in common stock, but their expected return may not be changed in realities. This uncertainty is the major risk to investors in stock market investment.

The return is income received on an investment, which is expressed as dividend, plus any change in market price of share (MPS) and usually expressed in percentage. Both dividend and market price of share are uncertain figures. So, the actual return on investment in common stock may differ substantially from the expected is defined return. The variability of returns from those that are expected is defined as risk. The greater the variability, the riskier the security is said to be *(Vanhorne, 2000:91)* the MPS of a company is driven by fundamental. For a given business, it is always worth attempting to identify which of there are driving its share price.

In general most of the investors are risk averter. They always expect higher return for taking more risk as risk premium. The primary problem in investment is to identify that security which has low risk and high return. Although, return can not be increased substantially, risk can be reduced by diversification of funds in different stocks by making a portfolio can eliminate the unsystematic risk, which is not explained by general market movement. Systematic risk, which is associated with change in return on the market as a whole, cannot be avoided by diversification of investment in different portfolio. Therefore, this study files to verify some empirical relationship between stock return and risk associated with it. In this connection, this study is devoted to conduct Beta analysis of Nepalese Companies so that the market movement sensitivity of the common

stock as measured by beta can be depicted. Beta in its true sense is a modern technique to measure systematic risk, the risk which cannot be minimized by diversification.

1.2 Focus of the Study

The main focus of the study is to analyze the market movement sensitivity of the common stock of Nepalese companies. This is possible only through beta analysis. The main aim of the study is that how to get sustainable profit by minimizing the considerable risk. People prefer less risk to more return i.e. they try to ignore risk which is not possible. Mere desire is not enough to minimize risk. Though proper diversification and the holding of a sufficient number of securities can reduce the unsystematic risk of individual stocks, but what is left is systematic risk which, because it is determined by the market (index), cannot be eliminated through portfolio balancing. Thus, this study focuses considerable significance to systematic risk and its most important measure, the beta coefficient (β). According to the study, the risk contribution to a portfolio of an individual stock can be measured by the stock's beta coefficient Beta coefficient plays a central role in the determination of expected return and risk for stocks as well as portfolios. Some analyses have proposed using beta coefficients to approach the problem of stock selection. In this approach, the out look for the market is assessed. Portfolios are constructed by optimizing beta coefficients in line with the market outlook. For example, if the market is expected to advance in the future, portfolios will be constructed containing stocks with beta coefficients that give maximum return. Such stocks would also carry high risks when the beta coefficients are large. A beta of +1.0 would indicate a stock with "average" volatility relative to the market. A beta of +2.0 would mean that if the market return was forecast as 10 percent the stock would have an estimated return of 20 percent. Thus, this study also tries of focus on the volatility of the stock returns of Nepalese companies analysis will increase the general investors' confidence and ultimately increase stock investment and increase the degree of market efficiency which is essential to gearing up overall economic development of the nation.

1.3 Statement of the Problem

Risk and return analysis is essential tool in the area of investment, because an investor can predict his profitable return with less risk from investing in different investment alternatives available in the security market. In Nepalese context due to lack of exploited by the financial institutions brokers of other market intermediaries to such an extent that investing in common stock is intolerably hazardous. But for this investors are responsible to make rational investment decision rather than switching blame to others. Investor's knowledge of business environment, behavior of stock prices company's dividend policy, government policy towards general public investment in the stocks, and Individuals Company's growth rate is essential. Investor attitude and perception also plays vital role in rational decision.

Research studies show that in Nepal most of the investors invest their funds in single security rather they can be benefited by investing in portfolio of securities through diversification of risk. Most of the rational investors hold portfolio of stocks and they are more concerned with the risk of portfolio than with the risk of individual securities.

At the same time there are no any separate institutions, which provide information required to rational decision that can accelerate the stock investment and market efficiency. Government policy is less encouraging in promoting common stock investment i.e., the plans and policies of the government are only sorted in paper but not implemented effectively for creating conclusive investment environment. The Nepalese stock market is characterized by a low trading volume, absence of professional brokers, early stage of growth, limited movement of share prices and limited information available to investors. The number of investors in stock market is still very few who are not confident to get appropriate returns from the listed companies. It is frequently seen that most of the Nepalese investors like to buy shares from primary market rather than secondary market and an interesting point to note is that they even don't like to know behavior of stock market, rising and falling of share prices. Even ignorance regarding risk and return of the investment in stocks in found in University graduate and post graduate in business studies/administration.

Many people feel more risk in investment of security that its actual risk. This is due to the absence of a simple and clear way technique to analysis risk and return of individual stock and portfolio Vis-à-vis lack of information to analyze risk and return on common stock investment. One can diversify risk by investing in portfolio. Portfolio investment is benefited because higher return from one asset offsets the lower return from another asset. Over long span of US history, a diversified portfolio of common equity has turn out to be an exceptionally good investment, especially when compared with government securities. *(kolb, 1991: 202)*

The general conclusion that emerges from above mentioned studies is that most of the Nepalese people strive for food shelter and who are able to invest on long term investment feel more risk in stock investment than its real risk. To overcome this problem this problem the public as well as government should initiate new programmes, plans and policies. The information essential to investment decision should be disseminated properly and timely. In addition idea of portfolio should be developed in potential investor's mind. Similarly it is seen that many previous research studies have been limited to expected return, standard deviation and coefficient of variation in the context of analyzing risk and return. But in today's periphery a modern technique has been developed to analyze risk, which is technically interpreted as beta. The expected return, standard deviation and coefficient of variation gives the limited information on assets, as for example expected return and standard deviation gives only comparative analysis of risk and return of different assets, coefficient of variation gives the per unit risk of the asset but ignores to give the decision what happens when the expected return is negative. So above all beta coefficient seems to be appropriate tool in the context of analyzing risk and return. Beta coefficient helps to know whether the asset if aggressive of defensive, gives the information about the volatility of stock returns, even be used for ranking the systematic risk of different assets and also in the determination of expected return and risks for stocks as well as portfolios. So this study is being done to eliminate the unnecessary fear of rational investor and others about the investment in common stock in security market. To sum up, this study tries to deal with the following issues;

- How much return do the common stocks of Nepalese companies provide to their investors and how the returns are calculated?
- How much risk is associated with common stock investment and what are its sources?
- What kind of relationship does there exist between risk and return?
- Does the portfolio of common stock of Nepalese companies help to reduce risk?
- What is the effect of portfolio on return?
- What is beta analysis and how the market sensitivity of the common stock of Nepalese companies is analyzed by beta?
- What is alpha intercept and how is it determined?
- How systematic and unsystematic risk calculated with the help of beta?

1.4 Objective of the Study

The major objectives of the study are as follows:

- To find the risk return behavior of stock and other relevant variables which are very important in making decision to invest in the stocks.
- To analyze the sensitivity of the stock of the sample company about the given change in the market as a whole.
- To compare between the sample companies risk return and market risk return.
- To examine the usefulness of diversification effect to reduce risk i.e. portfolio analysis.
- To analyze the significance of beta in capital assets pricing model analysis.
- To recommend suggestions about beta analysis to concerned authority in making their.
- Policy decision relating to risk return behavior of common stock.

1.5 Significance of the Study

The performance of the government of public sector is not satisfactory in developing country like Nepal. Even then the study of beta analysis of various companies in developing country like Nepal is very essential. An industrial sector is very sensitive in developing country as well as developed country. But, industrial sector in developing country are not well developed. Therefore beta analysis is very useful of identify the risk factors, which act as hurdle of barrier to succeed in the market. So it can provide useful information into the future behavior of companies. Similarly, this study may also provide valuable information about the companies' status and their condition in Nepal. Government of Nepal has been investing huge amounts in industrial sector because industrialization is the backbone of under developed country. Therefore, the significances of the study are:

- In many research studies it is frequently seen that the risks of the companies are being measured by the standard deviation of the companies but this study provides a modern technique in measuring risk, which is known as beta.
- The management of the company can take crucial decision more effectively on the basis of the volatility of returns of their stock.
- This study will be helpful to analyze the growth of individual company and market vis-à-vis understands the risk return behavior of individual stock and portfolio of listed companies in NEPSE.
- The finding of the study is helpful to the researcher in the field of financial management. Likewise, it will also be equally important for students and teachers in business administration in knowing about the related area of research.

- It will be helpful to related person i.e. analyst, promoters, investors, shareholders, management and policy makers.
- It will be helpful to government in policy making, regulating, controlling, monitoring, and supervising to create conducive investment environment.
- The major findings of the study will be important to other institutions involved in similar research work. It will also be helpful to the government and non-government organization as well as academicians.

1.6 Limitations of the Study

This study suffers from the following limitations:

- Only listed companies are taken as population of study, which are listed in Nepal Stock Exchange limited (NEPSE).
- The major sources of data are financial statement of annual general meeting (AGM) report and market price of common stock of listed companies. Which are available in the NEPSE Trading report?
- Some of the data are taken on the verbal information of the management of the company. The validity and confidence of the data depends on the faithful and trustworthiness.

1.7 Profiles of the sample company taken under study

i. Nepal SBI Bank Limited (NSBI)

Nepal SBI Bank Limited was established in 1993 under the Company Act. This is the joint venture of State Bank of India and Nepalese Promoters. The ownership structure of the shares of Nepal SBI Bank Limited is as follows:

State Bank of India	-	50.84%
Commercial Bank	-	5.08%
Organized Institution	-	15.25%
General Public	-	28.83%

The authorized capital and paid up capital of the bank is Rs.3000 million and Rs.2093.989769 million respectively. The main objectives of the bank are to carry out modern banking business in the country.

ii. Nepal Investment Bank Limited (NIBL)

Nepal Investment Bank Limited was established in 21st January 1986 as a joint venture bank under the company Act 1964 in the name of Nepal Indosuez Bank. Initially the bank was managed by 'Banque Indosuez' Paris in accordance with joint venture and technical services. Fifty percent of the share of Nepal Indosuez Bank Limited was held by Credit Agircole. Indosuez was sold to the Nepalese promoters on 25th April, 2002 as per the transaction record of NEPSE. After this divestment of share by Nepalese owners, the name of the company was changed to Nepal Investment Bank Limited by 15th AGM held on 31st May, 2002. Out of the total equity shares of Nepal Investment Bank Limited, 50% shares are held by a group of companies, 15% by commercial banks another 15% by financial institution and remaining 20% by general public. Authorized Capital of NIBL is 4000 million and issued and paid up capital are Rs.3012.924200 million respectively.

iii. Nepal Finance and Savings Company Limited (NFSC)

Nepal Finance and Savings Company Limited were established in 1993 under the Company Act 1964. The main objective of the company is to collect deposits in valued from and to provide loans and advance under Finance Company Act, 1985.

iv. Unilever Neapl Limited (UNL)

Unilever Nepal Limited was established in 1994 as a joint-venture company with an objective of establishing factory to manufacture, detergent, cosmetics, toiletries, oleaginous, saponaceous and other chemical products under the brand name of the products of Hindustan Lever Limited with 52.5 percent ownership has invested Rs.2250.00 Million in equity. This is the first joint venture of Hindustan Lever Limited outside India.

v. Citizen Investment Trust (CIT)

Citizen Investment Trust was established in 1991 under CIT Act, 1991. The main objective of the trust is to encourage general public to save by creating opportunities to invest in varied financial instruments and also to contribute in the process of capital market development as investment management.

vi. Himalayan General Insurance Company Limited (HGICL)

Himalayan General Insurance Company Limited was established under the Company Act in 1964 in 1988 and listed in NEPSE on 1994. Its authorized capital is 100.80 million. Its objective is of undertaking non-life and reinsurance business in the country.

vii. United Insurance Company Limited (UICL)

United Insurance Company Limited was established in 1992 with ad objective of providing non life insurance services in the field of fire marine vehicle and miscellaneous in the country and abroad. It was listed in the Nepal Stock Exchange in the year 1994 A.D.

viii. Soaltee Hotel Limited (SHL)

Soaltee Hotel Limited was established in 1968 under the Company Act,1964 as a private limited company. The main objective of the company is to provide hotel facilities like business center, swimming pool, health club, beauty parlor, conference hall, banquet facilities. Later on, in 1975 it was converted into public limited company and admitted international Finance Corporation, Washington D.C and Oberoi Hotel India as shareholders. The hotel was operating in collaboration with Oberoi Hotel under the name of Soaltee Oberoi till may, 1994. The management of the hotel has been changed from Oberoi hotel to Holiday Inn Crown Plaza since 1st June, 1994 and then onwards the hotel is in operation on under the name of Hotel Soaltee Holiday Inn Crown Plaza.

ix. Salt Trading Company Limited (STL)

Salt Trading Company Limited was established in 1963. The main objective of the corporation are to import and distribute salt and other consumable goods within the kingdom of Nepal, to act as an agent of the national and international companies and to establish the industry.

x. Bishal Bazar Company Limited (BBC)

Bishal Bazar Company Limited was established in 1969 under the Company Act, 1964. The main objective of the company is to make available various consumer goods. The other objective of the company is to procure land in prime area and to construct commercial buildings and complexes.

1.8 Organization of the Study

The study is dividend into 5 chapters:

Chapter-I:- Introduction includes background of the study, focus of the study, statement of the problem, objectives of the study, signification of the study, hypothesis statements and limitations of the study.

Chapter-II: - Review of literature includes review of various books, journal and review of related studies.

Chapter-III: - Research Methodology includes the research design, data collection procedures, tools for analysis, methods of analysis and presentation.

Chapter-IV: - Data presentation interpretation and analysis includes the analysis of risk and return of the common stock of selected companies, comparison of sample companies with market in terms of risk and return, hypothesis test, beta calculations and portfolio analysis.

Chapter-V: - Summary, Conclusions and Recommendations are presented in this chapter.

CHAPTER – II
REVIEW OF LITERATUER

"Literature review is basically a "stock taking" of available literature in one's field of research" *(Wolf and Pant, 2000:30).* The second chapter attempts to review the literature on Beta, a measure of systematic risk. So regarding this attempt is being made to explore the ideas and facts from different books and journals. Also before analyzing the literature on beta, this chapter also attempts to focus on the theories of risk and return followed by portfolio theory and capital assets pricing model.

2.1 Conceptual Framework

Before getting in to the core subject matter of beta analysis, it is imperative to be acquainted with the general concepts of the share and other related matters. Following subsection to this section will be explaining the conceptual matters.

2.1.1 Common Stock

The most important from the corporate stock is common stock or ordinary share. The common stockholders are the real owners of a firm. They invest on the firm with the expectation of return in future. It is because they receive only the residual left after satisfying the claims of all on firm's assets and income. The business may decline of profit may fall to the unacceptable level. But the risk of common stock ownership is limited. The stockholder is responsible only for the amount of fund invested by him, not more than that.

"Common stock represents equity, or an ownership position in a corporation. It is a residual claim, in the sense that creditors and preferred stockholders must be paid as scheduled before common stockholders are in principle entitled to any value remaining after all other claimants have been satisfied. (However, in practice, courts sometimes violate this principle).

The grate advantage of the corporate form of organization is the limited liability of its owners. Common stocks are generally "fully paid and non assessable," meaning that common stockholders may lose their initial investment, but not more. That is, if the corporation fails to meet its obligations, the stockholders cannot be forced to give the corporation the funds that are needed to pay off the obligations. However, as a result of such a failure, it is possible that the value of a corporation's shares will be negligible. This will result in the stockholders' are having lost an amount equal to the price previously paid to buy the shares". *(Sharpe, Alexander and Bailey, 1999:501)*

2.1.2 Stock Certificate

Each share of the stock is represented by stock certificate which is the unit of ownership in the firm. The exact percentage of the ownership of shareholder depends on the number of shares received in total number of shares. Each share is the claim in the firm's income left after payment of all expenditure.

The ownership of a firm's stock has typically been represented by a single certificate, with the number of shares held by the particular investors noted on it. Such a stock certificate is usually registered, with the name, address, and holdings of the investor included on the corporation's books. Dividend payments, voting material, annual and quarterly reports and other mailings are then sent directly to the investor, taking into account the size of his of her holdings.

Shares of stock held by an investor may be transferred to a new owner with the assistance of either the issuing corporation or, more commonly, its designated transfer agent. This agent will cancel the old stock certificate and issue a new one in its place, made out to the new owner. Frequently, a registrar will make out to the new owner. Frequently, a registrar will make sure that this canceling and issuing of certificates has been done properly. Usually, banks and trust companies act as transfer agents and registrars. Many stockholders have chosen to avoid these rather cumbersome procedures. Instead depository arrangements are used, which substitute computerized records for embossed certificates" *(Sharpe, Alexander and Bailey, 1999:502)*

2.1.3 Securities

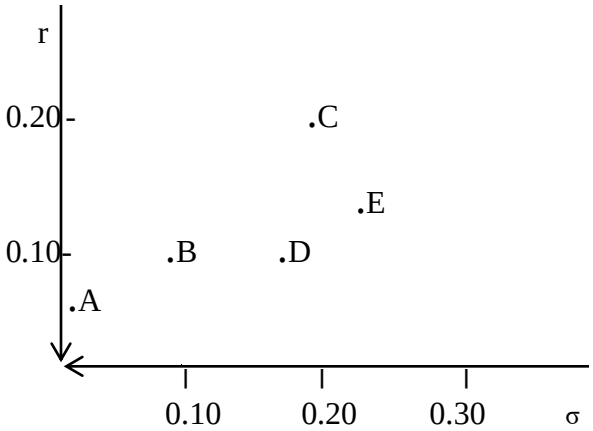
The investment environment encompasses the kinds of marketable securities that exist and where and how they are bought and sold. Securities are normally the shares, debentures, preferred stocks, warrant, convertibles or any other financial certificates issued by the finance companies to the general public. These certificates are issued at a certain price called par value and are transferable from one person to another. In simple way, we can understand securities as the promissory paper that the company gives to the investors after receiving certain rupees as loan or share.

The first issue of concern is how an individual selects the specific securities to be held during the current period. Assume that our knowledge of the individual's attitudes towards risky investment is that for a given expected return the alternative with minimum standard deviation will be preferred and for a given standard deviation the alternative with the maximum expected return will be preferred. The standard deviation as a measure of risk will be used here rather than variance.
Consider the following situation. There are five different securities that have the following characteristics to be evaluated.

Security	Expected return (r)	Standard Deviation (σ)
A	0.05	0.00
B	0.10	0.08
C	0.22	0.20
D	0.10	0.18
E	0.15	0.20

If you were to choose only one of these securities, which would you pick? As an aid in answering that question suppose we plot the securities as in the following figure. By the assumption of attitudes made above, securities D and E are ruled out as choices because B offers less risk for the same return than D and security C offers more return than E and

has the same risk. We are left with the choice among A, B and C. If there are no other alternatives, nothing else could be said without knowing the utility function of the individual faced with these choices. However, people have the option of investing in more than one security and may also be able to borrow to finance additional investment. If so then there are many more alternatives available even in this simple situation.



"The term security will be used to refer to a legal representation of the right to receive prospective future benefits under stated conditions" *(Sharpe, Alexander and Bailey, 1993:3) Ross, Westerfield and Jaffe (1998:272)* have pointed out the characteristics of individual securities as:

a) Expected Return: This is the return that an individual expects a stock to earn over the next period. Of course, because this is only an expectation, the actual return may be either higher or lower. An individual's expectation may simply be the average return period a security has earned in the past. Alternatively, it may be based on a detailed analysis of a firm's prospects, on some computer based model or a specific (or inside) information.

b) Variance and Standard Deviation: There are many ways to assess the volatility of a security's return. One of the most common is the variance, which is a measure of the squared root of the variance, may be thought of as a standardized version of the variance.

c) Covariance and Correlation: Returns on individual securities are related to one another. Covariance is a statistic measuring the interrelationship between two securities. Alternatively, this relationship can be restated in terms of the correlation between two securities. Covariance and correlation are building blocks to an understanding of the beta coefficient.

"Of the all forms of securities, common stocks (Equity Shares) appear to be the most romantic, while fixed income investment revenue may be more important to most of the investors, equity shares seem to capture their interest most. The potential rewards and penalties associated with equity shares make them an interesting even exciting proposition, no wonder equity investment is favorite topic for conversation in parties and get-together" *(Chandra, 1995:93)*

2.1.4 Meaning and Concept of Risk and Return

Risk and Return are most important concepts in finance. In fact, they are the foundation of the modern finance theory. What is Risk? How is it measured? What is Return? How is it measured? So this study attempts to focus on the concepts of risk and return with respect to the trade off between risk and return.

2.1.4.1 Concept of Return

Over the years most companies pay dividends to shareholders. If the company is profitable, it generally will distribute some of its profits to shareholders. Therefore as the owner of shares of stock, the shareholders will receive some cash called dividend, during the year. This cash is called the income component of shareholder's return. In addition to the dividends, the other part of return is the capital gain-or, if it is negative, the capital loss (negative capital gain)-on the investment.

The capital gain like the dividend is the past of the return that shareholders require to maintain their investment otherwise capital loss.

The total return on investment is the sum of the income and the capital gain of loss on the investment:

Total return = Dividend income + Capital gain

The conceptual meaning of return may very between financial experts:

"The return from an investment is the realizable cash flow earned by its owner during a given period to time. Typically it is expressed as a percentage of the beginning of period value of the investment" *(Chandra, 1997:62)*

"The rate of return from a capital investment is a concept that has different meanings to different investors. Some companies seek near- term cash inflows and give less value to more distant returns. Such a firm might purchase the stock of other firms that pay large cash dividends. Other investors are concerned primarily with growth. They would seek projects that offer the promise of long-term, higher-than-average growth of sales and earnings. Still others measure return using financial ratios. They might seek to invest in a company that has a high return on investment or equity" *(Hampton, 1983:341)*

"The investment return is defined as the after-tax increase in the value of the initial investment. The increase in value can come from two sources: a direct cash payment to the investor or an increase in the market value of the investment relative to the original purchase price" (Cheney and Moses, 1992:30)

"The rate of return is the percentage increase in our wealth associated with holding the stock for the period. Our dollar return is equal to cash dividend received during the period plus the change in the value of the stock in the period. Our percentage rate of return is equal to the dollar return dividend by the market value of the stock at the beginning of the period" *(Haugen, 1997:39)*

Thus return can be defined as the net proceeds after tax from given investment alternatives. Return increases the value of initial investment after deducting tax.

2.1.4.1.1 Classification of Measurement of Return

(a) On the Basis of Time Period of Investment

i) Single Period Measurement

ii) Measurement of return over several periods

iii) On the Basis of Average of Return

i) Annualized HPR (AM)

ii) Geometric HPR (GM)

(b) On the Basis of Form of Return

i) Required rate of return

ii) Expected rate of return

(a) On the Basis of Time Period

Single Period Measurement: "The return from holding an investment over some period say a year is simply any cash payments received due to ownership, plus the change in market price, dividend by the beginning price" *(Vanhorne and Wachowicz, 1992:1-2)*

The single period rate of return is the basis random variable in investment analysis. This rate of return concept is important because it measure the speed at which the investor's wealth increases or decreases. An investment's single period rate of return, denoted r, is simply the total return an investor would receive during the investment period or holding period stated as a percent of the investment's price at the start of the holding period.

$$r = \frac{\text{Ending wealth} - \text{Beginning wealth}}{\text{Beginning wealth (or, purchase price)}}$$

An investor can obtain two kinds of income from an investment in a share of stock or bond:

i) Income form price appreciation (or losses from price depreciation), sometimes called capital gains (or losses). This quantity is denoted $P_t - P_{t-1.}$

ii) Cash flow income from cash dividend or coupon interest payments represented by the convention $C_{t.}$

The sum of these two sources of income (or loss) equals the change in the invested wealth during any given holding period. The rate of return formula can be restated in a form appropriate for almost any investment.

$$r_t = \frac{\textit{Price change + cash flow (if any)}}{\textit{Price at beginning of the period}} = \frac{(P_t - P_{t-1}) + C_t}{P_{t-1}}$$

Where,

P_t = market price at end of period t.

P_{t-1} = price at end of period t-1.

C_t = cash flow income received during the t th period (Francis, 1992:1-2)

The return is the change in the value of an asset plus any cash distribution, expressed as a percentage of the beginning price. "The return on any investment is measured as the total gain or loss experienced on behalf of the owners over a given period of time. It is commonly stated as the change in value plus any cash distribution expressed as a percentage of the beginning of period investment value" *(Gitman, 2001:211)*
Similarly, *Fischer and Jordan (200:6)* appropriately remarked that the rate of return achieved is the composite of dividend yield and change in price (capital gain yield)

* **Measurement of Return Over Several Periods**

The rate of return of a share may be calculated for a period longer than one year. "The average rate of return is the sum of the various one- period rates of return dividend the number of periods" *(Pandey, 1995:323)*
Symbolically,

$$\bar{R} = \frac{1}{n}[R_1 + R_2 + ... + R_n]$$

$$= \frac{1}{n}\sum_{t=1}^{n} R_t$$

Where, $\bar{R}$ = Average rate of return
R_1, R2….R_t = Observed rates of return in period 1, 2……t
n = total number of periods

(b) On the Basis of Average of Return

* **Annualized HPR**

Annualized HPR is simply an arithmetic mean of HPRs of different years.

$$\overline{HPR} = \frac{HPR_1 + HPR_2 + ... + HPR_n}{n}$$

Where,
HPRn = Amount of return received during years.
n = number of years of investment horizon.

Merits

* Simple to calculate

Demerits

* The annualized HPR ignores compounding effect.
* If there is large difference between the incomes of subsequent years the HPR does not scientifically pot ray or depict the real picture.

Geometric HPR
The geometric average is defined as the nth root of the product resulting from multiplying a series of returns together.

Geometric $\overline{HPR}_g = \sqrt[n]{t=1}\left(\left(1 + HPR_t\right)^{1/n} - 1\right.$

Where,

$\overline{\quad}$) (= Product of multiplication

Merits

The geometric mean considers compounding effect and reinvestment of income which is ignored by annualized HPR. Further the geometric mean is always equal to or less than arithmetic mean. Both of them will only be equal when the HPR_s are constant over the investment horizon.

(c) On the Basis of Form of Return

*** Required Rate of Return**

Required rate of return is the minimum return that an investor expects at least not to suffer from loss.

"When setting the required rate of return on an investment, an investor must consider the real rate of return, expected inflation, and risk. Because consumption is forgone today, the investor is entitled to a rate of return that compensates for this deferred consumption. Since the investor expects to receive an increase in the real goods purchased later, and assuming, for the moment, zero expected inflation and risk, the required rate could equal the real rate of return, in which case it would represent the pure time value of money. The capital markets determine this rate based upon the supply of money to be invested relatively to the demand for borrowed money" *(Cheney and Moses, 1992:33-34)*

Thus, when setting the required rate of return an investor must consider following 3 components.

- **Real Risk Free Rate of Return: -** It denotes the time value of money. This rate is determined by capital market depending upon the demand and supply of capital.
- **Expected Inflation: -** It denotes the future price appreciation of goods which the investor has planned to purchase through the return of his investment after the retirement of scheme.
- **Risk: -** Risk generally denotes uncertainty of getting back interest and principal amount.

* **Expected Rate of Return**

The return that an investor expects from his investment in the forthcoming future is called expected rate of return. Expected rate of return depends upon the future cash receipt over investment horizon. Expected rate of return remains unknown to the investors. That is why it is also called as ex-ante return of investment.

"As its name would imply, the expected rate of return tells what we expect to get from the stock as a rate of return in the course of the next period (say month)" *(Haugen, 1997:63)*

Similarly, Chandra (1997.63) has defined the expected rate of return as when the rate of return can taken several possible values because of investment risk, it is common to calculate the expected rate of return, a measure of central tendency.

"If an investment is to be made, the expected rate to return, or the expected holding period return, should be equal to or greater than the required rate of return for that

investment. The expected rate of return is based upon the expected cash receipts (eg., dividends or interest) over the holding period and the expected ending, or selling price. The expected rate of return is an ex-ante, or unknown, future return. Unless the rate of return id guaranteed, most investors recognize that several rates of return are possible. Investors summarize these possible rates of return into a single number called the expected rate of return."*(Cheney and Moses, 1992:34)*

"The expected rate of return for any asset is the weighted average rate of return using the probability of each rate of return as the weight. The expected rate of return is calculated by summing the products of the rates of return and their respective probabilities" *(Francis, 1992:11)*

Probability distributions are used to describe possible outcomes and to assign individual probabilities from zero (non chance of occurring) to one (Full certainty that the outcome will happen), to each possible outcome. Expected rate of return will always be more than required rate of return. It is therefore when an investor has higher expected rate of return or at least equal to the required rate of return then only investment alternative is acceptable.

The expected rate of return can be calculated as:

$$E(HPR) = \sum_{j=1}^{n} P_J \ HPRj$$

Where,
E (HPR) = Expected rate of return.
P_j = Probability associated with return of investment.
HPR_j = Holding period return of investment.

Decisions regarding investment are based on expectations about the future. But future events are uncertain. So, assigning probability to uncertain future events is quite difficult. When future events are not possible to obtain for calculating the expected rate of return, in such a condition, the historical data are used to calculate the rate of return.
Mathematically,

$$E(HPR) = \frac{\sum HPRs}{N}$$

Where,
E (HPR) = Expected rate of return.
Σ HPRs = Sum of the returns of N years.
N = Total number of years.

2.1.4.2Concept of Risk

The dictionary meaning of risk is the chance of injury, damage or loss. In the most basic sense, risk can be defined as the chance of loss or uncertainty of getting back both interest (return) and principal amount invested. Assets having greatest chances of loss are viewed as more risky than those with lesser chances of loss. More formally, the term risk is used interchangeable with uncertainty to refer to the variability of expected returns

associated with a given asset. For instance, a government bond that guarantees its holder Rs.1000 interest after 30 days has no risk, since there is no variability associated with the return. An equivalent investment in the common stock of a firm that may return over the same period any where form Rs.0 to Rs.2000 is very risky because of the high variability if returns. The more certain return from an asset, the less variability and therefore the risk. "Risk refers to the amount of variability among the outcomes associated with a particular strategy. Where there is only one probable outcomes of a decision, there is said to be little risk; where there are many possible outcomes with substantially different dollar retunes, there is said to be substantial risk" *(Peterson and Lewis, 2001:464)*

"Risk may be defined as the likely hood that the actual return from an investment will be less than the forecast return. Stated differently it is the variability of return from an investment" *(Hampton, 1983:340)*

"Risk can be defined as a financial loss or more formally, the variability of returns associated with a given asset" *(Gitman, 2001:211)*

The term risk also can be defined as uncertainty as to one outcome of an event when two or more possibilities exist. Risk can be used synonymously as chances of loss or injury, a hazard, a peril, volatility of returns, variation of outcomes, and dispersion of return and so on.

"Risk refers to the dispersion of a probability distribution: How much do individual outcomes deviates form the expected value? A simple measure of dispersion is the range of possible outcomes, which is simply the difference between the highest and lowest outcomes" *(Chandra, 1997:64)*

An investment risk is associated with the probability of earning a return less than expected return- the greater the chance of low or negative returns, the riskier the investment.

"The risk as the term with reference to investment decision may be defined as the variability in the working life in relation to estimating returns as forecast at the end of time of the initial capital budgeting decision." *(Khan and Jain, 1980:64)*

The difference between risk and uncertainty as defined by the statistician is related to the decision maker's knowledge of the probabilities, or chances of certain outcomes occurring. Risk exists when the decision maker is able to estimate the probabilities associated with various outcomes. Objective probability distributions are normally based on historical data. For instance, if a person wishes to determine the probabilities associated with a given asset's returns, he or she can develop a distribution of probabilities based on historical return data on other assets of the same type. Uncertainty exists when the decision maker has no historical data and must make educated guesses in order to develop a subjective probability distribution.

For example, if the proposed asset is new to the firm, the decision maker, through research and consultation with others, may be able subjectively to assign probabilities to various return outcomes. Thus, probabilities are after used to assess more accurately the risk involved in an asset. Risk can be equated with the probability of variance of actual return form the expected one in respect of a project financed. The risk associated is obviously the resultant effect of a probable negative variance (i.e., actual return is less than probable one) in which case the unit assisted may not be in a position to pay back the loan.

2.1.4.2.1 Measurement of Risk

(a) Standard Deviation (σ)

(b) Beta (β)

(a) Standard Deviation Method

The most common statistical measure of an asset's risk is the standard deviation forms the mean or expected value of return. The standard deviation of a distribution of asset returns represents the square root of the average squared deviations of the individual outcomes from the expected value. The first step in calculation the standard deviation of a distribution to returns is to find the expected value, E (HPR) that is given by,

$$E(HPR) = \sum_{j=1}^{n} HPR_j . P_j$$

Where,

E (HPR) = Expected rate of return

HPR_j = Holding period return of investment

P_j = Probability associated with return of investment

n = Number of outcome considered.

The expression for the standard deviation of the probability distribution of returns is given

$$\sigma HPR = \sqrt{\sum_{j=1}^{n} \left(HPR_j - \overline{HPR}\right)^2 \times P_j}$$

It can be seen from this equation that the standard deviations represent the square root of the sum of the product of each deviation form the expected value, E (HPR), squared and the associated probability of occurrence.

The formula commonly used to find the standard deviation of returns σHPR, in a situation where the outcomes are known and their related probabilities are assumed equal is

$$\sigma(HPR) = \sqrt{\sum_{j=1}^{n} \frac{\left(HPR_j - \overline{HPR}\right)^2}{n}}$$

Where n = number of observations.

Our primary concern with standard deviations lies in their use in comparing asset risk. One must be careful in using the standard deviation to compare risk, since it is an absolute

measure of dispersion and does not consider the dispersion of outcomes in relationship to an expected value.

In comparisons of assets with differing expected values, the use of the standard deviation can easily be improved upon by converting the standard deviation into coefficient of variation. The coefficient of variation is generally computed only for data that are non-negative. The C.V. measures per unit risk in percent of an asset in the financial analysis but when there is negative expected return in that case coefficient of variation could come negative value. Negative value of coefficient of variation could not measure per unit of risk. Some statistician explain that the negative value of C.V. should be made positive value to see the variability (scatter of data) but this explanation would not satisfy the purpose of financial analysis and interpretation of data, that means this is the shortcoming of the coefficient of variation for in the field of financial management. The coefficient of variation is calculated by dividing the standard deviation, σHPR, for an asset by its expected value $\overline{HPR}$. The equation for CV is

$$\text{C.V.} = \frac{\sigma HPR}{\overline{HPR}}$$

A distribution with smaller C.V. is said to be more homogeneous or uniform than the distribution with greater C.V.

Standard deviation is the only absolute measure of risk, depending upon the units of measurement. Also

Standard deviation = $\sqrt{Variance}$

"The variance of return (given that we have subjective probability estimates and sampling statistics) is defined as the average of the mean squared error terms. A mean squared error is simply the square of the difference between a given return, R_i, and average of all returns, E(R):

Mean squared error = $[R_i - E(R)]^2$ " (Weston and Copeland, 1989:364)

Symbolically,

$$\text{Variance, VAR (R)} = \sum_{i=1}^{n} P_i \left[HPR_i - E(HPR)\right]^2$$

Where,

P_i = Probability associated with i^{th} outcome.

HPR_i = Holding period return of investment.

E (HPR) = Expected rate of return.

n = Number of outcomes considered.

When variance is estimated from a sample from a of observed returns (historical data), variance is calculated by adding the squared deviations and dividing by N-1 rather than 'N' to correct for that is called the loss of a degree of freedom.

Mathematically,

$$\text{VAR (R)} = \frac{1}{N-1}\sum_{i=1}^{n}\left[HPR_i - E(HPR)\right]^2$$

Where,

N = Total number of observation or years taken for the study.
HPR_i = Holding period return of investment.
E (HPR) = Expected rate of return.

"The standard deviation and the variance are equally acceptable and conceptually equivalent measures of an asset's total risk" (Francis, 1992:12-13)

Chandra (1997:78) has stated the principal reasons for using standard deviation seem to be:

- If a variable is normally distributed, its mean and standard deviation contain all the information about its probability distribution.
- If the utility of money is represented by a quadratic function (a function commonly suggested representing diminishing marginal utility of wealth), then the expected utility is a function of mean and standard deviation. *Chandra (1997:64)* has pointed out the following features of standard deviation.
- The differences between the various possible values and the expected value are squared. This means that value which are far away form the expected value have a much more effect on standard deviation than values, which are close to the expected value.
- The squared differences are multiplied by the probabilities associated with the respective values. This means that the smaller the probability that a particular value will occur, the lesser its effect on standard deviation.
- The standard deviation is obtained as the square root of the sum of squared differences (multiplied by their probabilities). This means that the standard deviation and expected value are measured in the same units and hence the two can be directly compared.

(b) Beta

Beta is a modern scientific technique of measuring a security's risk. It is an indicator of the relationship between an individual investment's return and the general market return. The beta coefficient is an index of systematic risk. Systematic risk is that risk which cannot be diversified away. A detailed study of beta as a modern technique of measuring risk and its computation will be described in detail in the later phase.

In the context of measuring risk Hampton (1983:340-41) has identified the following three methods as commonly used to measure risk.

- **Beta Coefficient: -** This is a mathematical value that measures the risk of an asset in terns of its effects on the risk of a group of assets, called a portfolio. It is concerned solely with market related risk, as would be the concern for an investor holding stocks and bonds. It is derived mathematically so that a high beta indicates high level of risk; a low beta represents a low level of risk.
- **Standard Deviation:** - This is a measure of the dispersion of forecast returns when such returns approximate a normal probability distribution. It is a statistical concept and is widely used to measure risk from holding a single asset. The standard deviation is derived to that a high standard deviation represents a large dispersion of return and is a high risk; a low deviation is a small dispersion and represents a low risk.
- **Subjective Estimates:** - A subjective risk measure occurs when qualitative rather than quantitative estimates are used to measure dispersion. As an example an analyst may estimate that a proposal offers a "Low" level risk. This means that, in the analyst's view,

the dispersion of returns will not be very wide. Similarly, a "high" risk level will accompany a project whose forecast returns may very a great deal.

2.1.4.2.2 Sources of Investment Uncertainty

"Every investment involves uncertainties that make future investment returns risky" (*Francis, 1992.3)*

The sources of uncertainty that contribute to investment risk are as follows:-

1. **Interest Rate Risk:-**
   Interest rate risk is defined as the potential variability of return caused by changes in the market interest rates. If market interest rise, then investment's value, market prices will fall and vice-versa. The variability of return that results is interest rate risk. The interest rate risk affects the price of bonds, stocks, real estate, gold, puts, calls, futures contracts, and other investments as well.
2. **Purchasing Power Risk:-**
   Purchasing power risk is the variability of return an investor suffers because of inflation. Economists measure the rate of inflation by using a price index.
3. **Bull-Bear Market Risk:-**
   Bull-Bear market risk arises from the variability in market returns resulting from alternating bull and bear market forces.
   When a security index rises fairly consistently from a low point, called a trough for a period of time, this upward trend is called a bull market. The period during which the market declines to the next trough is called a bear market. The alternating bull and bear market forces create a perennial source of investment risk.
4. **Management Risk:-**
   Management risk refers errors made by business managers can harm those who invested in their firms.

5. **Default Risk:-**
   Default risk is that portion of an investment's total risk and results from changes in the financial integrity of the investment. The variability of return that investors experience as a result of changes in the credit worthiness of a firm in which they invested is their default risk.
6. **Liquidity Risk:-**
   Liquidity risk is that portion of an asset's total variability of return which results from price discounts given or sales commissions paid in order to sell the asset without delay.
7. **Call Ability Risk:-**
   Call ability risk is that portion of a security's total variability of return that derives from the possibility that the issue may be called. Call ability risk commands a risk premium that comes in the form of a slightly higher average rate of return. This additional return should increase as the risk that the issue will be called increases.
8. **Convertibility Risk:-**
   Convertibility risk is that portion of the total variability of return from a convertible bond or a convertible preferred stock that reflects the possibility that the investment

may be converted into the issuer's common stock at a time or under terms harmful to the investor's best interests.

9. Political Risk:-

Political risk arises from the exploitation of a politically weak group for the benefit of a politically strong group, with the efforts of various group to improve their relative positions increasing the variability of return from the affected assets. Political risk may be international or domestic political risk

10. Industry Risk:-

Industry risk is that portion of an investment's total variability return caused by events that affect the products and firms that make up on industry.

