

## Chapter 1

### INTRODUCTION

This chapter contains background of the study, commercial banks and stock exchange, statement of the problem, objective of the study, significance of the study, limitation of the study and organization of the study.

#### 1.1 Background of the Study

Investment means the sacrifice of current money to increase future money. It is the purchase of an asset or item with the hope that it will generate income or appreciate in future and sold at the higher price. In investment, two attributes are generally involved: time and risk. Risk is the fluctuation of actual return and expected return. The sacrifice takes place in the present and is certain. The reward comes later and is uncertain. Investor always tries to minimize the risk by investing two or more securities. A set of two or more securities is called portfolio.

Portfolio investment refers to an investment that combines several securities. It is grouping of financial assets such as stocks, bonds and cash equivalents. Portfolios are designed according to the investor's risk tolerance, time frame and investment objectives.

To minimize the risk at given rate of return, the concept of portfolio diversification is necessary. It is one such tool that helps for proper utilization of resources. Most investors hope that if they have several securities then even one goes bad, the other will provide protection from loss. So, they gather different securities. These securities diversify the risk.

A portfolio simply represents the practice among the investor of having their fund in more than one asset. The combination of investment assets is called portfolio (Weston & Brigham, 1992).

A systematic investment process should be followed to win the stock market. Investment process describes how an investor should go about making decision with regard to what marketable to invest in, how extensive the investment should be and when the investors should be made. A five step procedure for making these decision forms the basis of investment process:

- ) Set investment policy
- ) Perform security analysis

- ) Construct a portfolio
- ) Revise the portfolio
- ) Evaluate the performance of portfolio (Sharpe, Gordon & Bailey, 1995).

Among these investment processes the research is focused on security analysis and portfolio selection. Security analysis involves examining of individual securities or group of securities within the broad categories of financial assets. Portfolio construction identifies those specific assets in which to invest determining the proportion of investor's wealth. Diversification should be done to minimize the risk and maximize the return. Portfolio performance involves determining periodically how the portfolio performs in terms of not only the return earned, but also the risk experienced by the investor.

It is the process of selecting a bundle of securities that provides the investing person or organization a maximum yield for a given level of risk. It can be also taken as risk and return management. It aims to determine an appropriate assets mix which attains optimal level of risk and return.

### **Commercial Banks and Nepal Stock Exchange**

Commercial banks are organizations which normally perform certain financial transactions. They perform the twin task of accepting deposits from members of public and make advances to needy and worthy people from the society. However, the natures of banks have changed as the time has changed.

Commercial banks play very important role in the economic life of the nation. The health of the economy is closely related to the soundness of its banking system. Although banks create no new wealth but their borrowing, lending and related activities facilitate the process of production, distribution, exchange and consumption of wealth. In this way they become very effective partners in the process of economic development. Today modern banks are very useful for the utilization of the resources of the country. The banks are mobilizing the savings of the people for the investment purposes. If there would be no banks then a great portion of a capital of the country would remain idle. Importance of commercial banks has emerged through their primary role in the acceptance of demand deposits that can be withdrawn by checks by distributors at any time after the time of deposit. Banks are now the major buyers of debt and other securities. Commercial banks play a dominant role in the money and capital markets. Thus the importance of commercial banks has emerged as a prime component of the financial system and has a large impact on the economy.

In this competitive and market oriented open economy, each and every commercial bank and financial institution has to play a determining role by widening various opportunities for the sake of expanding provision of best service to their customers and by making themselves as a strong and potential financial intermediaries as per countries need of present scenario to obtain the desired level of economic development of nation.

Nepal Stock Exchange, in short NEPSE is the only stock exchange of Nepal operating under Securities Exchange Act, 2040. The former Securities Exchange Center was converted into NEPSE under the program initiated to reform the capital market. The basic objectives of NEPSE is to impart free marketability and liquidity to the government and corporate securities by facilitating transactions in its trading floor through market intermediaries such as brokers, market makers and others. Before conversion into stock exchange centre, it was only the capital market institution undertaking the job of brokering, undertaking, managing public issue, market making for government bonds and other financial services.

In the words of James H. Lorie and Peter Dodd “Stock market is the financial market which probably has the greatest glamour and it perhaps the least understood. Some observer considers it has legalized heaven for gambling and many investors consider stock market investing as a game in which sole purpose is picking winners.”

At present NEPSE has 59 registered brokers and the numbers of listed companies are 334(as on April 4, 2013), which include commercial banks, hydro power companies, insurance companies, finance companies, development banks, hotels, trading organizations and others.

## **1.2 Statement of the Problem**

The major problem in almost all developing countries is capital formation and proper utilization. Mostly people are unknown about the risk and reward associated with stocks. They even do not know the stocks can be the best alternative to maximize their wealth. They are investing their funds in unproductive sector. This is because of lack of knowledge of investment opportunities available in financial market.

Portfolio management is relatively new concept in Nepalese context. Many institutions still have less awareness while investing in productive sector. They have no consideration towards portfolio optimization. They rely upon the instruction and guidelines of Nepal Rastra Bank. They do not try to pay due attention towards proper

matching of deposit and investment portfolio, which creates financial problem enforcing to take wrong decisions. In this study, investors refer to the institutional investors.

The study will be examined about the rate of risk in commercial banks and their associated risk of securities listed in NEPSE? And for bearing that what is the rate of return? Which is the optimum portfolio in NEPSE to invest?

### **1.3 Objective of the Study**

The main objective of this study is to analyze and examine the portfolio followed by investors on their investment in various securities. The specific objectives of the study are as follows:

1. To analyze the risk and return of selected banks.
2. To examine the market risk and return of commercial banks.
3. To study the market sensitivity of sampled banks.
4. To compare required return and expected return of commercial banks.
5. To analyze portfolio risk and return of selected banks.
6. To find out optimal portfolio of sampled commercial banks for an investor.

### **1.4 Significance of the Study**

Commercial banks have a pivotal role in collection of dispersed small savings and transforming them into meaningful capital investment. The success/prosperity of the banks relies heavily upon the successful investment of collected resources to the productive sectors of economy. Hence, the main significance of this study is to help how to minimize risk on investment and maximize return through portfolio analysis. This research is important to acknowledge the investors how important risk and return evaluation and motivate them for rational investment.

They can compare market risk and individual risk to conclusion whether the security is as risky as market or not. This research will inform then about valuation of stock is over-priced or under-priced. So this research helps to increase analytical skill, communicative skill and decision-making on investment and suggestions for its improvement.

### **1.5 Limitation of the Study**

Some of the limitations are as follows:

- ) The study mainly based on secondary data collected from the different sources.
- ) It covers only commercial banks of Nepal not other banks and other organizations of the economy.
- ) The study is simply a partial study for the fulfillment of MBS degree. So the study cannot cover all the dimension of the subject matter.
- ) There are time and resource constraints.

## **1.6 Organization of the Study**

This study is organized into following five major chapters: introduction, review of literature, research methodology, analysis and presentation of data and summary and conclusion.

### **Introduction**

The first chapter includes introduction, commercial banks and Nepal Stock Exchange, statement of the problem, and objective of the study, significance of the study and limitation of the study.

### **Review of Literature**

The second chapter includes theoretical review, review of related studies and review of thesis.

### **Research Methodology**

The third chapter includes research design, data collection procedure, sample tools and techniques for analysis.

### **Analysis and Presentation of Data**

The fourth chapter includes data of banks, analysis of market risk and return, analysis of market sensibility, analysis of systematic and unsystematic risk, analysis of required and expected return, analysis of portfolio risk and return, calculation of optimal portfolio composition.

### **Summary, Conclusion and Recommendations**

The fifth chapter includes summary, conclusion and recommendations. This chapter presents the major findings and compares them with theory and other empirical evidence to the extent possible.

## Chapter 2

### REVIEW OF LITERATURE

With progressing growth of investment activity, portfolio investment has helped the investors to make investment strategy and meet the financial objectives. The portfolio investment includes the efforts made to achieve the best trade-off between risk tolerance and returns. This chapter deals with the theoretical aspect of the topics on investment portfolio in more detail and comprehensive review of recent and relevant literature. For this study, basic academic course books, journals, articles, annual reports, various internet websites and some research paper related with this topic have been reviewed. Therefore this chapter is arranged as the follows:

#### 2.1 Theoretical Framework

It provides the fundamental framework and foundation on the present study. It consists of 2.1.1 Investment, 2.1.2 Investment Process, 2.1.3 Investment Alternatives, 2.1.4 Risk and Return, 2.1.5 Portfolio Analysis, 2.1.6 Portfolio Analysis and Diversification, 2.1.7 Portfolio Selection and 2.1.8 Portfolio Theories.

##### 2.1.1 Investment

Investment means the sacrifice of current money to increase future money. The sacrifice takes place in the present and certain while the reward comes later and uncertain. Investment involves long-term commitment and waiting for a reward. It involves the commitment of resources that have been saved or put away from current consumption in the hope that some benefit will occur in future.

“In finance, the purchase of a financial product or other item of value with an expectation of favorable returns is investment. In general terms, investment means the use of money in the hope of making more money” (www.investorwords.com, 2014).

##### 2.1.2 Investment Process

The investment process outlines the steps in creating a portfolio, and emphasizes the sequence of actions involved from understanding the investor’s risk preferences to asset allocation and selection to performance evaluation. By emphasizing the sequence, it provides for an orderly way in which an investor can create his or her own portfolio or portfolio for someone else. The investment process provides a structure that allows investors to see the source of different investment strategies. The investment process involves these steps:

) **Set Investment Policy:** The investment process starts with setting the investment policy. It determines the objectives and the amount of his/her investment fund. Investment objective should be stated in terms of both risk and return. This step involves the identification of the potential categories of financial assets for consideration in the ultimate portfolio. This identification will be based on the investment objectives, amount of wealth and tax status of the investor.

) **Perform Securities Analysis:** In this step, securities analysis involves examining a number of individual securities/group of securities within the broad categories of financial assets. The investor will evaluate them in term of their price whether they are under priced or overpriced, risk associated with that specific security; his/her expected return and so on.

There are two main analyses: technical analysis and fundamental analysis. Technical analysis is a security analysis methodology for forecasting the direction of prices through the study of past market data, primarily price and volume. Fundamental analysis is performed on historical and present data with the goal of making financial forecasts. It involves analyzing its financial statements and health, its management and competitive advantages, and its competitors and markets.