2.1.4.2.3 Techniques used for Evaluation of Risk

1) Sensitivity Analysis

It is a technique used to determine which of the many variables are the most critical for the success of failure of a project. Variables that are commonly analyzed include raw material cost, sales value, selling price, other variable costs, project life,plant capacity etc. After identification of the critical factors, the project appraiser asks the question, "What happens if we change one or more variables in the project?" This will help him or her to ascertain the intrinsic strength of the unit. For instance, what happens if the sales volume goes down by 5 percent of if the price of raw material goes up by 5 percent or what happens if both to them occur together? Higher the sensitivity of operations and profitability of a unit to the variations the critical factors, greater the risk.

2) Certainty Equivalent Method

In this approach, the risky cash flows are converted to a 'risk-less' of certain equivalent value. This conversion is normally done with a hypothetical assumption regarding the future inflow of funds. The greater the risk of an expected cash flow, the smaller will be the certainty equivalent value.

3) Adjustment of Discount Rate

Under this method, a premium equivalent to the risk element is added to the given discount rate and then net present value (NPV) is computed, which gives an indication of the extent of risk coverage. This gives a fairly good idea regarding the risk absorption capacity of the proposed unit. In order to decide the exact premium to be added one can take to help of capital asset pricing model (CAPM).

4) Predetermined Payback Period

Under this method, a predetermined maximum payback period is fixed and a project's cash flows are computed with reference to that period. However for very high capital-intensive projects, this approach may not be realistic.

5) Statistical Techniques

Probability estimates of cash flow dispersion/spread of returns, computation of variance of NPV, simulation modeling are some of the complex statistical techniques used for evaluating project risks. However, considering the time constraint these techniques are hardly used except for very large projects.

6) Financial Analysis

By applying various appraisal techniques, the degree or extent of risks in different categories can be evaluated to a reasonable extent. However, all risks are, to a certain extent, interdependent to each other. For example, high business risk leads to high financial risk and also to high default risk. Again high financial risk leads to high default risk. Similarly high cost base leads to high financial risk and also to high default risk. Further, high fiduciary risk leads to high financial risk and also to high default risk.

Thus, the loan appraiser's responsibility is to ensure an optimum balance in all "five legs" of risk and reduce the risk by suggesting suitable alternatives to theentrepreneur. For example, a new entrepreneur may be advised to go in for rented/leased-land/building rather than to purchase the same, as it will substantially reduce the fixed cost. It will also bring down the break-even point and improve the safety margin of operations.

7) Credit Review System

The nature of credit review systems may very based on institution's size, complexity, and managements of a review system; may include components of a traditionalcredit review function that is independent of the lending function, or it may place some reliance on credit officers. In addition, the use of the term "credit review system" can refer to various responsibilities assigned to credit administration, loan administration, problem loan workout, or other areas. These responsibilities may range form administering the internal problem loan reporting process to maintaining the integrity of the credit grading process. (e.g., ensuring that changes are made in credit grades as needed) and coordinating the information necessary to assess the adequacy of the allowance fur losses.

2.1.5 Theories of Risk and Return

2.1.5.2 Introduction

Any theory based on the concepts of risk and return is known as risk and return theory. Portfolio Theory, Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory are the most important and popular theories used to analyze risk- return of an investment.

2.1.5.2 Portfolio Theory/Mean Variance Theory

2.1.5.2.1 Meaning of Portfolio Theory

Portfolio theory was originally proposed by Harry M. Markowitz an applied economist, in his article, "Portfolio Selection", published in journal of Finance in 1952. Portfolio is a mixture of securities, assets, stocks, properties etc. Portfolio theory suggests how a risk averse investor can select an optimal portfolio. A risk- averse investor is an investor who selects a portfolio that maximizes expected return for any given level of risk or minimizes risk for any given level of expected return. That is, a risk averse investor will select only efficient portfolios.

Since the utility of the investor is a function of mean return and variance of return, portfolio theory is also referred to as the mean-variance portfolio theory or two-parameter portfolio theory.

With an individual investment, we must consider risk of more specifically our attitudes towards the undesirable events that might occur. As soon as the firm is considering the purchase of more than one asset, we must consider risk not of the individual assets but of the entire collection of assets. So it seems that the outcome of the investments, however, the uncertainty about the joint outcomes is eliminated. "A portfolio is a bundle of combination of individual assets or securities" *(Pandey, 1999:329)*

Portfolio theory is a normative theory. Normative means "Normal" or "Standard".
In economics a normative theory refers to the "Normal" way consumers behave.
According, portfolio theory (or Markowitz theory) delineates the decisions that will be made by a population of normal investors- each exercising his or her personal preferences. Thus, the portfolio theory provides a normative approach to theinvestors' decision to investment in assets or securities under risk.

Specifically, portfolio theory holds that all investors are risk averse. This means that, other things being equal all rational investors will avoid risk or hold well- diversified portfolio instead of investing their entire wealth in a single asset or security. If investor holds a well-diversified portfolio, then his concern should be the expected return and risk of portfolio rather than individual assets or securities."The objective of portfolio analysis is to develop a portfolio that has the maximum return at whatever level of risk the investor deems appropriate" *(Francis, 1992:228)*

2.1.5.2.2 Assumptions of Portfolio Theory

A portfolio is simply a combination of assets. Portfolio theory shows how in investor can reach his optimal portfolio position. Portfolio theory is, essentially, a defensive technique to counter the problem of investment risk. Portfolio performance coincides with out intuitive risk ranking. The assumptions of portfolio theory are as follows.

1. Investors are risk averse. But there are some investors who prefer risk to return. For example, gambles. Risk aversion means that the investor prefers less risk to high risk of prefers more return. Risk-seekers/loves, risk neutrals and risk averters are the various types of investors.

"Alternatively, an individual is said to be risk averse if the utility of expected wealth is greater than the expected utility of wealth i.e., if

U [E (w)]>E [U (w)] ⟶ Risk Aversion

If the utility of expected wealth is equal to the expected utility of wealth, then investor is said to be risk neutral, that is,

U [E (w)] = [U (w)] ⟶ Risk Neutrality

Finally, an investor is said to be risk seeking if the utility of expected wealth is less than expected utility of wealth, i.e.

U [E (w)] < [U (w)] ⟶ Risk Seeking"

(Peterson and Lewis, 2001:470)

2. The returns from an asset or security is the expected return, that is the weighted average value returns, weights being the probability distribution returns for same period.

3. The risk of returns from an asset of security of the variability of returns from the average value of returns, which is the standard deviation or variance.
4. An investor makes investment (portfolio) decisions purely on the basis of risk and return of that asset or portfolio. That is, the utility function (or the indifference curve) of the investor is based on risk and return.
5. Investors adhere to the principle of dominance that means investors prefer the asset which has high return for any given level of risk than the which has low return, they prefer the asset which has low risk for any given level of return that the asset which has high risk.

2.1.5.2.3 Risk and Expected Return of a Portfolio

(a) The Portfolio's Rate of Return

Portfolio return is simply the weighted average return of individual securities which are combined in certain ratio in portfolio and the weights being the proportion invested in individual securities i.e., A,B,C,D…….Suppose we consider a single period of time; say a month. If the individual securities in the portfolio produce various rates of return, what will be the return to the portfolio as a whole? Let us consider a portfolio of two securities and first consider the rupee return to the portfolio. We will assume we have Rs. 1000 to invest, and we put Rs. 400 of it in security A and Rs. 600 in security B. In the next month, a produces a rate of return of 10 percent (a rupee return of Rs.40) and B produces a rate of return of 6 percent (Rs.36). What is the rupee rate of return to the portfolio?

The rupee returns to the portfolio it obviously the sum of the rupee returns to the two securities.

Rs. 76 = (Rs.400 × .10) + (Rs. 600 × .06)

Rs. 76 = Rs.40+Rs.36

The percentage rate of return to the portfolio is given by the rupee return divided by the amount we have invested, which in this case is Rs.1000. Dividing both sides of the above equation by Rs.1000 we get

$$7.6\% = \frac{Rs76}{Rs1000} = \left(\frac{Rs400}{Rs1000} \times 0.10\right) \times \left(\frac{Rs600}{Rs1000} \times .03\right)$$

$R_P = W_A \times R_A + W_B \times R_B$

The term w is the fraction of money we are investing in each security. Thus the rate of return to our portfolio, in any given period of time, is a weighted average of the rates of return produced by the securities in the portfolio, where we are weighting by the fraction of our money that we are investing in each security. These fractions are also called portfolio weights. When summed they add up to 100 percent, and they are computed as.

$$W_A = \frac{\text{Rupee amount of security a bought (sold short)}}{\text{Total equity investment in the portfolio}}$$

A portfolio weight can either be positive or negative. A positive weight means we are buying the security; we also refer to this as taking a long position in the security. The opposite of taking a long position is taking a short position, or selling short. In this case the portfolio weight is negative because the numerator is negative.

Selling a security short isn't quite the same as selling some security that we happen to own. For example, when we sell stock short, we borrow shares of stock from someone (Usually through our broker). We're obligated to return to this person, after a certain period of time, the same number of shares we borrowed. Suppose Shyam borrows 100 shares of NIC stock from Ram. Then the Shyam turn around and sell it for Rs.10 per share, collection Rs.1000. After a period of , the stock falls Rs.5 per share. Shyam then go back into the market and buy 100 shares back for a total Rs.500. Shyam then return the 100 shares that the he borrowed from Ram, and the short sales is completed. Shyam have made a profit on this short sale, the difference between the Rs.1000 Shyam got for the borrowed stock when he sold it and the Rs.500 it took to buy the stock back later in the market. However, if the stock paid any dividends between the times Shaym sold it and the time he bought it back, Shyam would have to pay cash, in the amount of these dividends to Ram, the person from whom Shyam borrowed the stock.

Suppose Shyam have Rs.1000 of his own money and he sells short of Rs.600 of stock B and use this money in addition to his money to buy Rs.1600 stock A. What are his portfolio weights? Shaym is buying Rs.1600 of stock A, Which 160 percent of his Rs.1000 equity W_A is 1.6. At the same time Shaym is selling Rs.600 of stock B which is -60 percent of his equity investment. The sigh is negative because Shyam is doing the opposite of buying the stock – he is selling it. It is to be noted that the two portfolio weights still add up to 100 percent.

Now suppose that in the period of time Shyam is holding this stock position, stock A produces 20 percent rate of return and stock B produces a 10 percent rate of return. What's his rate of return on the "portfolio" of the two stocks?

$R_P = (W_A . R_A) + (W_B . R_B)$

$0.26 = (1.6 \times .20) + [(-0.6) \times .10]$

To verify this, let us consider Shyam have got a profit on his long position of Rs 320 (.20 × Rs.1600). He has also got a Rs.60 loss the short sale, since he sold stock B for Rs.600 and repurchased it for Rs.660 (a 10 percent increase).His net profit therefore is Rs.260. Since he initially invested Rs.1000 of his own money, this represents a 26 percent rate of return on his investment. "Expected rate of return to a portfolio is a simple weighted average of the expected rates of return to the securities that are included in the portfolio. The weights are gained equal to the fractions of our own money that we are investing in each security" *(Haugen, 1997:69-70)* The general formula for the expected return of a portfolio is as follows.

$$E(R_P) = \sum_{i=1}^{n} Wij \; E\,(Rij)$$

J=1

Where,

$E(R_P)$ = Expected return on portfolio.

Wij = Weight of proportion of investment into assets/securities I and j.

E(Rij) = Expected returns of individual securities or assets i and j.

n = total number of different securities in the portfolio

To summarize, we can say that in any given period of time, the rate of return on our portfolio is a weighted average of the rates of return on the stocks in the portfolio. In taking the average, the weights are given by the fraction of our own money that we

are investing in each stock. If we are buying the stock in question, the weight assigned to the stock is positive; if we are short selling the stock, the weight is negative. In any case, the weight is 100 percent.

Portfolio Return – Two Asset case

In this case, the formula use will be,

$$E(R_P) = \sum_{i=1}^{n} (W_A)\, E(R_A) + (1-W_A)\, E(R_B)$$

Where,
$E(R_P)$ = Expected return on portfolio.
W_A = Weight or proportion of investment in asset A.
$E(R_A)$ = Expected return on asset A.
$E(R_B)$ = Expected return on asset B.
n = Total number of securities in the portfolio.

Portfolio Return – N asset case

$$E(R_p) = \sum_{i=1}^{n} (W_A)\, E(R_A) + (W_B)\, E(R_B) + \ldots\ldots\ldots\ldots\ldots\ldots W_n\, E(R_n)$$

Where,
$E(R_P)$ = Expected return on portfolio.
W_A = Weight or proportion of investment in asset A.
$E(R_A)$ = Expected return on asset A.
W_B = Weight or proportion of investment in asset B.
$E(R_B)$ = Expected return on asset A.
n = Total number of securities held in portfolio.

(b) Portfolio Risk

It is not easy to calculate portfolio risk. The reason is covariability between returns of securities combined in the portfolio. Portfolio risk is not only the weighted averageof individual securities included in a portfolio but also its covariance."Covarianceis a statistical measure of the degree to which two variables (e.g., securities returns) more together. Positive covariance shows that, on average the r two
variables more together. Negative covariance suggests that, on average, the two

variables move in opposite directions. Zero covariance means that the two variables show no tendency to vary together in either a positive or negative linear fashion.Covariance between security returns complicates our calculation of portfolio standard deviation. Still, this dark cloud of mathematical complexity contains a silver lining- covariance between securities provides for the possibility of elimination some risk without reducing potential return"*(Vanhorne and wachowicz, 1992:96)*

"The covariance number is an important one for us to know because it's a critical input in determining the variance of a portfolio of stocks". *(Haugen, 1997:48-49)*

So, portfolio risk the weighted average risk of individual securities combined in the portfolio and their covariability. The riskiness of a portfolio, as in the case of individual assets or securities, is measured by the variance or standard deviation of the portfolio rate of return. However, the variance (or standard deviation) of a

portfolio is not simply the weighted average of variances (or standard deviations) of individual securities. The portfolio variance (or standard deviation) is affected by the association of movement of returns of two securities. Covariance to two securities measures their co movement. *(Pandey 1995:332)* has identified the following three steps involved in the calculation of covariance.

- Determine the expected returns for securities.
- Determine the deviation of possible returns from the expected return for each security.
- Determine the sum of the product of each deviation of returns of two securities and probability.

"The covariance is a useful means of measuring how two random variables react to events" *(Bierman and Smidt 1986:75)*

If x and y are two securities, then the covariance can be calculated as:

$$Cov_{xy} = \sum_{i=1}^{n} [R_x - E(R_x)] [R_y - E(R_y)]. P_i$$

Where,
Cov_{xy} = Covariance of returns of securities X and Y
R_x, R_y = Returns of securities X and Y
$E(R_x)$, $E(R_y)$ = Expected returns of X and Y
P_i = Probability of occurrence of occurrence of the state of economy.

It can observed from the calculation of covariance of returns of securities x and y that it is a measure of the deviations of the securities and their association. Thus covariance can also be calculated as:
$Cov_{xy} = \sigma_x \sigma_y$ cov.xy.
Where,
Cov_{xy} = Covariance of returns of securities x and y.
$\sigma_x \sigma_y$ = Standard deviation of returns for securities x and y.
cov.xy = Correlation coefficient of securities x and y.

The variance of two security portfolio is given as:
$VAR(R_P) = \sigma^2_P = W_i^2 \sigma_i^2 + W_j^2 \sigma_j^2 + 2.W_i W_j Cov_{ij}$
Where,
σ^2_P = Variance of the portfolio.
σ_i^2 = Variance of individual asset i.
σ_j^2 = Variance of individual asset j.
$W_i W_j$ = Percentage invested on the asset I & j.

In the above formula of variance, there are three terms on the right hand side of the equation. The first term involves the variance of i (σ_i^2), the second term involves the variance of j (σ_j^2) and the third involves the covariance between two securities (Cov_{AB}). (It should be noted that $Cov_{A,B} = Cov_{B,A}$. That is, the ordering of the variables is not relevant when expressing the covariance between two securities).

The formula indicated an important point. The variance of a portfolio depends on both the variance of individual securities and the covariance between the two securities.The variance of a security measures the variability of an individual security's return. Covariance measures the relationship between two securities. From given variances of the individual securities, a positive relationship or covariance between the two securities increases the variance of the entire portfolio. A negative relationship or covariance between the two securities decreases the variance of the portfolio. If one of our securities tends to go up when the other goes down, or vice versa, our two securities are offsetting each other. We are achieving what we call a hedge in finance, and the risk of our entire portfolio will be low. However, if both our securities rise and fall together, we are not hedging at all. Hence, the risk of our entire portfolio will be higher.

The standard deviation of the portfolio's return is,

σ_P = SD (portfolio) = $\sqrt{Var(Portfolio)}$

Correlation coefficient, which is significant in portfolio construction, is standardized statistical measure of the linear relationship between two variables. The extent of the benefits of portfolio diversification depends on the correlation between returns of securities. The correlation coefficient will always lie between +1.0 and -1.0. Lesser the correlation higher will be the reduction in portfolio of risks. There are three influences to reduce portfolio risk in relation to the standard deviation of individual securities in isolation as:

- The extent to which the correlation between the returns from the individual securities is less than 1.0
- The number of securities in the portfolio.
- The proportions or weights of the individual securities in the portfolio in relation to their correlation among one another.

"The covariance number is unbounded. Theoretically, its range extends all the way from minus to plus infinity. We can bind it, however by dividing it by the productof the standard deviations from the two investments." *(Haugen 1997:48-49*

The correlation ρ_{XY} between two random variables is defined as the covariance divided by the product of their standard deviations.

Mathematically,

$$\rho_{XY} = \frac{Cov_{XY}}{\sigma_X \sigma_Y}$$

Where,

ρ_{XY} = Correlation coefficient between the returns on securities X and Y.

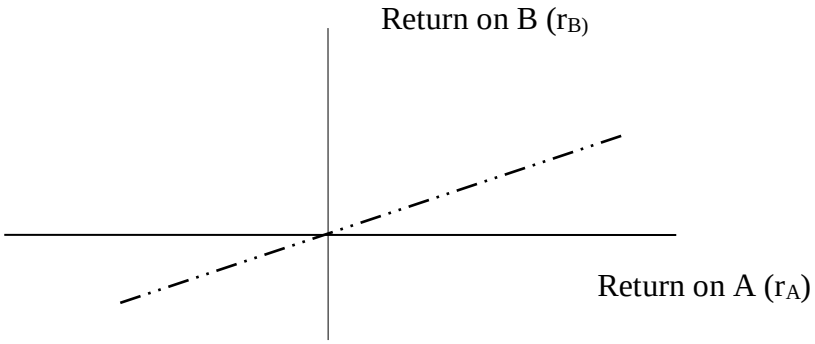
Cov_{xy} = Covariance of returns of securities X and Y.

σ_x σ_y = Standard deviation of the returns for securities X and Y.

A correlation coefficient of 1.00 indicates that an increase in the return for one security is always associated with a proportional increase in the return from the other security, and similarly for decrease. A correlation coefficient of -1.00 indicates than an increase in the return from one security is always associated with a proportional decrease in the return for the other security, and vice-versa. A zero coefficient indicates an absence of correlation, so that the returns of each security vary independently of the other.

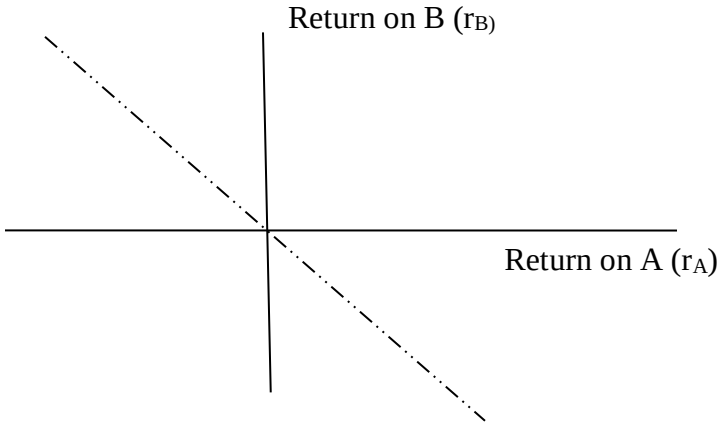
The concept of correlation coefficient can also be explained with the help of following figures.

Figure: 2.1.1
Perfect Positive Correlation



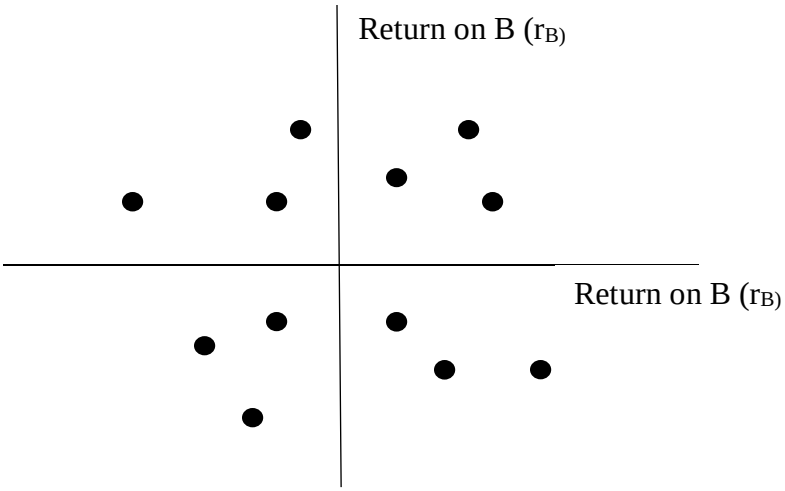
If the slope of the line passing through all the observations is positive, we have perfect positive correlation; if it's negative we have perfect negative correlation. It is seen in the figure 2.1.1 that all the points lie precisely on a straight upward sloping line. The means that when one of the two securities has relatively high return, then so will the other. Similarly, when one of the two securities have a relatively low return, then so will the other.

Figure:2.1.2
Perfectly Negative Correlation.



The returns on the two securities will have a perfectly negative correlation when the diagram shows or indicates that the points lie precisely on a straight downward sloping line as shown in fig. 2.1.2. In such a case the returns on the two securities can be seen to more opposite to each other. That is, when one security has a relatively high return, then the other will have a relatively low return.

Figure 2.1.3
Perfectly Zero Correlation.



The diagram fig. 2.1.3.shows that the security returns shows dispersion that cannot be represented even approximately by an upward sloping or downward – sloping line. In such an instance, the returns are uncorrelated, meaning that the correlation coefficient is zero. In this situation, when one security has a relatively high return, then the other can have either a relatively high, low or average return.

Portfolio Risk: N – Security Case

The calculation of risk becomes quite involved when a large number of securities are combined to form a portfolio.

Based on the logic of portfolio risk in a two-security case, the portfolio risk (measured as variance) in N – Security case can be calculated as follows:

σ_P^2 = n$\left[1/n\right]^2$ + average variance + (n^2 – n) $\left[\frac{1}{n}\right]^2$ × average covariance

= $\left[1/n\right]$ average variance + $\left[1-\frac{1}{n}\right]$× average covariance" (Brealey and Myers, 2000:142)

To summarize, the riskiness of a portfolio is a function of

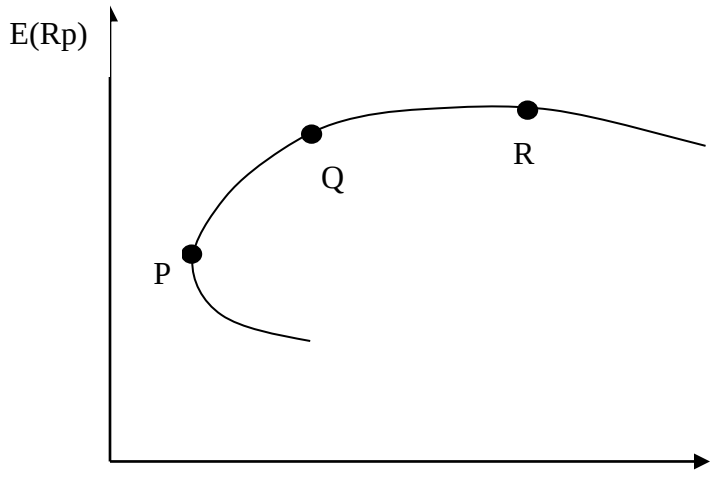
i.) the proportions invested in the components,
ii) the riskiness of the components, and
iii) the correlation of returns on the component securities.

2.1.5.2.4 The Efficient Frontier

The fact that the expected return and standard deviation of a given portfolio of n securities can be computed from the equations as, $E(R_P) = \sum_{i=1}^{n}$ Wij E (Rij) and J=1

$\sigma^2 p = \sum_{i=1}^{n} W_i^2 \sigma_i^2 + W_j^2 + \sigma_j^2 + 2Wi.Wj.\rho_{ij}\sigma_i\sigma_j$ does not answer the question of which $^{j=1}$ Securities should be held and in what propositions. There is an infinite number of possible portfolios that can form so long as there as least two security. This because the total investment can be allocated among the securities in any of an infinity of ways. However the set of possibilities can be thought of in general terms, assuming many securities.

Figure. 2.2
Efficient Frontier



Suppos [illegible] were plotted as in figure 2.2. We may observe that portfolio P has minimum risk. Portfolio P has low risk and low return than portfolio Q that has high risk and high return. Portfolio R has risk and low return as compared to portfolio Q. Thus portfolio Q dominates portfolio R. A risk averse investor will prefer a portfolio with the highest expected return for a given level of risk or prefer a portfolio with the lowest level of risk for a given level of expected return. In portfolio theory, this is referred to as the principle of dominance and the portfolio, which has the highest expected return for a given level of risk, is called efficient portfolio. "An efficient portfolio is the one that offers the largest return compatible with a specified degree of risk, or which minimizes the risk accompanying a sought – for level of return" (Christy and Clendenin, 1974:16) The frontier formed the set of efficient portfolios is called efficient frontier. "The efficient set of efficient defines the efficient frontier in risk – return space. The efficient frontier dominates all other asset". *(Francis, 1992:568)* In figure 2.2 the line PR is the efficient frontier and represents the locus of all portfolios, which have the highest for a given level of risk. All other portfolio, which lies outside the efficient frontier, is inefficient portfolios.

It may be observed that in figure 2.2 both portfolios P and Q are equally efficient – portfolio P has low risk and low return, while portfolio Q has high risk and high return, which portfolio investor will choose will depend on his risk – return preference.

Thus, efficient frontier is a curve in which the efficient portfolios lie. It indicates that the portfolio, which lies in the efficient frontier curve, is more efficient than portfolio, which lies below the curve. Because of lack of perfectly positive correlation the efficient frontier is concave.

2.1.5.3 Capital Asset Pricing Model

2.1.5.3.1 Concept and Meaning of Capital Asset Pricing Model (CAPM)

Much time and effort has been expended on developing a measure of risk and a system for using this measure in assessing returns. The two key components of that have emerged from this theoretical effort are beta, which is a statistical measure of risk, and the capital asset pricing model (PAPM), which links risk (beta) to the level of required return.

Over the past few years, a great deal of theory has been developed with respect to risk return trade offs. The most important aspect of risk is the overall risk of the firm as perceived by investors in the market place. This risk significantly affects investment opportunities and even more important, the owner's wealth. The basic theory with respect to risk and return is commonly called the capital asset pricing model (CAPM). It was developed to explain the behavior of security prices and provide a mechanism whereby investors could assess the impact of a proposed security investment on their overall portfolio risk and return.

The CAPM says that investors have available a market basket of risky securities and the opportunity to invest in securities with no risk of default. Risk preferences of investors dictate a combination of the market basket of the risky securities and the riskless securities. In equilibrium, the return of any security must be such that the investor expects to earn a basic return equal to the return on a default free security plus an adjustment that is heavily influenced by the "correlation" of the security's return and the market's return. If the return from the investment is positively correlated with the market return, the equilibrium return will be larger than the default free return. If the correlation is negative, the equilibrium return will be smaller than the default free return. We cannot prove that investors behave in manner consistent with the CAPM, but it is likely that the model is useful representation of how investors act.

CAPM offers a hope for accomplishing a systematic calculation of risk-adjusted present value. The measure reflects the investor's alternative investment return risk trade offs opportunities in the same way as the rate of interest on a government bond reflects investment opportunities when there is no default risk.

The capital asset pricing model (commonly referred to as CAPM) derives the risk appropriate required rate of return for a given asset in a given market. It was introduced by William Sharpe, Lintner and Mossin independently, though it is commonly attributed only to the first of them, who published it earliest (in 1964), and subsequently received (jointly with Harry Markowiz and Merton Miller). The Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel for his contribution to the field of financial economics.

The CAPM is an attempt to provide both a theoretical understanding and a practical measure of the cross-section of one period expected return rate a currently marketed portfolios of risky assets during a particular period of time.

The CAPM is a "one-factor" pricing model in the sense that it postulates that only one factor-namely, the expected return rate on the market portfolio M-suffices to explain the cross section of portfolio return rates.

The major implication of the model is that the expected return of an asset will be related to a measure of risk for that asset known as beta. The model provides the intellectual basis for a number of the current practices in the investment industry.

CAPM suggests that in equilibrium market, every security available in the market is period and they provide risk-adjusted rate of return.

One important limitation of CAPM for corporate decision-making should be kept in mind. The model assumes that the investors are widely diversified and equally important; it assumes that the managers of the firm are willing to make investment decisions with the objective of maximizing the well being of this type of investor. This means that unsystematic risk (for which the investor is well diversified) may be ignored in the evaluation of investments.

It is well known that objectives of firms and managers are multidimensional and that there will be a reluctance to ignore risk because it doesn't affect the well- diversified investor. The so-called "Unsystematic" risk is not something that is likely to be ignored by a management that includes among its objectives the continuity of existence of the firm.

Investors are much more complex in their behavior and markets are less than perfect. Investment decision-making under uncertainty is not an easy task, but uncertainty is a characteristic that the CAPM model generally relies on historic data to estimate required (or expected) returns. The betas, which are developed by using historical data for the given asset as well as for the market, may not actually reflect the future variability of returns. Therefore the required returns specified by the model can be viewed only as rough approximations. It is interesting to note that analysts and other users of betas commonly make subjective adjustments to the historically determined betas in order to reflect their expectations of the future when such expectations differ from the actual risk- return behaviors of the past.

Various financial experts have viewed CAPM in different ways. Some of them are as follows.

"Capital asset pricing model (CAPM) describes the way expected returns on different securities will relate to their risk if everyone in the economy used portfolio theory to determine his/her investment positions" *(Haugen, 1997:119)*

"The capital asset pricing model (CAPM) is a rigorously developed, comprehensive statement of the relationship between security risk and the level of return that investors should receive. The value of any economic asset is the present worth of its expected cash flows; the CAPM defines the discount rates and, therefore the appropriate prices for such securities, or capital asset" *(Henderson, Trennipohl and Wert, 1984:186-77)*

"The conceptual basis for examining the relationship between risk and return is developed in a framework called the capital asset pricing model. The model offer a theory and methodology for evaluating any investment decision where capital is committed for the purpose of earning future profits" *(Hampton, 1983:339)* "CAPM is an equilibrium model of the trade off between expected portfolio return and unavoidable risk" *(Vanhorne, 2000:62)*

Thus, the CAPM is a major contribution to modern business finance theory and practice. It is extension of the portfolio literature of the 1950s and early 1960s. The main change is that CAPM makes use of the prices that the market is setting for return risk trade offs rather than uses subjective measures of attitudes towards risk (such as the risk preferences of specific investors). The relationship between expected return and unavoidable risk, and the valuation of securities that follows is the essence of the capital asset pricing model (CAPM).

Before getting into the core subject matter of capital asset pricing model, it seems appropriate to be acquainted with diversifiable (unsystematic) and diversifiable (systematic) risk.

A Diversifiable Risk

Also referred to us unsystematic risk, diversifiable risk emerges out of internal sources of the business. This sort of risk is associated with certain specific investment and unable to diversity such risk. "Diversifiable risk, which is sometimes called unsystematicrisk, represents the portion of an asset's risk that can be eliminated through diversification. Such as strikes, lawsuits, regulatory actions, loss of a key account and so forth. The events that cause firms to have diversifiable risk vary from firm to firm, they are therefore unique to the given firm" *(Gitman, 2001:122)* Unsystematic risk is specific to the company (of asset) and s independent to what happens to other securities. If investor's portfolio consists of a very large number of securities with no security being a large percentage of the portfolio, then this residual risk is equal to var (x)/n. If n is very, this unsystematic risk can be made to approach zero by a strategy of perfect diversification.

Diversifiable risk can be eliminated or minimized or diversified bye investing in different investment alternatives at different proportion so that the loss came out of one investment alternative can be compensated through the profit of another investment alternative which is popularly known as portfolio investment. This reduction in total risk resulting from combining securities into a portfolio is called the portfolio effect. "Diversifiable risk is that portion of total risk which is unique to the firm that issued the securities." *(Francis, 1992:264)*

Since the unsystematic risk i.e., the risk emerging out of internal causes can be diversified away, investors should not expect any additional return from the investment on the ground that he had faced this portion of total risk "Diversifiable risk is the variability of return on stocks or portfolios not explained by general market movements. It is avoidable through diversification" *(Vanhorne and wachowicz, 2000:98)*

When securities are combined in portfolios, risk is reduced. Diversification reduces risk when the returns of securities do not exactly vary in the same direction.Can diversification reduce risk of securities, A part of total risk arises from the uncertainties which are unique to individual securities, and which is diversifiable if large number of securities are combined t form well diversified portfolios. The unique risk of individual securities in a portfolio cancels out each other. This part of risk can be totally reduced through diversification, and it is called unsystematic or unique risk. The examples of unsystematic risk are:

- workers declare strike in the company
- the R & D expert of the company leaves.
- a formidable competitor enters the market.
- the company loses a big contract in a bid.
- the company makes a breakthrough in process innovation
- the government increase custom duty of the material used by the company.
- the company is not able to obtain adequate quantity of raw material from the suppliers
-

"Unsystematic risk is that portion of total risk that is unique of peculiar to a firm of an industry, above and beyond that affecting securities market in general. Factors such as management capability, consumer preferences, and labor strikes can cause unsystematic variability of returns for a company's stock. Because these factors affect one industry and/or one firm they must be examined separately for each company" *(Fisher and Jordan, 2000:74-75)*

The uncertainty surrounding the ability of the issuer to make payments on securities stems from two sources: (i) the operating environment of the business, and (ii) the financing of the firm. These risks are referred to as business risk and financialrisk, respectively. They are strictly a function of the operating conditions of the firm and the way in which is chooses to finance its operations.

i) Business Risk: - Business risk is a function of the operating conditions faced by a firm and the variability these conditions inject into operating income and expected dividends. In other words, if operating earning are expected to increase 10 percent per year over the foreseeable future, business risk would be higher if operating earnings could grow as much as 14 percent or as little as 6 percent than if the range were from a high of 11 percent to a low of 9 percent. The degree of variation from the expected trend would measure business risk.

Business risk can be divided into two broad categories: external and internal. Internal business risk is largely associated with the efficiency with which a firm conducts its operations within the broader operating environment imposed upon it. Each firm has its own set of internal risks, and the degree to which it is successful in coping with then is reflected in operating efficiency.

To a large extent, external business risk is the result of operating conditions imposes upon the firm by circumstances beyond its control. Each firm also faces its own set of external risks, depending upon the specific operating environmentfactors with which it must deal. The external factors, from cost of money to defense – budget cuts to higher tariffs to a downswing in the business cycle, are far too numerous to list in detail, but the most pervasive external risk factor is probably the business cycle. The sales of some industries (steel, autos) tend to move in tandem with the business cycle, while the sales of others move influence revenues through changes in the birthrate or the geographical distribution of the population by age, group, race and so on. Political parties are a part of external business risk; government policies with regard to monetary and fiscal matters can affect revenues through the effect on the cost and availability of funds. If money is more expensive, consumers who buy on credit may postpone purchase, and municipal government may not sell bonds to finance a water-treatment plant. The impact upon retail stores television manufactures, and producers of water- purification system are clear.

ii) Financial Risk: - Financial risk is associated with the way in which a company finances its activities. We usually gauge financial risk by looking at the capital structure of a firm. The presence of borrowed money of debt in the capital structure creates fixed payments in the form of interest that must be sustained by the firm. The presence of these interest commitments- fixed-interest payments due to debt or fixed dividend payments on preferred stock-causes the amount of residual earnings available for common stock dividends to be more variable than if no interest payments were required. Financial risk is available risk to the extent that managements have the freedom to decide to borrow or not to borrow funds. A firm with no debt financing has no financial risk.

By engaging in debt financing, the firm changes the characteristics of the earnings stream available to the common stock holders. Superficially, the reliance on debt financing, called financial leverage, has at least three important effects on common stock holders. Debt expectations concerning their returns, and © increase their risk of being ruined.

B Non diversifiable risk

Non diversifiable risk also referred to as systematic risk or market risk of a security stems from the influence of certain economy-wide factors like money supply, inflation, level of government spending, and industrial policy which have a bearing on the all firms, investors cannot avoid the risk arising from them, however diversified their portfolios may be. Put differently such risk cannot be diversified away. Hence it is referred to as non diversifiable risk or market risk (as it is applicable to all securities in the market place) or systematic risk (as it systematically affects all securities).

"Non diversifiable risk, which is also called systematic risk, is attributed to forces that affect all firms. Factors such as war inflation, international incidents, and political events account for non diversifiable risk. This risk can be assessed in relation to the risk of a diversified portfolio of all assets, which is commonly called the market portfolio of the market" *(Gitman, 2001:122)*

Systematic risk arises on account of the economy wide uncertainties and the tendency of individual securities to move together with changes in the market.This part of risk cannot be reduced through diversification, and it is called systematic or market risk. Investors are exposed to market risk even when they hold well-diversified portfolios of securities. "Undiversifable risk is that portion of total variability in return caused by market factors that simultaneously affect the prices of all securities". *(Francis, 1992:265)*

The examples of systematic risks are:

- the government changes the interest rate policy.
- the corporate tax is increased.
- the government results to massive deficit financing.
- the inflation rate increases.

Systematic risk or market risk represents the change in value resulting from market value changes. Systematic risk can be somewhat reduced by the choice of securities(low-beta securities). Also reducing systematic risk in this way increase total risk, since the investor's portfolio will not be perfectly diversified. "Systematic risk is the variability of return on stocks or portfolios associated with changes in return on the market as a whole." *(Vanhorne*

and wachowicz, 2000:98) Because any investor can create a portfolio or assets that will diversify away all diversifiable risk, the other relevant risk is non diversifiable risk. Any investor (or firm) therefore must be concerned solely with non diversifiable risk, which reflects the contribution of an asset to the risk or standard deviation of the portfolio. This risk is not the same for each asset; different assets will affect the portfolio differently. In other words, the non diversifiable risk of each asset depends upon how it behaves in the market environment. Because the relevant risk differs from asset to asset, its measurement is important to in all allowing investors to select for their portfolios assets offering the desired risk- return characteristics.

"Systematic risk refers to that portion of total variability in return caused by factors affecting the prices of all securities. Economic, Political and sociological change are sources of systematic risk. Their effect is to cause prices of nearly all individual common stocks and/or all individual bonds to more together in the same manner" *(Fischer and Jordan, 2000:70)*

The beta of a security measures the systematic risk. This is the risk associated with changes in the market's excess return. Since most securities have betas between the value of 0.8 and 1.2 and most investors want extensive diversification, it is difficult to reduce systematic risk by changing the composition of the risky securities in the portfolio (by the definition the beta of market is 1.0)

Unsystematic risk can be diversified away because each security's unsystematic risk is independent of the unsystematic risk of other securities. If a portfolio consists of a very large number of securities with no security being a large proportion of the portfolio, the unsystematic risk of the portfolio will approach zero. It does not take many securities for the unsystematic risk of the portfolio to approach zero.

A beta coefficient of unity indicates that a security has the same amount of systematic risk as the market portfolio. A beta coefficient greater (less) than unity indicates the security is riskier (safer) than market portfolio.
Thus, as systematic risk are to be borne out by the investor at any cost and this is not diversifiable, so the investor experts certain additional return from the investment in order to cover up emergence of systematic risk and beta is the modern technique to calculate systematic risk.
Systematic risk includes the following

i) Market Risk
ii) Interest-Rate Risk
iii) Purchasing Power Risk

i) Market Risk:- Finding stock prices falling from time to time while a company's earnings are rising, and vice versa, is not uncommon. The price of a stock may fluctuate widely within a short span of time even though earnings remain unchanged. The causes of this phenomenon are varied, but it is mainly due to change in investor's attitudes towards equities in general, or toward certain types or groups of securities in

particular. Variability in return on most common stocks that are due to basic sweeping changes in investor expectations is referred to as market risk.

Market risk is caused by investor reaction to tangible as well as intangible events. Expectations of lower corporate profits in general may cause the larger body of common stocks to fall in price. Investors are expressing their judgment that too much is being paid for earnings in the light of anticipated events. The basis for the reaction is set of real, tangible events-political, social of economic.

Intangible events are related to market psychology. Market risk is usually touched off by a reaction to real events, but the emotional instability of investors acting collectively leads to snowballing overreaction. The initial decline in the market can cause the fear of loss to grip investors, and a kind of herd instinct builds as all investors make for the exit. These reactions to reactions frequently culminate in excessive selling, pushing prices down far out of line with fundamental value. With a trigger mechanism such as the assassination of a politician, the threat of war, or an oil shortage, virtually all stocks are adversely affected. Likewise, stocks in a particular industry group can be hard hit when the industry goes "out of fashion".

ii) Interest Rate Risk: - Interest rate risk refers to the uncertainty of future market values and of the size of future income, caused by fluctuations in the general level of interest rates.

The root cause of interest of interest-rate risk lies in the fact that, as the rate of interest pain on government securities rises of falls, the rates of return demanded on alternative investment vehicles, such as stocks and bonds issued in the private sector, rise or fall. In other words as the cost of money changes for nearly risk- free securities, the cost of money to more risk-prone issuers (private sector) will also change.

Investors normally regard government securities as coming closest to being risk free. The interest rates demanded on government securities are thought to approximate the "pure" rate of interest, or the cost of hiring money at no risk. Changes in rates of interest demanded on government securities will permeate the system of available securities, from corporate bonds down to the riskiest common stocks.

iii) Purchasing –Power Risk:- Market risk and interest rate risk can be defined in terms of uncertainties as to the amount of current rupees to be received by an investor Purchasing power risk is the uncertainty of the purchasing power of the amounts to be received. In more everyday terms, purchasing power risk refers to the impact of inflation or deflation on an investment.

If we think of investment as the postponement of consumption, we can see that when a person purchases a stock, he has foregone the opportunity to buy some good or service for as long as he owns the stock. If, during the holding period, prices on desired goods and services rise, the investor actually loses purchasing power. Rising prices on goods and services are normally associated with what is referred to as inflation. Falling prices on goods and services are termed deflation. Both inflation and deflation are covered in the all-encompassing term purchasing power risk. Generally, purchasing power risk has come to be identified with

inflation (rising prices); the incidence of declining prices in most countries has been slight.

Rational investors should include in their estimate of expected return an allowance for purchasing power risk, in the from of an expected annual percentage change in prices. Just as changes in interest rate have a systematic influence on the prices of all securities, both bonds and stocks, so too do anticipated purchasing power change manifest themselves.

Thus market, purchasing power, and interest rate risk are the principle sources of systematic risk in securities.

2.1.5.3.2 Assumptions of Capital Asset Pricing Model (CAPM)

In its purest form, the capital asset pricing model is a comprehensive theory of risk and return relationship is perfect markets it makes such assumptions as rational behavior on the part of all investors; a highly competitive environment for investing, where all investors know risks and expected returns; no fees commission or taxes; and no risk of bankruptcy. Within the confines to these highly restrictive assumptions a risk return relationship is developed in considerable detail. In perfect markets, such as those assumed by the model, there is no quarreling with capital asset theory. It is a conceptually correct approach to risk and return.

The CAPM model relies on a number of assumptions that create nearly perfect world. Although they appear to be unrealistic empirical studies have confirmed their reasonableness and have provided support for the existence of relationship described by CAPM. CAPM is based on a number of assumptions. (Haugen 1997:197-202) has identified the following assumptions of CAPM.

Assumption I:

Investors can choose between portfolios on the basis of expected return and variance.

We can justify making investment choices in the basis of expected return and variance if (a) we constrain the probability distributions for portfolio returns to be normal or (b) we constrain utility functions to be quadratic. Actually the former constraint is preferable to the latter; because the quadratic utility functions has some undesirable properties. In the first place, utility reaches a maximum at some wealth level and then actually declines. While it may be possible to be saturated with a single commodity such as bananas, we probably have never met anyone who was saturated with money, which can be turned into a number of different commodities. Second, with a quadratic utility function, as our wealth level increases, out propensity or willingness to take on risk decreases. In general, rich people are more willing to take on risk than poor people. Consequently, it may be unrealistic to assume people have quadratic utility functions. If we're going to assume investment choices are made on the basis of expected return and variance, it's probably safer to base our assumption on normal probability distributions for portfolio returns.

Assumption II:

All investors are in agreement regarding the planning horizon and the distributions of security.

We are going to assume all investors plan their investments over o single period of time that is the same for all. Furthermore, we all agree on the numbers required to our Markowitz portfolio models. We all agree on the expected rates or return for each stock. We all agree on the numbers in the covariance matrix for all the securities in the market. To some extent, this assumption is consistent with the assumption made below; information about securities flows freely throughout the capital market.

Assumption III:

There are no frictions in the capital market. Frictions are defined as impediments to the free flow of capital and information throughout the market. Thus, we will assume that there are no transactions costs associated with buying or selling securities. We will also assume there are no taxes imposed on dividends, interest income or capital gains. Moreover, we assume information flows freely to everyone in the marketplace and there are no restrictions on short selling.

However, the assumptions of CAPM are also pointed out in brief as follows:

- All assets are traded in a competitive market with no taxes or transactions costs so that the market is efficient.
- There exists a risk-free rate i.e. investors can lend and borrow unlimited amounts at the risk-free rate.
- Assets do not pay dividends and there are no restrictions on short sales of assets.
- Each saver's preferences over asset portfolios depend only on the risks and expected return rates associated with these portfolios where the risk of a portfolio is measured by the standard deviation of its return rate.
- Given any level of risk, each saver prefers a higher expected return rate to a lower expected return rate; and given any expected return rate, each saver prefers less risk to more.
- All savers have a common time horizon for portfolio choice (e.g. one year) and all savers have the same beliefs regarding the risks and expected return rates associated with portfolios over this common time horizon. The only reason two different savers might choose to hold two different portfolios is differences in their personal preference for risk versus return.
- The capital markets are always at equilibrium. If not, they tend to be at equilibrium. Therefore, there is no under priced or overpriced securities in the market.
- Limited number of securities and all are marketable and divisible infinitely.
- There is no unanticipated change in inflation and interest rates.

Given these assumption (which are, in fact, not as limiting as they appear), the CAPM provides an explicit statement of the equilibrium expected return on all assets.Whenthe market is in equilibrium, there is no pressure for change. In disequilibrium, investors are dissatisfied with either the securities they hold or the prices of these securities and, as a result, there is pressure for change. At any movement, however, the market is in equilibrium, reflecting the combined influence on all investor's wealth, preferences and predictions.

Whenever disequilibrium occurs because of changes in wealth, preferences or predictions, these changes are translated to the market and equilibrium is restored.

Thus, the CAPM is the fact of capital market theory that provides an explicit statement of the equilibrium expected return for all securities. Specifically, the CAPM states that the prices of assets in a capital market will be in equilibrium where the expected return on a security is equal to a riskless rate of interest plus a premium that is proportional to the amount of market-related risk-beta. Stated another way, the expected excess return for a security of portfolio will come entirely from the market component of return. This is because in equilibrium a security with zero systematic risk (beta) will have the expected return that is available for a riskless asset. Further, in equilibrium, the expected excess return from the non-market component is always zero.

According to the CAPM, for efficient portfolios:

- An appropriate measure of risk is the standard deviation of return.
- In equilibrium, there is a linear relationship between risk and expected return.

Thus, to summarize, in general, the assumptions of CAPM are made so that we can obtain a definitive picture of the relationship between risk and expected return in the market. We want to see the effect of risk on expected return. We don't want expected returns to be affected by the costs of transacting, and we don't want expected returns to be influenced by the degree to which the income from a security is exposed to taxes. Also, we don't want the picture to be clouded by market inefficiencies caused by impediments in the flow and processing of information.

2.1.5.3.3 Use the Capital Asset Pricing Model (CAPM)

Even though the assumptions on which CAPM is based limit the generality of the model, it is still widely used. *Bierman and Smidt (1986:115)* has identified the following uses of CAPM:

- To estimate the cost of equity capital using $\bar{r}_i = r_f + \left(\bar{r}_m - r_f \right) \beta_i$

  These estimated are used both for public utility regulatory proceedings and determining the required return to be earned by operating divisions of corporations.
- To from portfolios of securities (the weighted average of the betas of all the securities is one relevant risk measure if the investor is imperfectly diversified)
- To evaluate securities- if the expected return is larger than $\bar{r}_i = r_f + \left(\bar{r}_m - r_f \right) \beta_i$ the

  security is a "bargain"

  If a security has a larger expected return than the return indicated by the CAPM all investors (with homogeneous expectations) will buy is until its expected return is lowered to be equal to $\bar{r}_i = r_f + \left(\bar{r}_m - r_f \right) \beta_i$

  In like manner if a security i is expected to earn less than. $r_f + \left(\bar{r}_m - r_f \right) \beta_i$ on one

  will buy (some will sell it short), its price will decrease, and its expected return will increase.

All securities are contained in the market portfolio in proportion to their market value. The beta of market portfolio is 1.

2.1.5.3.4 Capital Market Line

"The capital asset pricing model can be portrayed graphically by means of the capital market line. Theoretically, the "Market" encompasses all securities in proportion to their market value; however, in practice, value-weighted indexes, such as the NYSE or the S&P composite indexes are used as proxies for the "Market". Given the assumption of an efficient capital market, the pricing of the market portfolio an any point in time, accurately reflects an equilibrium relationship between the market's consensus of risk and expected return.

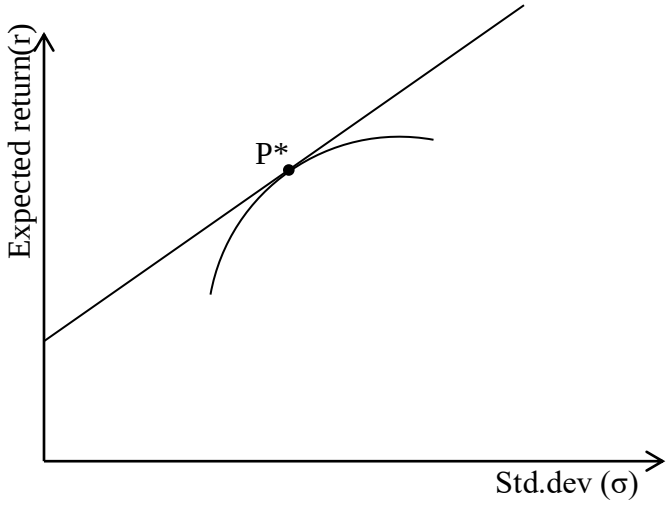
Simply, a construct that is used to portray the relationship between the risk and return in a market portfolio and the riskless rate of return thereby defining the widely held notions of the price of risk and the price of immediate consumption is the capital market line. Since "Price" to the buyer is the same as the "Reward" to the seller, hese notions can also be thought of as rewards; specifically, the reward per unit of risk borne and the reward for waiting.

By assumption the only characteristics of securities and portfolios that matter to the individual are the expected returns and standard deviations. Suppose we display all available assets in terms of these two characteristics as in the figure 2.3. Under these conditions, P^* was the only risky asset of interest to the investors, since they could borrow or lend to achieve their preferred combination of risk and return. The same condition hold true now. Relatively risk averse investors will hold combinations of the riskless asset and P^*. The values for the expected return and standard deviations on their investments lie along the portion on the line between R_F and P^*. Investors who are willing to incur higher risks for higher returns will borrow to finance investment in P^*. If they can borrow at a rate of interest R_F, the resulting values of expected return and standard deviation lie along the line extending from P^* with higher risks and returns than P^*. The result that the optimal portfolio of risky securities does not depend on individual preferences is the "Separation Theorem"

The essence of separation theorem is that the individual's choice of a portfolio of risky securities to hold is independent (separate) of the individual attitude towards risk. "In other words, provided that expected return and standard deviation are the only characteristics of interest to the individual, the optimal portfolio of risky securities for that individual is not related to the individual's feelings about risk. This statement is called the separation Theorem" *(Haley and Schall, 1979:132)*

Given now that investors in the market have the same expectations regarding risk and return from portfolios that they can freely borrow and lend at R_F, the portfolio P^* is the same for all investors. Everyone is best except those highly risk-averse individuals who will invest only in the riskless asset.

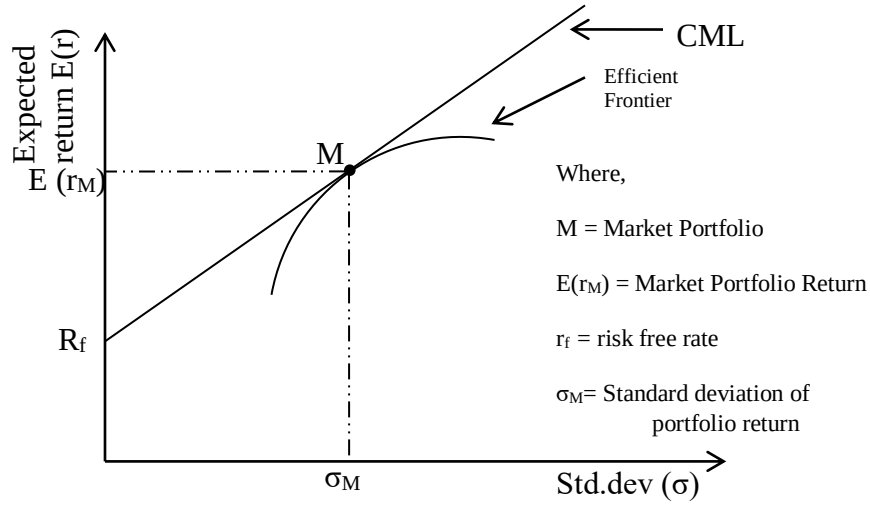
Figure 2.3
The Capital Market Line



If everyone wishes to hold the same, portfolio (P*) in order for the market to be in equilibrium that portfolio must contain all the securities in the market. This is so because someone must hold all securities. If some securities were not in P*, the prices would fall, thereby increasing their expected rate of return, until they became desirable and were included in P*. Since all securities in the market are in *, the proportion (in terms of market value) of each security in P* must be the proportion its value is of the whole market for e.g., suppose that there are only two in the market, A and B. The total amount held by investors must be the market value of A plus the market value of B denoted by V_A and V_B. Moreover, suppose that there are only two investors in the market, one with Rs.100 and the other with Rs. 1000. Both investors agree on the optimal proportions of A and B to be held in their portfolios. Suppose the proportions are 20% A and 80% B. The first investor will try to buy Rs.20 worth A and Rs.800 worth of B. If the value of A is Rs.220 and the value of B is Rs.880, both investors can and will achieve the proper proportions; otherwise the values of A and B will changes and the optimal proportions of A and B will change until equilibrium is reached. It is to be noted that the optimal proportions of the securities do depend on the current value (prices). If those values change, then sowill the proportions. The process by which the market is presumed to reach equilibrium is difficult to specify precisely. However, we can say something about the ultimate returns of the process.

If the market is to be in equilibrium to that no one wishes to change his or her holdings of any security, P* must be the market portfolio M. In other words, in equilibrium the only risky asset held by individuals is a portfolio M that contains all the risky securities in the market, and the proportion of the value of M assumed by each security is equal to the value of that security dividend by the value of all securities in the market. "Portfolio M is the market portfolio of risky securities where each security is held in proportion of its market value. It is portfolio since it dominates all other portfolios." *(Pandey, 1995:68)*

Figure.2.4
The Capital Market Line I



All individual will hold combinations that lie a long the line passing through r_f and M shown in fig 2.4. This line is called the capital market line (CML) and can be expressed as $E(r_j) = r_f + \lambda \sigma_j$

Where $E(r_j)$ is the expected return on any combination actually held by individuals and σ_j is the standard deviation of the rate of return on the combination. Λ is the slope of the CML and can be considered the "price of risk" in the market. Since the CML passes through the point $E(r_M,\sigma_M)$, $\lambda = (E(r_M) - r_f) / \sigma_M$ in equilibrium and thus the equation can be rewritten as

$$E(r_j) = r_f + \frac{E(r_M) - r_f}{\sigma_M}.\sigma_j$$

The CML expresses the current "trading terms" for risk and return for efficient combinations, the combinations investors will actually hold. It reflects current expectation regarding the distributions of future outcomes from investments. Realized rates of return will generally differ from the expected value. Also there is no reason to believe that the trading terms for risk and return will remain constant overtime. Both the interest rate r_f and the price of risk λ. Equilibrium conditions are therefore given only at the present point in time and reflect expectations of outcomes one period from now.

Over time the equilibrium changes as new assets enter the market and old assets disappear. Indeed, if such asset changes occur with sufficient rapidity, equilibrium may never be achieved since adjustments are not necessarily instantaneous. The theory presented here is meant to describe the equilibrium that the system at least approaches if not attains.

2.1.5.3.5 The Model: Capital Asset Pricing Model (CAPM)

The capital asset pricing model links the relevant risk and return for all assets. We will discuss it in four parts. The first part defines and describes the beta coefficient, which is an index for non diversifiable risk. The second part presents an equation of the model, the third part graphically describes the relationship between risk and return and the final part presents some general components on CAPM.

2.1.5.3.5.1 Beta Coefficient

In order to assess an asset's non diversifiable risk, its beta coefficient must be determined. The beta coefficient can be viewed as an index of the degree of responsiveness or co movement of asset return with market return. The beta coefficient for an asset can be found by examining the asset's historic returns relative to the returns for the market. The market returns should be based upon a broad index of all risky assets. Because such an index is not conviently available they are typically measured by the average return on all (or a large sample of) assets. In international context, the Standard and Poor's 500 stock composite index of some other stock index is commonly used to measure market return. The beta for the market is equal to 1; all other beta is viewed in relation to this value. Asset betas may take on values that are either positive or negative; positive betas are much more common than negative betas. The majority of betas fall between .2 and 2.

2.1.5.3.5.2 The Equation

The required rate of return for a particular asset in a market is derived based on its sensitivity to the movement of the market portfolio (i.e., the broad market). This sensitivity is known as the assets beta and reflects asset specific risk. The market portfolio by definition has a beta of one; a more sensitive (risky) stock will have a higher beta and will be discounted at a higher rate; less sensitive stocks will have lower betas and be discounted at a lower rate. According to the CAPM, using beta as our index of non diversifiable risk, the required rate of return for a stock is derived by:

$$E(r_j) = r_f + \lfloor E(r_m) - r_f \rfloor \beta_j$$

Where,

$E(r_j)$ = the required (expected) return on asset j.

r_f = the rate of return required on a risk-free asset, which is commonly measured by the yield on government security such as treasury bill.

$E(r_m)$ = the required rate of return on the market portfolio of assets that can be viewed as the average rate of return on all assets.

The required return on asset r_j, is an increasing function of beta β_j, which reflects the relevant risk. In other words, the higher the risk, the higher the required return, and vice versa. The model can be broken into two parts. (a) the risk-free rate, $r_{f;}$ and (b) the risk premium $[E(r_m)- r_f]\beta_j$. The portion of risk premium $E(r_m)$ - could be called the market risk premium since it represents the premium the investor must receive for taking the average amount of risk associated with holding the market portfolio of assets.

The beta measures the amount of systematic risk, that is, the risk arising because of fluctuations in the market return. There is no adjustment for risk specific to the firm

(Unsystematic risk) in the CAPM, since it is assumed that the unsystematic risk goes to zero given the very large number of investments (the unsystematic components are independent)

The beta of a security measures how the security's return is correlated with the market's return; thus it is a measure of the security's systematic risk. Fortunately, the CAPM is consistent with intuition-investors should require a higher return for holding a more risky asset. Betas exceeding one signify more than average riskiness, betas below one indicated lowers than average riskiness. Stock market indices are frequently used as local proxies for the market portfolio and in that case (by definition) have a beta of one.

2.1.5.3.5.3 The Graph: The Security Market Line.

When the capital asset pricing model is depicted graphically, it is called the security market line (SML) it should be clear that the SML will in fact, be a straight line. It reflects for each level of non diversifiable risk (beta) the required return in the market place. So, the security market line is used to portray the relationship between risk and expected return for securities, as well as portfolios. "The CML provides the equilibrium relationships for efficient combinations, but does not directly say anything about the expected returns on inefficient assets- either portfolios or individual securities. The equilibrium conditions for securities and inefficient portfolios can be determined from the mathematical relationship between the market portfolios M which lays the CML and the securities that comprise the portfolio." *(Hally and Schall, 1979:146-47)*

Very briefly we know that each security is held as part of a portfolio M. The characteristics of any given security of concern to an investor are the effects of including that security in the portfolio. The expected return of a portfolio changes inproportion to the expected return on a security added to it. The risk (standard deviation) of a portfolio depends primarily on the co variances of the securities in it.Consequently, the risk of an individual security that matters to investors holding a highly diversified portfolio is the covariance of the security's return with the returns of all other securities in the portfolio; that is the covariance of the security's return with the return on the market. The equilibrium expected return in a security (or any portfolio) can be expressed as

$$E(r_j) = r_f + \lfloor E(r_m) - r_f \rfloor \beta_j$$

Where,

$E(r_j)$ = expected return on security j.

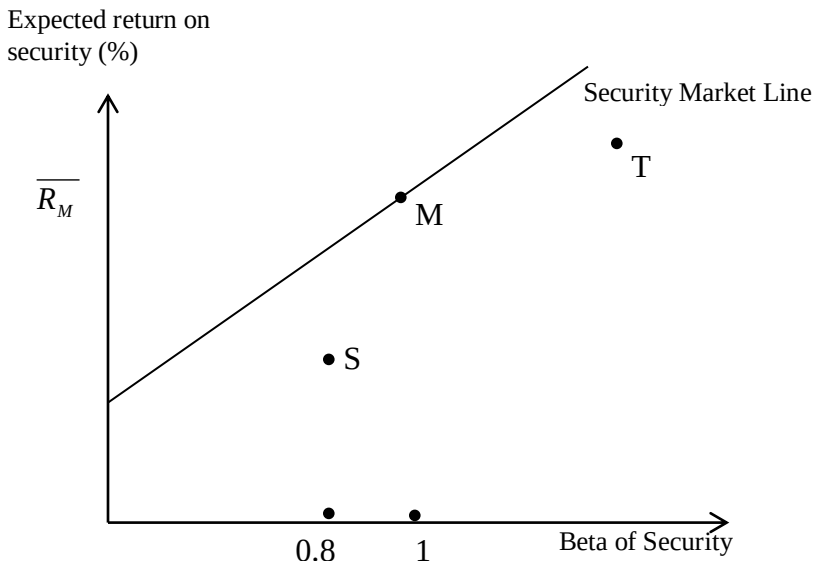
r_f = risk free rate

$E(r_m)$ = return on the market.

β_j = Beta coefficient.

This relationship expressed in the equation is the security market line; it is the major mathematical relationship of the capita asset pricing model. The figurebelow shows the security market line.

Figure: 2.5
The Security market line



The upward sloping line in the figure 2.5 is called security market line. It is to be noted that β is measured on the X-axis and expected return on the Y axis. M is the market portfolio with a beta of 1. The slope of the line is $\left(\overline{r_m} - r_f\right)$. The risk premium is $\beta_j \left(\overline{r_m} - r_f\right)$ for a security with β_j.

The SML shows that in equilibrium the required expected rate of return on risky assets is a function of the risk free rate of interest plus a premium for the risk where the risk is measured by the covariance of the asset's returns with the return on all assets.One of the interesting properties of this relationship is that a security whose returns are uncorrelated with the market (ρ_{iM}=0) will in equilibrium have an expected return equal to the risk free rate. Such a security is riskless when included in a very large portfolio even though it would be risky to hold it alone. Adding an uncorrelated security to a large portfolio has a negligible effect on the variance of the . This result is caused by the effectiveness of diversification. Moreover, any would have an expected return less than r_f because such securities serve to reduce the risk of the total portfolio. These points are subsidiary to the principle result-that the risk of a security is not its total risk as measured by standard deviation but only that portion of the total risk, which cannot be diversified away as measured by beta. This portion of total risk, which cannot be diversified away, is called the security's systematic risk.

So, for well diversified portfolio, non-systematic risk tends to go to zero, and the only relevant risk is systematic risk measured by beta. Because we assume that investors are concerned only with expected return and risk, the only dimensions of a security that need be of concern are expected return and beta.

We have seen that all investments and all portfolios of investment lie along a straight line in the return-to-beta space. To determine this line we need only connect the intercept (beta of zero, or riskless security) and the market portfolio (beta of one and return of $\overline{R}_M$). These two points identify the straight line shown in figure 2.5. The equation of a straight line is:

$R_j = \acute{\alpha} + b\beta_j$

This first point on the line is riskless assets with a beta of zero, so:

$R_f = \acute{\alpha} + b\ (0)$

$R_f = \acute{\alpha}$

The second point on the line is the market portfolio with a beta of 1 Thus.

$R_M = \acute{\alpha} + b\ (1)$

$R_M - \acute{\alpha} = b$

$R_M - R_f = b$

Combining the two results gives us:

$R_j = R_F + (R_M - R_F)\beta_j$

This is a key relationship. It is called the security market line (SML). It describes the expected return for all assets and portfolios of assets, efficient or not. The difference between the expected return on any two assets can be related simply to their difference in beta. The higher beta is for any security, the higher must be its expected return. The relationship between beta and expected return is linear. The security market line leads to a conclusion that if a security has more systematic risk the market will require a higher return. *Ross, Westerfield and Jffe (1998: 304- 307)* has associated six important points with this figure of SML. There are as follows.

i) A Beta of Zero: - The expected return on a security with a beta of zero is the risk free rate, R_F. Because a security with zero betas has no relevant risk, its expected return should equal the risk free rate.

ii) A Beta of One: - The average beta across all securities, when weighted by the proportion of each security's market value to that of the market portfolio, is 1. Because the market portfolio is formed by weighting each security by its market value, the beta of the portfolio is 1. Because all securities with the same beta have the same expected return, the expected return for any security with a beta of 1 is $\overline{R}_M$,the expected return on the market portfolio.

iii) Linearity: -The intuition behind on upwardly-sloping curve is clear. Because beta is the appropriate measure of risk, high beta securities should have an expected return above that of low beta securities. However the figure shows somethingmore than an upwardly sloping curve, the relationship between expected return and beta corresponds to a straight line.

It is easy to show that the line in figure 2.5 is straight. To see this let us consider security S with, say a beta of 0.8. This security is represented by a point below the security market line in the figure. Any investor could duplicate the beta of security S by buying a portfolio with 20 percent in the risk-free asset and 80 percent in any security with a beta of 1. However, the home made portfolio would itself lie on the SML. In other words, the portfolio dominated security S because the portfolio has a higher expected return and the same beta.

Now let us consider security T with, say, a beta greater than 1. This security is also below the SML in figure. Any investor could duplicate the beta of security T by borrowing to invest in a security with a beta of 1. This portfolio must also lie on the SMLthereby dominating security T.

Because no one would hold either S or T, their stock prices would drop. This price adjustment would raise the expected returns on the two securities. The price adjustment would continue until the two securities lay on the security market line. The above example considered

two overpriced stocks and a straight SML. Securities lying above the SML are under priced. Their prices must rise until their expected returns lie on the line. If the SML is itself curved, many stocks would be mispriced. In equilibrium, all securities would be held only when prices changed so that the SML become straight. In other words, linearity would be achieved.

iv) The capital- Asset Pricing Model: -We can see from figure 2.5 that the intercept of the SML is R_F. Because the expected return of any security with a beta of 1 is $\overline{R}_M$, the slope of the line is $\overline{R}_M$ - R_F. This allows us to write the SML algebraically as Capital – Asset – Pricing Model:

$\overline{R} = R_F + \beta \times (\overline{R}_M - R_F)$- eq^{N}2.1

Expected return on a security = Risk free rate + Beta of the security × Difference between expected return on the market and risk free rate.

According to financial economists, the above algebraic formula describing the SML is called the capital-asset pricing model. The formula can be illustrated by assuming a few special cases.

a) Assume that $\beta = 0$. Here $\overline{R} = R_F$, that is, the expected return on the security is equal to the risk free rate.

b) Assume $\beta = 1$. The equation reduces to $\overline{R} = R_M$, that is, the expected return on the security is equal to the expected return on the market.

As with any line, the line represented by equation has both a slope and an intercept R_F, the risk-free rate is the intercept. Because the beta of security is the horizontal axis, $\overline{R}_M$ less R_F is he slope. The line will be upward slopping as long as the expected return on the market is greater than the risk-free rate. Because the market portfolio is risky asset, theory suggests that its expected return is above the risk free rate.

Example

The stock of a enterprises has a beta of 1.5 and that of Z enterprises has a beta of 0.7. The risk free rate is 7 percent and the difference between the expected return on the market and the risk free rate is 8.5 percent. The expected returns on two securities are:

Expected return for A:

$19.75 = 7\% + 1.5 \times 8.5\%$

Expected return for Z: eq^n 2.2

$12.95 + 7\% + 0.7 \times 8.5$

v) Portfolios as well as securities:- Our discussion of the CAPM considered individual securities. Does the relationship in figure 2.5 and above example equation hold for portfolios as well?

Yes, to see this, consider a portfolio formed by investing equally in two securities A and Z. The expected return on the portfolio is:

$16.35\% = 0.5 \times 19.75\% + 0.5 \times 12.95\%$ eq^n 2.3

The beta of the portfolio is simply a weighted average of the two securities.

Thus we have:

Beta of portfolio:

$1.1 = 0.5 \times 1.5 + 1.5 \times 0.7$

Under the CAPM, the expected return on the portfolio is,

$16.75\% = 7\% + 1.1 \times 8.5\%$ eq^{n} 2.4

Because the value 16.35% is the same in both cases, the example shows that the CAPM holds for portfolios as well as individual securities.

vi) A potential confusion: - We often confuse the SML with the capital market line. Actually, the lines are quite different. The capital market line traces the efficient set of portfolios formed from both risky assets and the riskless asset. Each point on the line represents an entire portfolio.

The SML in figure 2.5 relates expected asset return to beta. The figure of SML differs from figure of CML in at least two ways. First, beta appears in the horizontal axis of SML figure but standard deviation appears in the horizontal axis of figure CML. Second, the SML holds both for all individual securities and for all possible portfolios, whereas the CML holds only for efficient portfolios.

2.1.5.3.5.4 Some Components on CAPM

The key concept from the preceding discussion is that a risk-return trade-off, which sometimes may be difficult to quantify, exists. When making financial decision, an awareness of this risk-return trade-off and an attempt to somehow capture and consider the risk involved should allow for better financial decisions. It is important to remember that the CAPM model generally relies on historic data toestimate required (or expected) returns. The betas, which are developed by using historic data for the given asset as well as for the market, may of may not actually reflect the future variability of retunes. Therefore, the required returns specified by the model can be viewed only as rough approximations. It is interesting to note that analysts and other users of betas commonly make subjective adjustment to the historically determined betas in order to reflect their expectations of the future when such expectations differ from the actual risk return behaviors of the past.

2.1.5.3.6 Relationship between the risk of an asset and its expected rate of return

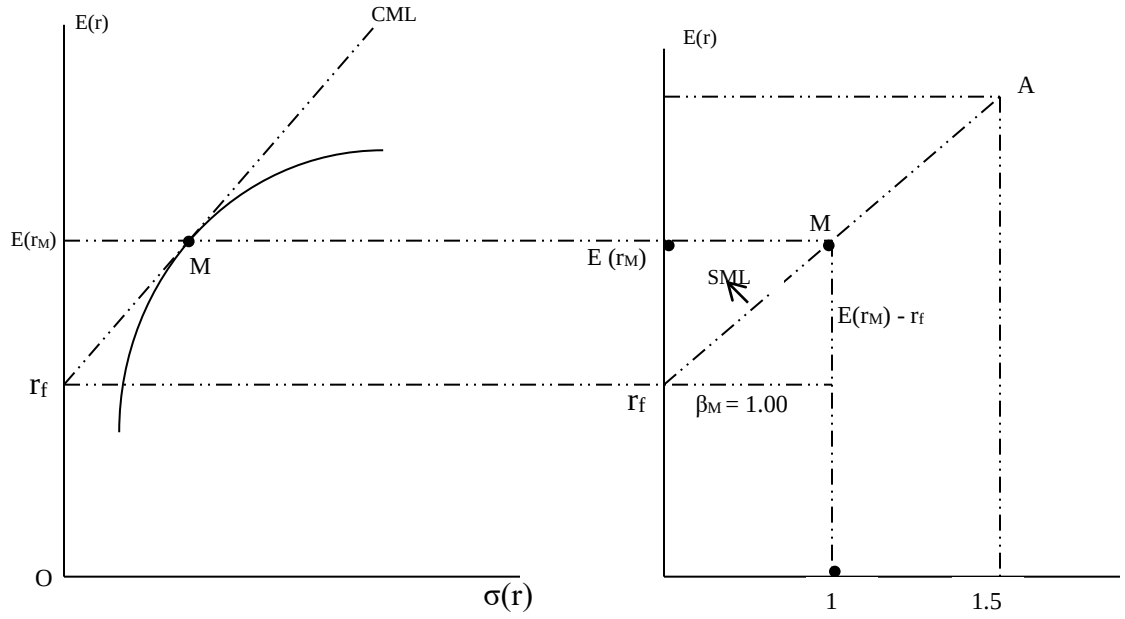
It is commonplace to argue that the expected return on a security should be positively related to its risk. That is, individuals will hold a risky security only if its expected return compensates for its risk. Now we consider our word where all individuals (i) have homogeneous expectations and (ii) all individuals can borrow and lend at the risk-free rate. All individuals hold the market portfolio of risky securities here. In this context, beta of a security is the appropriate measure of risk. It beta is the appropriate measure of he risk of stock, what is the relationship between beta and expected rate of return? We know the market portfolio is positioned at point M in figure 2.6.1 on the skin of bullet. If the market portfolio is efficient, then a perfect liner relationship should exist between the beta factors and their expected rates of return. The relationship can be found by drawing a line tangent to the bullet at M. The line of tangency is, in fact, the capital market line, and its intercepts the vertical axis at r_f. The line relating betas to expected rates of returns therefore will also intercept the vertical axis at r_F, as in figure 2.6.2. Given that the market portfolio is on efficient set, every security in the market must be positioned on this line. The relationship of figure 2.6.2 is called the security market line. The security market line is drawn in E®, β space, and it shows the relationship between a stock's risk

and its expected rate of return. Hence, the expected return on a security should be positively related to its beta.

While only the portfolios that are candidates to be held by investors are positioned on the capital market line (drawn in E(r), σ(r) space), all portfolios and individual securities are positioned on the security market line (drawn in E(r), β space)

Figure: 2.6.1
Capital Market Line

Figure: 2.6.2
Security Market Line



Since, the security market line is linear; it can be expressed in terms of its intercept and its slope. The intercept of the line is, of course, the risk-free rate. The slope is the vertical distance required to return to the line, dividend by the horizontal distance we have move away from the line. In figure 2.6.2, if we move horizontally from 0 to 1.00 in terms of beta, we must move vertically by a distance equal to $E(r_M)$-r_f in order to return to the line. Thus the slope is equal to $[E(r_M) – r_f] / 1.00$, or $E(r_M) – r_f$. The equation for the security market line relating expected return to beta, therefore is given by

$$E(r_j) = r_F + [E(r_m) - – r_f] \beta_j \qquad \text{eq}^n \text{ 2.5}$$

This equation 2.5 states that the expected rate of return on a stock is equal to the risk-free rate (compensation investors for delaying consumption over the planning horizon) plus a risk premium (compensation them for taking on the risk associated with the investment) The risk premium itself can be broken into two parts. The term in brackets on the right hand side of the equation is the risk premium for the market portfolio. It can also be thought of as the risk premium for an average, or representative, security. To get the risk premium for security J, we multiply the β risk premium for an average security by the other term, the risk measure for security J. The weighted average beta factor for all securities in the market is equal to 1.

Given the equation for the security market line, if a security is of average risk, having beta equal to 1, it will carry the average risk premium. If it is twice the average risk, it will carry twice the average risk premium.

In understanding the graph that has been presented, it is useful to keep the following facts in mind:

	X Axis	Y Axis
Capital market line	Standard deviation	Expected return
the slope is $\frac{\overline{r_m} - r_f}{\sigma_M}$		
Security market line	Beta	Expected return
(the slope is $\overline{r_m} - r_f$		

All two of the equations describe relation ships that should exist in equilibrium if the capital pricing model is correct.

The capital market line (CML) and the security market line (SML) are merely different pictures of the same market equilibrium. The CML may be used for determining the required return only for those efficient portfolios that the perfectly correlated with the market portfolio because they fall on the CML, but the SML may be used to explain the required rate of return on all securities whether or not they are efficient. The SML provides a unique relationship between un-accurately measures the beta of a security; we can estimate its equilibrium risk-adjusted rate of return.

The relationship between the CML and the SML can be seen by writing the two equations, one underneath the other.

CML: $E(R_P) = R_F + \left[\frac{E(R_M) - R_F}{\sigma_M}\right]\sigma(R_P)$ eq^n 2.6

SML: $E(R_J) = R_F + [E(R_M) - R_F]\,\beta_j$ eq^n 2.7

but since by definition,

$\beta_j = \frac{COV(R_{j,}R_M)}{VAR(R_M)}$

Rewriting in SML using the definition of $\beta_{j,}$ we have

SML: $E(R_J) = R_F + [E(R_M) - R_F]\,\frac{COV(R_{j,}R_M)}{VAR(R_M)}$ eq^n 2.8

It is to be noted that the beta of the market portfolio is equal to one because the covariance of the market with itself, $COV(R_J,R_M)$ is the same as the variance of the market, $VAR(R_M)$, and $VAR(R_M) / VAR(R_M) = 1$. Furthermore, since $VAR(R_M) = \sigma^2_M$,

SML: $E(R_J) = R_F + \left[\frac{E(R_M) - R_F}{\sigma_M}\right]\frac{COV(R_{j,}R_M)}{VAR(R_M)}$ eq^n 2.9

The above equation shows that the market price of risk per unit of risk is the same for the SML and for the CML.

Market price of risk = $\frac{E(R_M) - R_F}{\sigma_M}$

Also, $COV(R_J,R_M) = \rho_{jM}\,\sigma_j\,\sigma_M$, where ρ_{jM} is the correlation between return on asset j and the market rate of return, we can rewrite the SML as.

$$\text{SML: } E(R_J) = R_F + \left[\frac{E(R_M) - R_F}{\sigma_M}\right]\frac{\rho_{iM}\sigma_j\sigma_M}{\sigma_M} \qquad \text{eq}^n\ 2.10$$

$$= R_F + \left[\frac{E(R_M) - R_F}{\sigma_M}\right]\rho_{jM}\sigma_j$$

This equation shows that the undiversifiable risk of each asset can be thought of as having two parts: the asset's standard deviation or return, σ_j, and its correlation with the market portfolio, ρ_{jM}. If all points along the CML are perfectly correlated with the market portfolio, $\rho_{jm}=1$, then equation 2.10 for the SML reduces to be equal to equation 2.6 for the CML. Hence, for portfolios that are made up of the riskless asset and the market portfolio, the CML and SML are identical.

The capital asset pricing model (the SML) is an equilibrium theory of how toprice and measure risk. The logic of the security market line equation is that the required return on any investment factor is obtained by multiplying the risk premium required for the market return by the riskiness of the individual investment. If the returns on the individual investment fluctuate by exactly the same degree as the returns on the market as a whole, the beta for the security is one. In this situation, the required return on the individual investment is the same as the required return on the total market. If the undiversifiable (or systematic) risk in the return of an individual investment is greater than for the market portfolio, then the beta of the individual investment is greater than one, and its risk adjustment factor is greater than the risk adjustment factor for the market as a whole.