) **Construct a Portfolio:** Portfolio construction is all about investing in a range of funds that work together to create an investment solution. Construction of portfolio involves understanding the way various types of investments work, and combining them to address the investment objectives and factors such as attitude to risk, the investment and the expected life of the investment.

) **Revise the Portfolio:** The process of addition of more assets in an existing portfolio or changing the ratio of funds invested is called as portfolio revision. In another words, the sale and purchase of assets in an existing portfolio over a certain period of time to maximize returns and minimize risk is called as portfolio revision.

Portfolio revision arises when an individual feels the need to invest more as he/she has some additional money to invest. Change in investment goal also gives rise to revision in portfolio. Depending on the cash flow, an individual can modify his financial goal, eventually giving rise to changes in

the portfolio i.e. portfolio revision. Financial market is subject to risks and uncertainty. An investor might sell off some of his assets owing to fluctuations in the financial market.

) **Evaluate Portfolio Performance:** Portfolio performance evaluation involves determination of the actual performance of a portfolio in terms of risk and return and compares the performance with that of an appropriate benchmark portfolio.

### 2.1.3 Investment alternatives

The financial manager decides on a suitable maturity pattern for the holding on the basis of how long the funds are to be held. If the funds are wrongly invested without any financial risk, business risk and other various types of risk and facts, the investor cannot obtain profitable return as well as he should sometimes lose the principle. Therefore the suitable alternative can be selected and balanced in such a way those maturities and risk appropriate to the financial situation. There are various alternatives, which are as follows:

**Equity Securities:** Equity securities also called common stock or corporate stock represent ownership shares in a corporation and represent a claim on its proportional share in the corporation's assets and profit after payment of corporate liabilities and obligations. Shares of stock are reflected in written instruments known as stock certificates. Each share represents a standard unit of ownership in a corporation.

Equity securities are traded in organized exchanges OTC market. The value of a share of stock depends upon the issuing corporation's value, profitability, and future prospects. The market price reflects what purchasers are willing to pay based on their evaluation of the company's prospects.

Most stock also provides voting rights, which give shareholders a proportional vote in certain corporate decisions. Only a certain type of company called a corporation has stock; other types of companies such as sole proprietorships and limited partnerships do not issue stock.

**Preferred Stock:** Preferred stock is a fixed income security. Preferred shareholder does not have voting rights. "The hybrid nature of preferred stock becomes apparent when we try to classify it in relation to bonds and common stock. The priority feature and the (generally) fixed dividend indicate that preferred stock is similar to bonds.



Payments to preferred stockholders are limited in amount, so that common stockholders receive the advantages (or disadvantages) of leverage” (Weston & Copeland, 1992, p. 971). It is suitable for that investor who does not want to bear high risk but fixed return.

**Debt Securities:** Debt securities are borrowed money that must be repaid that has a fixed amount, a maturity date(s), and usually a specific rate of interest. Debt securities can be divided into two parts. They are short-term debt securities, and intermediate and long-term debt securities. Short-term debt securities are that obligation that matures in one year or less and traded in money market. Example of short-term debt securities are negotiable certificates of deposit, commercial paper, banker’s acceptance, treasury bills etc.

Intermediate and Long-term Debt Securities are the obligation that matures in more than one year. Intermediate and long-term debt securities are traded in OTC market. The examples are government securities, agency securities, municipal securities and corporate bonds.

Government securities are fixed income securities issued by the government. These securities are among the safest of all investment as the government is unlikely to default on interest or on principle repayments. They are treasury notes, treasury bonds and saving bonds. Agency securities are traded in the OTC market. Some examples of agency securities are government national mortgage association, federal home loan Mortgage Corporation, federal national mortgage association. Municipal bonds are debt obligation issued by state or local government and agency. The examples are revenue bonds and general obligation bonds. Corporate Bonds are traded in organization exchanges and the OTC market.

**Convertible Securities:** “A convertible security is a bond or a share of preferred stock that can be converted at the option of the holder into common stock of the same corporation. The investor is provided with a fixed return from a bond or with a specified dividend from preferred stock. In addition, the investor has an option on the common stock. As a result, a company is able to sell a convertible security at a lower yield than it would have to pay on a straight bond or preferred stock issue” (Van Horne, 2002, p. 637).

**Derivative Securities:** Derivative security derives their value from an underlying primary security. One example is the stock option. Movements in the price of the

underlying asset, the stock, drive the value of the derivative instrument, the option. Option, commodity futures, financial futures, option of futures, warrant, rights are examples of derivative.

**Real Assets:** Real assets are the non-financial assets. The examples are precious metal, real estate, collectibles etc.

**International Investment:** International investment is the investment by individual in debt or equity securities issued by organizations outside country of residence of the investor. Multinational corporations, foreign stocks traded on a local exchange, American depository receipts are examples.

**Other Investment Alternatives** are pension funds, mutual funds, closed-end companies

#### **2.1.4 Risk and Return**

‘The notion of risk is central to both security analysis and portfolio selection. The primary source of risk for an individual security is uncertainty about its future price. And the primary source of risk for a portfolio is uncertainty about its future market value’ (Sharpe, 1971). ‘Risk can be thought of as the possibility that the actual return from holding a security will deviate from the expected return’ (Van Horne, 2002, p.55). ‘We can define risk as the chance of receiving an actual return other than expected, which simply means there is variability in the returns or outcomes from the investment. Therefore, investment risk can be measured by the variability of the investment’s return’ (Weston, Besley & Brigham, Eleventh Edition, p.183). Return is the gain or loss of security in a particular period. The return consists of the income and the capital gains relative on an investment. It is quoted as a percentage.