2.1.5.3.7 Limitations of Capital Asset Pricing Model

- It is hard to estimate the risk free rate of return on projects under different economic environment.
- The CAPM is really just a single period model. It is not possible to use the CAPM for projects, which last for more than one year.
- The model does not appear to adequately explain the variation in stock returns. Empirical studies done in the past 15 year stocks may offer higher returns.
- What is market portfolio? Does it include the bond market? Real estate? Commodities? Private placements?
- The market portfolio, and hence its return, are not observable and have to be estimated, therefore the model is not testable.
- The model assumes that all investors create mean-variance optimized portfolios. There are many investors who don't know variance optimized portfolio is.
- Complications in decision-making cannot be modeled easily.

2.1.5.3.8 Sharpe's Portfolio Performance Measure

In assessing the performance of a portfolio, it is necessary to consider both risk and return. Ranking portfolios' average returns ignores the skill with which they minimize risk and therefore presents an oversimplified picture. Determining the relative efficiency of a portfolio is a more comprehensive analysis of a portfolio's performance.
However, it is often desirable to be able to rank portfolio's performances. The real need is for an index of portfolio performance that is determined by both the return and the risk of a portfolio.

The equation below defines a single parameter portfolio performance index that is calculated from both the risk and return statistics. William F. Share devised an index of portfolio performance denoted S_i for portfolio i,

$$S_i = \frac{risk.premiun}{total.risk} = \frac{\overline{r_i} - R}{\sigma_i} \qquad \text{eq}^n \text{ 2.11}$$

Where,

$\overline{r_i}$ = average return for portfolio i

σ_i = standard deviation of returns for portfolio i

R = riskless rate of interest.

The four basic principle of portfolio selection are as follows:

- Investors like high expected return and low standard deviation. Common stock portfolios that offer the highest expected return for a given standard deviation are known as efficient portfolios.
- If we want to know the marginal impact of a stock on the risk of a portfolio, we must look not at the risk of that stock in isolation, but at its contribution to portfolio risk. That contribution depends on the stock's sensitivity to changes in the value of the portfolio.
- A stock's sensitivity to changes in the value of the market portfolio is known as beta. Beta, therefore, measured the marginal contribution of a stock to the risk of the market portfolio.
- If investors can borrow and lend at the risk-free rate of interest, they should always hold a mixture of the risk-free investment and one particular common stock portfolio. The composition of this stock portfolio depends only on investors' assessment of the projects for each stock and not on their attitude to risk. If they have no superior information, they should hold the same stock portfolio as everybody else in other words, they should hold the market portfolio.

2.1.5.4 What Beta Means

2.1.5.4.1 Introduction of Beta

Risk associated with an investment outcome can be broken down into two parts: (i) the systematic part related to relationship of the security to the market and (ii) the residual part related to the deviation between the expected and actual results for the non-market component of return.

We can split up the variance of the return on a security of portfolio into two parts.

$$\sigma^2(r) = \beta^2\sigma^2(r_m) + \sigma^2(E) \qquad \text{eq}^n \text{ 2.13}$$

Total variance = systematic risk + residual variance

The first term on the right hands side of the equation is called the systematic risk of the investment. It accounts for the part of security's variance, which cannot be diversified away. This part of variance is contributed to the variance of a well-diversified portfolio of many different stocks the second term is called the residual variance or unsystematic risk. It represents the part of a security's total variance that disappears as we diversify. It is mainly because of residual variance that the variance

of portfolio is less than the weighted average of the variance of the securities in the portfolio.

We can see from the equation 2.12 that variability in return is accounted for by two things. The systematic risk accounts for one part of the total variability. This part results when market movement pulls the security along its characteristics line. It is to be noted that systematic risk itself is the product of two terms. The first term involves the security's beta, which tells us the extent to which the security responds to the up and down pull of the market. The second term is the market's variance, which tells us the extent to which the market is pulling up and down. The second part of a security's variance is the residual variance. This accounts for the part of the variability, which is due to deviations from the characteristics line. Thus, when we think of the total variability in a security's returns under the (single-factor model), parts of it is due to movement by the security along its characteristic line and part of it is due to deviations form the characteristic line.

The above equation 2.12 holds for an individual security and for a portfolio as well. Rewriting the equation for the case of a portfolio we get

$$\sigma^2(r_P) = \beta^2{}_P\sigma^2(r_M) + \sigma^2(E_P) \qquad \text{eq}^n\ 2.14$$

At this point, we need equations for the beta factor and residual variance of a portfolio as functions of the characteristics of the securities we put in the portfolio

Once we have these equations, we can substitute them for portfolio beta and residual variance and obtain a simpler, alternative expression for the portfolio variance to use in finding the minimum variance set.

The beta factor for a portfolio of M securities is a simple weighted average of betas of the stocks in the portfolio, where the weights are the relative amounts invested in each security.

$$\beta_P = \sum_{j=i}^{M} x_j \beta_j$$

Portfolio beta = weighted average of security betas.

Similarly the formula for residual variance of a portfolio

$$\sigma^2(E_P) = \sum_{j=i}^{M} x^2{}_j \sigma^2(E_J) \qquad \text{eq}^n\ 2.15$$

Portfolio residual variance = "Weighted average" of security residual variances where portfolio weights are squared.

Thus, the residual variance of a portfolio is also a weighted average (of stocks) of the residual variances of the securities in the portfolio. However, this time, in taking the average, we square the portfolio weights.

Given the assumption of uncorrelated residuals among securities, the residual variance of a portfolio begins to disappear as the number of securities in the portfolio is increased. Considering the residual variance formula, and suppose we have a large number of securities, each with a residual variance equal to 10 percent. If we invest half our money equal in two of the securities, the residual variance of the two-security portfolio is 5 percent according to the foregoing formula.

$\sigma^2(E_p) = (0.50^2 \times 0.10) + (0.50^2 \times 0.10) = 0.5$

In the same sense, if we invest a third of our money in each of three of the securities, the residual variance of the portfolio would be 3.33 percent and so on.

So as we diversify the residual variance of the equally weighted portfolio approaches, but never quite reach, zero. This is because the residuals in the portfolio are presumed to be uncorrelated and the good things happening to some of the securities are being offset by the bad things happening to others- some are above their characteristics lines, but others are below; the residual of the portfolio, being the average of the residuals of the individual securities, is always quite small if the number of securities is large. In fact, when we are dealing with a portfolio that is weighted equally among the various securities, the residual variance of the portfolio is equal to the average residual variance of the stocks, dividend by the number of securities in the portfolio. Of course, as the residual variance of the portfolio gets smaller and smaller, the correlation of the portfolio's return with the market gets larger and larger.

To summarize, the beta factor of a portfolio is equal to a weighted average of the betas of the securities in the portfolio, where the weights are equal to the fractions of the money we invest in each security. The residual variance under the single-factor model is assumed to be given by a similar weighted average, but this time, in taking the average, we square the portfolio weights.

2.1.5.4.2 Concept and Meaning of Beta

As discussed earlier, the total risk of an investment consists of two components: diversifiable and non-diversifiable risk. Beta measures non- diversifiable risk. Beta shows how the price of a security responds to market forces. In effect, the more responsive the price of a security is to changes in the market, the higher will be its beta.

Rational investors hold diversified portfolios form which the diversifiable risk is more or less eliminated. Hence the relevant measure of risk of an investment is its non-diversifiable risk? All securities do not have the same degree of non-diversifiable risk because the magnitude of influence of economy-wide factors tends to vary from one firm to another. Different securities have differing sensitive to variations in market returns.

How is non-diversifiable risk measured? It is generally measured by beta, β.

Though not perfect, beta represents the most widely accepted measure of the extent to which the return on a financial asset fluctuates with the return on the market portfolio. By definition, the beta for the market portfolio, β_M, is 1. A security which has a beta of, say, 1.5 experiences greater fluctuation than the market portfolio. More precisely if the return on market portfolio is expected to increase by 10 percent, the return on the security with a beta of 1.5 is expected to increase by 15 percent (1.5×10 percent). On the other hand, a security, which has a beta of, say, 0.8 fluctuates less than the market portfolio. If the return on the market portfolio is expected to rise by 10 percent, the return on the security with a beta of 0.8 is expected to rise by 8 percent (0.8 × 10 percent). Individual security betas generally fall in the range 0.60 to 1.80 and rarely, if ever, assume a negative value.

So the beta is an indicator of the relationship between an individual investment's return and the general market. The beta coefficient is an index of systematic risk. Beta coefficient may be used for ranking the systematic risk of different assets.

"A stock's contribution to the risk of a fully diversified portfolio depends on its sensitivity to changes. This sensitivity is generally known as beta". *(Brealey and Myers, 2000:145)*

Since the return on treasury bills is fixed, it is unaffected by what happens to the market. Thus the beta of treasury bills is zero. The most risky investment that we considered was the market portfolio of common stocks. This has average market risk: its beta is 1.0.

In the capital asset pricing model, beta is taken to be the appropriate measure of risk of an individual security or investment. Betas are obtained by relating individual security returns to the returns of the market portfolio. CAPM uses beta to link formally the notions of risk and return. Wise investors don't run risks just for fun. They are playing with real money. Therefore they require a higher return form the market portfolio than from treasury bills. The difference between the return on the market and the interest rate is termed the market risk premium. The CAPM model states that in well functioning capital markets the expected risk premium on each investment is proportional to its beta. Since, the market portfolio is efficient, there will be a simple linear relationship between the beta of any security and its expected race of return. In the context of CAPM, the relationship is referred to as the security market line (SML). So, CAPM tries to focus that each investment should lie on the sloping security market line connecting treasury bills and the market portfolio.

The capital asset pricing model (CAPM) shows that the risk of an individual security is well represented by its beta coefficient. "Statically, beta is defined as the covariance of the return of an individual stock with the 'market proxy' portfolio return dividend by the variance of the market's proxy return" *(Ross, Westerfied& Jaffe, 1998:264).* In statistical terms the beta tells us the tendency of an individual stock to covey with the market. A stock with beta of 1 tends to move up and down in the same percentage as the market. Stock with a beta coefficient less than 1 tends to move in percentage term less than the market. Similarly, a stock with a beta that is higher than 1 tending to move up and down more than market.

The expected return on a security is positively related to the security's risk, since investors will only take on extra risk if they receive extra compensation. The CAPM implies the beta not standard deviation, is the appropriate measure of risk. Thus insight allows us to calculate the expected return on an individual security.

Expected return = Current risk free rate + (Beta of a security × Historical market risk premium)

Risk of a portfolio is measured by its variance or standard deviation. The variance of a portfolio is sum of (a) the variance of individual securities times (square of) their respective weights and (b) the covariance (i.e., standard deviation of individual securities times their correlation coefficients) between securities times twice the product of their respective weights. In a well diversified portfolio where the weights of each security will be quite insignificant. The covariance between securities will, however, be insignificant. If all securities in the portfolio are highly negatively correlated, then the covariance term may also be negative. This logic boils down to the question of diversifiable and non-diversifiable risk of

securities. Unique of unsystematic risk of securities can be diversified when they are combined to form a large, well-diversified portfolio such on a market portfolio. On the other hand, the market of systematic risk of securities cannot be diversified because individual securities even when they are combined to form a well-diversified portfolio move with the changes in the market. A question arises, how can we measure the systematic risk of a security? One way to measure the risk contribution of an individual security in a well-diversified portfolio is to estimate the change in the variance of the portfolio after the addition of the security. This method involves difficult computations. A large number of variance and covariance terms will have to be calculated. To solve the problems of involved computation, Sharpe has developed the following market model.

$R_j = \acute{\alpha} + \beta_j R_M + e_j$ eq^n 2.16

Where R_j is the return on security j, R_M return on the market portfolio (consisting of all securities in the capital markets). B_j systematic risk of security j and e_j error of term. Beta (β_j) of security j is measure of the variability of its returns relative to the returns of a market portfolio.

"Beta is measure of the sensitivity of an individual security to changes in the market; it is an elasticity coefficient. Beta is the percentage change in as individual security's return for a 1% change in the return of the market". *(Henderson, Trennepohl and wert, 1984:109).* "Beta is the measure of the volatility of the security or portfolio (i.e. mutual fund) to the market return" (Rodriguez and Carter, 1976:184)

"The tendency of a stock to move with the market is reflected in its beta coefficient, b. which is a measure of the stock's volatility relative to that of an average a stock. Beta is a key element of the CAPM" *(Weston and Brigham, 1996:132)*

One of the key considerations in financial decision-making involves the trade-off between risk and return. In a perfect world of efficient markets, the only relevant risk is non-diversifiable risk, which is inescapable since it is attributed to changes in the economy. Diversifiable risk, which is attributed to the firm itself and results from the occurrence of uncontrollable or random events, can be eliminated through diversification. The non-diversifiable risk can be measured by beta, an index that relates responsiveness or co movement of an asset's return to that of the market. Betas may be positive or negative; most are positive and less than 2. The CAPM uses beta to relate an asset's risk relative to the market to the asset's required return. Graphically, the CAPM is referred to as an SML, which depicts for each level of non-diversifiable risk (beta) the associated return in the market place. Thus, since a stock's beta measures its contribution to the riskiness of a portfolio, beta is a theoretically correct measure of the stock's riskiness.

Beta is calculated by relating the returns on a security with the returns for the market. Market return is measured by the average return of a large sample of stocks; such as the S & P 500 stock index. The beta for the overall market is equal to 1.00 and other betas are viewed in relation to this value.

Betas can be positive or negative. However, nearly all betas are positive and most betas lie somewhere between 0.4 and 1.9.

2.1.5.4.3 Calculation of Beta

For calculation the beta of a security the following market model developed by William F. Sharpe is employed:

$R_j = \acute{\alpha}_j + \beta_j R_M + e_j$ eq^n 2.17

Where,

R_j = return on security j

$\acute{\alpha}_j$ = intercept term alpha

β_j = regression coefficient beta

R_M= return on market portfolio

e_j = random error term

Beta reflects the slope of the above regression relationship. It is equal to:

$$\beta_j = \frac{Cov_{jm}}{\sigma^2_M} = \frac{\rho_{jm}\sigma_j\sigma_M}{\sigma^2_M} = \frac{\rho_{jm}\sigma_j}{\sigma_M}$$

Where

β_j = Systematic risk of asset (investment) or risk of individual asset (investment) with market as a whole.

Cov_{jm} = Covariance of the individuals asset's return with return of market portfolio.

σ^2_M = Variance of the return on market portfolio.

ρ_{jm} = Correlation coefficient between the return on j^{th} security and the return on the market portfolio.

σ_j = Standard deviation of return on j^{th} security.

σ_m = Standard deviation of return on market portfolio.

2.1.5.4.4 Interpretation Beta

The BETA of the market portfolio is by definition always equal to 1 and Beta's value of asset generally ranges between +0.5 to 2.

β_j = +0.5 to 2

β_M = 1

β_j = 1 If β = 1 in this type of investment systematic risk is same as indicated in market portfolio.

β_j < 1 In this type of investment the proportion of systematic risk is lesser than market portfolio. Hence it is called DEFENSIVE

β_j > 1 In this type of investment the proportion of systematic risk is greater than market portfolio. Hence it is called AGGRESSIVE

2.1.5.4.5 The Characteristic Line

The total risk of an investment consists of two components.

Total risk = systematic risk + unsystematic risk

Diversifiable risk is that portion of total which is unique to the firm that issued the securities. Events such as labor strikes, management errors, inventions, advertising campaigns, shifts in consumer taste, and lawsuits cause unsystematic changes affect one firm, or at most a few firms, they must be forecast separately for each firm and for each

individual accident. Unsystematic security price movements are statistically independent from each other, and so they may be averaged to zero when different assets are combined to form a diversified portfolio.Therefore unsystematic risk it is also called diversifiable risk. To be more concrete, the rate of return from the i^{th} security in the t^{th} period can be written as the sum of two components.

$r_{i,t} = E(r_i) + e_{i,t}$ eq^n 2.18

Total rate of return = expected ratio of return + diversifiable return

The part of the i^{th} asset's total return that fluctuates around its expected return is denoted e i, t. The diversifiable return can make either a positive or a negative contribution to an asset's total return in any particular period; it has an expected value of zero, $E(e_{I,t}) = 0$. This portion of the asset's return is unique to asset I and may be diversified to zero in a portfolio of different securities.

Undiversifiable risk is that portion of total variability in return caused by market factors that simultaneously affect the prices of all securities. The systematic nature of there price changes makes them immune to much of the risk reduction effects of diversification. Thus, systematic risk is also called undiversifaible risk.The systematic nature of the undiversifiable portion of security's return is stated formally as follows:

$E(r_i) = \acute{\alpha}_i + b_1 E(r_m)$ eq^n 2.19

Equation 2.18 says that the ith assets expected return is a simple linear function of $E(r_m)$, the expected return from a highly diversified market portfolio. The $\acute{\alpha}_i$ term is a constant that is called the asset's alpha; the alpha has a value near zero for most assets. The b_1 tern is called the beta. The betas of most assets have values near positive unity. The beta is an index of un diversifiable risk that gauges how much the ith assets' return typically reacts to a change I market portfolio's return. Portfolio theory was developed mathematically without reference to the 'characteristics line'. The characteristic line will nevertheless be investigated here because it provides an easy way to gain important insights into portfolios theory.

If we substitute equation 2.19 into equation 2.18 we obtain equation 2.18a

$r_{i,t} = E(r_i) + e_{i,t}$ eq^n 2.18

$r_{i,t} = \acute{\alpha}_i + b_1 E(r_m) + e_{i,t}$ eq^n 2.18a

The expected value in equation 2.18a can be converted to a time-series variable by simply replacing the market's expected return $E(r_m)$ with the market's rate of return in the t th period $r_{m,t}$ to get equation 2.20.

$E(r_{i,t}) = \acute{\alpha}_i + b_i r_{mt} + e_{i,t}$ eq^n 2.20

Equation 2.20 is called the characteristic line for the i th asset. Statistically speaking $\acute{\alpha}i$ and b_i can be estimated as regression intercept and slop statistics, respectively, and $e_{i,t}$ is the regression model's unexplained residual return that occurs in period t. The characteristic line is used to measure statistically the un- diversifiable risk and diversifiable risk of individual assets and portfolios. Rearranging equation 2.20 so that the un diversifiable and diversifiable sources of the asset's returns are grouped yields equation 2.20a.

$E(r_{i,t}) = \acute{\alpha}_i + b_i r_{mt} + e_{i,t}$ eq^n 2.20a

Total rate of return in period t = un diversifiable return in period t + Diversifiable return in period t.

Equation 2.19 and 2.19 a both represent the characteristics line for the i th asset. The symbol E ($r_{i.}/r_m$, a,b) is read as " the expected return of asset I given the returns on the market, alpha and beta. Equations 2.19 and 2.19a are similar to 2.20 except that the residual return $e_{i,t}$ has been summed over all the observations to attain a total value of zero, and therefore, the $e_{i,t}$ term disappears.

Statistics	EBL	Market Portfolio
Expected return = E(r) = mean	0.03108	0.04064
Total risk. Or Variance	0.01389	0.00749
Total risk, or Standard Deviation	0.11785	0.08654
Two equivalent systematic risk measures: b_i^2 var (r_m) = p^2 Var (r_i)	0.007802	NA
Unsystematic risk measure: Residual error = Var(e)	0.00609	NA
Standard error = $\sqrt{Var(e)}$	0.0780.	NA
Beta = index of systematic risk	1.021	NA
Alpha = intercept	-0.0104	NA
Correlation with market = ρ	0.7495	NA
Systematic risk percentage = ρ^2	0.56176	1

NA means not applicable

The time subscripts in equation 2.20 have also been deleted because equation 2.19 and 2.19a encompass different periods and different states of nature.

E ($r_{i.}/r_m$, a,b) = $\acute{\alpha}_i + b_i r_m$ eq^n 2.19a

Statisticians call equation 2.19a conditional expectation because the ith asset's return is conditional the alpha and beta statistics and on the markets returns.

Alpha: - In equations 2.19 and 2.20 alpha is the intercept where the characteristic line intercepts the vertical axis. Alpha is an estimate of the ith asset's rate of return when the market is stationary, $r_{m,t} = 0$**.** The alpha intercept statistic is defined in equation 2.21

$$\alpha_i = \overline{r_i} - b_i \overline{r_m} = E(r_i) - b_i E(r_m) \qquad \text{eq}^n \text{ 2.21}$$

-1.04% = 3.108% - (1.021) (4.064%) = EBL's alpha

Beta: - The b_i is the beta coefficient; it measures the slope of the characteristic line. The beta coefficient is defined by equations 2.22 and 2.22a

$$b_i = \frac{Cov(r_i, r_{m)}}{Var(r_m)}$$

$$= \frac{0.007647}{0.00749} = 1.021 = \text{EBL'S beta} \qquad \text{eq}^n \text{ 2.22}$$

$$b_i = \frac{Units of\ rise}{Units of\ run} = \text{Slope of characteristic line} \qquad \text{eq}^n \text{ 2.22a}$$

The term Var(r_m) represents the variance of returns for the market portfolio, and Cov(r_i,r_m) denotes the "covariance" of returns of the i^{th} asset with the market.

Covariance: - The export co variance of returns of the ith asset with the market is defined in equation 2.23 equation 2.23a gives the ex-ante definition. Equation 2.23b provides a more intuitive, but numerically identical definition of the covariance.

$$Cov(r_i, r_{m)} = \left(\frac{1}{T}\right)\sum_{t=1}^{T}\left[r_{i.t} - E(r_{i)}\right]\left[r_{m,t} - E(r_m)\right] \quad \text{eq}^n \text{ 2.23}$$

$$Cov(r_i, r_m) = E[\{r_{i,t} - E(r_i)\}\{r_{m,t} - E(r_m)\}] \quad \text{eq}^n \text{ 2.23a}$$

$$Cov(r_i, r_m) = \rho_{i,m}\,\sigma_i\sigma_m. \quad \text{eq}^n \text{ 2.23b}$$

0.00764 = (0.74951) (0.11785) (0.08654) for EBL

Beta Measurements: - The beta coefficient is an index of systematic risk. Beta coefficients may be used for ranking the systematic risk of different assets. If the beta is larger then 1, b> 1.0, then the asset is more volatile than the market and is called an aggressive asset. If the beta is less than 1, b<1.0, the asset is a defensive asset; its price fluctuation are less volatile than the markets *(Francis, 1992:273)*

Partitioning Risk: - Total risk can measure by the variance of returns, denoted byvar(r). This measure of total risk is partitioned into its systematic and unsystematic components in equation 2.24.

$$Cov(r_i, r_m) = E[\{r_{i,t} - E(r_i)\}\{r_{m,t} - E(r_m)\}]$$

$$= \text{Var}\,(\alpha_i + b_i\, r_{m,r} + e_{i,t}) \text{ for } r_{i,t}$$

$$= 0 + \text{Var}\,(b_i\, r_{m,t}) + \text{Var}(e_{i,t}), \text{ Since Var}(\alpha_i) = 0 \quad \text{eq}^n \text{ 2.24}$$

$$\text{Var}(r_i) = b_i^2\,\text{Var}(r_m) + \text{Var}(e) \text{ Since Var}(b_i, r_{m,t}) = b_i^2\,\text{Var}(r_m)$$

$$= \text{Systematic} + \text{Unsystematic risk} \quad \text{eq}^n \text{ 2.24a.}$$

0.1389 = 0.00780 + 0.00609 for EBL

The unsystematic risk measure Var (e) is called in regression language the residual variance or, synonymously, the standard error squared.

Un diversifiable Proportion: The percentage of total risk that is systematic can be measured by the coefficient of determination ρ^2 (that is, the characteristic line's squared correlation coefficient)

$$\frac{Systematic\,risk}{Total\,risk} = \frac{b^{\,2}\,Var(r_m)}{Var(r_i)} = \rho^2$$

$$\frac{0.007802}{0.01389} = \frac{(1.021)^2\,(0.00749)}{0.01389} = 0.5647 \times 100 = 56.17\% \text{ for EBL}$$

Diversifiable Proportion: The percentage of unsystematic risk equal ($1.0-\rho^2$)

$$\frac{Unsystematic\,risk}{Total\,risk} = \frac{Var(e)}{Var(r_i)} = (1.0 - \rho^2)$$

$\frac{0.00609}{0.01389} = (1.0 - 0.5617) = 0.438 \times 100 = 43.8\%$ Unsystematic risk for EBL

Studies of the characteristic lines of hundreds of stocks listed on the NEPSE indicated that the average correlation coefficient is approximately ρ=0.5. This means that about ρ^2 = 25 percent of the total variability of return in most NEPSE securities is explained by movement in the market.

	NEPSE Average	EBL
Systematic risk : ρ^2	0.25	0.5617
Unsystematic risk : 1- ρ^2	0.75	0.4386
Total risk : 100%	1.0000	1.0000

As explained above, systematic changes are common to all stocks and therefore un-diversifiable.

A primary use of the characteristic line (or market model, or the single index model, as it is also called) is to assess the risk characteristics of one asset. The statistics in 2.19 for instance, indicate that EBL's common stock is slightly more risky than the average common stock in terms of total risk and systematic risk. New risk measurements must be made periodically, however, because the risk and return of an asset may change with the passage of time.

Measuring Company Betas

The basic method of measuring company betas is to estimate:

$$\frac{Cov(R_{ix}, R_{MX})}{Var(R_{MX}}$$

Using t = 1,2…….. T observations.

Problems

1. Betas may vary overtime.
2. The sample size may be inadequate
3. Betas are influenced by changing financial leverage and business risk.

Solutions

1. Problems 1 and 2 (above) can be moderated by more sophisticated statistical techniques.
2. Problem 3 can be lessened by adjusting for changes in business and financial risk.
3. Look at average beta estimates of several comparable firms in the industry.

(Ross, Westerfield & Jaffe, 1998:134)

2.2 Review of Thesis

In this section those previous theses have been reviewed which is related with the research's study.

Bhatta G.P. (1995) conducted a study on *"Assessment of the Performance of Listed Companies in Nepal"* Bhatta has taken 10 listed companies data from 1990 to 1995. One of the major objectives of this study is to analyze risk and return, systematic risk and diversification on risk through portfolio context of the listed companies.

Bhatta concluded that Nepalese capital market is not efficient and Nepalese investors have not yet practiced to invest in portfolio of securities. Systematic risk (market risk) and return may not represent reality, as stock price does not containall the information relating to market and company. Neither investor analyzes the overall relevant information of a stock nor the member of stock exchange tires to disseminate the information. The analysis shows that most companies are facing problems of unsystematic or specific risk. It was observed that Nepalese stock market required expert institutions for consultancy services to the investors to maximize their wealth through rational investment decision.

Upadhayay Sudeep (2003) entitled *"Risk and Return Analysis on common stock investment of Commercial Banks in Nepal"* conclude that:

The expected return on the common stock of Standard Chartered Bank was the maximum, which was very high rate of return. Expected return as the common stock of Nepal SBI Bank ltd was found minimum S.D is only on measure of market unsystematic risk which is not defined by market. Another major aspect of the risk is systematic risk, which is defined by market and measured by beta coefficient. Beta explains or volatility of the stock with market. Higher the beta greater the volatility.

The portfolio of NIBL and NGBL's can not reduce the standard deviation and the same time the optimum proportion that has been calculated is also greater than one making the portfolio construction not possible.

Tuladhar Pramila (2002) conducted a study on *"A Study on Risk and Return Analysis of Common Stock Investment"*. The study was based on eleven companies selecting two from each group that is categorized by NEPSE. The main relevant objectives of the study were,

- To describe the risk return and other relevant variables those are very important in taking decision on stock investment
- To analyze risk and return of common stock and the portfolio.

The study was based on randomly selected companies. The study was based on recent historical data it covers 7 years period form F/Y 1995/96 to F/Y 2000/02. The study had summarized the following findings.

Among each sample, ERR of Nepal Bangladesh Bank was the highest. Bishal Bazar co. had the lowest S.D. According to sector-wise comparision banking had the highest ERR with 11.92. Other sectors had the highest S.D. with 43.73 and trading sector had lowest S.D. with 11.10 other sector had the highest C.V with 595.78 and insurance and finance sector had lowest C.V with 285.28.

Khadka R.H (2003) conducted a study on *"A Study on Analysis of Risk and Return on Selected Nepalese Commercial Banks Listed in NEPSE"* with special reference to Nabil Bank, Investment Bank, SCBNL, HBL, SBI Bank, NBBL, EBL, including data of 5 years.

One of the objective was to determine whether the shares of commercial banks in Nepal are overpriced, underpriced, by analyzing risk and return of the individual share. Form the study, Khadka addressed the following finding.

The share of Bangladesh Bank offered highest realized rate of return i.e. while the Nabil bank had the lowest realized rate or return. It's realized rate of return was not even enough to cover risk free rate of return. None of the share prices was in equilibrium. The unsystematic risk of Nabil bank limited was the highest one amongst the shares under review, an SCBNL had the lowest.

Although the total variance or total risk of Bangladesh Bank was the highest. It was in the second last position in terms of systematic risk being risk less explained by the market in comparison with other stocks.

Tamang B.R (2003) had been conducted the research entitled *"Risk and Return of Commercial Banks in Nepal."* The objectives of his study were follows:

One is to analyze whether the common stock of commercial banks are correctly priced or not by analyzing the required rate of return by using the CAPM and it is also aims to measure systematic and unsystematic risk of the commercial banks. From his findings, Nepal Bangladesh Bank had the highest return and Nabil bank had lowest return where as unsystematic risk of Naibl Bank was highest and the bank of kathmandu was lowest. Correlation coefficient (CV) of Nabil bank shows that return on the bank goes down when market return goes up. Though the shares of banking sector are one of the heavily traded shares in Nepal none of the companies' shares are correctly priced. From his study, the shares of commercial banks in Nepal are heavily treaded in NEPSE none of the share price is correctly priced.

Shrestha Amrit (2003) conducted a study on *"Risk and Return Analysis on Common Stock Investment of Banking Sector in Nepal."* He had taken 8 companies for his study.

The relevant objectives of his study were as follows:

- The study returns associated with common stock investment of bank.
- To study systematic risk and unsystematic risk associated with security.

The study was based on descriptive and analytical research design. This study was based on recent historical data which covers five year period and 8 banks had been taken as sample for the study. Expected rate of return, mean rate of return, standard deviation, coefficient of variation, beta coefficient, coefficient of determination, Sharpe's performance measure, Treynor's performance measure, t- test tools were used to analyze the data.

The major findings of the study were as follows:

NBBL's common stock was yielding the highest realized rate or return with 71.8 more than banking industry, average were NBBL, BOK and EBL and their related rates of returns were 71.8 percent, 67.6 percent and 65.6 percent BOK's common stock consists of the highest 104.21 percent of the total risk which was the riskiest where as HBL's stock is the least risky as it consists of only 28.12 percent of the total risk.

In conclusion, Shrestha had conclude that NBBL had highest return and BOK' s common stock consists of highest 104.21 percent of the total risk which was the riskiest where as HBL's stock was the least risky as it consists of only 28.12 percent of the total risk.

Pandey L.N (2003) conducted a study on *"A Study on Risk and Return Analysis of Common Stock Investment"* concluded that without proper analysis of individual, security, industry and overall market. It is almost impossible to beat the stock market. The main objective of the study was to analyze risk and return of common stock investment with special reference to six finance companies in Nepal. Higher risk may have greater possible return. Deversification lowers the portfolio risk. From his analysis, kahtmandu Finance Limited seemed undoubtedly the best for investment from the view point of expected return and coefficient of variation and citizen investment trust had a lesser beta from the view point of market sensitivity.

Bhatta Dipesh (2003) conducted a study on *"Portfolio Management Listed Finance companies in Nepal"*. The main objective of the study was to identity the present situation of portfolio management of finance company in Nepal with help of risk return and other relevant variables which concluded that the most of finance companies have enough unsystematic risk that means there is not effective portfolio management of listed finance companies. In context of portfolio risk and return of epalese Finance Companies investor has to bear a higher portfolio risk to increase ittle bit of portfolio return.

The major problem to manage the portfolio is volatility of different securities in Nepalese capital market. For the selection of portfolio in Nepal technical analysis does not work effectively but fundamental analysis work effectively. In Nepalese stock market passive strategy is more suitable then active strategy to achieve better result.Corporate investors think portfolio evaluation in necessary but lack of specific knowledge they depend on conventional method.

Sharma D.M (2004) conducted a study on *"Portfolio Management of Listed Commercial Banks and Insurance Company in Nepal"* and submitted to Shankar Dev Campus in is found to be a support of this study. The main relevant objectives of this study were,

- To analyze the return and risk of the common stock of commercial banks and insurance companies.
- To analyze the diversifiable (unsystematic) and undiversifiable (systematic) risk of the return on common stocks.

He had used five years historical data from F/Y 1998 to F/Y 2002. Following were some of his findings.

1. On the basis of risk and return, the shares of all the commercial banks were attractive for investment.
2. The political and economic scenario is worsening day by day and it had the adverse impact on economic activities of the companies.
3. The overall market return can not be regarded as attractive with respect its risk. The risk per unit of return of market is very high.
4. Unsystematic risk of all the economics is high in comparison to total risk.

Shrestha Merina (2006) had conducted a thesis in the title of *"Risk and Return Analysis of listed companies under Group "A" category by NEPSE"* (with special

reference to commercial bank finance company and insurance company). She has done her thesis from public youth campus. Shrestha had taken on 6 listed companies data from 1997 to 2005.

The main relevant objectives of this study were as follows:

- To examine common stock of listed companies in terms of risk and return with the price to form an optimal portfolio.
- To measure systematic and unsystematic risk of the individual companies. On the basis of her findings were concluded as follows:

The expected return on the stock of KFL was maximum i.e.35.19 percent which was very high rate of return. Expected return on the common stock of PIC was minimum (17.71%) other return on the common stock of UFC and NIB was maximum (32.98%, 22.59%).

The common stock KFL was most risky on the basis S.D. and PIC was less risky. Beta coefficient is an index of systematic risk. Beta explains the volatility of stock price.Her findings are follows:

She found SBI's common stock was most volatile because its beta was highest and PIC's common stock was least volatile because its beta was lowest.

In terms of systematic and unsystematic risk, KBL and NIB had lower systematic risk in total risk. SBI had the highest systematic risk in total risk which is the most risky in comparison to other, financial institutions. KFL had the lowest systematic risk which was less risky investment.

Shrestha Sudip (2006) had conducted a thesis in the title of "Risk and Return Analysis of Common Stock Investment in Nepal." Shrestha had taken 12companies were selected for the study data from 2055/56 to 2060/61. The relevant objectives of is study was

- To analyze the risk and return of common stocks.

The main findings of his study were as follows:

The study of the beta coefficient, which measures the systematic risk of the company, reveals that systematic risk of selected ranges from 3.162 to 0.052. The NIDC Capital Market had highest beta risk followed by NBTL, SCBL, HBL, RBS, SHL, UL, NF, NAL, BBCL and STC. NIDC Capital Market, Everest Insurance and Bottlers Nepal (Terai) had higher beta, i.e. those companies stock were aggressive. Other remaining companies were defensive as their betas were less than of the market. Bishal Bazar and Salt Trading Corporation had low beta that means market movement did not affect them much.

2.3 Research Gap

There have been many national and international studies in the field of risk and return to date. All the concepts and practices of foreign author's model about risk and return practices not in used in our Nepalese risk and return analysis. The Nepalese capital market is in the early stage of development. The conclusion made by the international studies may not be relevant in the Nepalese context. So, it is recommended to devote some effort and think how to use those foreign model risk and return. The previous researchers have done investigation about the risk and return part of other different companies of Nepal. The concerned main different companies (Banking Sector, Finance Sector, Manufacturing and Processing Sector, Insurance Sector and Trading Sector)taken as sample in this research is also the leading companies of the country having huge market share and their performance and

activities significant impact on the national economy. The study focuses on the performance of common stock of sample companies and overall Stock market. Not only this study analyses the return, risk and their required rate of return but also gives the comparative knowledge of their performance along with Stock market. This research will help the investors who want to know where and when to invest their hard-earned money in stock market. So, this study will fruitful those interested persons,parties, students, teachers and Government for academically as well as policy perspective.

CHAPTER – III

RESEARCH METHODOLOGY

3.1 Introduction

This chapter makes an attempt to study the methodological aspects in brief. In other words, the overall approach to the research process is presented in this chapter. "Research Methodology describes the methods and process of the study or it's a way to systematically solve the research problem" (Kothari, 1991:10). Similarly, Kerlinger (1983:275) has defined research methodology as the plan, structure and strategy of investigation concelved so as to obtain answers to research questions and to control variance. So, research methodology simply means the sequential steps to be followed in studying or analyzing a problem. As most of the data are quantitative the research in based a scientific methods. It is composed of both paths of technical aspects and logical aspects. On the basis, historical data using both financial and statistical tools an attempt is being made to conduct detail analysis of different variables vis-à-vis results presented in simple way using tables, graphs and diagrams.

3.2 Research Design

Research design simply is the plan for the collection and analysis of data. It presents a series of guideposts to enable the researcher to progress in the right direction in order to achieve the goal. This research study is based on recent historic data. It covers the five years period from F/Y 2007/08 to 2011/12. It deals with the common stock of 12 selected Nepalese companies on the basis of available information. Since the study is related to beta analysis of Nepalese Companies, the title of the study itself suggests, the research of this study is more analytical empirical but less descriptive.

3.3 Population and Sample

This study is concerned with the beta analysis of Nepalese companies. So the population of study is all the listed companies. But, the study of all companies is not possible. As a result a sub-group of the population is selected, which is called sample and samples in this study are the common stocks and dividend of 10 listed Nepalesecompanies from different industry. The following companies are samples for this study:

i) Banking Sector/Industry
   - Nepal SBI Bank Limited (NSBL)
   - Nepal Investment Bank Limited (NIBL)

ii) Finance Sector/Industry
   - Nepal Finance and Savings Company Limited (NFSC)
   - Citizen Investment Trust (CIT)

iii) Manufacturing and Processing Sector/Industry
   - Unilever Nepal Limited (UNL)

iv) Insurance Sector/Industry
   - Himalayan General Insurance Company Limited (HGICL)
   - United Insurance Company Limited (UILC)

v) Hotel Sector/Industry

- Soaltee Hotel Limited (SHL)

vi) Trading Sector/Industry
- Salt Trading Limited (STL)
- Bishal Bazar Company (BBC)

3.4 Sources of Data

This study is conducted on the basis of secondary data. The data required for the analysis are directly obtained from the balance sheet P/L account of concerned bank's annual reports and publication of NEPSE. Supplementary data and information are collected from number of institutions and authorities like NRB, Security Board Nepal, Stock Exchange Ltd, Ministry of Finance, Budget speech of different fiscal years, economic survey.

All the secondary data are compiled, processed and tabulated in the time series as per the need and objectives.

Likewise, various data and information are collected from the economic journals, periodicals, bulletins, magazines and other published and unpublished reports and documents form various sources.

3.5 Data Collection Techniques

This research study is based on secondary data. So, for the purpose of the study, data are collected from the website of NEPSE (www.nepalstock.com) NRB (www.nrb,org,np) and Security Board Nepal (www.sebon.np.com). In this website the financial statements of different listed companies are placed and as per the data are collected for study.

3.6 Method of Analysis and Presentation

Results are presented in tabular form and clear interpretation on it is given simultaneously. Detail calculations are presented in appendices at the end of report. To make report simple and easily understandable charts, diagrams and graphs have been used. Summary, conclusion and Recommendations are presented finally.

3.7 Data analysis Tools

After the collection of research data, an analysis of the data is to be done. The data can be analyzed using statistical and financial tools. This study is being analyzedusing both statistical and financial tools.

3.7.1 Statistical Tools

Arithmetic Mean

Arithmetic Mean also called 'the mean' or 'average' or 'arithmetic average' is the ratio of the sum of all observations to the number of observations. If x_1, x_2,……x_n denotes 'n' variate value of the random variable x_1, then the arithmetic mean denoted by,

$$\overline{X} = \frac{X_1 + X_2 + ... + X_n}{n} = \frac{\sum x}{n}$$

Where,

Σ x = sum of observation

n = number of observation.

Weighted Arithmetic Mean

Simple average method assumes that all the items under consideration are of equal important in the distribution. But in many cases, the relative importance of theitems in the distribution is not same. In such a situation the relative importance are considered as weights of the variables and the weighted average is to be computed. Mathematically, if $x_1, x_2,\ldots\ldots x_n$ denoted the varieties with corresponding weights $w_1, w_2,\ldots\ldots w_n$ respectively (W may denote the percentage of weighted form) then the weighted arithmetic mean is given by

$$\overline{X} = \frac{W_1X_1 + W_2X_2 + \ldots\ldots\ldots\ldots\ldots + W_NX_n}{W_1 + W_2\ldots\ldots\ldots\ldots + W_n + X_n} = \frac{\sum Wx}{\sum W}$$

Standard Deviation

Standard deviation is the most popular and most useful measure of dispersion and gives uniform, correct and stable results. The chief characteristic of standard deviation is that it is based on mean, which gives uniform and dependable results. Astandard deviation is the positive square root of average sum of squares of deviations of observations form arithmetic mean of the distribution. The square of standard deviation is called variance so; standard deviation is a statistical measure of the variability of a distribution of return around its return and thus measures the total risk on stock investment. If $x_1, x_2,\ldots\ldots x_n$ denotes a set of 'n' observation then its standard deviation is given by

$$S.D/\sigma = \sqrt{\frac{\sum\left(X - \overline{X}\right)^2}{n-1}}$$

Where,

σ = Standard Deviation

X = Observation Set

$\overline{X}$ = Arithmetic Mean

N = No. of Observation

Coefficient of Variance (C.V)

The Coefficient of Variance measures the risk per unit return. It is the ration of Standard Deviation of returns to the mean of that distribution. It is a measure of relative risk. Symbolically,

Coefficient of Variation (C.V) = $\frac{\sigma}{\overline{X}}$

Where,

σ = Standard Deviation

$\overline{X}$ = Mean

Enns(1985:121) has stressed that the Coefficient of Variance is normally computed only for data that are non-negative.

Correlation

Correlation is the measure of relationship between two or more character tics of a population or a sample. If two quantities vary in a related manner so that a movement – an increase or decrease in one tend to accompanied by a movement in the same

or opposite direction in the other, they are called Correlated. If the relationship is inverse they are called negatively correlated and if the relationship is inverse they are called negatively correlated. If any change on one does not affect theother variable they are called uncorrelated. Symbolically,

$$r = \frac{Cov(xy)}{\sigma x.\sigma y}$$

Where,
Cov(xy) = Covariance between x and y.
σx = Standard Deviation of Variable x.
σy = Standard Deviation of Variable y.
r = Coefficient of Correlation.

Testing Hypothesis
If the test is 'test of significance for a single mean' the test statistics (t) is:

$$t = \frac{\overline{X} - \mu}{\frac{S}{\sqrt{n}}}$$

Where,
t = Student's test statistics
$\overline{X}$ = Arithmetic mean of sample statistics.
μ = Arithmetic mean of population parameter.
S = Estimated standard deviation of population parameters which is given as:

$$S = \sqrt{\frac{S\left(X - \overline{X}\right)^2}{n-1}}$$ If deviation is taken from actual mean.

$$S = \sqrt{\frac{1}{n-1}\left(\sum d^2 - \frac{\left(\sum d\right)^2}{n}\right)}$$ If the deviation is taken from assume mean.

d = X – A, Where A = assume mean
Where,
n = sample size

Test Result: If t calculated value ≤ t tabulated value: accept the null hypothesis of vise versa.

3.7.2 Financial Tools

Market Price of Stock (P)

Market price of stock is the main data of this study. The closing price is used as market price of stock, which has specific time span of one year and the study has focused in annual basis.

Dividend (D)

A problem does not arise to take the dividend amount if a company declares only the cash dividend. But if company declares stock dividend (bonus share), it is difficult to

obtain the amount of total dividend that really shareholders have gained. In this case, they get extra number of shares as dividend and simultaneously price of the stock decline as a result of increased number of stocks. There is no any model (formula) to get a real amount of dividend in books but previous research in this subject matter has suggested the models, which are used in this research also.

The Model

1. In the case of stock dividend:
   Total dividend amount = cash dividend + stock dividend × Next year's MPS
2. In case of 'right issued' at par
   Total dividend amount = Cash dividend + right share % (Next year's MPS-price of right share)

Return on Common Stock(R)

Return simply is the income received on an investment plus any change in market price, usually expressed as percentage of the beginning market price of investment.

Symbolically,

$$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$$

Where,

R = Actual Rate of return on common stock at time t.

D_t = Cash dividend received at time t.

P_t = Price of stock at time t.

P_{t-1} = Price of stock at time (t-1).

Expected Return on Common Stocks ($\overline{R}$)

One of the main aims of this study is to determine the expected return on the investment in common stock. Generally, this obtained by arithmetic mean of the past year's return. Symbolically,

$$E(R_j) = \overline{R_j} = \frac{\sum R_j}{n}$$

Where,

$E(R_j) = \overline{R}_j$ = Expected rate of return on stock j.

n = Number of years that the returns are taken.

Beta (β)

It is a modern technique to measure systematic risk of an investment or is an index of systematic risk. It measures the sensitivity of a stock's return on the market portfolio. Symbolically,

$$\beta_j = \frac{Cov(R_j R_m)}{\sigma^2 m}$$

Where,

β_j = Beta Coefficient of stock j.

$Cov(R_j R_m)$ = Covariance between R_j and R_m and is equal to:

$$Cov(R_j R_m) = \frac{\sum (R_j - \overline{R}_j)(R_m - \overline{R}_m)}{n-1}$$

$\sigma^2 m$ = Variance of market return.

Alpha (α) intercept

Alpha (α) intercept = $\overline{R} - \beta \overline{R} m$

Expected Return of common stock j = $\overline{R}$

Expected Return of market = $\overline{R}_m$

Beta coefficient of common stock j = β

Systematic risk and unsystematic risk

Total Risk (σ^2) = Systematic Risk $\left(\beta^2 \sigma^2 m\right)$+ Unsystematic Risk ($e^2$)

Systematic Risk = $\beta^2 \sigma^2 m$

Unsystematic Risk (e^2) =Total Risk (σ^2) –Systematic Risk $\left(\beta^2 \sigma^2 m\right)$= σ^2 - $\beta^2 \sigma^2 m$

Standard Error = $\sqrt{Var(e)} = \sqrt{e^2}$

Where,

Variance of total risk of common stock j = σ^2

Variance of market = σ^2 m

Beta Coefficient of common stock j = β

Unsystematic risk = Var(e)

Coefficient of Determination or Proportion of systematic risk (ρ^2) and Proportion of Unsystematic risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) = $\frac{Systematic\,Risk}{Total\,Risk} = \frac{\beta^2 \sigma^2 m}{\sigma^2}$

Correlation with Market = ρ

Proportion of Unsystematic Risk = 1- ρ^2

Where,

Variance total risk of common stock j = σ^2

Systematic Risk = $\beta^2 \sigma^2 m$

CHAPTER – IV
PRESENTATION AND ANALYSIS OF DATA

This chapter includes data of Market Price of Share and Dividend of each selected sample companies, NEPSE, index of each industry, the market, their interpretation and analysis are done here and thus it is the main body of the study. Here the market movement of Nepalese stock is analyzed on the basis of study on trading report, annual general meeting report and literature review. Different tables and diagrams are used to make the result easily understandable.

4.1 Analysis of Individual Companies

4.1.1 Nepal SBI Bank Limited (NSBL)

Table 4.1 represents the market price and dividend per share of NSBI.

Table 4.1

Market Price of Share and Dividend per Share Data of NSBI

Fiscal Year	Market Price of share (P) (Closing) Rs	Divdend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	1176	12.59	47.59	731.67	
2007/08	1511	-	-		
2008/09	1900	2.11	42.11	314.16	
2009/10	741	5	17.5	103.88	
2010/11	565	5	17.5	116.13	
2011/12	635	5	17.5		

Source: NEPSE Index and AGM Report of NSBI

Cash + Bonus × Next Year's MPS

12.59 + 47.59% × 1511 = 731.67 5 + 17.5% × 565 = 103.88

2.11 + 42.11% × 741 = 314.16 5 + 17.5% × 635 = 116.13

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of NSBI:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.2 shows the calculations of year- wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.2

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ) and Coefficient of Variation of NSBI

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	1176	731.67		-	-	
2007/08	1511		0.9070	0.7166	0.5135	
2008/09	1900	314.16	0.2574	0.0670	0.0045	
2009/10	741	103.875	-0.4447	-0.6351	0.4034	
2010/11	565	116.125	-0.0973	-0.2877	0.0828	
2011/12	635	0	0.3295	0.1391	0.0193	
Total			0.9519		1.0235	

Data Source: Table No.4.1

Expected Return E(R) = $\bar{R} = \frac{\sum R}{n} = \frac{0.9519}{5} = 0.1904$ or 19.04%

Standard Deviation, $\sigma = \sqrt{\frac{\sum\left(R-\bar{R}\right)^2}{n-1}} = \sqrt{\frac{1.0235}{4}} = 0.5058$

Coefficient of Variation, C.V.= $\frac{\sigma}{\bar{R}} = \frac{0.5080}{0.1904} = 2.6565$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of NSBL respectively by using least square method.

Table 4.3
Trend Value of NSBI

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.9070	-2.0000	-1.8140	4	0.4923	
2008/09	0.2574	-1.0000	-0.2574	1	0.3414	
2009/10	-0.4447	0.0000	0.0000	0	0.1904	
2010/11	-0.0973	1.0000	-0.0973	1	0.0394	
2011/12	0.3295	2.0000	0.6590	4	-0.1116	
Total	0.9519	0.0000	-1.5097	10		

Data Sources: Table 4.2

We have,

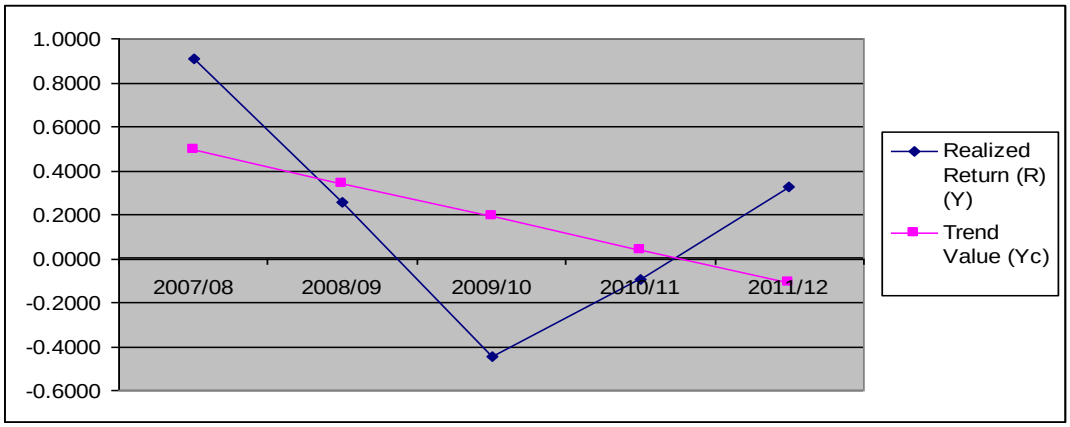
The equation of Trend Line is Yc = a + bx

As, Σx = 0, a = $\frac{\sum y}{n} = \frac{0.9519}{5} = 0.1904$

B = $\frac{\sum xy}{\sum x^2} = \frac{-1.5097}{10} = -0.1510$

Hence, Trend Line is Yc = 0.1904 + (-0.1510)x
When x = -2, Yc = 0.1904 + (-0.1510)(-2) = 0.4923
When x = -1, Yc = 0.1904 + (-0.1510)(-1) = 0.3414
When x = 0, Yc = 0.1904 + (-0.1510)(0) = 0.1904
When x = 1, Yc = 0.1904 + (-0.1510)(1) = 0.0394
When x = 2, Yc = 0.1904 + (-0.1510)(2) = -0.1116

Figure: 4.1
Movement of Stocks Realized Rate of Return and Trend Line of NSBL.



The above diagram shows the movements of stock realized rate of return and trend line of NSBI.

4.1.2 Nepal Investment Bank Ltd. (NIBL)

Table 4.4 represents the market price and dividend per share of NIBL.

Table 4.4
Market Price of Share and Dividend Per Share Data Of NIBL

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	1729	5	30	740	
2007/08	2450	7.5	40.83	574.22	
2008/09	1388	20	20	161	
2009/10	705	25	25	153.75	
2010/11	515	25	50	280.50	
2011/12	511	5	30	5	

Data Source: Nepse Index and AGM Report of NIBL

Cash + Bonus × Next Year's MPS

5 + 30% × 2450 = 740

7.5 + 40.83% × 1388 = 574.22

20 + 20% ×705 = 161

25 + 25% × 515 = 153.75

25 + 50% × 511 = 280.50

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of NIBL:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.5 shows the calculations of year- wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.5
Realized rate of return, expected returns, so and C.V of the common stock of NIBL

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \bar{R}$	$(R - \bar{R})^2$	Remarks
2006/07	1729	740		-	-	
2007/08	2450	574.22	0.8450	0.6939	0.4815	
2008/09	1388	161	-0.1991	-0.3502	0.1226	
2009/10	705	153.75	-0.3761	-0.5271	0.2779	
2010/11	515	280.50	-0.0514	-0.2025	0.0410	
2011/12	511	0	0.5369	0.3858	0.1489	
Total			0.7553		1.0719	

Data Source: Table No.4.4

Expected Return E(R) = $\bar{R} = \frac{\sum R}{n} = \frac{0.7553}{5} = 0.1511 or 15.11\%$

Standard Deviation, σ = $\sqrt{\frac{\sum (R - \bar{R})^2}{n-1}} = \sqrt{\frac{1.0719}{4}} = 0.5177$

Coefficient of Variation, C.V. = $\frac{\sigma}{\bar{R}} = \frac{0.5177}{0.7553} = 0.6854$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of NIBL respective by using least square method.

Table 4.6
Trend Value of NIBL

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.8450	-2.0000	-1.6900	4	0.2448	
2008/09	-0.1991	-1.0000	0.1991	1	0.1979	
2009/10	-0.3761	0.0000	0.0000	0	0.1511	
2010/11	-0.0514	1.0000	-0.0514	1	0.1042	
2011/12	0.5369	2.0000	1.0738	4	0.0574	
Total	0.7553	0.0000	-0.4685	10		

Data Source: Table 4.5

We have,

The equation of Trend Line is Yc = a + bx

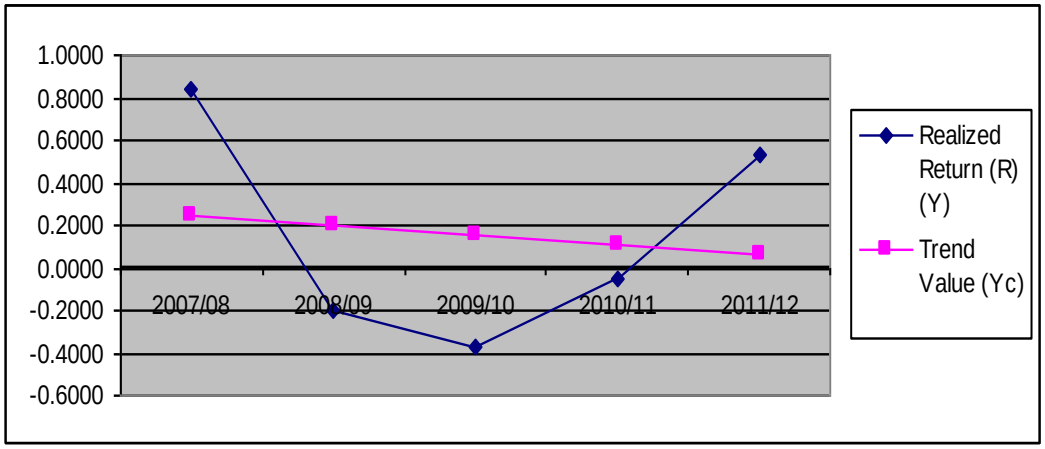
As, Σx = 0, a = $\frac{\sum y}{n} = \frac{0.7553}{5} = 0.1511$

b = $\frac{\sum xy}{\sum x^2} = \frac{-0.4685}{10} = -0.0469$

Hence, Trend Line is Yc = 0.1511 + (-0.0469)x

When x = -2, Yc = 0.1511 + (-0.0469) (-2) = 0.2448
When x = -1, Yc = 0.1511 + (-0.0469) (-1) = 0.1979
When x = 0, Yc = 0.1511 + (-0.0469) (0) = 0.1511
When x = 1, Yc = 0.1511 + (-0.0469) (1) = 0.1042
When x = 2, Yc = 0.1511 + (-0.0469) (2) = 0.0574

Figure: 4.2
Movement of Stocks Realized Rate of Return and Trend Line of NIBL.



The above diagram shows the movements of stock realized rate of return and trend line of NIBL.

4.1.3 Nepal Finance and Savings Company(NFSC)

Table 4.7 represents the market price and dividend per share of NFSC.

Table 4.7
Market Price of Share and Dividend Per Share Data of NFSC

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	265	0	50	237.50	
2007/08	475	0	0	0.00	
2008/09	400	0	0	0.00	
2009/10	295	0	0	0.00	
2010/11	187	0	0	0.00	
2011/12	115	0	0	0.00	

Source: NEPSE Index and AGM Report of NFSC

Cash + Bonus × Next Year's MPS
0 + 50% × 475 = 237.50

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of NFSC:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.8 shows the calculations of year- wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.8

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ)

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	265	237.50		-	-	
2007/08	475	0.00	0.7925	0.8683	0.7539	
2008/09	400	0.00	-0.1579	-0.0821	0.0067	
2009/10	295	0.00	-0.2625	-0.1867	0.0349	
2010/11	187	0.00	-0.3661	-0.2903	0.0843	
2011/12	115	0.00	-0.3850	-0.3092	0.0956	
Total			-0.3791		0.9754	

Data Source: Table No.4.7

Expected Return E(R) = $\overline{R} = \frac{\sum R}{n} = \frac{-0.3791}{5} = -0.0758$ or -7.58%

Standard Deviation, σ = $\sqrt{\frac{\sum (R - \overline{R})^2}{n-1}} = \sqrt{\frac{0.9754}{4}} = 0.4938$

Coefficient of Variation, C.V.= $\frac{\sigma}{\overline{R}} = \frac{0.4938}{-0.0758} = -6.5145$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of NFSC respectively by using least square method.

Table 4.9
Trend Value of NFSC

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.7925	-2	-1.5849	4	0.4368	
2008/09	-0.1579	-1	0.1579	1	0.1805	
2009/10	-0.2625	0	0.0000	0	-0.0758	
2010/11	-0.3661	1	-0.3661	1	-0.3321	
2011/12	-0.3850	2	-0.7701	4	-0.5884	
Total	-0.3791	0	-2.5632	10		

Data Sources: Table 4.8

We have,

The equation of Trend Line is Yc = a + bx

As, $\Sigma x = 0$, $a = \frac{\sum y}{n} = \frac{-0.3791}{5} = -0.0758$

$$B = \frac{\sum xy}{\sum x^2} = \frac{-2.5632}{10} = -0.2563$$

Hence, Trend Line is Yc = -0.0758 + (-0.2563)x

When x = -2, Yc = -0.0758 + (-0.2563)(-2) = 0.4368

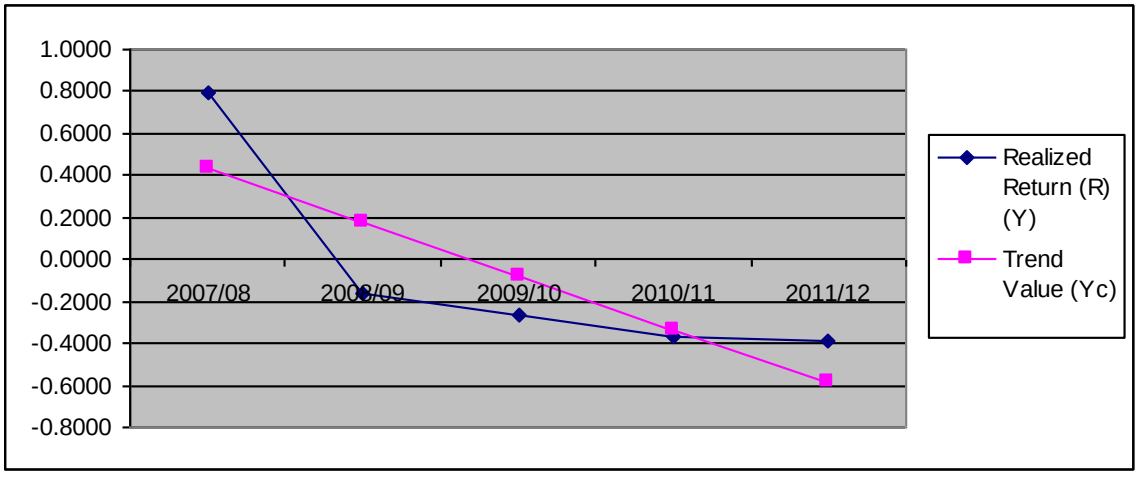
When x = -1, Yc = -0.0758 + (-0.2563)(-1) = 0.1805

When x = 0, Yc = -0.0758 + (-0.2563)(0) = -0.0758

When x = 1, Yc = -0.0758 + (-0.2563)(1) = -0.03321

When x = 2, Yc = -0.0758 + (-0.2563)(2) = -0.5884

Figure: 4.3
Movement of Stocks Realized Rate of Return and Trend Line of NFSC.



The above diagram shows the movements of stock realized rate of return and trend line of NFSC.

4.1.4 Citizen Investment Trust (CIT)

Table 4.10 represents the market price and dividend per share of CIT.

Table 4.10
Market Price of Share and Dividend Per Share Data of CIT

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	352	18	50	237.42	
2007/08	438	1.75	33.33	245.06	
2008/09	730	0	25	132.50	
2009/10	530	0	0	0.00	
2010/11	405	0	0	0.00	
2011/12	566	0	40	0.00	

Source: NEPSE Index and AGM Report of CIT

Cash + Bonus × Next Year's MPS

18 + 50% × 438 = 237.42

1.75 + 33.33% × 730 = 245.06

0+ 25% × 530 = 132.50

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of CIT:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.11 shows the calculations of year-wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.11

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ) and Coefficient of Variation of CIT

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	352	237.42		-	-	
2007/08	438	245.06	0.9405	0.5810	0.3376	
2008/09	730	132.50	0.9692	0.6097	0.3717	
2009/10	530	0.00	-0.2740	-0.6335	0.4013	
2010/11	405	0.00	-0.2358	-0.5953	0.3544	
2011/12	566	0.00	0.3975	0.0381	0.0014	
Total			1.7974		1.4665	

Data Source: Table No.4.10

Expected Return E(R) = $\overline{R} = \frac{\sum R}{n} = \frac{1.7974}{5} = 0.3595$ or 35.95%

Standard Deviation, $\sigma = \sqrt{\frac{\sum\left(R-\bar{R}\right)^2}{n-1}} = \sqrt{\frac{1.4665}{4}} = 0.6055$

Coefficient of Variation, C.V.= $\frac{\sigma}{\bar{R}} = \frac{0.3595}{0.6055} = 0.5937$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of CIT respectively by using least square method.

Table 4.12
Trend Value of CIT

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.9405	-2	-1.8810	4	0.8177	
2008/09	0.9692	-1	-0.9692	1	0.5886	
2009/10	-0.2740	0	0.0000	0	0.3595	
2010/11	-0.2358	1	-0.2358	1	0.1304	
2011/12	0.3975	2	0.7951	4	-0.0987	
Total	1.7974	0	-2.2910	10		

Data Sources: Table 4.11

We have,

The equation of Trend Line is Yc = a + bx

As, $\Sigma x = 0$, $a = \frac{\sum y}{n} = \frac{1.7974}{5} = 0.3595$

$$B = \frac{\sum xy}{\sum x^2} = \frac{-2.2910}{10} = -0.2291$$

Hence, Trend Line is Yc = 0.3595 + (-0.2291)x

When x = -2, Yc = 0.3595 + (-0.2291) (-2) = 0.8177

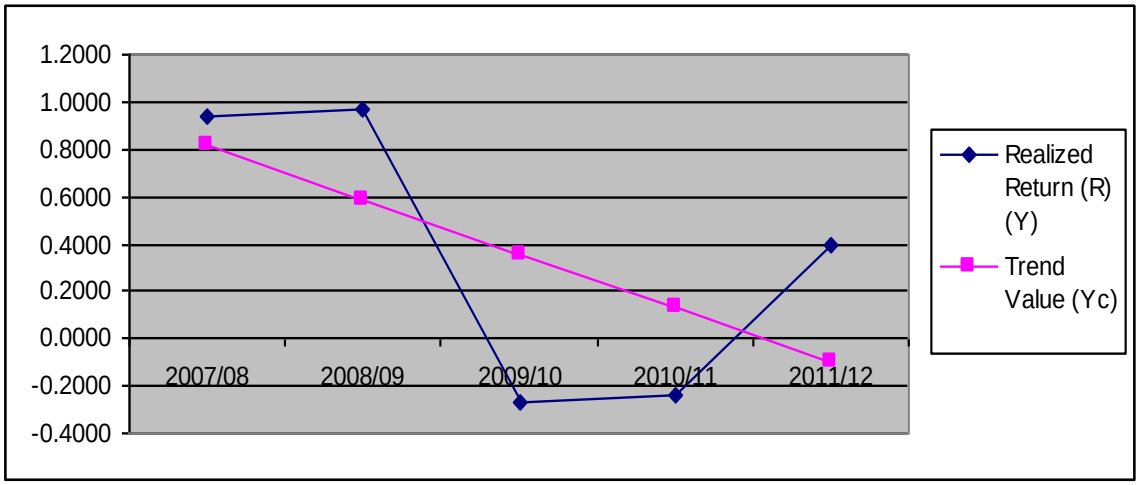
When x = -1, Yc = 0.3595 + (-0.2291)(-1) = 0.5886

When x = 0, Yc = 0.3595 + (-0.2291)(0) = 0.3595

When x = 1, Yc = 0.3595 + (-0.2291)(1) = 0.1304

When x = 2, Yc = 0.3595 + (-0.2291)(2) = -0.0987

Figure: 4.4
Movement of Stocks Realized Rate of Return and Trend Line of CIT.



The above diagram shows the movements of stock realized rate of return and trend line of CIT.

4.1.5 Unilever Nepal Limited

Table 4.13 represents the market price and dividend per share of UNL.

Table 4.13
Market Price of Share and Dividend Per Share Data of UNL

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	3400	250	0	250.00	
2007/08	4100	275	0	275.00	
2008/09	4250	325	0	325.00	
2009/10	4149	325	0	325.00	
2010/11	4781	560	0	560.00	
2011/12	6300	680	0	680.00	

Source: NEPSE Index and AGM Report of NSBL

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of UNL:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.14 shows the calculations of year-wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.14

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ) and Coefficient of Variation of UNL

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	3400	250.00		-	-	
2007/08	4100	275.00	0.2868	0.0463	0.0021	
2008/09	4250	325.00	0.1159	-0.1247	0.0155	
2009/10	4149	325.00	0.0527	-0.1878	0.0353	
2010/11	4781	560.00	0.2873	0.0468	0.0022	
2011/12	6300	680.00	0.4599	0.2194	0.0482	
Total			1.2026		0.1033	

Data Source: Table No.4.13

Expected Return E(R) = $\overline{R} = \frac{\sum R}{n} = \frac{1.2026}{5} = 0.2405$ or 24.05%

Standard Deviation, σ = $\sqrt{\frac{\sum (R - \overline{R})^2}{n-1}} = \sqrt{\frac{0.1033}{4}} = 0.1607$

Coefficient of Variation, C.V.= $\frac{\sigma}{\overline{R}} = \frac{0.2405}{0.1607} = 1.4966$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of UNL respectively by using least square method.

Table 4.15

Trend Value of UNL

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.2868	-2	-0.5735	4	0.1370	
2008/09	0.1159	-1	-0.1159	1	0.1887	
2009/10	0.0527	0	0.0000	0	0.2405	
2010/11	0.2873	1	0.2873	1	0.2923	
2011/12	0.4599	2	0.9199	4	0.3441	
Total	1.2026	0	0.5178	10		

Data Sources: Table 4.14

We have,

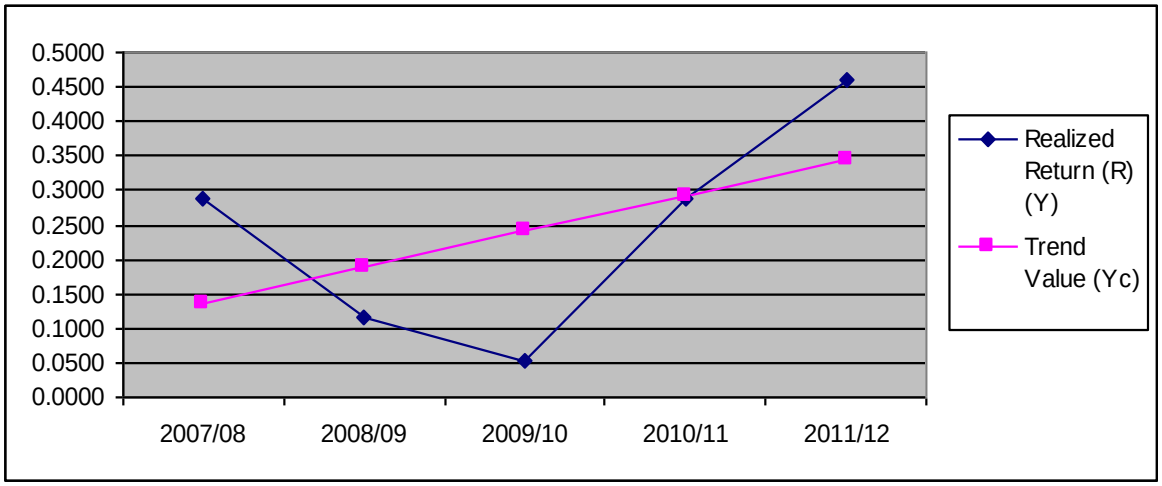
The equation of Trend Line is Yc = a + bx

As, Σx = 0, a = $\frac{\sum y}{n} = \frac{1.2026}{5} = 0.2405$

B = $\frac{\sum xy}{\sum x^2} = \frac{0.5178}{10} = 0.0518$

Hence, Trend Line is Yc = 0.2405 +0.0518*x
When x = -2, Yc = 0.2405 +0.0518(-2) = 0.1370
When x = -1, Yc = 0.2405 +0.0518(-1) = 0.1887
When x = 0, Yc = 0.2405 +0.0518(0) = 0.2405
When x = 1, Yc = 0.2405 +0.0518(1) = 0.2923
When x = 2, Yc = 0.2405 +0.0518(2) = 0.3441

Figure: 4.5
Movement of Stocks Realized Rate of Return and Trend Line of UNL.



The above diagram shows the movements of stock realized rate of return and trend line of UNL.

4.1.6 Himalayan General Insurance Company (HGIC)

Table 4.16 represents the market price and dividend per share of HGIC.

Table 4.16
Market Price of Share and Dividend Per Share Data of HGIC

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	300	0	0	0.00	
2007/08	345	0	110	313.50	
2008/09	285	5.26	0	5.26	
2009/10	234	0	0	0.00	
2010/11	200	0	0	0.00	
2011/12	197	0	0	0.00	

Source: NEPSE Index and AGM Report of HGIC

Cash + Bonus × Next Year's MPS

0 + 110% × 285 = 313.50

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of HGIC:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.17 shows the calculations of year-wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.17

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ) and Coefficient of Variation of HGIC

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	300	0.00		-	-	
2007/08	345	313.50	1.1950	1.0556	1.1143	
2008/09	285	5.26	-0.1587	-0.2981	0.0889	
2009/10	234	0.00	-0.1789	-0.3184	0.1014	
2010/11	200	0.00	-0.1453	-0.2847	0.0811	
2011/12	197	0.00	-0.0150	-0.1544	0.0238	
Total			0.6971		1.4094	

Data Source: Table No.4.16

Expected Return E(R) = $\overline{R} = \frac{\sum R}{n} = \frac{0.6971}{5} = 0.1394$ or 13.94%

Standard Deviation, σ = $\sqrt{\frac{\sum (R - \overline{R})^2}{n-1}} = \sqrt{\frac{1.4094}{4}} = 0.5936$

Coefficient of Variation, C.V. = $\frac{\sigma}{\overline{R}} = \frac{0.5936}{0.1394} = 4.2502$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of HGIC respectively by using least square method.

Table 4.18
Trend Value of HGIC

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	1.1950	-2	-2.3900	4	0.6207	
2008/09	-0.1587	-1	0.1587	1	0.3801	
2009/10	-0.1789	0	0.0000	0	0.1394	
2010/11	-0.1453	1	-0.1453	1	-0.1012	
2011/12	-0.0150	2	-0.0300	4	-0.3419	
Total	0.6971	0	-2.4066	10		

Data Sources: Table 4.17

We have,

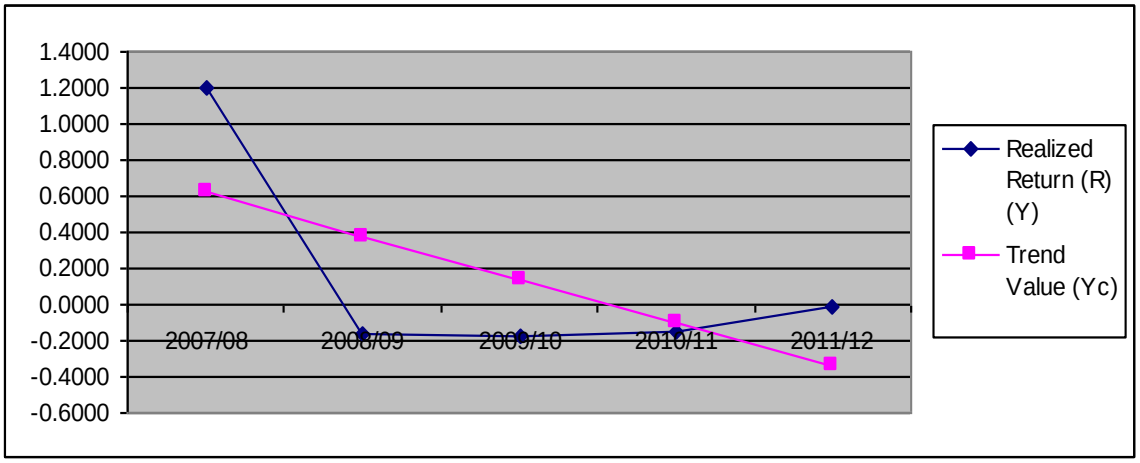
The equation of Trend Line is Yc = a + bx

As, Σx = 0, a = $\frac{\sum y}{n} = \frac{0.6971}{5} = 0.1394$

$$B = \frac{\sum xy}{\sum x^2} = \frac{-2.4066}{10} = -0.2407$$

Hence, Trend Line is Yc = 0.1394 + (-0.2407)x
When x = -2, Yc = 0.1394 + (-0.2407)(-2) = 0.6207
When x = -1, Yc = 0.1394 + (-0.2407)(-1) = 0.801
When x = 0, Yc = 0.1394 + (-0.2407)(0) = 0.1394
When x = 1, Yc = 0.1394 + (-0.2407)(1) = -0.1012
When x = 2, Yc = 0.1394 + (-0.2407)(2) = -0.3419

Figure: 4.6
Movement of Stocks Realized Rate of Return and Trend Line of HGIC



The above diagram shows the movements of stock realized rate of return and trend line of HGIC.

4.1.7 United Insurance Company (UIC)

Table 4.19 represents the market price and dividend per share of UIC.

Table 4.19

Market Price of Share and Dividend Per Share Data of UIC

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	219	0	0	0.00	
2007/08	315	0	20	59.00	
2008/09	295	0	0	0.00	
2009/10	270	0	0	0.00	
2010/11	295	0	0	0.00	
2011/12	275	0	0	0.00	

Source: NEPSE Index and AGM Report of UIC

Cash + Bonus × Next Year's MPS

0 + 20% × 295 = 59

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of UIC:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.20 shows the calculations of year-wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.20

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ) and Coefficient of Variation of UIC

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	219	0.00		-	-	
2007/08	315	59.00	0.7078	0.5909	0.3492	
2008/09	295	0.00	-0.0635	-0.1804	0.0325	
2009/10	270	0.00	-0.0847	-0.2016	0.0406	
2010/11	295	0.00	0.0926	-0.0243	0.0006	
2011/12	275	0.00	-0.0678	-0.1847	0.0341	
Total			0.5843		0.4570	

Data Source: Table No.4.19

Expected Return E(R) = $\overline{R} = \frac{\sum R}{n} = \frac{0.5843}{5} = 0.1169$ or 11.69%

Standard Deviation, σ = $\sqrt{\frac{\sum (R - \overline{R})^2}{n-1}} = \sqrt{\frac{0.4570}{4}} = 0.3380$

Coefficient of Variation, C.V.= $\frac{\sigma}{R} = \frac{0.3380}{0.1169} = 2.8914$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of UIC respectively by using least square method.

Table 4.21
Trend Value of UIC

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.7078	-2	-1.4155	4	0.3959	
2008/09	-0.0635	-1	0.0635	1	0.2564	
2009/10	-0.0847	0	0.0000	0	0.1169	
2010/11	0.0926	1	0.0926	1	-0.0226	
2011/12	-0.0678	2	-0.1356	4	-0.1621	
Total	0.5843	0	-1.3950	10		

Data Sources: Table 4.20

We have, The equation of Trend Line is Yc = a + bx

As, $\Sigma x = 0$, $a = \frac{\sum y}{n} = \frac{0.5843}{5} = 0.1169$

$$B = \frac{\sum xy}{\sum x^2} = \frac{-1.3950}{10} = -0.1395$$

Hence, Trend Line is Yc = 0.1169 + (-0.1395)x

When x = -2, Yc = 0.1169 + (-0.1395)(-2) = 0.3959

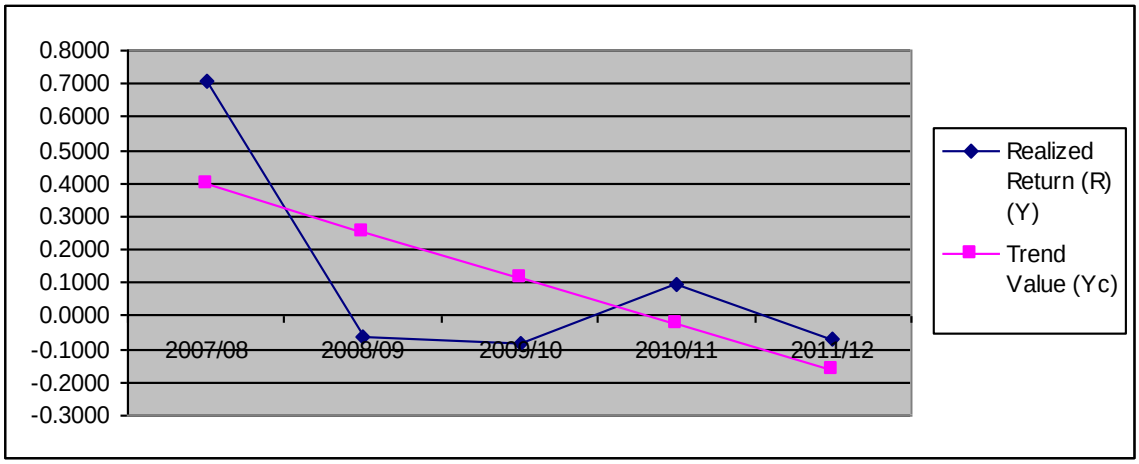
When x = -1, Yc = 0.1169 + (-0.1395)(-1) = 0.2564

When x = 0, Yc = 0.1169 + (-0.1395)(0) = 0.1169

When x = 1, Yc = 0.1169 + (-0.1395)(1) = -0.0226

When x = 2, Yc = 0.1169 + (-0.1395)(2) = -0.1621

Figure: 4.7
Movement of Stocks Realized Rate of Return and Trend Line of UIC



The above diagram shows the movements of stock realized rate of return and trend line of UIC.

4.1.8 Soaltee Hotel Limited (SHL)

Table 4.22 represents the market price and dividend per share of SHL.