##### **2.1.4.1 Investment Risks**

Risk is the chance that an outcome other than expected will occur. ‘Investment risk, then is related to the possibility of actually earning a return other than expected – the greater the variability of the possible outcomes, the riskier the investment’ (Weston, Besley & Brigham, p.183). Usually investors are not in favor of taking risks or being exposed to risk, as they always look for investments that make them the highest returns with the least risk. Investors always prefer the less risky securities when other things being equal, i.e. profits, but they may deal with higher risky securities to earn more revenues which compensate for those risks.

## **Types of Investment Risks**

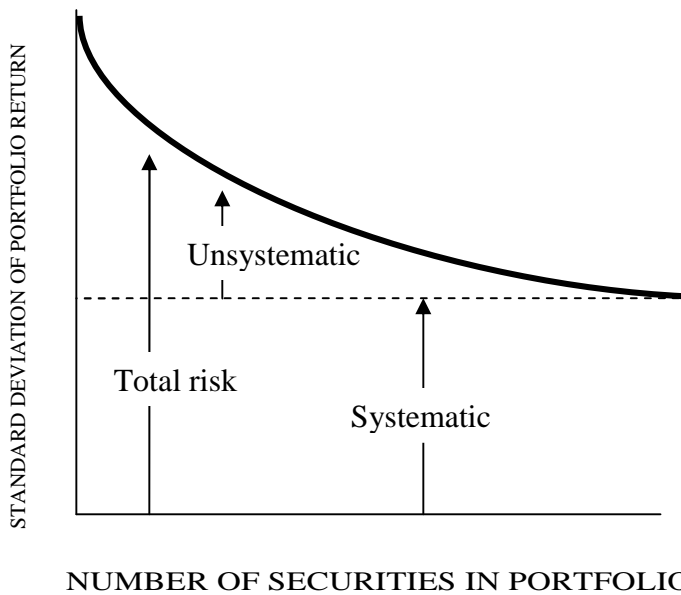
There are two types of investment risks, systematic risk and unsystematic risk.

**Systematic Risk:** The risk inherent to the entire market or entire market segment is known as systematic risk. It is the risk which is due to the factor which is beyond the control of the people working in the market and that's why risk free rate of return is used to just compensate this type of risk in market also known as un-diversifiable risk or market risk such as interest rates, recession and wars. These risk factors affect the entire market and cannot be avoided through diversification; this type of risk affects a broad range of securities. "Investors can eliminate unique risk by holding a well-diversified portfolio, but they cannot eliminate market risk" (Brealey & Meyers, 2003, p. 187). "All the risk of a fully diversified portfolio is market risk" (Brealey & Meyers, 2003, p. 187). Types of risk under the group of systematic risk are interest rate risk, market risk and purchasing power or inflationary risk.

**Unsystematic Risk:** Specific risk such as company or industry that is inherent in each investment is known as unsystematic risk. It is also known as specific risk, diversifiable risk, unique risk or residual risk. This risk can be defined as that part of a risk which is not correlated with general market movements. This risk due to the factors which are controllable by the people working in market and market premium is used to compensate this type of risk. This kind of risk can be reduced by diversification. The types of unsystematic risk are business or liquidity risk, financial or credit risk and operational risk.

Since these events are essentially random, their effects on a portfolio can be eliminated by diversification i.e. bad events in one firm will be offset by good events in another.

## Risk and Diversification



**Figure No.1**

**Source: James C. Van Horne, Financial Management Policy; 12<sup>th</sup> edition.**

**(New Delhi, Prentice hall of India PVT 2002)**

## Measurement of Risk

The tools for measurement of risk are standard deviation, coefficient of variation, beta and Capital Assets Pricing Model.

**Standard Deviation:** Standard deviation is a measure of relative dispersion of a probability distribution. A high standard deviation represents a large dispersion of return and is a high risk; a low deviation is a small dispersion and represents low risk. In another words, standard deviation measures how much return on an investment is deviating from the expected normal or average returns.

**Coefficient of variation:** Risk is measured by the standard deviation, and then risk per unit of expected return can be measured by the coefficient of variation (c. v). High c.v. represents the higher risk of the investment. The C.V. shows the risk per unit of return and it provides a more meaningful basis for comparison when the expected return and risk on two alternatives is not the same. (Weston and Brigham, 1993)

The coefficient of variation represents the ratio of the standard deviation to the mean, and it is a useful statistic for comparing the degree of variation from one data series to another, even if the means are drastically different from each other. CV allows determining how much volatility (risk) an investor is assuming in comparison to

amount of return he/she can expect from the investment. In simple language, lower the ratio of standard deviation to mean return the better risk return tradeoff.

**Beta:** The beta is simply the slope of the characteristic line (security market line). It measures volatility or systematic risk compared to the market or the benchmark.

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 is calculated by relating the returns on a security with the returns for the market. Beta can be positive or negative. But nearby all betas are positive. The measure of a stock's sensitivity to market fluctuations is called beta coefficient (  $\beta$  ).