Table 4.22
Market Price of Share and Dividend Per Share Data of SHL

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	126	0	0	0.00	
2007/08	236	0	0	0.00	
2008/09	207	11.05	10	33.95	
2009/10	229	11.58	20	51.98	
2010/11	202	17.36	30	86.36	
2011/12	230	32.63	20	32.63	

Source: NEPSE Index and AGM Report of SHL

Cash + Bonus × Next Year's MPS

11.05 + 10% × 229 = 33.95

11.58 + 20% × 202 = 51.98

17.36+ 30% × 230 = 86.36

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of SHL:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.23 shows the calculations of year-wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.23

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ) and Coefficient of Variation of SHL

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	126	0.00		-	-	
2007/08	236	0.00	0.8730	0.5432	0.2950	
2008/09	207	33.95	0.0210	-0.3089	0.0954	
2009/10	229	51.98	0.3574	0.0275	0.0008	
2010/11	202	86.36	0.2592	-0.0706	0.0050	
2011/12	230	0.00	0.1386	-0.1912	0.0366	
Total			1.6492		0.4328	

Data Source: Table No.4.22

Expected Return E(R) = $\overline{R} = \frac{\sum R}{n} = \frac{1.6492}{5} = 0.3298$ or 32.98%

Standard Deviation, σ = $\sqrt{\frac{\sum (R - \overline{R})^2}{n-1}} = \sqrt{\frac{0.4328}{4}} = 0.3289$

Coefficient of Variation, C.V.= $\frac{\sigma}{\overline{R}} = \frac{0.3289}{0.3298} = 0.9973$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of SHL respectively by using least square method.

Table 4.24
Trend Value of SHL

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.8730	-2	-1.7460	4	0.5760	
2008/09	0.0210	-1	-0.0210	1	0.4529	
2009/10	0.3574	0	0.0000	0	0.3298	
2010/11	0.2592	1	0.2592	1	0.2068	
2011/12	0.1386	2	0.2772	4	0.0837	
Total	1.6492	0	-1.2306	10		

Data Sources: Table 4.23

We have,

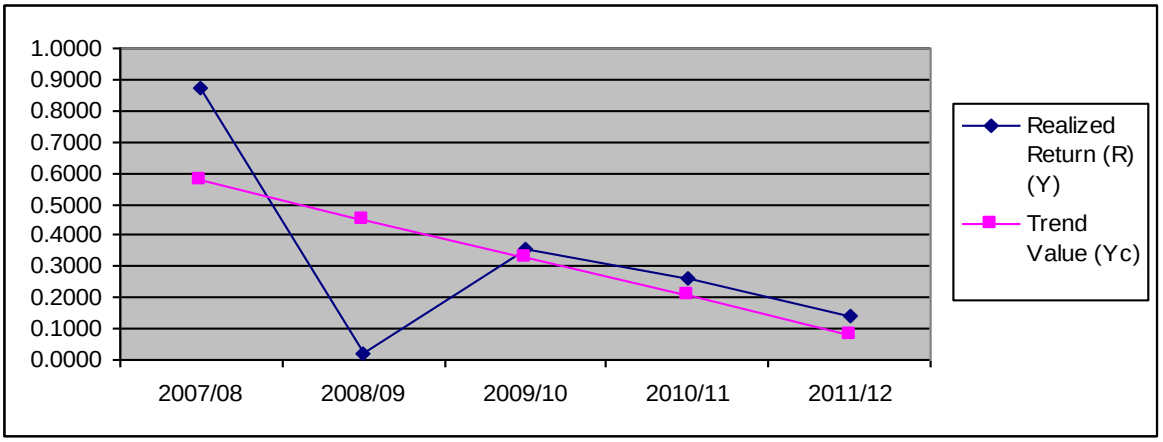
The equation of Trend Line is Yc = a + bx

As, Σx = 0, a = $\frac{\sum y}{n} = \frac{1.6492}{5} = 0.3298$

$$B = \frac{\sum xy}{\sum x^2} = \frac{-1.2306}{10} = -0.1231$$

Hence, Trend Line is Yc = 0.3298 + (-0.1231)x
When x = -2, Yc = 0.3298 + (-0.1231)(-2) = 0.5760
When x = -1, Yc = 0.3298 + (-0.1231)(-1) = 0.4529
When x = 0, Yc = 0.3298 + (-0.1231)(0) = 0.3298
When x = 1, Yc = 0.3298 + (-0.1231)(1) = 0.2068
When x = 2, Yc = 0.3298 + (-0.1231)(2) = 0.0837

Figure: 4.8
Movement of Stocks Realized Rate of Return and Trend Line of SHL



The above diagram shows the movements of stock realized rate of return and trend line of SHL.

4.1.9 Salt Trading Company (STC)

Table 4.25 represents the market price and dividend per share of STC.

Table 4.25
Market Price of Share and Dividend Per Share Data of STC

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	325	20	0	20.00	
2007/08	331	0	20	69.20	
2008/09	346	10	15	56.05	
2009/10	307	5	15	43.40	
2010/11	256	10	20	48.60	
2011/12	193	15	10	15.00	

Source: NEPSE Index and AGM Report of STC

Cash + Bonus × Next Year's MPS
0 + 20% × 346 = 69.20

10 + 15% × 307 = 56.05
5 + 15% × 256 = 43.60
10 + 20% × 193 = 48.60

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of STC:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.26 shows the calculations of year-wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.26

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ) and Coefficient of Variation of STC

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	325	20.00		-	-	
2007/08	331	69.20	0.2314	0.1787	0.0319	
2008/09	346	56.05	0.2147	0.1620	0.0262	
2009/10	307	43.40	0.0127	-0.0400	0.0016	
2010/11	256	48.60	-0.0078	-0.0605	0.0037	
2011/12	193	15.00	-0.1875	-0.2402	0.0577	
Total			0.2634		0.1211	

Data Source: Table No.4.25

Expected Return E(R) = $\overline{R} = \frac{\sum R}{n} = \frac{0.2634}{5} = 0.0527$ or 5.27%

Standard Deviation, σ = $\sqrt{\frac{\sum (R - \overline{R})^2}{n-1}} = \sqrt{\frac{0.1211}{4}} = 0.1741$

Coefficient of Variation, C.V.= $\frac{\sigma}{\overline{R}} = \frac{0.1741}{0.0527} = 3.3036$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of STC respectively by using least square method.

Table 4.27
Trend Value of STC

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.2314	-2	-0.4628	4	0.2647	
2008/09	0.2147	-1	-0.2147	1	0.1587	

2009/10	0.0127	0	0.0000	0	0.0527	
2010/11	-0.0078	1	-0.0078	1	-0.0533	
2011/12	-0.1875	2	-0.3750	4	-0.1594	
Total	0.2634	0	-1.0602	10		

Data Sources: Table 4.26

We have,

The equation of Trend Line is Yc = a + bx

As, $\Sigma x = 0$, $a = \frac{\sum y}{n} = \frac{0.2634}{5} = 0.0527$

$$B = \frac{\sum xy}{\sum x^2} = \frac{-1.0602}{10} = -0.1060$$

Hence, Trend Line is Yc = 0.0527 + (-0.1060)x

When x = -2, Yc = 0.0527 + (-0.1060)(-2) = 0.2647

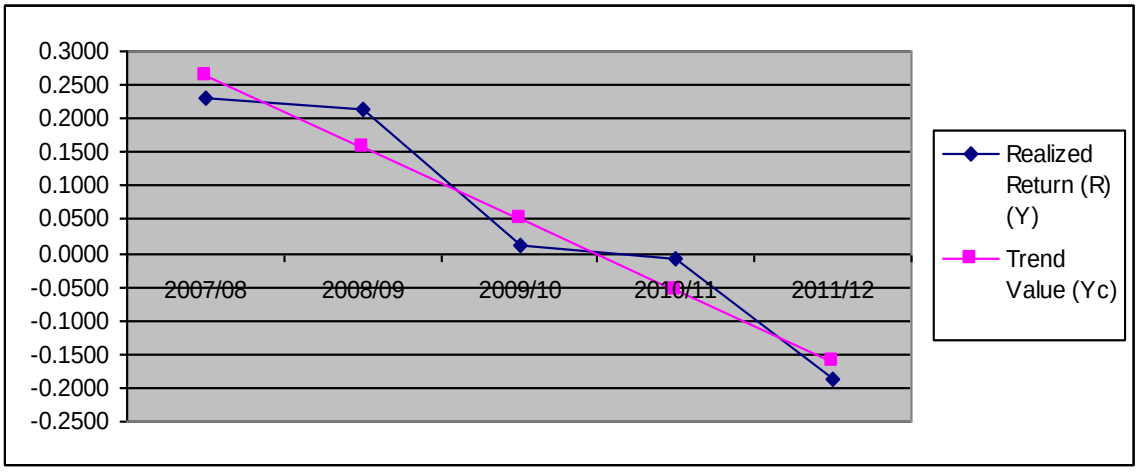
When x = -1, Yc = 0.0527 + (-0.1060)(-1) = 0.1587

When x = 0, Yc = 0.0527 + (-0.1060)(0) = 0.0527

When x = 1, Yc = 0.0527 + (-0.1060)(1) = -0.0533

When x = 2, Yc = 0.0527 + (-0.1060)(2) = -0.1594

Figure: 4.9
Movement of Stocks Realized Rate of Return and Trend Line of STC



The above diagram shows the movements of stock realized rate of return and trend line of STC.

4.1.10 Bishal Bazar Company Limited (BBCL)

Table 4.28 represents the market price and dividend per share of BBCL.

Table 4.28

Market Price of Share and Dividend Per Share Data of BBCL

Fiscal Year	Market Price of share (P) (Closing) Rs	Dividend Per Share (D)			Remarks
		Cash (Rs)	Stock	Total	
2006/07	2575	0	100	2201.00	
2007/08	2201	20	80	2631.20	
2008/09	3264	50	0	50.00	
2009/10	3100	10	15	408.25	
2010/11	2655	0	0	0.00	
2011/12	2050	0	0	0.00	

Source: NEPSE Index and AGM Report of STC

Cash + Bonus × Next Year's MPS

0 + 100% × 2201 = 2201.00

20 + 80% × 3264 = 2631.20

10 + 15% × 2655 = 408.25

Calculated of Realized Returns(R), its expected Return(R), Standard Deviation (σ) and Coefficient of Variation of BBCL:

Realized rate of returns for each year are calculated on the basis of year- end price and dividend amount of respective year. Table 4.26 shows the calculations of year-wise realized returns, expected returns, standard deviation and coefficient of variation of returns.

Table 4.29

Realized rate of Returns (R), Expected Returns $(\overline{R})$, Standard Deviation (σ) and Coefficient of Variation of BBCL

Fiscal Year	Year and Price (P)	Dividend (D)	$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$	$R - \overline{R}$	$(R - \overline{R})^2$	Remarks
2006/07	2575	2201.00		-	-	
2007/08	2201	2631.20	0.8766	0.6594	0.4349	
2008/09	3264	50.00	0.5057	0.2885	0.0833	
2009/10	3100	408.25	0.0748	-0.1423	0.0203	
2010/11	2655	0.00	-0.1435	-0.3607	0.1301	
2011/12	2050	0.00	-0.2279	-0.4450	0.1980	
Total			1.0857		0.8665	

Data Source: Table No.4.28

Expected Return E(R) = $\overline{R} = \frac{\sum R}{n} = \frac{1.0857}{5} = 0.2171$ or 21.71%

Standard Deviation, σ = $\sqrt{\frac{\sum (R - \overline{R})^2}{n-1}} = \sqrt{\frac{08665}{4}} = 0.4654$

Coefficient of Variation, C.V.= $\frac{\sigma}{\overline{R}} = \frac{0.4654}{0.2171} = 2.1437$

Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on common stock of BBCL respectively by using least square method.

Table 4.30
Trend Value of BBCL

Fiscal Year	Realized Return (R) (Y)	Deviation from 09/10 (X)	XY	X^2	Trend Value (Yc)	Remarks
2007/08	0.8766	-2	-1.7532	4	0.7888	
2008/09	0.5057	-1	-0.5057	1	0.5029	
2009/10	0.0748	0	0.0000	0	0.2171	
2010/11	-0.1435	1	-0.1435	1	-0.0687	
2011/12	-0.2279	2	-0.4557	4	-0.3545	
Total	1.0857	0	-2.8581	10		

Data Sources: Table 4.26

We have,

The equation of Trend Line is Yc = a + bx

As, $\Sigma x = 0$, $a = \frac{\sum y}{n} = \frac{1.0857}{5} = 0.2171$

$$B = \frac{\sum xy}{\sum x^2} = \frac{-2.8581}{10} = -0.2858$$

Hence, Trend Line is Yc = 0.2171 + (-0.2858)x

When x = -2, Yc = 0.2171 + (-0.2858)(-2) = 0.7888

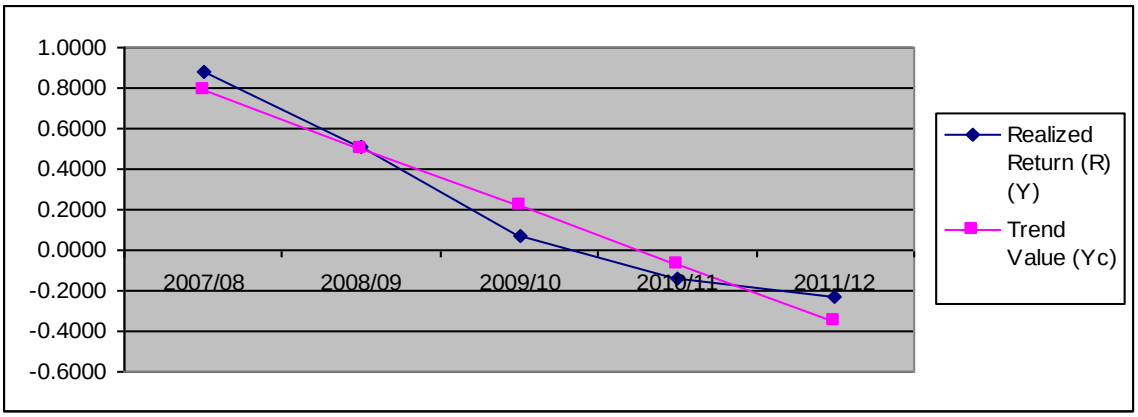
When x = -1, Yc = 0.2171 + (-0.2858)(-1) = 0.5029

When x = 0, Yc = 0.2171 + (-0.2858)(0) = 0.2171

When x = 1, Yc = 0.2171 + (-0.2858)(1) = -0.0687

When x = 2, Yc = 0.2171 + (-0.2858)(2) = -0.3545

Figure: 4.10
Movement of Stocks Realized Rate of Return and Trend Line of BBCL



The above diagram shows the movements of stock realized rate of return and trend line of BBCL.

4.2 Inter-Firm Comparison

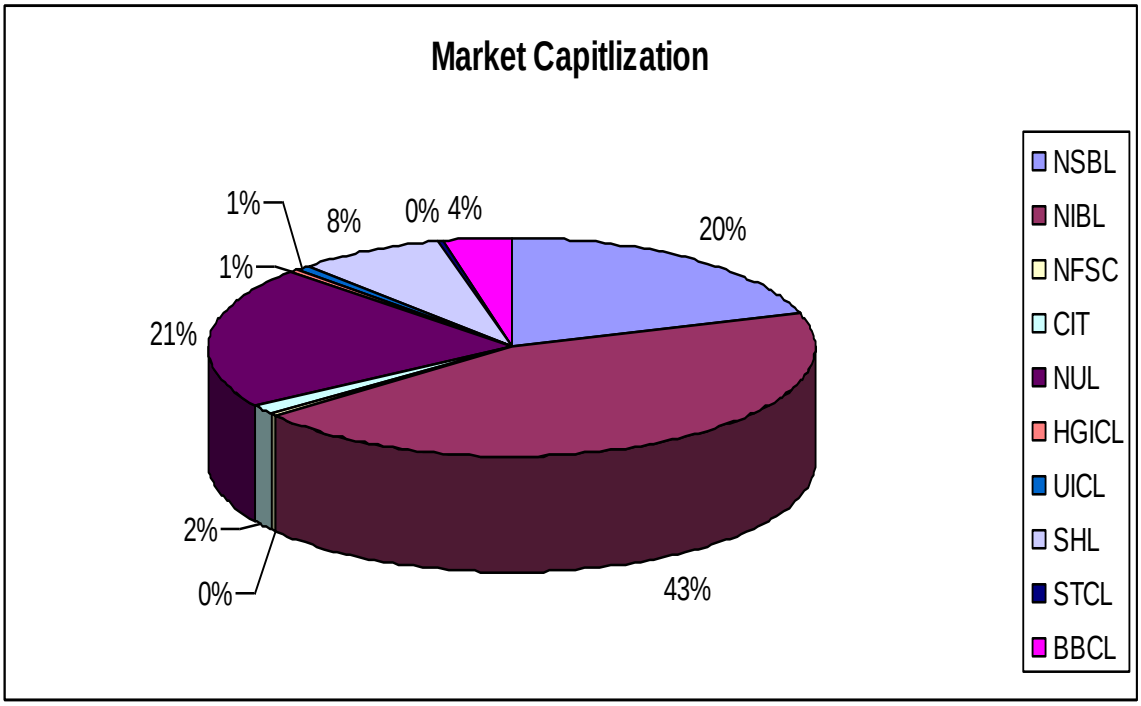
4.2.1 On the basis of Market Capitalization

Based on market capitalization size of each company are presented in diagram 4.11 at the end of fiscal year 2011/12. Market Capitalization is the total market value at specific time of company.

Company	NSBL	NIBL	NFSC	CIT	NUL
Market Capitalization (Rs. In Millions)	5546.59(19.97%)	12300.12(44.29%)	34.5(0.12%)	452.8(1.63%)	5800.41(20.89%)

Company	HGICL	UICL	SHL	STCL	BBCL
Market Capitalization (Rs. In Millions)	198.58(0.72%)	165(0.59%)	2200.37(7.92%)	64.67(0.23%)	1007.37(3.63%)

Figure: 4.11



On the basis of market capitalization NIBL is the biggest (i.e.43%) and the NFSC is the smallest among the selected sample companies taken under study.

4.2.2 On the basis of Risk and Return Analysis

A Comparative analysis of return and risk is performed here according to the section 4.1 expected returns, standard deviation and coefficient of variation of returns of each company are given in table 4.31.

Table 4.31

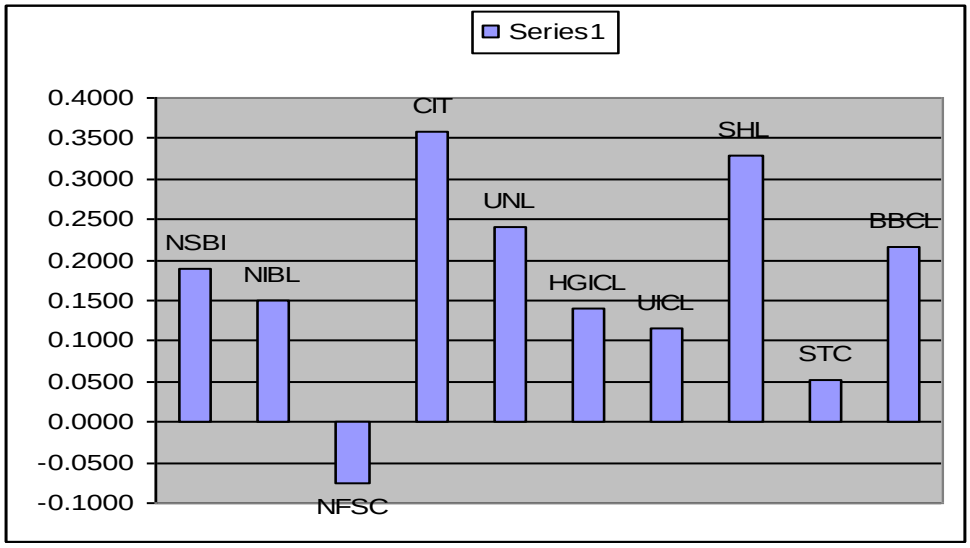
S.N	Company	Expected Return($\bar{R}$)	Standard Deviation (σ)	Coefficient of Variation (C.V)	Remarks
1	NSBI	0.1904	0.5058	2.6565	
2	NIBL	0.1511	0.5177	0.6854	
3	NFSC	-0.0758	0.4938	-6.5145	*
4	CIT	0.3595	0.6055	0.5937	Best as per $\bar{R}$ and C.V
5	UNL	0.2405	0.1622	1.4827	Best as per S.D
6	HGICL	0.1394	0.5936	4.2502	
7	UICL	0.1169	0.3380	2.8914	
8	SHL	0.3298	0.3289	0.9973	
9	STC	0.0527	0.1741	3.3036	
10	BBCL	0.2171	0.4654	2.1437	

* The Coefficient of Variation is normally computed only for data that are non negative.

Table 4.32
Expected return in common stock of each company

Company	Expected Return
NSBI	0.1904
NIBL	0.1511
NFSC	-0.0758
CIT	0.3595
UNL	0.2405
HGICL	0.1394
UICL	0.1169
SHL	0.3298
STC	0.0527
BBCL	0.2171

Figure: 4.12
Expected return in common stock of each company.



Investor can get highest return form investment in common stock of CIT but investment in common stock of NFSC has maximum loss as per expected return. CIT has highly riskier and STC less risky among the assets as per standard deviation (σ) among the assets, which are described above as standard deviation. Coefficient of Variation (C.V) is the more appropriate basis when the expected return is positive, to taking decision on the investment in single security. In consider both, the return and considers both the return and risk. CIT's common stock is the best security for investment because of its minimum C.V in comparison of others.

4.3 Comparison with Market

Nepal Stock Exchange Limited is the only one stock market in Nepal. Overall market return movement is presented by market index. Market portfolio return, its standard deviation and Coefficient of variation is calculated in table 4.31.

A Realized Returns (R), Its expected Return ($\bar{R}$), Standard Deviation (σ), and Coefficient of Variation (C.V) of market.

Realized rate of returns for each year are calculated on the base of year end NEPSE index of respective year. Table 4.32 shows the calculated of year-wise realized, expected return, standard deviation and coefficient of variation of returns.

Table 4.33
Realized Return, Its Expected Return, Standard Deviation, Coefficient of Variation of Market

Fiscal Year	NEPSE Index	$Rm = \frac{(NI_t - NI_{t-1})}{NI_{t-1}}$	$Rm - \overline{Rm}$	$(Rm - \overline{Rm})^2$	Remarks
2006/07	683.95		-	-	
2007/08	963.36	0.4085	0.4770	0.2276	
2008/09	749.10	-0.2224	-0.1539	0.0237	
2009/10	477.73	-0.3623	-0.2938	0.0863	
2010/11	362.85	-0.2405	-0.1720	0.0296	
2011/12	389.74	0.0741	0.1426	0.0203	
Total		**-0.3425**		**0.3874**	

Data Source: NEPSE Index

Now,Expected Return E(Rm) = $\overline{Rm} = \frac{\sum Rm}{n} = \frac{-0.3425}{5} = -0.0685$ or -6.85%

Standard Deviation, σ = $\sqrt{\frac{\sum (Rm - \overline{Rm})^2}{n-1}} = \sqrt{\frac{0.3874}{4}} = 0.3112$

Coefficient of Variation, C.V. = $\frac{\sigma}{\overline{Rm}} = \frac{0.3112}{-0.0685} = -4.5431$

B) Future (Expected) Realized Rate of Return (Yc)

Future realized rate of returns (Trend Value) for each year are calculated on the basis of realized rate of return on market index. (NEPSE Index) respective year by using least square method.

Table 4.34

Fiscal Year	Realized Return (Rm) (Y)	Deviation from 09/10 (X)	XY	X	Trend Value (Yc)	Remarks
2007/08	0.4085	-2	-0.8170	4	0.0689	
2008/09	-0.2224	-1	0.2224	1	0.0002	
2009/10	-0.3623	0	0.0000	0	-0.0685	
2010/11	-0.2405	1	-0.2405	1	-0.1372	
2011/12	0.0741	2	0.1482	4	-0.2059	
Total	**-0.3425**	**0**	**-0.6869**	**10**		

Data Source: Table 4.32

The Equation of Trend Line is Yc = a + bx

As, $\Sigma x = 0$, $a = \frac{\sum y}{n} = \frac{-0.3425}{5} = -0.0685$

$b = \frac{\sum xy}{\sum x^2} = \frac{-0.6869}{10} = -0.0687$

Hence, Trend Line is Yc = -0.0685 + (-0.0.687)x

When x = -2, Yc = -0.0685 + (-0.0.687)(-2) = 0.0689

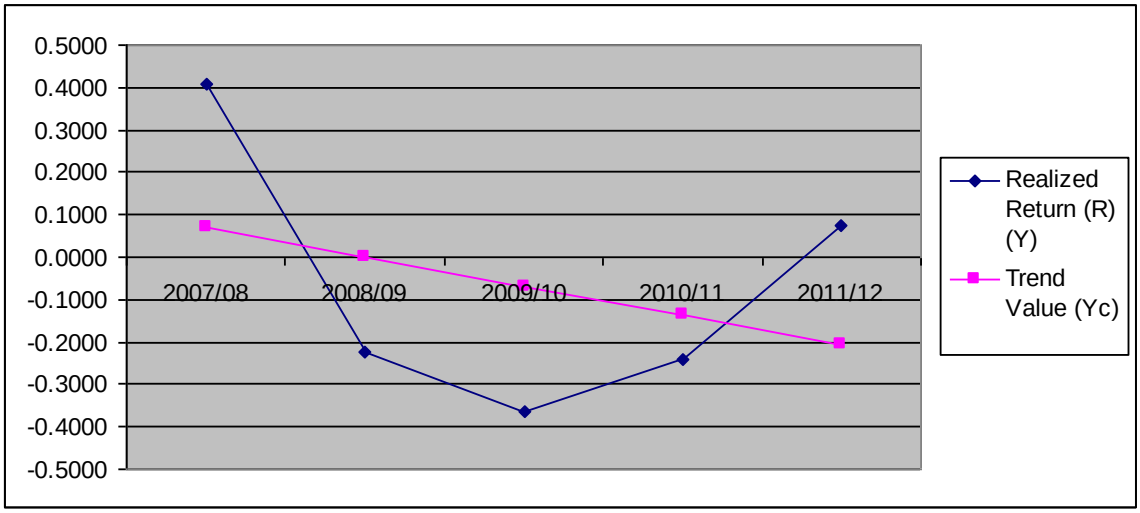
When x = -1, Yc = -0.0685 + (-0.0.687)(-1) = 0.0002

When x = 0, Yc = -0.0685 + (-0.0.687)(0) = -0.0685

When x = 1, Yc = -0.0685 + (-0.0.687)(1) = -0.1372

When x = 2, Yc = -0.0685 + (-0.0.687)(2) = -0.2059

Figure: 4.13
Movement of Stocks Realized Rate of Return and Trend Line of market



4.3.1 Risk Return Statistics of Sample Companies and Market

A. Commercial Bank Industry

1.Nepal SBI Bank Limited(NSBI)

Table 4.35
Risk Return Statistics for NSBI and Market

Statistics	NSBI	Market	Remarks
Expected Return = $\overline{R}$ =Mean	0.1904	-0.0685	
Total Risk, or Var(R) = σ^2	0.2558	0.0968	
Total Risk, or S.D.(σ)	0.5058	0.3112	
Coefficient of Variation (C.V.)	2.6565	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.0438	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.2120	NA	

Beta(β) = Index of Systematic Risk	0.6725	1	
Alpha (α) = Intercept	0.2365	NA	
Correlation with Market (ρ)	0.4138	NA	
Systematic Percentage (ρ^2)	0.1712	NA	
Proportion of unsystematic risk(1- ρ^2)	0.8288	NA	

Data source: For company table 4.31 and Appendix I. NA means not applicable

Expected Return ($\overline{R}$): NSBI'S common stock expected return is higher than the market return (negative return) i.e.19.04%>-6.85%. This market return (negative return) is due to the decreasing market (NEPSE) during the sample period and every year NSBI company is paying high dividend.

Standard deviation (σ): NSBI'S common stock standard deviation is higher than the market standard deviation (0.5058>0.3112) which means NSBI'S stock total risk on return is 1.6253 times (i.e. 0.5058/0.3112) riskier than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. NSBI'S C.V. is positive and market C.V. is negative, the negative market C.V. means negative expected rate of return. NSBI is the less risky assets as per positive expected rate of return than the market.

Beta coefficient (β) (Slope): NSBI has a beta (β) of 0.6725 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 0.6725 (β<1) means that NSBI's returns is less volatile then the market return and is called defensive asset.

Alpha (α): The intercept is 0.2365(i.e.23.65%). It shows the NSBI's return (value of Rs.) when market return (value of Rm) is zero. NSBI'S expected yearly return is 23.65% when the market earns nothing. If the yearly market return is expected to be 1 percent, NSBI's expected yearly return is:

$$R = \alpha + \beta iRm = 0.2365 + (0.6725)\ (0.01) = 0.2432 \text{ or } 24.32\%$$

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.4138. The positive correlation indicates that the market (NEPSE) return goes up, NSBI `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk (1-ρ^2): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.1712 (i.e. 17.12%). It indicates the percentage of the variance of NSBI`s return explained by change in the market returns. Thus 17.12% of NSBI`s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable. The 82.88% residual variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.33.

2. Nepal Investment Bank Limited (NIBL)

Table 4.36
Risk Return Statistics for NIBL and Market

Statistics	NIBL	Market	Remarks
Expected Return = $\overline{R}$ =Mean	0.1511	-0.0685	
Total Risk, or Var(R) = σ^2	0.2680	0.0968	
Total Risk, or S.D.(σ)	0.5177	0.3112	
Coefficient of Variation (C.V.)	0.6854	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.1641	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.1039	NA	
Beta(β) = Index of Systematic Risk	1.3022	1	
Alpha (α) = Intercept	0.2403	NA	
Correlation with Market (ρ)	0.7825	NA	
Systematic Percentage (ρ^2)	0.6123	NA	
Proportion of unsystematic risk(1- ρ^2)	0.3877	NA	

Data source: For company table 4.31 and Appendix II NA means not applicable

Expected Return ($\overline{R}$): NIBL'S common stock expected return is higher than the market return (negative return) i.e.15.11%>-6.85%. This market return (negative return) is due to the decreasing market (NEPSE) during the sample period and every year NIBL company is paying high dividend.

Standard deviation (σ): NIBL'S common stock standard deviation is higher than the market standard deviation (0.5177>0.3112) which means NIBL'S stock total risk on return is 1.6635 times (i.e. 0.5177/0.3112) riskier than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. NIBL'S C.V. is positive and market C.V. is negative, the negative market C.V. means negative expected rate of return. NIBLis the less risky per unit return assets as per positive expected rate of return than the market.

Beta coefficient (β) (Slope): NBIL has a beta (β) of 0.1.3022 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 1.3022 (β>1) means that NIBL's returns is high volatile then the market return. Hence the stock NIBL has undiversificable risk.

Alpha (α): The intercept is 0.2403(i.e.24.03%). It shows the NIBL's return (value of R.) when market return (value of Rm) is zero. NIBL'S expected yearly return is 24.03% when the market earns nothing. If the yearly market return is expected to be 1 percent, NIBL's expected yearly return is:

$R = \alpha + \beta iRm = 0.2403 + (0.6725)\ (0.01) = 0.2470$ or 24.70%

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.7825. The positive correlation indicates that the market (NEPSE) return goes up, NIBL `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk ($1-\rho^2$): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.6123 (i.e. 61.23%). It indicates the percentage of the variance of NIBL`s return explained by change in the market returns. Thus 61.23% of NIBL `s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable. The 82.88% residual variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.34.

B. Finance Sector

3. Nepal Finance and Savings Company Limited (NFSC)

Table 4.37
Risk Return Statistics for NFSC and Market

Statistics	NFSC	Market	Remarks
Expected Return = $\overline{R}$ =Mean	-0.0758	-0.0685	
Total Risk, or Var(R) = σ^2	0.2438	0.0968	
Total Risk, or S.D.(σ)	0.4938	0.3112	
Coefficient of Variation (C.V.)	-6.5145	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.1535	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.0903	NA	
Beta(β) = Index of Systematic Risk	1.2593	1	
Alpha (α) = Intercept	0.0105	NA	
Correlation with Market (ρ)	0.7935	NA	
Systematic Percentage (ρ^2)	0.6296	NA	
Proportion of unsystematic risk(1- ρ^2)	0.3704	NA	

Data source: For company table 4.31 and Appendix III.NA means not applicable

Expected Return ($\overline{R}$): NFSC'S common stock expected return is less (negative return) than the market return (negative return) i.e.-7.58%>-6.85%. Which means NFSC stock return is lower (loss) than the market return. This is due to decreasing share price during the sample period and no dividend paid during the sample period.

Standard deviation (σ): NFSC'S common stock standard deviation is higher than the market standard deviation (0.4938>0.3112) which means NIBL'S stock total risk on return is 1.587 times (i.e. 0.4938/0.3112) riskier than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. NFSC'S C.V. is negative and market C.V. is also negative, the negative C.V. means negative expected rate of return. NFSC is the very risky asset as per negative expected rate of return and negative C.V.

Beta coefficient (β) (Slope): NFSC has a beta (β) of 0.1.2593 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 1.2593 (β>1) means that NFSC's returns is high volatile then the market return. Hence the stock NFSC has undiversificable risk.

Alpha (α): The intercept is 0.0105(i.e.1.05%). It shows the NFSC's return (value of R.) when market return (value of Rm) is zero. NFSC'S expected yearly return is 1.05% when the market earns nothing. If the yearly market return is expected to be 1 percent, NFSC's expected yearly return is:

$R = \alpha + \beta iRm = 0.0105 + (0.6725)\ (0.01) = 0.0172$ or 1.72%

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.7935. The positive correlation indicates that the market (NEPSE) return goes up, NFSC `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk ($1-\rho^2$): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.6296 (i.e.62.96%). It indicates the percentage of the variance of NFSC`s return explained by change in the market returns. Thus 62.96% of NFSC `s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable.

The 37.04% residual variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.35.

4. Citizen Investment Trust (CIT)

Table 4.38
Risk Return Statistics for CIT and Market

Statistics	CIT	Market	Remarks
Expected Return = $\overline{R}$ =Mean	0.3595	-0.0685	
Total Risk, or Var(R) = σ^2	0.3666	0.0968	
Total Risk, or S.D.(σ)	0.6055	0.3112	
Coefficient of Variation (C.V.)	0.5937	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.1470	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.2196	NA	
Beta(β) = Index of Systematic Risk	1.2324	1	
Alpha (α) = Intercept	0.4439	NA	
Correlation with Market (ρ)	0.6322	NA	
Systematic Percentage (ρ^2)	0.4011	NA	
Proportion of unsystematic risk(1- ρ^2)	0.5989	NA	

Data source: For company table 4.31 and Appendix IV. NA means not applicable

Expected Return ($\bar{R}$): CIT'S common stock expected return is higher than the market return (negative return) i.e.35.95%>-6.85%. This market return (negative return) is due to the decreasing market (NEPSE) during the sample period and every year CIT company is paying high dividend

Standard deviation (σ): CIT'S common stock standard deviation is higher than the market standard deviation (0.6055>0.3112) which means CIT'S stock total risk on return is 1.9457 times (i.e. 0.6055/0.3112) riskier than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. CIT'S C.V. is positive and market C.V. is also negative, the negative market C.V. means negative expected rate of return. CIT is the lower risk per unit return than the market return.

Beta coefficient (β) (Slope): CIT has a beta (β) of 0.1.2324 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 1.2324 (β>1) means that CIT's returns is high volatile then the market return. Hence the stock CIT has undiversificable risk.

Alpha (α): The intercept is 0.4439(i.e.44.39%). It shows the CIT's return (value of R.) when market return (value of Rm) is zero. CIT'S expected yearly return is 44.39% when the market earns nothing. If the yearly market return is expected to be 1 percent, CIT's expected yearly return is:

$$R = \alpha + \beta iRm = 0.4439 + (0.6725)\ (0.01) = 0.4506 \text{ or } 45.06\%$$

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.6322. The positive correlation indicates that the market (NEPSE) return goes up, CIT `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk (1-ρ^2): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.4011 (i.e.40.11%). It indicates the percentage of the variance of CIT`s return explained by change in the market returns. Thus 40.11% of CIT `s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable.

The 59.89% residual variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.36.

C. Manufacturing and Processing Sector

5. Unilever Nepal Limited (UNL)

Table 4.39
Risk Return Statistics for UNL and Market

Statistics	UNL	Market	Remarks
Expected Return = $\overline{R}$ =Mean	0.2405	-0.0685	
Total Risk, or Var(R) = σ^2	0.0258	0.0968	
Total Risk, or S.D.(σ)	0.1607	0.3112	
Coefficient of Variation (C.V.)	1.4966	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.0092	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.0166	NA	
Beta(β) = Index of Systematic Risk	0.3089	1	
Alpha (α) = Intercept	0.2617	NA	
Correlation with Market (ρ)	0.5972	NA	
Systematic Percentage (ρ^2)	0.3567	NA	
Proportion of unsystematic risk(1- ρ^2)	0.6433	NA	

Data source: For company table 4.31 and Appendix V. NA means not applicable

Expected Return ($\overline{R}$): UNL'S common stock expected return is higher than the market return (negative return) i.e.24.05%>-6.85%. This market return (negative return) is due to the decreasing market (NEPSE) during the sample period and every year UNL company is paying high dividend.

Standard deviation (σ): UNL'S common stock standard deviation is lower than the market standard deviation (0.1607>0.3112) which means UNL'S stock total risk on return is less risky than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. UNL'S C.V. is positive and market C.V. is negative, the negative market C.V. means negative expected rate of return. UNL is the lower risky per unit return than the market return.

Beta coefficient (β) (Slope): UNL has a beta (β) of 0.3089 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 0.3089 (β<1) means that UNL's returns is low volatile then the market return and is called defensive asset.

Alpha (α): The intercept is 0.2617(i.e.26.17%). It shows the UNL's return (value of R.) when market return (value of Rm) is zero. UNL'S expected yearly return is 26.17% when the market earns nothing. If the yearly market return is expected to be 1 percent, UNL's expected yearly return is:

$R = \alpha + \beta iRm = 0.2617 + (0.6725)\ (0.01) = 0.2684$ or 26.84%

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.5972. The positive correlation indicates that the market (NEPSE) return goes up, UNL `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk ($1-\rho^2$): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.3567 (i.e.35.67%). It indicates the percentage of the variance of UNL`s return explained by change in the market returns. Thus 35.67% of UNL `s risk (variance of returns) is of explained by the market. It is called themarket (systematic) risk the therefore it is undiversifiable.

The 64.33% residual variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.37.

D. Insurance Sector

6. Himalayan General Insurance Company Limited (HGICL)

Table 4.40

Risk Return Statistics for HGICL and Market

Statistics	HGICL	Market	Remarks
Expected Return = $\overline{R}$ =Mean	0.1394	-0.0685	
Total Risk, or Var(R) = σ^2	0.3524	0.0968	
Total Risk, or S.D.(σ)	0.5936	0.3112	
Coefficient of Variation (C.V.)	4.2502	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.2879	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.0645	NA	
Beta(β) = Index of Systematic Risk	1.7301	1	
Alpha (α) = Intercept	0.2579	NA	
Correlation with Market (ρ)	0.9038	NA	
Systematic Percentage (ρ^2)	0.8170	NA	
Proportion of unsystematic risk(1- ρ^2)	0.1830	NA	

Data source: For company table 4.31 and Appendix VI. NA means not applicable

Expected Return ($\overline{R}$): HGICL'S common stock expected return is higher than the market return (negative return) i.e.13.94%>-6.85%.This market returns (negative return) is due to the decreasing market (NEPSE) during the sample period and every year. This company during the sample period sometime is paying the dividend.

Standard deviation (σ): HGICL'S common stock standard deviation is higher than the market standard deviation (0.5936>0.3112) which means HGICL'S stock total risk on return is high risky than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. HGICL'S C.V. is positive and market C.V. is

negative, the negative market C.V. means negative expected rate of return.

HGICL is the lower risky per unit return than the market return.

Beta coefficient (β) (Slope): HGICL has a beta (β) of 0.1.7301 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 1.7301 (β>1) means that HGICL's returns is high volatile then the market return and is called aggressive asset.

Alpha (α): The intercept is 0.2579(i.e.25.79%). It shows the HGICL's return (value of R.) when market return (value of Rm) is zero. HGICL'S expected yearly return is 25.79% when the market earns nothing. If the yearly market return is expected to be 1 percent, HGICL's expected yearly return is:

$R = \alpha + \beta iRm = 0.2579 + (0.6725)\ (0.01) = 0.2646$ or 26.46%

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.9038. The positive correlation indicates that the market (NEPSE) return goes up, HGICL `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk ($1-\rho^2$): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.8170 (i.e.81.70%). It indicates the percentage of the variance of HGICL`s return explained by change in the market returns.Thus 81.70% of HGICL `s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable.

The 18.30% unexplained variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.38.

7. United Insurance Company Limited (UICL)

Table 4.41

Risk Return Statistics for UICL and Market

Statistics	UICL	Market	Remarks
Expected Return = $\overline{R}$ =Mean	0.1169	-0.0685	
Total Risk, or Var(R) = σ^2	0.1142	0.0968	
Total Risk, or S.D.(σ)	0.3380	0.3112	
Coefficient of Variation (C.V.)	2.8914	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.0351	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.0791	NA	
Beta(β) = Index of Systematic Risk	0.8954	1	
Alpha (α) = Intercept	0.1228	NA	
Correlation with Market (ρ)	0.5549	NA	
Systematic Percentage (ρ^2)	0.3074	NA	
Proportion of unsystematic risk(1- ρ^2)	0.6926	NA	

Data source: For company table 4.31 and Appendix VII.NA means not applicable

Expected Return ($\bar{R}$): UICL'S common stock expected return is higher than the market return (negative return) i.e.11.69%>-6.85%.This market returns (negative return) is due to the decreasing market (NEPSE) during the sample period and every year. This company during the sample period sometime is paying the dividend.

Standard deviation (σ): UICL'S common stock standard deviation is higher than the market standard deviation (0.3380>0.3112) which means UICL'S stock total risk on return is high risky than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. UICL'S C.V. is positive and market C.V. is negative, the negative market C.V. means negative expected rate of return. UICL is the lower risky per unit return than the market return.

Beta coefficient (β) (Slope): UICL has a beta (β) of 0.8954 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 0.8954 ($\beta<1$) means that UICL's returns is low volatile then the market return and is called defensive asset.

Alpha (α): The intercept is 0.1228(i.e.12.28%). It shows the UICL's return (value of R.) when market return (value of Rm) is zero. UICL'S expected yearly return is 12.28% when the market earns nothing. If the yearly market return is expected to be 1 percent, UICL's expected yearly return is:

$$R = \alpha + \beta iRm = 0.1228 + (0.6725)\ (0.01) = 0.1295 \text{ or } 12.95\%$$

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.5549. The positive correlation indicates that the market (NEPSE) return goes up, UICL `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk (1-ρ^2): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.3074 (i.e.30.74%). It indicates the percentage of the variance of UICL`s return explained by change in the market returns. Thus 30.74% of UICL `s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable.

The 69.26% unexplained variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.39.

E. Hotel Sector

8. Soaltee Hotel Limited (SHL)

Table 4.42
Risk Return Statistics for SHL and Market

Statistics	SHL	Market	Remarks
Expected Return = $\bar{R}$ =Mean	0.3298	-0.0685	
Total Risk, or Var(R) = σ^2	0.1082	0.0968	
Total Risk, or S.D.(σ)	0.3289	0.3112	
Coefficient of Variation (C.V.)	0.9973	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.0519	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.0563	NA	
Beta(β) = Index of Systematic Risk	0.7319	1	
Alpha (α) = Intercept	0.3799	NA	
Correlation with Market (ρ)	0.6926	NA	
Systematic Percentage (ρ^2)	0.4797	NA	
Proportion of unsystematic risk(1- ρ^2)	0.5203	NA	

Data source: For company table 4.31 and Appendix VIII, NA means not applicable

Expected Return ($\bar{R}$): SHL'S common stock expected return is higher than the market return (negative return) i.e.32.98%>-6.85%.This market returns (negative return) is due to the decreasing market (NEPSE) during the sample period. Every year this company during the sample period is paying the dividend.

Standard deviation (σ): SHL'S common stock standard deviation is higher than the market standard deviation (0.3289>0.3112) which means SHL'S stock total risk on return is risky than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. SHL'S C.V. is positive and market C.V. is negative, the negative market C.V. means negative expected rate of return. SHL is the lower risky per unit return than the market return.

Beta coefficient (β) (Slope): SHL has a beta (β) of 0.7319 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 0.7319 (β<1) means that SHL's returns is low volatile then the market return and is called defensive asset.

Alpha (α): The intercept is 0.3799(i.e.37.99%). It shows the SHL's return (value of R.) when market return (value of Rm) is zero. SHL'S expected yearly return is 37.99% when the market earns nothing. If the yearly market return is expected to be 1 percent, SHL's expected yearly return is:

$R = \alpha + \beta iRm = 0.3799 + (0.6725)\ (0.01) = 0.3866$ or 38.66%

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.6926. The positive correlation indicates that the market (NEPSE) return goes up, SHL `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk (1-ρ^2): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.4797 (i.e.47.97%). It indicates the percentage of the variance of SHL`s return explained by change in the market returns. Thus 47.97% of SHL `s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable.

The 52.03% unexplained variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.40.

F. Trading Sector

9. Salt Trading Company Limited (STC)

Table 4.43
Risk Return Statistics for STC and Market

Statistics	STC	Market	Remarks
Expected Return = $\overline{R}$ =Mean	0.0527	-0.0685	
Total Risk, or Var(R) = σ^2	0.0303	0.0968	
Total Risk, or S.D.(σ)	0.1741	0.3112	
Coefficient of Variation (C.V.)	3.3036	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.0015	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.0288	NA	
Beta(β) = Index of Systematic Risk	0.1245	1	
Alpha (α) = Intercept	0.0612	NA	
Correlation with Market (ρ)	0.2225	NA	
Systematic Percentage (ρ^2)	0.0495	NA	
Proportion of unsystematic risk(1- ρ^2)	0.9505	NA	

Data source: For company table 4.31 and Appendix IX.NA means not applicable

Expected Return ($\overline{R}$): STC'S common stock expected return is higher than the market return (negative return) i.e.5.27%>-6.85%.This market returns (negative return) is due to the decreasing market (NEPSE) during the sample period. Every year this company during the sample period is paying the dividend.

Standard deviation (σ): STC'S common stock standard deviation is lower than the market standard deviation (0.1741>0.3112) which means STC'S stock total risk on return is less risky than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. STC'S C.V. is positive and market C.V. is

negative, the negative market C.V. means negative expected rate of return. STC is the lower risky per unit return than the market return.

Beta coefficient (β) (Slope): STC has a beta (β) of 0.1245 based on theyearly returns during fiscal year 2006/07 to 2011/12. A beta of 0.1245 ($\beta<1$) means that STC's returns is low volatile then the market return and is called defensive asset.

Alpha (α): The intercept is 0.0612(i.e.6.12%). It shows the STC's return (value of R.) when market return (value of Rm) is zero. STC'S expected yearly return is 6.12% when the market earns nothing. If the yearly market return is expected to be 1 percent, STC's expected yearly return is:

$R = \alpha + \beta iRm = 0.0612 + (0.6725)\ (0.01) = 0.0679$ or 6.79%

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.2225. The positive correlation indicates that the market (NEPSE) return goes up, STC `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk ($1-\rho^2$): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.0495 (i.e.4.95%). It indicates the percentage of the variance of STC`s return explained by change in the market returns. Thus 4.95% of STC `s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable.

The 95.05% unexplained variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.41.

10. Bishal Bazar company Limited (BBCl)

Table 4.44
Risk Return Statistics for BBCL and Market

Statistics	BBCL	Market	Remarks
Expected Return = $\overline{R}$ =Mean	0.2171	-0.0685	
Total Risk, or Var(R) = σ^2	0.2166	0.0968	
Total Risk, or S.D.(σ)	0.4654	0.3112	
Coefficient of Variation (C.V.)	2.1437	-4.5431	
Two equivalent Systematic risk measure; β^2 Var (m) = ρ^2 Var (R)	0.0622	NA	
Unsystematic risk measure: Residual Variance = Var(e)	0.1544	NA	
Beta(β) = Index of Systematic Risk	0.8019	1	
Alpha (α) = Intercept	0.2720	NA	
Correlation with Market (ρ)	0.5359	NA	
Systematic Percentage (ρ^2)	0.2872	NA	
Proportion of unsystematic risk(1- ρ^2)	0.7128	NA	

Company table 4.31 and Appendix X.NA means not applicable

Expected Return ($\bar{R}$): BBCL'S common stock expected return is higher than the market return (negative return) i.e.21.71%>-6.85%.This market returns (negative return) is due to the decreasing market (NEPSE) during the sample period. Every year this company during the sample period is paying the dividend.

Standard deviation (σ): BBCL'S common stock standard deviation is lower than the market standard deviation (0.4654>0.3112) which means BBCL'S stock total risk on return is high risky than the market return.

Coefficient of variation (C.V.): Coefficient of variation is better measure of risk because it measures per unit risk. BBCL'S C.V. is positive and market C.V. is negative, the negative market C.V. means negative expected rate of return. BBCL is the lower risky per unit return than the market return.

Beta coefficient (β) (Slope): STC has a beta (β) of 0.8019 based on the yearly returns during fiscal year 2006/07 to 2011/12. A beta of 0.8019 ($\beta<1$) means that BBCL's returns is low volatile then the market return and is called defensive asset.

Alpha (α): The intercept is 0.2720(i.e..27.20%). It shows the BBCL's return (value of R.) when market return (value of Rm) is zero. BBCL'S expected yearly return is 27.20% when the market earns nothing. If the yearly market return is expected to be 1 percent, BBCL's expected yearly return is:

$R = \alpha + \beta iRm = 0.2720 + (0.6725)\ (0.01) = 0.2787$ or 27.87%

Coefficient of Correlation or Correlation with market (ρ): The Coefficient of correlation is 0.5359. The positive correlation indicates that the market (NEPSE) return goes up, BBCL `s return also goes up and vise-versa.

Coefficient of determination or Systematic Percentage (ρ^2) and Proportion of Unsystematic risk ($1-\rho^2$): The Squared Coefficient of Correlation or the Coefficient of determination (ρ^2) is 0.2872 (i.e.28.72%). It indicates the percentage of the variance of BBCL`s return explained by change in the market returns. Thus 28.72% of BBCL `s risk (variance of returns) is of explained by the market. It is called the market (systematic) risk the therefore it is undiversifiable.

The 71.28% unexplained variance is the firm specific risk. It is called unsystematic risk and it is diversifiable. The values of systematic and unsystematic risk are shown above table 4.42.

Table 4.45
Summary of Risk-Return for Sample Companies and Market

Statistics	NSBI	NIBL	NFSC	CIT	UNL	HGICL	UICL	SHL	STC	BBCL	Market
$\overline{R}$	0.1904	0.1511	0.0758	0.3595	0.2405	0.1394	0.1169	0.3298	0.0527	0.2171	0.0685
σ^2	0.2558	0.2680	0.2438	0.3666	0.0258	0.3524	0.1142	0.1082	0.0303	0.2166	0.0968
σ	0.5058	0.5177	0.4938	0.6055	0.1607	0.5936	0.3380	0.3289	0.1741	0.4654	0.3112
(C.V.)	2.6565	0.6854	6.5145	0.5937	1.4966	4.2502	2.8914	0.9973	3.3036	2.1437	4.5431
β^2 Var m)	0.0438	0.1641	0.1535	0.1470	0.0092	0.2879	0.0351	0.0519	0.0015	0.0622	NA
e^2	0.2120	0.1039	0.0903	0.2196	0.0166	0.0645	0.0791	0.0563	0.0288	0.1544	NA
(β)	0.6725	1.3022	1.2593	1.2324	0.3089	1.7301	0.8954	0.7319	0.1245	0.8019	1
(α)	0.2365	0.2403	0.0105	0.4439	0.2617	0.2579	0.1228	0.3799	0.0612	0.2720	NA
(ρ)	0.4138	0.7825	0.7935	0.6322	0.5972	0.9038	0.5549	0.6926	0.2225	0.5359	NA
(ρ^2)	0.1712	0.6123	0.6296	0.4011	0.3567	0.8170	0.3074	0.4797	0.0495	0.2872	NA
(1-ρ^2)	0.8288	0.3877	0.3704	0.5989	0.6433	0.1830	0.6926	0.5203	0.9505	0.7128	NA

Data source: For company table 4.31 and Appendix I

4.3.2 Analysis of Market Sensitivity

Market Sensitivity of common stock is explained by its beta coefficient (β). Higher the beta means greater the market sensitivity. Beta is the measure of only a portion of total risk, which is market related risk of investment projects, and it may be different between the projects due to their higher or lower co variability with market returns. So, Beta coefficient is a index of systematic risk, which cannot be reduced by diversification. Thus, Beta coefficient of market is always 1. This statement can be proved as follows:

$$\beta j = \frac{Cov(RjRm)}{\sigma^2 m} = \frac{\sigma j \sigma m.\rho}{\sigma m.\sigma m} = \frac{\sigma j.\rho}{\sigma m}$$

Where,
ρ = Correlation between market return and Stock (Say Stock j)

Hence, $\beta_m = \frac{Cov(Rm.Rm)}{\sigma^2 m} = \frac{\sigma m.\sigma m.\rho}{\sigma m.\sigma m} = \rho = 1$

Hence, (βm) Coefficient of market is always equal to 1. Beta coefficients of each company are shown in table 4.45 and detail calculation are shown in appendix no. I to X.

Table 4.46
Beta Coefficient of Sample Companies

S.N	Company	Beta
1	Nepal SBI Bank Limited	0.6725
2	Nepal Investment Bank Limited	1.3022
3	Nepal Finance and Savings Company Limited (NFSC)	1.2593
4	Citizen Investment Trust(CIT)	1.2324
5	Unilever Nepal Limited	0.3089
6	Himalayan General Insurance Company Limited(HGICL)	1.7301
7	United Insurance Company Limited(UICL)	0.8954
8	Soaltee Hotel Limited (SHL)	0.7319
9	Salt Trading Company Limited(STC)	0.1245
10	Bishal Bazar Company Limited(BBCL)	0.8019

Beta of different Nepalese Companies presented on table 4.45 represents the stocks volatility since it is the major of degree of systematic risk. It is said that if the value of beta for company is less than one, the stock is known as less volatile the market or defensive stock because the value of market beta is always 1. In the other hand, if beta of a company is more than 1, the stock is known as more volatile than market or sensitivity of stock with market is higher and these stock are considered as aggressive. There are four Nepalese Companies whose value of beta is higher than one. In other words, there are four Nepalese Companies which are more volatile than market. The companies with higher value of beta than market beta are: NIBL (1.3022), NFSC (1.2593), CIT (1.2324) and HGICL (1.7301). Thecompanies NSBIL, UNL, UICL, SHL, STC, and BBCL have the value of beta which is nearly 1. It refers that this stocks volatility is nearly as market volatility.

Figure: 4.14
The Overall Look of Betas for All Securities

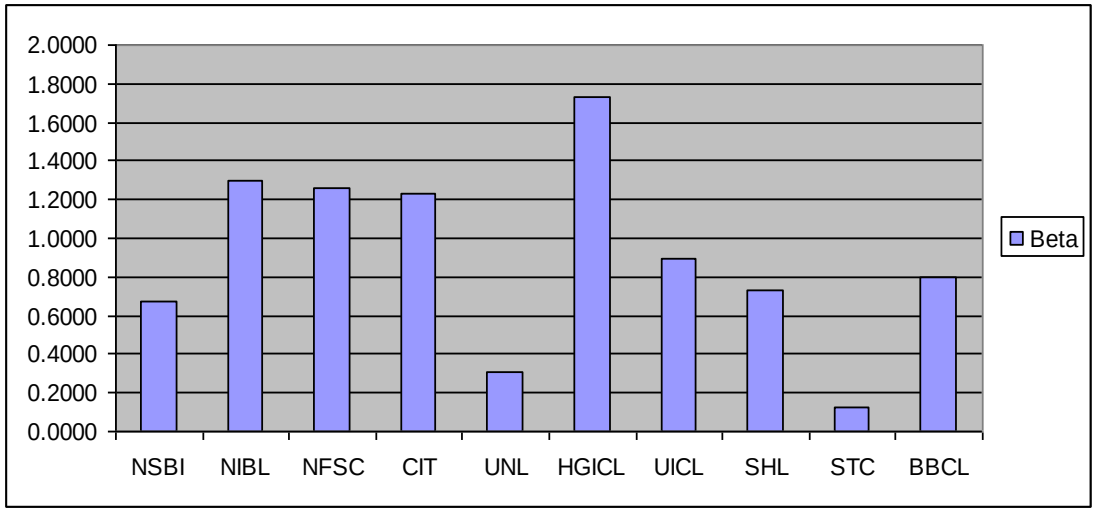


Figure: 4.14 Beta for all selected samples during the period of study

The beta of banking sector varies widely. The lowest beta is 0.1245 of STC. On the other hand, the highest beta is 1.7301 of HGICL. The stock of NIBL has more market

risk than other banking sectors beta. On the analysis of beta, the stock of NIBL is the riskiest among all in banking sector.

The beta of finance sector varies from 1.2324 to 1.2593. The lowest beta 1.2324 is of CIT whereas the highest beta of 1.2593 is of NFS. On this ground, the stock of NFSC has the highest undiversifiable risk. The stock of CIT has the highest systematic risk. While making a portfolio, stock with higher beta should not be taken because beta isindex of systematic risk, which can never be diversified.

The beta of manufacturing, insurance, hotel and trading sector is less volatile except HGICL. HGICL is the high volatile. It is because the beta of these companies is within the standard of 2. The highest level of beta among all selected companies is 1.7301 of HGICL. It means the stock of HGICL is risky.

4.3.3 Using Beta of Estimate Return or Sample Companies Capital Asset Pricing Model Analysis:

CAPM uses beta to link formally the notions of risk and return. CAPM was developed to provide a system whereby investors are able to assess the impact of an investment in proposed security on the risk and return of their portfolio. The CAPM is used to understand the basic risk-return tradeoff involved in various types of investment decisions.

Table No.4.47
Calculation of RRR and Price Evaluation by CAPM model

S.No	Company	Beta	RRR(Kr.)=Rf+Bs($\overline{Rm}$-Rf)	ERR($\overline{R}$)	Price Evaluation
1	NSBI	0.6725	-0.0293	0.1904	Underpriced
2	NIBL	1.3022	-0.1046	0.1511	Underpriced
3	NFSC	1.2590	-0.0995	-0.0758	Underpriced
4	CIT	1.2324	-0.0963	0.3595	Underpriced
5	UNL	0.3090	0.0141	0.2405	Underpriced
6	HGICL	1.7301	-0.1558	0.1394	Underpriced
7	UICL	0.8954	-0.0560	0.1169	Underpriced
8	SHL	0.7320	-0.0364	0.3298	Underpriced
9	STC	0.1245	0.0362	0.0527	Underpriced
10	BBCL	0.8019	-0.0448	0.2171	Underpriced

Where,

$\overline{R}$ = Expected rate of return (From Table 4.31)

R = Risk fee rate of return (From Appendix No. XVI)

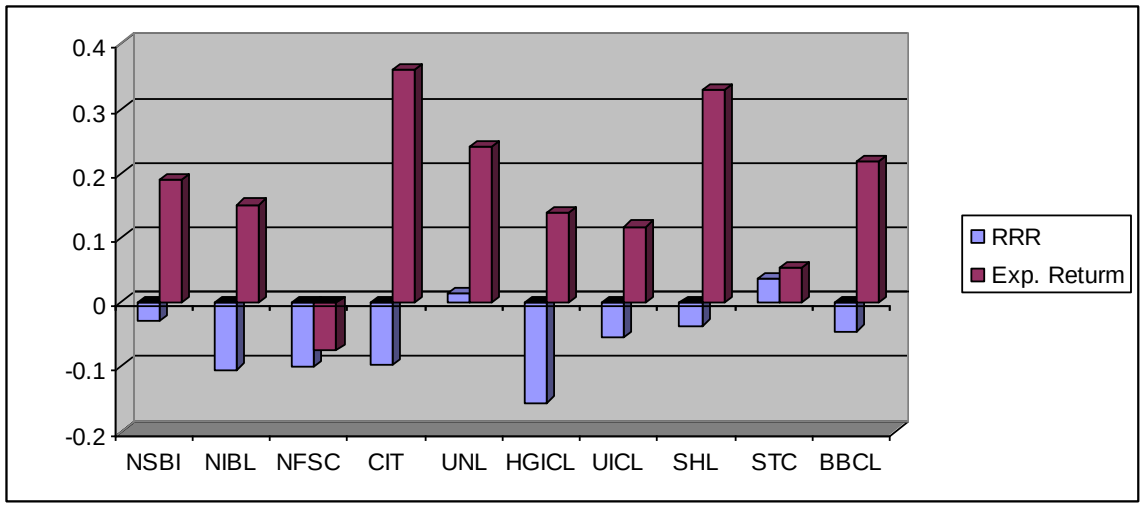
$\overline{Rm}$ = Market rate of return

B = Beta coefficient of common stock of individual sample company. (From Appendix I to X)

From the above calculation it can be seen that CAPM reflects a negative mathematical relationship between risk and return, since the higher the risk (Beta) the higher the required return. So using beta as a measure of non-diversifiable risk, the CAPM is used to define the required return on a security. The comparison between RRR and expected rate of return (ERR) determines whether the stock is under priced or overpriced. If RRR (Kr) is less than ERR ($\overline{R}$), the stock is said to be under priced, and vice-versa. Similarly, expected rate of market

return ($\bar{R}m$) , risk free rate of return (Rf) and Beta (β) coefficient are the major affecting variables to RRR. For this analysis the risk free rate of return is needed which is taken from the interest rate of Treasury bill issued by Nepal Rastra Bank. NRB issues Treasury Bill 91 days and 364 days duration. As suggested by the Treasury Bill section of NRB, the interest rate of T_Bill i.e of 91 duration is taken as risk free rate, which is approximately 5.11% (Appendix XVI)

Figure: 4.15
Comparison between RRR and Expected Return



From the above diagram, for any rational investment, the expected return should be more than the required rate of return.

4.4 Portfolio Analysis

Portfolio Analysis is essentially a defensive technique to counter the problem of investment risk. Portfolio means a combination of two or more securities or assets. It is based on the assumption that investors hold well-diversified portfolios instead of investing their entire wealth in a single asset or security. A portfolio is a bundle or combination portfolio then his concern should be the expected return and risk of the portfolio rather than individual securities. The second assumption of the portfolio theory is that the returns of securities are normally distributed. This means that the mean and variance analysis is the foundation of the portfolio decision. The expected returns of the securities comprising that portfolio. The weights are equal to the proportion of total funds invested in each security.

4.4.1 Analysis of Diversification

Diversification is very effective in reducing cost. The portfolio of the common stock of two asset cases is analyzed here to test the effect of diversification. Portfolio theory suggests that a negative correlation between two securities reduces the risk significantly. Similarly, positively correlated securities do not reduce the risk. The portfolio of the common stock of NSBI (let stock A) and common stock of NFSC (let stock B) is selected. Table 4.47 shows the calculation of covariance of the returns of the given two stocks [Cov.(R_A.R_B)], and the proportion of stock A(W_A) that minimizes the risk (Standard Deviation).

Table 4.48

FiscalYear	$(R_A - \bar{R}_A)$	$(R_B - \bar{R}_B)$	$\{(R_A - \bar{R}_A)(R_B - \bar{R}_B)\}$	Remarks
2007/08	0.0945	0.8683	0.0820	$(R_A - \bar{R}_A)$
2008/09	0.2750	-0.0821	-0.0226	From Table 4.2
2009/10	-0.7457	-0.1867	0.1392	
2010/11	-0.2712	-0.2903	0.0787	$(R_B - \bar{R}_B)$
2011/12	-0.0577	-0.3092	0.0178	From Table 4.7
Total			0.2952	

$$\text{Cov.}(R_A, R_B) = \frac{\sum (R_A - \bar{R}_A) \times (R_B - \bar{R}_B)}{n-1} = \frac{0.2952}{5-1} = 0.0738$$

And to minimize the risk the weight (proportion) of stock A in the portfolio is given as,

$$W_A = \frac{\sigma^2{}_B - Cov.(R_A.R_B)}{\sigma^2{}_A + \sigma^2{}_B - 2Cov.(R_A.R_B)}$$

Where,

W_A = Weight (or proportion) of stock A(NSBI)
Standard Deviation of Stock A (NSBI) (σ_A) = 0.5058
Standard Deviation of Stock B (NFSC) (σ_B) = 0.4938

$$W_A = \frac{(0.4938)^2 - 0.0738}{(0.5058)^2 + (0.4938)^2 - 2 \times (0.0738)}$$

$$= \frac{0.2438 - 0.0738}{0.2558 + 0.2438 - 0.1476}$$

$$= \frac{0.17}{0.352}$$

$$= 0.4830$$

And the proportion of stock B (W_B)

W_B = Weight (or proportion) of stock B = 1- W_A = 1-0.4830 = 0.5170

Hence, the portfolio return is given as,

$$\bar{R}_P = W_A.\bar{R}_A + W_B.\bar{R}_B$$

Where,

$\bar{R}_P$ = Expected return on portfolio of stock A and Stock B.
Expected return of stock A (NSBI) ($\bar{R}_A$) =0.1904
Expected return of stock A (NFSC) ($\bar{R}_B$) =-0.0758
W_A = Weight of stock A (W_A) = 0.4830
W_B = Weight of stock A (W_B) = 0.5170

$\bar{R}_P$ = (0.4830).(0.1904)+ (0.5170).(-0.0758)

= 0.0921 – 0.0392

= 0.0529 or 5.29%

And the portfolio risk is given as,

$$\sigma_P = \sqrt{W_A{}^2.\sigma_A{}^2 + W_B{}^2\sigma_B{}^2 + 2W_A.W_B.Cov(R_A.R_B)}$$

$$= \sqrt{(0.4830)^2(0.5058)^2 + (0.5170)^2(0.4938)^2 + 2(0.4830)(0.5170)(0.0738)}$$

$$= \sqrt{(0.2333)(0.2558) + (0.2673)(0.2438) + 0.0369}$$

$$= \sqrt{0.0597 + 0.0652 + 0.0369}$$

$$= \sqrt{0.1618}$$

$$= 0.4022$$

Where, σ_p = Standard Deviation of portfolio returns of stock A and stock B.

The Correlation coefficient will always lie between +1.00 and -1.00. Returns of securities vary perfectly together when the correlation coefficient is +1.00 and imperfectly opposite direction when it is -1.00. A zero correlation coefficient implies that there is no relationship between the returns of securities. Correlation can be used whether the portfolio is beneficial or not. If the correlation is perfectly positive (or +1.00) then the portfolio cannot reduce any level of risk. On the other hand, if the correlation is perfectly negative (or -1.00) then the proper combination of the two securities can reduce unsystematic risk. The highly positive correlation between securities return is not so beneficial and vice-versa.

In the case of portfolio of NSBI's stock and NFSC's stock, the correlation of the securities return is positive (near or zero). The actual value of the correlation between stock A and stock B and correlation coefficient of both the stock (ρ_{AB}) can be calculated as follows:

$$\rho_{AB} = \frac{Cov.(R_A.R_B)}{\sigma_A.\sigma_B}$$

$$= \frac{0.0738}{(0.5058)(0.4938)}$$

$$= \frac{0.0738}{0.2498}$$

$$= 0.2954$$

The correlation is positive, that's why the portfolio construction between these two stocks seems to be good, because portfolio risk is less than both the individual stock's risk. (i.e. $\sigma_P = 0.4022 < 0.5058$ and 0.4938)

Table 4.48 shows the expected risk and return for various level of investment between the common stock of NSBI and NFSC.

Table 4.49
Portfolio consisting varying proportions of funds between NSBI and NFCS

Portfolio	NSBI (A)	NFSC B)	Calculation of $\overline{R}_P = W_A.\overline{R}_A + W_B.\overline{R}_B$
1	1.00	0.00	$\overline{R}_{P_1}$ = (1.00)(0.1904)+(0.00)(-0.0758)=0.1904
2	0.90	0.10	$\overline{R}_{P_2}$ =(0.90)(0.1904)+(0.10)(-0.0758)=0.1638
3	0.80	0.20	$\overline{R}_{P_3}$ =(0.80)(0.1904)+(0.20)(-0.0758)=0.1372
4	0.70	0.30	$\overline{R}_{P_4}$ =(0.70)(0.1904)+(0.30)(-0.0758)=0.1105
5	0.60	0.40	$\overline{R}_{P_5}$ =(0.60)(0.1904)+(0.40)(-0.0758)=0.0839
6	0.50	0.50	$\overline{R}_{P_6}$ =(0.50)(0.1904)+(0.50)(-0.0758)=0.0573
7	0.40	0.60	$\overline{R}_{P_7}$ =(0.40)(0.1904)+(0.60)(-0.0758)=0.0307
8	0.30	0.70	$\overline{R}_{P_8}$ =(0.30)(0.1904)+(0.70)(-0.0758)=0.0041
9	0.20	0.80	$\overline{R}_{P_9}$ =(0.20)(0.1904)+(0.80)(-0.0758)=-0.0226
10	0.10	0.90	$\overline{R}_{P_{10}}$ =(0.10)(0.1904)+(0.90)(-0.0758)=-0.0492
11	0.00	1.00	$\overline{R}_{P_{11}}$ =(0.00)(0.1904)+(1.00)(-0.0758)=-0.0758

Calculation of Standard Deviation

$$\sigma_P = \sqrt{W_A{}^2.\sigma_A{}^2 + W_B{}^2\sigma_B{}^2 + 2W_A.W_B.\rho_{AB}.\sigma_A.\sigma_B}$$

$$\sigma_{P_1} = \sqrt{(1)^2.(0.5058)^2 + (0)^2(0.4938)^2 + 2(1)(0)(0.2954)(0.5058)(0.4938)}$$
$$= 0.5058$$

$$\sigma_{P_2} = \sqrt{(0.90)^2.(0.5058)^2 + (0.10)^2(0.4938)^2 + 2(0.90)(0.10)(0.2954)(0.5058)(0.4938)}$$
$$= \sqrt{0.2072 + 0.0024 + 0.0133}$$
$$= 0.4722$$

$$\sigma_{P_3} = \sqrt{(0.80)^2.(0.5058)^2 + (0.20)^2(0.4938)^2 + 2(0.80)(0.20)(0.2954)(0.5058)(0.4938)}$$
$$= \sqrt{0.1637 + 0.0098 + 0.0236}$$
$$= 0.4440$$

$$\sigma_{P_4} = \sqrt{(0.70)^2.(0.5058)^2 + (0.30)^2(0.4938)^2 + 2(0.70)(0.30)(0.2954)(0.5058)(0.4938)}$$
$$= \sqrt{0.1254 + 0.0219 + 0.0311}$$
$$= 0.4223$$

$$\sigma_{P_5} = \sqrt{(0.60)^2.(0.5058)^2 + (0.40)^2(0.4938)^2 + 2(0.60)(0.40)(0.2954)(0.5058)(0.4938)}$$
$$= \sqrt{0.0921 + 0.0390 + 0.0354}$$
$$= 0.4080$$

$$\sigma_{P_6} = \sqrt{(0.50)^2.(0.5058)^2 + (0.50)^2(0.4938)^2 + 2(0.50)(0.50)(0.2954)(0.5058)(0.4938)}$$
$$= \sqrt{0.0641 + 0.0611 + 0.0369}$$
$$= 0.4022$$

$$\sigma_{P_7} = \sqrt{(0.40)^2.(0.5058)^2 + (0.60)^2(0.4938)^2 + 2(0.40)(0.60)(0.2954)(0.5058)(0.4938)}$$

$= \sqrt{0.0409 + 0.0878 + 0.0354}$

$= 0.4051$

$\sigma_{P_8} = \sqrt{(0.30)^2.(0.5058)^2 + (0.70)^2(0.4938)^2 + 2(0.30)(0.70)(0.2954)(0.5058)(0.4938)}$

$= \sqrt{0.0230 + 0.1195 + 0.0311}$

$= 0.4165$

$\sigma_{P_9} = \sqrt{(0.20)^2.(0.5058)^2 + (0.80)^2(0.4938)^2 + 2(0.20)(0.80)(0.2954)(0.5058)(0.4938)}$

$= \sqrt{0.0102 + 0.1561 + 0.0236}$

$= 0.4358$

$\sigma_{P_{10}} = \sqrt{(0.10)^2.(0.5058)^2 + (0.90)^2(0.4938)^2 + 2(0.10)(0.90)(0.2954)(0.5058)(0.4938)}$

$= \sqrt{0.0026 + 0.1975 + 0.0133}$

$= 0.4620$

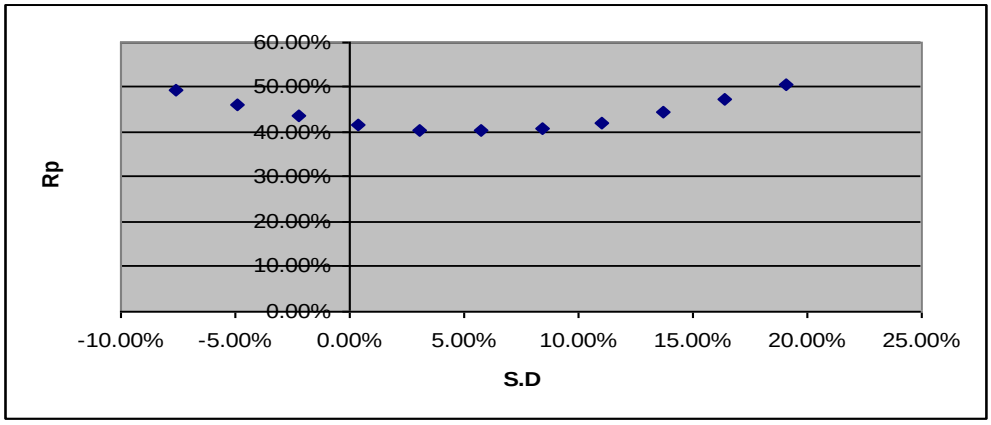
$\sigma_{P_{11}} = \sqrt{(0.00)^2.(0.5058)^2 + (1.00)^2(0.4938)^2 + 2(0.00)(1.00)(0.2954)(0.5058)(0.4938)}$

$= 0.4938$

The above result can be presented in a graphic from which is also called “Efficient Frontier”.

WA	WB	$\overline{R}_P(\%)$	$\sigma_P(\%)$
1.00	0.00	19.04%	50.58%
0.90	0.10	16.38%	47.22%
0.80	0.20	13.72%	44.40%
0.70	0.30	11.05%	42.23%
0.60	0.40	8.39%	40.80%
0.50	0.50	5.73%	40.22%
0.40	0.60	3.07%	40.51%
0.30	0.70	0.41%	41.65%
0.20	0.80	-2.26%	43.58%
0.10	0.90	-4.92%	46.20%
0.00	1.00	-7.58%	49.38%

Figure: 4.16
Risk and Return for portfolio of stock of NSBI and NFSC



The line joining various points in the graph is moving upward right. This line supports the very base relation between risk and return. As the return is increasing steadily so does the risk and vice-versa. The choice of investment is however, not so easy. Investor attitude toward risk is the thing that determines the best level of investment. The most investor, however, prefers lower level of risk and like to be at the first left side point and thereby reducing the level of risk.

Another portfolio is between the common stock of UNL and SHL. The portfolio of the common stock of UNL (let stock A) and common stock of SHL (let stock B) is analyzed here. Table 4.49 shows the calculation of covariance of the returns of the given two stocks [Cov.(R_A.R_B)] and the proportion of stock A (W_A) that minimizes the risk (Standard Deviation).

Table 4.50

FiscalYear	(R_A - $\bar{R}_A$)	(R_B - $\bar{R}_B$)	{(R_A - $\bar{R}_A$) (R_B - $\bar{R}_B$)}	Remarks
2007/08	0.0463	0.5432	0.0251	(R_A - $\bar{R}_A$)
2008/09	-0.1247	-0.3089	0.0385	From Table 4.13
2009/10	-0.1878	0.0275	-0.0052	
2010/11	0.0468	-0.0706	-0.0033	(R_B - $\bar{R}_B$)
2011/12	0.2194	-0.1912	-0.0420	From Table 4.22
	Total		0.0132	

$$\text{Cov.}(R_A, R_B) = \frac{\sum (R_A - \bar{R}_A) \times (R_B - \bar{R}_B)}{n-1} = \frac{0.0132}{5-1} = 0.0033$$

And to minimize the risk the weight (proportion) of stock A in the portfolio is given as,

$$W_A = \frac{\sigma^2{}_B - Cov.(R_A.R_B)}{\sigma^2{}_A + \sigma^2{}_B - 2Cov.(R_A.R_B)}$$

Where,

W_A = Weight (or proportion) of stock A(UNL)
Standard Deviation of Stock A (UNL) (σ_A) = 0.1607
Standard Deviation of Stock B (SHL) (σ_B) = 0.3289

$$W_A = \frac{(0.3289)^2 - 0.0033}{(0.1607)^2 + (0.3289)^2 - 2 \times (0.0033)}$$

$$= \frac{0.1082 - 0.0033}{0.0258 + 0.1082 - 0.0066}$$

$$= \frac{0.1049}{0.1274}$$

$$= 0.8234$$

And the proportion of stock B (W_B)

W_B = Weight (or proportion) of stock B = 1- W_A = 1-0.8234 = 0.1766

Hence, the portfolio return is given as,

$$\overline{R}_P = W_A.\overline{R}_A + W_B.\overline{R}_B$$

Where,

$\overline{R}_P$ = Expected return on portfolio of stock A and Stock B.

Expected return of stock A (UNL) ($\overline{R}_A$) =0.2405

Expected return of stock A (SHL) ($\overline{R}_B$) =-0.3298

W_A = Weight of stock A (W_A) = 0.8234

W_B = Weight of stock A (W_B) = 0.1766

$\overline{R}_P$ = (0.8234).(0.2405)+ (0.1733).(0.3298)

= 0.1980 – 0.0572

= 0.1408 or 14.08%

And the portfolio risk is given as,

$$\sigma_P = \sqrt{W_A{}^2.\sigma_A{}^2 + W_B{}^2\sigma_B{}^2 + 2W_A.W_B.Cov(R_A.R_B)}$$

$$= \sqrt{(0.8234)^2(0.1607)^2 + (0.1766)^2(0.3289)^2 + 2(0.8234)(0.1766)(0.0033)}$$

$$= \sqrt{(0.6781)(0.0258) + (0.0312)(0.1082) + 0.0010}$$

$$= \sqrt{0.0175 + 0.0034 + 0.0010}$$

$$= \sqrt{0.0219}$$

$$= 0.1481$$

Where, σ_p = Standard Deviation of portfolio returns of stock A and stock B.

$$\rho_{AB} = \frac{Cov.(R_A.R_B)}{\sigma_A.\sigma_B}$$

$$= \frac{0.0033}{(0.1607)(0.3289)}$$

$$= \frac{0.0033}{0.0529}$$

$$= 0.0624$$

Since, the Correlation is positive but near to zero, the risk of the portfolio is reduced significantly. Portfolio standard deviation is less than both the individual stock's risk (i.e. σ_P = 0.1481<0.1607 and 0.3289). Similarly portfolio expected return is decreased

compared with expected return of stock A (UNL) (i.e. $\overline{R}_P < \overline{R}_A$ =14.08 %< 24.05. And portfolio expected return is less than the expected return of stock B (SHL) (i.e. $\overline{R}_P < \overline{R}_B$ = 14.08 %< 32.98%. The above analysis shows that portfolio management reduces the risk and same time gives sustainable (moderate) profit to the investor. Actually, diversification usually leads to risk reduction, because the standard deviation of portfolio is generally less than the individual assets standard deviation.