**Capital Assets Pricing Model (CAPM):** "The capital asset pricing model is a set of predictions concerning equilibrium expected returns on risky assets" (Bodie, Kane, Marcus & Mohanty, 2009, p. 303). It is sometimes used to estimate the required rate of return for any firm with publicly traded stocks. The CAPM is based in the premise that the only important risk of a firm is systematic risk, or the risk that results from exposure to general stock market movements. The CAPM is not concerned with so called unsystematic risk, which is specific to an individual firm, because investors can avoid those types of risk by holding diversified portfolios.

The CAPM states that the expected risk premium on each investment is proportional to its beta; this means that each investment should lie on the sloping security market line connecting treasury bills and market portfolio.

#### **2.1.4.2 Return**

Return is the gain or loss of security in a particular period. The return consists of the income and the capital gains relative on an investment. It is quoted as a percentage. It is reward for investment. A major purpose of investment is to get a return or income on the invested. On a bond an investor expect to receive interest and on a stock dividends may be anticipated. So return from investment has different meaning to different investors. Some companies seek near term cash inflow and give less value to more distant returns. Other investors are concerned primarily with growth. Still others measure return using financial ratios. They might seek to invest in a company that has a high return on investment.

All the investor wants to maximize expected returns subject to their tolerance for risk. Return is the motivating force and it is the key method available to investors

in comparing alternative investments. Realized return and expected returns are two terms which is often used in the language of investment. Realized return is after the fact return, return that was earned or it is history. Expected return is the return from an asset that investor will earn over some future period. It is a predicted return, which may not occur.

### **2.1.5 Portfolio Analysis**

In Nepalese context many investors placed their entire wealth in a single investment because of lack of proper awareness about portfolio. A portfolio is collection of investment securities. If investors hold a well diversified portfolio, then his concern should be the expected return and risk of portfolio rather than individual assets or securities.

Portfolio analysis is a study of the performance of specific portfolio under different circumstances. It includes the efforts made to achieve the best trade-off between risk tolerance and returns. The analysis of a portfolio involves quantifying the operational and financial impact of the portfolio. It is vital to evaluate the performances of investments and timing the returns effectively. It extends to all classes of investments such as bonds, equities, commodities, funds, options and securities. Portfolio analysis gains importance because each asset class has peculiar risk factors and returns associated with it. Hence, the composition of a portfolio affects the rate of return of the overall investment. The portfolio theory provides a normative approach to the investor decision to investment assets or securities under risk. The main objective of the portfolio analysis is to develop a portfolio that has the maximum return at specified degree of risk.

Modern portfolio theory (MPT) or portfolio theory was introduced by Harry Markowitz with his paper “Portfolio Selection” in the 1952 Journal of Finance. According to the theory, it’s possible to construct an “efficient frontier” of optimal portfolio offering the maximum possible expected return for a given level of risk. Markowitz formalized that investors focus on selecting portfolio based on those portfolios’ overall risk-reward characteristics instead of merely compiling portfolios from securities that each individually have attractive risk-reward characteristics. In a nutshell, investors should select portfolios not individual securities.

### **2.1.6 Portfolio Analysis and Diversification**

The idea of diversification is to create a portfolio that includes multiple investments in order to reduce risk. If an investment consists of only the stock issued by a single company, the portfolio will sustain the full brunt of the decline if that company's stock suffers a serious downturn. By splitting the investment between the stocks of two different companies we can reduce the potential risk to the portfolio.

Investment risk can be reduced by including more than one alternative of assets in the portfolios and by including more than one asset from each category. Hence diversification is essential to creation of an efficient investment because it can reduce the variability of returns around the expected return. This diversification may significantly reduce risk without a corresponding reduction in the expected rate of return on the portfolio.

A portfolio that is invested in multiple instruments whose returns are uncorrelated will have an expected simple return which is the weighted average of the individual instruments' returns. Its volatility will be less than the weighted average of the individual instruments' volatilities. This is diversification. Diversification means that an investor can reduce market risk simply by investing in many unrelated instruments. The risk reduction is "free" because expected returns are not affected. The concept is often explained with the age-old saying "don't put all your eggs in one basket" (Risk Encyclopedia, 2013).

#### **Markowitz Diversification**

Markowitz diversification may be defined as combining assets that are less than perfectly positive risk correlated in order to reduce portfolio risk without sacrificing portfolio returns. It can some times reduce risk below the non-diversification level.

It is more analytical and considers assets correlation. The lower correlation between assets more that Markowitz diversification will be to reduce the portfolio's risk. Markowitz diversification can lower risk below un-diversifiable level if the securities analyst find securities, whose rates of return have low enough correlations. Unfortunately there are only a few securities that have low correlation. Therefore, using Markowitz diversification requires a data bank of financial statistics for many securities a computer and some economic analysis.

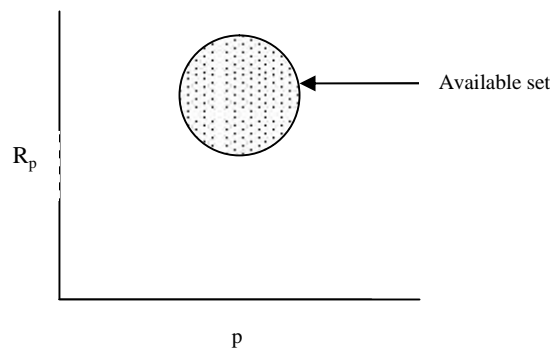
Markowitz paper is the first mathematical formalization of the idea of diversification of investment; the financial version of “the whole is greater than the sum of its parts” through diversification, risk can be reduced without changing expected portfolio return. The decision to hold a security should not be made simply comparing its expected return and variance to others, but rather the decision to hold any security would depend on what other securities the investors want to hold. Securities could be properly evaluated in isolation, but only as a group.