In this study, while comparing with the first portfolio between common stock of UNL and SHL is beneficial than the portfolio between common stock of NSBI and NFSC, the reason is that the correlation between the common stock of UNL and SHL is less than the correlation of portfolio between the common stock of NSBI and NFSC (i.e. $\rho_{UNL\ and\ SHL} < \rho_{NSBI\ and\ NFSC} = 0.0624 < 0.2954$). Similarly, an analysis between NSBI and NFSC can also be done with varying proportion of funds as done in the second case.

4.4.2 Portfolio Investment Performance Evaluation

In assessing the performance of a portfolio, it is necessary to consider both risk and return. Ranking portfolio's average returns ignores the skill with which they minimize risk and therefore presents an oversimplified picture. So, it is often desirable to be able to rank portfolio's performance. The real need is for an index of portfolio performance that is determined by both the return and the risk of portfolio.

William F.Sharpe's performance measure has been developed to evaluate a portfolio performance considering both return and risk simultaneously. The equation as developed by Sharpe is presented below:

$$\text{Si} = \frac{risk\ premium}{total\ risk} = \frac{\overline{ri} - R}{\sigma i}$$

Where,

Si = William F. Sharpe's index of portfolio performance

$\overline{ri}$ = average return form portfolio i

σi =Standard Deviation of returns for portfolio i

R = risk less rate of interest.

Table 4.51
Sharpe's Portfolio Performance Measure

Company	Rf	$\overline{R}$	σ	$\frac{\overline{R}-R_f}{\sigma}$	Ranking
NSBI	0.0511	0.1904	0.5058	0.2754	5
NIBL	0.0511	0.1511	0.5177	0.1932	7
NFSC	0.0511	-0.0758	0.4938	-0.2570	10
CIT	0.0511	0.3595	0.6055	0.5093	3
UNL	0.0511	0.2405	0.1622	1.1677	1
HGICL	0.0511	0.1394	0.5936	0.1488	8
UICL	0.0511	0.1169	0.3380	0.1947	6
SHL	0.0511	0.3298	0.3289	0.8474	2
STC	0.0511	0.0527	0.1741	0.0092	9
BBCL	0.0511	0.2171	0.4654	0.3567	4

Where,

$\overline{R}$ = Average return form the individual portfolio (From Table 4.31)

σ = Standard Deviation of return for individual portfolio (From table 4.31)

Rf = Riskless rate of interest (Appendix No. XVI)

Sharpe's index of performance generates one (ordinal) number that is determined by both the risk and return of the portfolio or other investment being evaluated. Table 4.50 lists each company's average return, standard deviation and Sharpe's performance measure and thus an attempt is being made to evaluate the performance of each individual company. Thus it can be clearly seen from the table that UNL>SHL>CIT>BBCL>NSBI>UICL>NIBL>HGICL>STC>NFSC indicates that UNL is performer than SHL and SHL is better performer than CIT and so on.

4.5 Empirical Findings of the study

The empirical findings of the study based on the analysis of data and their interpretation vis-à-vis the objectives set could be summarized as follows:

1 Most of the sample companies taken under study are offering cash dividends every year but few companies like NFSC, HGICL, UIC, BBCL have unable to pay dividend from last two to three years. UNL is high dividend paying company and UIC is the low dividend paying company among the sample companies. (Table No. 4.7, 4.16,4.19,4.28 and 4.13.

2 The expected rate of return is simply a weighted average of the possible returns with the weights being the probabilities of occurrences expected return on common stock of CIT is highest (i.e.35.95%) common stock of UNL, SHL, BBCL are over 20%. Similarly, STC's expected return is positive but below 10% and NFSC obtain negative returns. (Table No.4.31)

3 The average realized rate of return of all these sample companies are not the same over the sample period. Therefore, the coefficient of variation can be preferred as measure of risk. On the basis of C.V. CIT's C.V is low among the sample companies. Hence, CIT's common stock is the best security for investment. And the remaining sample companies C.V of SHL, NIBL, UNL's common stock have comparatively less than others. Hence, these companies can be considered as best investment devices, as they have low risk,

higher and consistent returns. Those assets which have negative C.V. considered to be risky assets because negative expected returns asset are unacceptable in the view point of the investment. Here, NFSC have negative C.V. (Table No.4.31)

4 When comparing with the market, expected return of NFSC have less than the market return (i.e. $\overline{R} < \overline{R}$ m). And remaining sample companies expected return are higher than the market return (i.e. $\overline{R} > \overline{R}$ m). (Table No. 4.7 and 4.32)

5 On the basis of realized return's line in the graph is quite difficult to predict and generalize the movement of realized rate of return on common stock because the movement of the realized rate of return line looks like the business cycle line. Hence, least square method is used to calculated trend value and draws the trend line. Most of the common stock of the sample companies' trend line when graphically presented shown the downward movement. (Diagram 4.1 to 4.10)

6 The coefficient of variation is the best measure of risk because it measures per rupee of risk. On the basis of this all the company's CV is higher than market CV except NFSC stock CV. Market CV has the negative and NFSC has also negative C.V. The Coefficient of Variation is normally computed only for data that are not negative. (Table No. 4.31 and 4.32)

7 The beta coefficient is an index of systematic risk. Beta coefficient may be used for ranking the systematic risk of different assets. Beta of NIBL, NFSC, CIT, and HGICL is greater than one (i.e.$\beta>1$). Hence, these sample companies common stock are aggressive asset. Similarly, beta of NSBI, UNL, UICL, SHL, STC and BBCL is less than one (i.e.$\beta<1$). Hence, these companies stock are defensive asset, its price fluctuation are less volatile than the market. (Table No.4.44)

8 Alpha is simply the intercept of the characteristic line on the vertical axis, Alpha is an estimate of its asset's rate of return when the market is stationary, Rm = 0, or market rate of return is zero. CIT's alpha is the highest (α = 44.39%) among the sample companies. Similarly, NSBI, NIBL, UNL, HGICL, SHL and BBCL's alpha are more than 20% and NFSC, UICL, STC and BBCL alpha have positive value. CIT's common stock is the best among the sample companies. (Table No.4.44)

9 Correlation coefficient is a statistical measure similar to covariance, in that it measures the degree of mutual variation between two random variables. The value of correlation coefficient always lies in the range form -1 to +1. All the sample companies taken under study have positive correlation with the market. The positive correlation indicates that when market return goes up, sample companies common stock's return also goes up and vice-versa. HGICL's correlation coefficient is the highest (i.e. ρ = 0.9038) while STC's correlation coefficient is the lowest (i.e. ρ = 0.2225) among the sample companies. (Table No. 4.44)

10 Total risk of common stock can be divided into two parts- systematic risk (undiversifiable risk) and unsystematic risk can be converted to coefficient of determination (ρ^2) and proportion of unsystematic risk ($1-\rho^2$). Coefficient of determination of HGICL's common stock is highest (i.e.81.70%) among the sample companies. Similarly, NIBL and NFSC have more than 50% of coefficient of determination and CIT, UNL, UICL, SHL, and BBCL have more than 20% coefficient of determination while NSBI and STC have less than 20% coefficient of determination. STC's common stock coefficient of determination is lowest (i.e.0.0495). Higher the coefficient of determination, higher will be the undiversifiable risk (market risk).

Alternatively, lower the coefficient of determination means higher the proportion of unsystematic risk (higher the diversifiable risk). That means there is inverse relationship between the coefficient of determination and proportion of unsystematic risk. In the case of sample companies, STC's common stock has highest proportion of unsystematic risk (i.e. 95.05%) while HGICL's common stock has lowest proportion of unsystematic risk. This means that STC's common stock risk is highly diversifiable while that of HGICL is not highly diversifiable and vise-versa. The assets which have high proportion of unsystematic risk can be avoided through diversification. (Table No.4.44)

11 Required rate of return (RRR) of the security is the risk-free-rate plus a premium based on the systematic risk of that security. CAPM is used to compare between RRR and expected rate of return (ERR), whether the stock is overpriced or under priced. If ERR>RRR, the stock is known as under priced, alternatively if ERR<RRR, the stock is known as over priced. The common stocks of sample companies are under priced. (Table No.4.46)

12 Portfolio analysis serves as a defensive technique to counter the problem of investment risk. Generally, it is seen that most of the investors invest in two or more securities without any analysis of portfolio. Portfolio reduced the unsystematic risk of the security. So construction of portfolio of securities seems to be favorable for any investor. In this study, the first portfolio between common stock of NSBI and NFSC seems less beneficial then the second between UNL and SHL. The reason is that the correlation between the common stock of NSBI and NFSC is higher than the correlation of portfolio between UNL and SHL (i.e. $\rho_{UNL\ and\ SHL} < \rho_{NSBI\ and\ NFSC} = 0.0624 < 0.2954$). This analysis shows that the minimum correlation is beneficial for the construction of portfolio between assets. (Table No.4.46)

13 Last but not the least, on the basis of Sharpe's portfolio performance measure; an attempt is being made to evaluate the performance of each individual sample company taken under study. Thus, UNL > SHL > CIT > BBC L> NSBI > UICL > NIB L> HGICL > STC > NFSC. This indicates that UNL is performer than SHL and SHL is better performer than CIT and so on. (Table No.4.50)

CHAPTER V
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter basically involves with the findings and conclusions derived from the study of Beta analysis of the common stock of Nepalese companies. This chapter makes an attempt to draw the summary, conclusions/findings of the study and the final section gives recommendation to solve the problem on the basis of the findings.

5.4 Summary

To summarize the study on Beta Analysis of Nepalese Companies this study follows the conventions of the methodology set by the Facility of Management of Tribhuvan, Kathmandu, Nepal. First chapter includes introduction, statement of problem, objectives of the study and limitations of the study. Second chapter includes review of literature where theories of risk and return are included with respects to concept of beta. Third chapter makes an attempt to review the methodological aspect in brief. Similarly, in the fourth chapter, analytical exploration and manipulation of data has been presented within the frame of the Research Methodology and the analyzed data are presented in suitable forms like tables and diagrams. Finally, the fifth chapter includes summary of the study, conclusions derived from the study and recommendations.

Risk and Return is not the overnight concept. There exists positive relationship between risk and return i.e., the higher the level of risk, the higher will be the rate of return. People have many motives for investing. Some people invest in order to gain a sense of power or prestige often the control of corporate empires is a driving motive. For most investors, however, their interest in investment is largely pecuniary- to earn a return on their money. However, selecting stocks exclusively on the basis of maximization of return is not enough. The fact that most investors do not place available funds into the one, two or even three stocks promising the return in the selection process. Investors not only like return, they dislike risk. To say that investors like return and dislike risk is, however, simplistic. To facilitate our job of analyzing securities and portfolios with in a return-risk context, we began with a clear understanding or what risk-return are, what creates them and how they should be measured. Therefore, the rate of return expected form any investment proposal is the sum of risk-free rate of return and the premium pain to the additional level or risk taken. The level of risk is not so easy to measure. However, different scholars have suggested various statistical tools like standard deviation, variation, coefficient of variations, residual variance, beta coefficient, correlation coefficient, coefficient of determination,proportion of unsystematic risk to measure the level of risk associated with a particular asset and these have been dealt with in this study on beta analysis. Within the framework of the objectives set this study can be summarized as:

- The risk and return of common stock is explained using the statistical tools namely average rate of return, standard deviation and coefficient of variation.

- The systematic and unsystematic risk of common stock is explained using different financial and statistical tools like variance of stock value of systematic risk, value of unsystematic, coefficient of determination and proportion of unsystematic risk.
- The sensitivity of the stocks of the sample company is explained using beta coefficient and also security market line approach is applied to assess the overpriced or under priced state of a particular security.
- The diversification of the risk of asset is explained with the help of portfolio analysis and performance evaluation of assets is explained with the help of Sharpe's performance index.

5.5 Conclusions

The conclusions of the study are as follows:

- Unilever Nepal Limited (UNL) is the best among the sample companies taken under study on the basis of dividend paying company.
- The expected rate of return on common stock of Citizen Investment Trust (CIT) is the highest (i.e.35.95%). Similarly, SHL, UNL,BBCL,NSBI, NIBL, HGICL, UICL, STC have expected return higher than market return while remaining sample company expected return is less than the market return.
- On the basis of realized return's line in the graph is quite difficult to predict and generalize the movement of realized rate of return on common stock because the movement of the realized rate of return line looks like the business cycle. Hence, lease square methods are used to calculated trend value and draw the trend line. Most of the common stock of the sample companies' trend line when graphically presented shown the downward movement.
- On the basis of coefficient of variation Nepal SBI Bank's common stock can be considered as less risky whereas National Finance and Saving Company's common stock can be considered as more risky, because NSBI's common stock has lowest coefficient of variation while NFSC's common stock has negative coefficient of variation among the positive coefficient of variation while comparing with market all the sample companies' coefficient of variation is less risky than market because all the sample companies have minimum coefficient of variation than market.
- The beta coefficient of market sensitivity analysis, the main focus of the study, measures the index of the systematic risk. Beta coefficients of 10 sample companies showed mixed results. Four companies are aggressive while six companies are defensive.
- In our analysis of alpha, alpha of CIT's is the highest (i.e.44.39%). So CIT is the best among the sample companies on the basis of alpha analysis.
- All the sample companies taken under study have positive correlation with maket. HGICL's correlation coefficient is the highest while STC's is the lowest among the sample companies.
- Coefficient of determination of HGICL's common stock is highest (i.e.81.70%) where as coefficient of determination of STC's common stock is lowest (i.e. 4.95%) among the sample companies lower the coefficient of determination means higher the proportion of unsystematic risk. Coefficient risk can be avoided through diversification.
- On the basis of CAPM analysis, it was found that all sample companies are under priced.
- Under portfolio analysis, the first portfolio between common stock of NSBI and NFSC seems to be less beneficial than the second between UNL and SHL. The reason is that the

correlation of portfolio between the common stock of NSBI and NFSC is more than the correlation of portfolio between the common stock of UNL and SHL
(i.e. $\rho_{UNL\ and\ SHL} < \rho_{NSBI\ and\ NFSC} = 0.0624 < 0.2954$).

- On the basis on Sharpe's portfolio performance measure UNL > SHL > CIT > BBCL > NSBI > UICL > NIBL > HGICL > STC > NFSC. This indicates that asset UNL is a better performer than SHL and SHL is better performer than CIT and so on.

5.6 Recommendations

The recommendations offered by this study are as follows:

- Investors want to maximize expected returns subject to their tolerance for risk. Return is the motivating force and the principle reward in the investment process and it is the key method available to investors in comparing alternative investments. Forces that contribute to variation in return-price or dividend (interest) - constitute elements of risk. The investment opportunity and threat to the general investor; fight their rights and unhealthy practices in the market. This study suggests constructing the efficient portfolio to minimize risk and get sustainable future expected returns. Investor has to choose to those assets which have high returns minimum proportion of systematic risk, negative correlation to make the efficient portfolio among the securities in the market. So investor should use beta as a modern technique in analyzing the risk of an investment so that they can maximize their returns.
- Many Nepalese companies are being recognized with inefficient management system, low productivity, poor quality product, and services not transparent, slow decision making towards changing environment because of that caused high systematic risk which cannot be eliminated. Hence, such type of companies are recommended to change their policy and strategy to make quick decision towards changing environment, produce the products with good quality and standard, develop the efficient management system, be transparent and maintain international standard of accounting system which will help to reduce or eliminate the systematic risk.
- The company should disclose their financial statements periodically, conduct AGM timely, give the information of all the event and strategy of company, that will send positive message in the market and help to increase the market demand of share of the company which will in turn increase the market price per share and ultimately increase the overall market capitalization of the company.
- NEPSE should keep on developing different parameters related to the congenial functioning of the stock market. It has to get into the modernization and be well-equipped and further needs to develop effective and efficient information system whereby it can disclose the information related to investment practices and companies listed with it. Furthermore, it has to adopt such a technique or system whereby it can give information to the general investors of listed companies relating to market price per share, dividend per share of the company in respective fiscal year, eradicate or regulate the unhealthy practices rooted in member brokers, listed company, staff and concerned body so that one can easily trade their stocks at their desire.
- The Security Board of Nepal was established in 2050 Jestha with an objective of regulating, monitoring, directing, controlling and coordinating the entire capital market. The Board works under the ministry of finance and is viewed as market developer and regulator. So, this board should always make an attempt to initiate research and

development program, educational and training program with respect to seminar and workshops in regular intervals. Similarly, it should also be alert in detecting deregulations and violations affected by the corporate sectors, investors, promoters and other related professionals. The SEBON should make every attempt to render contribution for the development of capital market by making securities transaction fair, healthy, efficient and responsible so that the general investor may not lose their investment in the particular company.

- Nepalese share market were badly affected.It is recommended that the government should make every uncontrollable forces for the economic growth, make the business policy transparent and international standard as per WTO norms. Similarly, government should devise rules and regulations regarding the operation of stock market for a healthy economic development of the nation, however the rules so emerging should not violate the norms of the general public and development of security to market. The government further should make every possible arrangement to trade securities on the floor of NEPSE, the only organized stock market in the country to feel a sense of safe and belongingness form the view point of investor and that the position of Nepal Stock Exchange Limited is strengthened.

BIBLIOGRAPHY

Books

Bhalla, V.K.(2001). **Investment Management**. New Delhi: Prentice Hall of India

Bierman Jr, H., and Smidt, S. (1986). **Financial Management For Decision Making**. New York: Mc Millian Publishing Company

Brealey, R.A., and Myers, S.C. (2000). **Principles of Corporate Finance**. New Delhi: Tata Mc. Graw-Hill

Brigham, E.F. (1980). **Fundamental of financial Management**. Chicago: The Dryden Press.

Chandra, P. (1995). **The Investment Game**. India: Tata Mc. Graw-Hill.

Chandra, P.(1997). **Financial Management: Theory and Practice**. New Delhi: Tata Mc. Graw-Hill

Cheney, J.M., and Moses, E.A. (1992**). Fundamentals of Investments**. New York: West Publishing Company.

Christy, G.A., and Clendenin, J.C.(1974). **Introduction to Investments**. New York: Mc. Graw-Hill Book Company.

Dobbins, R. (1986). **Investment Decisions and Financial Strategy**. New Delhi: Heritage Publishers.

Enns, P.G (1985). **Business Statistics: Methods and Applications**. USA: D.Irwin Inc.

Fischer, D.E., and Jordan, D.J.(2000). **Security Analysis and Portfolio Management**. New Delhi: Prentice Hall of India.

Francis, J.C. (1992**). Investment Analysis and Management**. New York: Mc. Graw Hill International.

Gitman, L.J. (2001). **Principle of Management Finance**. New York: Harper and Raw Publishers.

Gupta, C.B. (1978). **Business Organization and Management**. New Delhi: prentice Hall of India.

Gupta, S.P. (1997). **Statistical Method**. New Delhi: Sultan Chand and Sons Publishers.

Hagin, R.L. (1979). **The Dow Jones-Irwin Guide to Modern Portfolio Theory**. USA: Dow Jonet-Irwinwood, Illinois 60430.

Haley, C.W., and Schall, L.D. (1979). **The Theory of Financial Decisions**. NewDelhi: Mc Graw Hill Kugakusha Ltd.

Hampton, J.J. (1983). **Financial Decision Making**: Concepts, Problems and Cases. New Delhi: Prentice Hall of India.

Haugen, R.A. (1997). **Modern Investment Theory**. New Jersey: Prentice Hall International Inc.

Henderson, G.V., Trennepohl, G.L., nad Wert, J.E. (1984). **An Introduction to Financial Management**.(n.p.): Addison-Wesely Publishing Company.

Joshi, P.R. (2002).**Research Methodology**. Kathmandu: Buddha Academic Publishers and Distributors Pvt. Ltd.

Kerlinger, F.N (1983). **Foundations of Behavioral Research**. NewDelhi: Surjeet Publications.

Khan, M.Y., and Jain, P.K. (1992). **Financial Management** Text and Problems New Delhi: Tata Mc. Graw-Hill Publishing Company.
Khan, M.Y., and Jain, P.K. (1980). **Management Accounting**. New Delhi: Tata Mc. Graw-Hill Publishing Company.
Kolb, R.W.(1991**). The Investment Reader**. Kolb Publishing Company Inc.
Kothari, C.R.(1991). **Research Methodology: Methods and Techniques**. New Delhi: Wishwa Prakashan.
Levi, M.D. (1996). **International Finance**.(n.p.): Mc. Graw- Hill Inc.
Lorie, J.h., and Dodd, P(1985). **The Stock Market: Theories and Evidence**. USA: Richard D. Irwin Inc.
Mahat, R.S.(1981). **Capital Market, Financial Flows and Industrial Finance in Nepal**. Lalitpur: Sajha Prakashan.
Mohsin, M., and Khan, M.A. (1980). **Corporation Finance**. New Delhi: Tata Mc. Graw-Hill Publishing Company.
Pandey, I.M. (1995**). Financial Management**. New Delhi: Vikas Publishing House Pvt. Ltd.
Peterson, C., and Lewis, C.W.(2001). **Managerial Economics**. New Delhi: Prentice Hall of India.
Rodriguez, R.M., and Carter, E.E. (1976). **International Financial Management**.(n.p.): Prentice Hall Inc.
Ross, S,A., Westerfield, R,W., and Jaffe, J.F. (1998). **Corporate Finance**. USA: Richard D. Irwin Inc.
Sharpe, W.F., Alexander, G.J., and Bailey, J.V.(1999). **Investments**. New Delhi: Prentice Hall of India Pvt. Ltd.
Soloman, E., and Pringle, J.J.(1978). **An Introduction to Financial Management**. New Delhi: Prentice Hall of India.
Vanhorne, J.C. (2000). **Financial Management and Policy**. New Delhi: Prentice Hall of India.
Vanhorne, J.C., and Wachowicz, Jr, J.M. (2000). **Fundamentals of Financial Management**. New York: Mc Graw Hill International.
Weston, F.J., and Brigham, E.F. (1996). **Essentials of Managerial Finance**. New York: The Dryden Press.
Weston, J.F., and Copeland, T.E.(1989). **Managerial Finance**. Chicago: The Dryden Press.
Wolf, H.K., and Panta, P.R. (2000). **A Handbook for Social Science Research and Thesis Writing**. Kathmandu: Buddha Academic Enterprises Pvt. Ltd.

Thesis

Bhatta, G.P (1995) "Assessment of the Performance of Listed Company in Nepal". Kath.: Central Department of Management Tribhuvan University.
Bhatta, Dipesh.(2003)"Portfolio Management of Listed Finance Companies in Nepal". Kath.:Central Department of Management Tribhuvan University.
Khadka, Ram Hari.(2003)"A Study on Analysis of Risk and Return on Selected Nepalese Commercial Banks Listed In Nepse". Kath.: Central Department of Management Tribhuvan University.

Pandey, Lila Nath.(2003) "Risk and Return Analysis on Common Stock Investment". Kath.: Central Department of Management Tribhuvan University.

Shrestha, Amit.(2003) "Risk and Return Analysis on Common Stock Investment of Banking Sector In Nepal". Shankar Dev Campus, Tribhuvan University. Sharma, Durga Mani (2004). "Portfolio Management of Listed Commpanies Bank and Insurance Companies in Nepal". Shankar Dev Campus, Tribhuvan University.

Shretha, Merina.(2006) "Risk and Return Analysis of Listed Companies Under Group 'A' Category by Nepse". Central Department of Management, Public Youth Campus, Tribhuvan University.

Shrestha, Sudip.(2006) "Risk and Return Analysis of Common Stock Investment in Nepal". Central Department of Management, Public Youth Campus, Tribhuvan University .

Tuladhar, Pramila (2002). "Risk and Return Analysis of Common Stock Investment". Central Department of Management Tribhuvan University.

Tamang, Buddhi Raj (2003). "Risk and Return of Commercial Banks in Nepal". Central Department of Management Tribhuvan University.

Upadhaya, Sudeep.(2003) "Risk and Return Analysis on Common Stock Investment of Commercial Banks in Nepal". Tribhuvan University.

Journals and Articles:

Bodurtha, J.N., and Mark, N.C.(2004). **"Testing the CAPM with Time Varying Risk and Returns"**. *The journal of Finance*. Vol.46. No.4.

Fama, E.F., and French, K.R.(2003). **" The Cross Section of Expected Stock Returns"**. *Journal of Finance*. Vol.48.

Malkiel, B.G. (1999). **"Return on Investing In Equity Mutual Funds: 1972-1991"**. *The Journal of Finance*. Vol.50 No.2

Manandhar, K.D.(1998). **"A Study of Dividend Policy and Value of the firm in small stock market: A case of Nepal"**. Management Dynamics. *A Journal on Management and Economics*. Vol.8.No.1

Pradhan, R.S. (2001). **"Stock Market Behavior in a Small Capital Market: A Case Study of Nepal"**. *The Nepalese Management Review*. Vol.9.No.1.

Rosenberg, B., and Guy, J. (1998). **"Prediction of Systematic Risk from Investment Fundamentals"**. *Financial Analysis Journal*. Vol.32. No.3.

Shrestha, M.K. (1998). **"The Nepalese Financial Market Earning Dimensions of Challenges and Prospects"**. Management Dymamics. *A Journal on Management and Economics*. Vol.6.No.1.

Websites

www.edunepal.com.np September 2013
www.fncci.org.np September 2013
www.nepalstcok.com.np October 2013
www.nrb.org.np October 2013
www.sebonp.com October 2013

APPENDICES

Appendix No. I

Calculation of Beta (β) and other values of NSBI

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.0945	0.4770	0.0451	
2008/09	0.2750	-0.1539	-0.0423	
2009/10	-0.7457	-0.2938	0.2191	
2010/11	-0.2712	-0.1720	0.0466	
2011/12	-0.0577	0.1426	-0.0082	
Total			**0.2602**	

Data Source: Table 4.2 and Table 4.31

Now, Cov.(R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\bar{Rm})}{n-1} = \frac{0.2602}{5-1} = 0.0651$

(i) Beta Coefficient of NSBI $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.0651}{0.0968} = 0.6725$

Where, n = number of observation

$\sigma^2 m$ = variance of market return (Section 4.3.A) =0.0968

R = return on common stock of NSBI.

(ii) Calculation of alpha (α) intercept.

Expected return of NSBI (Section 4.1.1 B) ($\bar{R}$) = 0.1904

Expected return of market (Section 4.1.A) ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = 0.1904-(0.6725) (-0.0685) = 0.2365

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of NSBI (Section 4.1.1.B) (σ^2) = $(0.5058)^2$ = 0.2558

Variance of market (Section 4.3.A) ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $0.6725^2 \times 0.0968$ = 0.0438

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.2558 – 0.0438

= 0.212

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) = $\frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

= $\frac{0.0438}{0.2558}$ = 0.1712

Correlation with Market $(\rho) = \sqrt{0.1712}$ = 0.4138

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.1712

= 0.8288

Appendix No. II

Calculation of Beta (β) and other values of NIBL

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.7230	0.4770	0.3449	
2008/09	-0.3938	-0.1539	0.0606	
2009/10	-0.4074	-0.2938	0.1197	
2010/11	0.1023	-0.1720	-0.0176	
2011/12	-0.0241	0.1426	-0.0034	
Total			**0.5042**	

Data Source: Table 4.5 and Table 4.31

Now, Cov.(R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\bar{Rm})}{n-1} = \frac{0.5042}{5-1} = 0.1261$

(i) Beta Coefficient of NIBL $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.1261}{0.0968} = 1.3022$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of NIBL

(ii) Calculation of alpha (α) intercept.

Expected return of NIBL ($\bar{R}$) = 0.1511

Expected return of market ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = 0.1511-(1.3022) (-0.0685) = 0.2403

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of NIBL (σ^2) = $(0.5177)^2$ = 0.2680

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $1.3022^2 \times 0.0968$ = 0.1641

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.2680 – 0.1641

= 0.1039

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) = $\frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

= $\frac{0.1641}{0.2680}$ = 0.6123

Correlation with Market $(\rho) = \sqrt{0.6123}$ = 0.7825

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.6123

= 0.3877

Appendix No. III

Calculation of Beta (β) and other values of NFSC

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.8683	0.4770	0.4142	
2008/09	-0.0821	-0.1539	0.0126	
2009/10	-0.1867	-0.2938	0.0548	
2010/11	-0.2903	-0.1720	0.0499	
2011/12	-0.3092	0.1426	-0.0441	
Total			**0.4875**	

Data Source: Table 4.8 and Table 4.31

Now, Cov.(R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\overline{Rm})}{n-1} = \frac{0.4875}{5-1} = 0.1219$

(i) Beta Coefficient of NFSC $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.1219}{0.0968} = 1.2593$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of NFSC

(ii) Calculation of alpha (α) intercept.

Expected return of NFSC ($\bar{R}$) = -0.0758

Expected return of market ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = -0.0758-(1.2593) (-0.0685) = 0.0105

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of NFSC (σ^2) = $(0.4938)^2$ = 0.2438

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $1.2593^2 \times 0.0968 = 0.1535$

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.2438 – 0.1535

= 0.0903

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) = $\frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

= $\frac{0.1535}{0.2438}$ = 0.6296

Correlation with Market $(\rho) = \sqrt{0.6296}$ = 0.7935

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.6296

= 0.3704

Appendix No. IV

Calculation of Beta (β) and other values of CIT

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.5810	0.4770	0.2772	
2008/09	0.6097	-0.1539	-0.0938	
2009/10	-0.6335	-0.2938	0.1861	
2010/11	-0.5953	-0.1720	0.1024	
2011/12	0.0381	0.1426	0.0054	
Total			**0.4772**	

Data Source: Table 4.11 and Table 4.31

Now, Cov.(R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\overline{Rm})}{n-1} = \frac{0.4772}{5-1} = 0.1193$

(i) Beta Coefficient of CIT $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.1193}{0.0968} = 1.2324$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of CIT

(ii) Calculation of alpha (α) intercept.

Expected return of CIT ($\bar{R}$) = 0.3595

Expected return of market ($\bar{Rm}$) = -0.0685

$\alpha = \bar{R} - \beta \bar{Rm}$ = 0.3595-(1.2324) (-0.0685) = 0.4439

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of CIT (σ^2) = $(0.6055)^2$ = 0.3666

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2 \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2 \sigma^2 m$) = $1.2324^2 \times 0.0968$ = 0.1470

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2 \sigma^2 m$)

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

= 0.3666 – 0.1470

= 0.2196

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk ($1-\rho^2$)

Proportion of Systematic Risk (ρ^2) $= \frac{Systematic\,Risk}{Total\,Risk} = \frac{\beta^2 \sigma^2 m}{\sigma^2}$

$= \frac{0.1470}{0.3666} = 0.4011$

Correlation with Market $(\rho) = \sqrt{0.4011} = 0.6332$

Proportion of Unsystematic Risk ($1-\rho^2$) = 1 – 0.4011

= 0.5989

Appendix No. V

Calculation of Beta (β) and other values of UNL

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.0463	0.4770	0.0221	
2008/09	-0.1247	-0.1539	0.0192	
2009/10	-0.1878	-0.2938	0.0552	
2010/11	0.0468	-0.1720	-0.0080	
2011/12	0.2194	0.1426	0.0313	
Total			**0.1197**	

Data Source: Table 4.14 and Table 4.31

Now, Cov.(R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\bar{Rm})}{n-1} = \frac{0.1197}{5-1} = 0.0299$

(i) Beta Coefficient of UNL $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.0299}{0.0968} = 0.3089$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of UNL

(ii) Calculation of alpha (α) intercept.

Expected return of UNL ($\bar{R}$) = 0.2405

Expected return of market ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = 0.2405-(0.3089) (-0.0685) = 0.2617

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of UNL (σ^2) = $(0.1607)^2$ = 0.0258

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $0.3089^2 \times 0.0968 = 0.0092$

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.0258 – 0.0092

= 0.0166

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) = $\frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

= $\frac{0.0092}{0.0258}$ = 0.3567

Correlation with Market $(\rho) = \sqrt{0.3567}$ = 0.5972

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.3567

= 0.6433

Appendix No. VI

Calculation of Beta (β) and other values of HGIC

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	1.0556	0.4770	0.5035	
2008/09	-0.2981	-0.1539	0.0459	
2009/10	-0.3184	-0.2938	0.0935	
2010/11	-0.2847	-0.1720	0.0490	
2011/12	-0.1544	0.1426	-0.0220	
Total			**0.6699**	

Data Source: Table 4.17 and Table 4.31

Now, Cov.(R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\overline{Rm})}{n-1} = \frac{0.6699}{5-1} = 0.1675$

(i) Beta Coefficient of HGIC $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.1675}{0.0968} = 1.7301$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of HGIC

(ii) Calculation of alpha (α) intercept.

Expected return of HGIC ($\bar{R}$) = 0.1394

Expected return of market ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = 0.1394-(1.7301) (-0.0685) = 0.2579

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of HGIC (σ^2) = $(0.5936)^2$ = 0.3524

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $1.7301^2 \times 0.0968$ = 0.2879

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.3524 – 0.2879

= 0.0645

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) $= \frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

$= \frac{0.2879}{0.3524} = 0.8170$

Correlation with Market $(\rho) = \sqrt{0.8170} = 0.9038$

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.8170

= 0.1830

Appendix No. VII

Calculation of Beta (β) and other values of UICL

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.5909	0.4770	0.2819	
2008/09	-0.1804	-0.1539	0.0278	
2009/10	-0.2016	-0.2938	0.0592	
2010/11	-0.0243	-0.1720	0.0042	
2011/12	-0.1847	0.1426	-0.0263	
Total			**0.3467**	

Data Source: Table 4.20 and Table 4.31

Now, Cov.(R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\overline{Rm})}{n-1} = \frac{0.3467}{5-1} = 0.0867$

(i) Beta Coefficient of UICL $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.0867}{0.0968} = 0.8954$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of UICL

(ii) Calculation of alpha (α) intercept.

Expected return of UICL ($\bar{R}$) = 0.1169

Expected return of market ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = 0.1169-(0.0867) (-0.0685) = 0.1228

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of UICL (σ^2) = $(0.3380)^2$ = 0.1142

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $0.8954^2 \times 0.0968$ = 0.0351

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.1142 – 0.0351

= 0.0791

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) = $\frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

= $\frac{0.0351}{0.1142}$ = 0.3074

Correlation with Market $(\rho) = \sqrt{0.3074}$ = 0.5544

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.3074

= 0.6926

Appendix No. VIII

Calculation of Beta (β) and other values of SHL

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.5432	0.4770	0.2591	
2008/09	-0.3089	-0.1539	0.0475	
2009/10	0.0275	-0.2938	-0.0081	
2010/11	-0.0706	-0.1720	0.0121	
2011/12	-0.1912	0.1426	-0.0273	
Total			**0.2834**	

Data Source: Table 4.2 and Table 4.31

Now, Cov. (R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\bar{Rm})}{n-1} = \frac{0.2834}{5-1} = 0.0709$

(i) Beta Coefficient of SHL $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.0709}{0.0968} = 0.7319$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of SHL

(ii) Calculation of alpha (α) intercept.

Expected return of SHL ($\bar{R}$) = 0.3298

Expected return of market ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = 0.3298-(0.7319) (-0.0685) = 0.3799

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of SHL (Section 4.1.1.B) (σ^2) = $(0.3289)^2$ = 0.1082

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $0.7319^2 \times 0.0968 = 0.0519$

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.1082 – 0.0519

= 0.0563

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) $= \frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

$= \frac{0.0519}{0.1082} = 0.4797$

Correlation with Market $(\rho) = \sqrt{0.4797} = 0.6926$

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.4797

= 0.5203

Appendix No. IX

Calculation of Beta (β) and other values of STC

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.1787	0.4770	0.0852	
2008/09	0.1620	-0.1539	-0.0249	
2009/10	-0.0400	-0.2938	0.0117	
2010/11	-0.0605	-0.1720	0.0104	
2011/12	-0.2402	0.1426	-0.0343	
Total			**0.0482**	

Data Source: Table 4.23 and Table 4.31

Now, Cov.(R.Rm) $= \frac{\sum(R-\bar{R})(Rm-\overline{Rm})}{n-1} = \frac{0.0482}{5-1} = 0.0121$

(i) Beta Coefficient of STC $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.0121}{0.0968} = 0.1245$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of STC

(ii) Calculation of alpha (α) intercept.

Expected return of STC ($\bar{R}$) = 0.0527

Expected return of market ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = 0.0527-(0.1245) (-0.0685) = 0.0612

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of STC (σ^2) = $(0.1741)^2$ = 0.0303

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $0.1245^2 \times 0.0968 = 0.0015$

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.0303 – 0.0015

= 0.0288

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) = $\frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

= $\frac{0.0015}{0.0303}$ = 0.0495

Correlation with Market $(\rho) = \sqrt{0.0495}$ = 0.2225

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.0495

= 0.9505

Appendix No. X

Calculation of Beta (β) and other values of BBCL

Fiscal Year	$R-\bar{R}$	$Rm-\bar{Rm}$	$(R-\bar{R})(Rm-\bar{Rm})$	Remarks
2007/08	0.6594	0.4770	0.3146	
2008/09	0.2885	-0.1539	-0.0444	
2009/10	-0.1423	-0.2938	0.0418	
2010/11	-0.3607	-0.1720	0.0620	
2011/12	-0.4450	0.1426	-0.0635	
Total			**0.3105**	

Data Source: Table 4.2 and Table 4.31

Now, Cov.(R.Rm) = $\frac{\sum(R-\bar{R})(Rm-\overline{Rm})}{n-1} = \frac{0.3105}{5-1} = 0.0772$

(i) Beta Coefficient of BBCL $(\beta) = \frac{Cov.(R.Rm)}{\sigma^2 m} = \frac{0.0772}{0.0968} = 0.8019$

Where,

n = number of observation

$\sigma^2 m$ = variance of market return = 0.0968

R = return on common stock of BBCL

(ii) Calculation of alpha (α) intercept.

Expected return of BBCL ($\bar{R}$) = 0.2171

Expected return of market ($\bar{Rm}$) = -0.0685

α = $\bar{R}$ - β $\bar{Rm}$ = 0.2171-(0.8019) (-0.0685) = 0.2720

(iii) Calculation of systematic risk and Unsystematic risk

Variance or Total Risk of BBCL (σ^2) = $(0.4654)^2$ = 0.2166

Variance of market ($\sigma^2 m$) = $(0.3112)^2$ = 0.0968

Total risk (σ^2) = Systematic Risk ($\beta^2\ \sigma^2 m$) + Unsystematic Risk (e^2)

Systematic Risk ($\beta^2\ \sigma^2 m$) = $0.8019^2 \times 0.0968$ = 0.0622

Unsystematic Risk (e^2) = Total risk (σ^2) - Systematic Risk ($\beta^2\ \sigma^2 m$)

= σ^2 - $\beta^2\ \sigma^2 m$

= 0.2166 – 0.0622

= 0.1544

(iv) Coefficient of Determination or Proportion of Systematic Risk (ρ^2) and Proportion of Unsystematic Risk (1- ρ^2)

Proportion of Systematic Risk (ρ^2) = $\frac{Systematic\ Risk}{Total\ Risk} = \frac{\beta^2\sigma^2 m}{\sigma^2}$

= $\frac{0.0622}{0.2166}$ = 0.2872

Correlation with Market $(\rho) = \sqrt{0.2872}$ = 0.5359

Proportion of Unsystematic Risk (1- ρ^2) = 1 – 0.2872

= 0.7128

Appendix No. XI

Weighted Average Treasury Bills Rate

(in percent)

Mid-Month	TRB-91 Day					Total
	2007/08	2008/09	2009/10	2010/11	2011/12	
Aug	4.25	5.17	1.77	3.81	3.98	
Sept	2.41	3.73	2.41	3.77	2.28	
Oct	2.35	6.08	2.73	5.63	1.82	
Nov	3.03	5.55	4.67	7.73	0.97	
Dec	3.59	4.72	6.35	6.82	0.80	
Jan	3.86	4.32	8.74	8.21	0.70	
Feb	5.79	6.64	9.01	7.78	0.61	
Mar	5.54	6.83	7.79	8.09	0.97	
Apr	4.07	5.98	7.35	9.06	1.09	
May	5.32	6.73	7.41	9.00	0.83	
Jun	5.41	6	6.77	8.34	1.34	
Jul	5.13	6.8	8.13	8.52	1.15	
Annual average	4.22	5.83	6.5	7.41	1.31	25.27

$$\text{Risk Free Rate (Rf)} = \frac{Total\ Annual\ Average}{N}$$

$$= \frac{25.57}{5}$$

$$= 5.11$$