### 2.1.7 Portfolio Selection

There are three steps to select a portfolio by an investor.

#### ) **Determination of portfolio opportunities or attainable set of portfolio**

It is the first step to select the optimum portfolio. From the various securities we can combine limitless number of portfolios. Each possible portfolio will have an expected rate of return and risk.



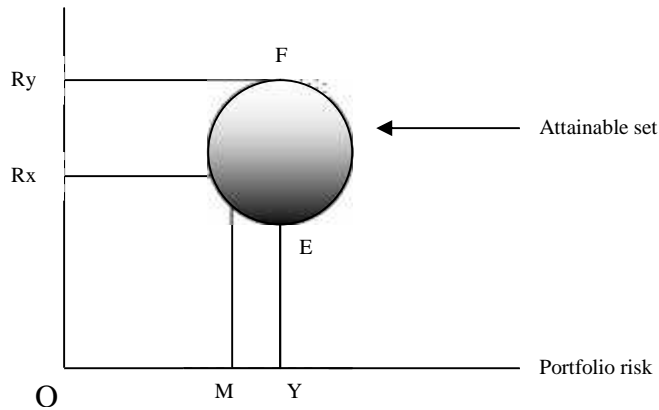
**Figure No.2**

The hypothetical set of all possible portfolios called the portfolio opportunity set or attainable set.

#### ) **Determination of Efficient Set**

Efficient set is the collective form or set of portfolio. Efficient set theorem explains how investor will choose their portfolio from the set of efficient portfolio. If we consider the infinite number of portfolios that could be formed from two or more securities and plotted portfolios expected return and risk, we would create a graph like the one in the figure. The efficient frontier is represented by the line from E to F. Portfolios along curve. EF dominates all other investment possibilities.



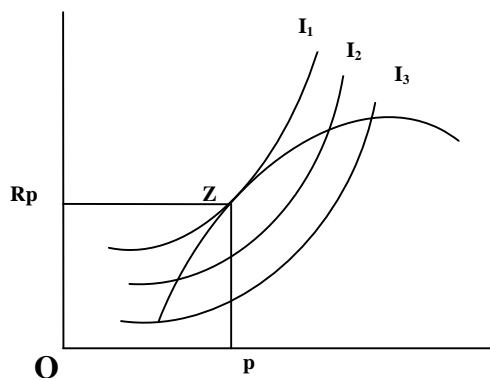


**Figure No.3**

An efficient frontier or portfolio is a portfolio that provides the highest possible expected return for varying level of risk or the lowest possible degree of risk for varying level of expected return. Portfolios to the left of the efficient frontier are not possible, they lie outside the attainable set. Portfolios to the right of the efficient frontier are inefficient because some other portfolio could provide either a higher return with same degree of risk or a lower risk for the same rate of return. In figure, x is a portfolio which provides  $R_x$  return with  $\gamma$  risk and y is the portfolio which provides  $R_y$  return with same level of risk of  $\gamma$  and portfolio M provides same return of  $R_x$  as portfolio x with less than that of portfolio x because both portfolios Y and M lies in efficient frontier.

### ) Selection of Optimal Portfolio

After finding the efficient frontier, select the optimal portfolio which maximizes the utility of investors with the help of indifference curve.



**Figure No.4**

In the above figure, indifference curve  $I_1$  has higher utility than that of  $I_2$  and  $I_3$ . An investor selects that portfolio which lies in the efficient frontier of the opportunity set which is tangent to the indifference curve of the investor and the portfolio becomes optimal for him. The indifference curve  $I_1$  tangents with efficient frontier at the point Z. Here investor's optimal portfolio is z. Therefore, this point z makes a higher level of satisfaction an investor can achieve.

### 2.1.8 Portfolio Theories

Investors focused on assessing the risks and rewards of individual securities in constructing their portfolios, standard investment advice was to identify those securities that offered the best opportunities for gain with the least risk and then construct a portfolio from these. In order to build a portfolio model, investors had to quantify their risk variable.

- Markowitz had developed the portfolio basic model; he derived the expected rate of return for a portfolio of assets and their expected risk measure. Markowitz showed that the variance of the rate of return was a meaningful measure of portfolio risk under a reasonable set of assumptions; this theory indicated the importance of diversifying the investments to reduce the total risk of the portfolio.
- Capital Market Theory extends the portfolio theory and developed a model for pricing all risky assets in a "Capital Asset Pricing Model", or (CAPM). This model allows investors to determine the required rate of return for any risky assets. The importance of this theory is how it explains and helps investors and analysts predict behavior in the real world but not on the assumptions postulated.

The equation for the CAPM is

$$E(R_j) = R_f + [E(R_m) - R_f] \beta_j$$

Where,

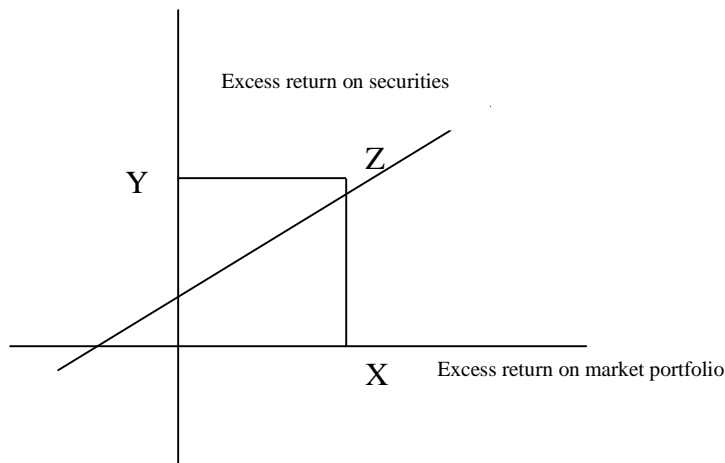
$E(R_j)$  = the expected return on the  $J^{\text{th}}$  risky assets

$R_f$  = the rate of return on a risk less assets

$E(R_m)$  = the expected return on the market portfolio

$\beta_j$  =  $\text{cov}(R_j, R_m) / \text{var } R_m$

- Arbitrage Pricing Theory (APT) created in 1976 by Stephen Ross defines as an asset pricing model based on the idea that an asset's returns can be predicted using the relationship between that same asset and many common risk factors. This theory predicts a relationship between the returns of a portfolio and the returns of a single asset through a linear combination of many independent macro-economic variables. Arbitrageurs use the APT model to profit by taking advantage of mispriced securities. A mispriced security will have a price that differs from the theoretical price predicted by the model.
- The Single Index Model, the simplification of Markowitz model provides that the desirability of any stock is directly related to its excess return to beta ratio. Single index model for optimal portfolio enable to find out the number of securities to be in optimal portfolio. In this case the desirability of including a stock directly related to its excess return to beta ratio. If stocks ranked by excess return to beta for highest to lowest, the ranking represents the desirability of any stocks inclusion in a portfolio. The number of stocks with selected depends on a unique cut of rate such that all stock with higher ratios will be included and all stocks with lower ratios excluded.



**Figure No. 5**

The beta of security represents the market linearity of the stock. The market influences each stock. Negative beta defines that security is not linear to market. The security having negative beta coefficient is rejected as investment alternatives. In the same way security that provides lower rate of return than risk free rate of return

rejected as investment alternatives. To determine which securities are to be included in the optimum portfolio, investors have to find out cut off rate. We can calculate  $c_j$  using following formula:

$$C_j = \frac{\sigma_m^2 (R_j - R_f) S_j}{1 + \sigma_m^2 \beta_j^2 \frac{S_j^2}{\sigma_{ei}^2}}$$

Where,

$\sigma_m^2$  = Variance of the market index

$R_j$  = Expected return of stock j

$R_f$  = Risk free rate of return

$\sigma_{ei}^2$  = Unsystematic risk of stock j

$\beta_j$  = Beta of stock j

Investor selects highest  $C_j$  value; that is  $C^*$  (selected cut off rate). The value of  $C^*$  is used in calculation of  $Z_j$ .

$$\text{Weight of security } (Z) = \frac{Z_j}{N}$$

$$\text{Where, } (Z) = \frac{S_j (R_j - R_f) C^*}{\sigma_{ei}^2 S_j}$$

Where,

$C^*$  = Selected Cut off rate

$R_j$  = Expected return of stock J

$R_f$  = Risk free rate of return

$\beta_j$  = Beta of stock J

$\sigma_{ei}^2$  = Unsystematic risk of stock J

## 2.2 Review of Related Studies

The review of related studies includes review of research articles and review of thesis conducted by students for partial fulfillment of Master and PhD degrees.

### 2.2.1 Review of Research Articles

Ray (2013) in the title Over viewing the scope of international portfolio investment tries to overview the scope of international portfolio investment in

globalize world. According to him, investing internationally provides not only increased stability to a portfolio, but also potential higher yields with less risk. By investing in foreign securities, investors can participate in the growth of other countries and diversify the risk of a potential bearish market, hedge their consumption basket against exchange rate risk, realize diversification effects and take advantage of market segmentation on a global scale. Nevertheless, the risks of international portfolio investment can not be ignored. In an international context, financial investments are not only subject to exchange risk and political risk, but there are many institutional constraints and barriers like tax issues. Moreover, international stocks can be impulsive in the short-term therefore, instead of buying international stocks to provide a possible short-term boost; they should be part of a long-term investment plan. Therefore, investors should diversify portfolio globally because it will offer improved stability of their financial profile as well as higher yields with less risk.

Investing in shares of commercial banks in Nepal: An assessment of return and risk elements by Paudel, N. P. Deputy Director, Finance Department, Nepal Rastra Bank. An attempt has been made in this paper to determine whether the shares of commercial banks in Nepal are correctly priced and to trace their future price movements when striving towards equilibrium. For this, some theoretical models have been discussed to analyzed return and risk characteristics of those shares. The objective of the article is to determine whether the shares of commercial banks are correctly priced by analyzing the realized rates of returns and required rates of return using the Capital Asset Pricing Model (CAPM).

To analyze the risk characteristics of the shares of joint-venture commercial banks, the share price of Nepal Arab Bank(NABIL), Nepal Indosuez Bank(NIBL), Standard Charter Bank Nepal Limited(SCBNL),Nepal Bangladesh Bank Limited(NBBL), Himalayan Bank Limited(HBL), Nepal SBI Bank Limited(NSBL) and NEPSE index have been collected from the secondary sources. The sample period commenced on mid-July 1996 and ends in mid-July 2001. Following are the conclusions from the article:

- ) Despite the risk element inherent to investment in shares, most investors desire to invest in shares in anticipation that the future price of the stock will increase.

- ) Investors in most cases do not analyze published financial statements before the make the investment in shares of a given company.
- ) The actual market price of the stock striving towards equilibrium must reflect the theoretical value of the stock determined by using some valuation models. Determining the intrinsic value of the stock today and company it with the actual market price however, are rare in practice.
- ) The shares of commercial banks in Nepal are heavily traded in the stock market and, therefore, these shares play a key role in the determination stock exchange indicators.

Diversification in Banking and its Effect on Banks' Performance: Evidence from Turkey by Turkmen, S. and Yigit, I. in their study examined the effect of sectoral and geographical diversification on the performance of Turkish banks and tried to show the diversification affects banks performance. The study asks whether diversification via sectoral and geographical credits helps banks.

As their conclusion, the performance of a bank concerns other firms and sectors in the economy. Focusing or diversifying credit portfolios influence the risk level that banks take on. Losses in one sector or location can be compensated from the gain obtained from other sector or location etc. On the hand, if the diversification level increases, it leads to rising of costs that are undertaken and diversification may not be associated with higher returns in every circumstances. It is important to make strategic decisions for a bank, in cases of risk and return preferences”.

Orabi, M. in the title “Assessment of Investment Portfolio of Jordanian Banks” deals with the central question how investors select investments that will give them their required rate of return; they mainly concerned with the performance alternatives. The study is mainly concerned with the performance of Jordanian Banks in their alternative investments in general and the portfolio investments in particular.

The research question is “What is the extent of applying theoretical and practical principles in composing investment portfolios in Jordanian Commercial Banks?”

As per the results reached, researcher recommends that:

- ) In composing an investment portfolio, the bank should diversify the portfolio in the sense that the return of any investment tool is appropriate for the degree of its risk, i.e. there will be a trade-off between return and risk.

- ) The bank has to follow a balanced policy when composing an investment portfolio so as to maintain the relation between risk and return at any time.

Study of Paudel, R. B. & Koirala S., Researchers studied Application of Markowitz and Sharpe Models in Nepalese Stock Market whether or not Markowitz and Sharpe models of portfolio selection offer better investment alternatives to Nepalese investors. It has been done by applying those models in a sample of 30 stocks traded in Nepalese stock market. The study finds that the application of these elementary models developed about a half century ago offer better options for making decision in the choice of optimal portfolios in Nepalese stock market.

The following procedures have been followed to apply Markowitz two-stock portfolio model:

- ) The mean return and risk in terms of standard deviation, coefficient of variation and beta have been calculated for 30 sample stocks.
- ) Four hundred thirty-five two-stock portfolios have been formed from 30 sample stocks and correlations of these 435 sets have been calculated.
- ) Out of 435 sets, 50 sets of two-stock portfolios with least correlation have been selected for consideration.
- ) Risk minimizing weights, portfolios return and portfolio standard deviations have been calculated for 50 sets of two-stock portfolio.
- ) An efficient frontier has been developed on the basis of mean and standard of each portfolio.

The following procedures have been followed to apply Shape's model:

- ) Excess return-to-beta ratio has been calculated for each stock under review and they have been ranked from highest to lowest.
- ) A cutoff point has been determined.
- ) Optimum portfolio has been formed from those stocks that have higher excess return-to-beta ratio than the cutoff point.

In their study, industry-wise comparison reveals that banks are the clear winner in terms of return as well as risk. The average market return for the period was 12.86% with 28.80% standard deviation. By using single index model and calculations the

study has shown that an investor in Nepalese stock market can reduce risk in his/her investment by applying simple models of portfolio selection developed some five decades ago.

Kane & Buser (1979) deals with how a firm performs a useful function by holding a portfolio of efficiently priced securities in their study portfolio diversification at commercial banks. As they suggest, it is rational for a firm to engage in prior found of assets diversification of behalf of its shareholder even when all assets are priced efficiently and available for direct purchase by shareholders. As a way of testing their perceptive empirically, they estimated regression model designed to explain the no. of distinct of U.S. treasury and federal agency debt held in a time series of cross section of large US commercial banks. They interpret the systematic pattern of diversification observed for large US commercial banks as evidence that bank stockholder for a relatively uniform diversification clientele. For firm, marginal benefits from diversification take reductions in the cost equity funds offered by its specific clientele of stockholders. To maximize the value of the firm, these benefits must be weighted against the explicit and implicit marginal cost of diversification.

The researchers have concluded that even wealthy investors should be sensitive to administrative costs associated with selection, evaluation, managing, and continually keeping track of a large number of securities. Either homemade or firm produced diversification, reduces the variance of shareholders portfolio return. If homemade diversification bears in ordinary high levels of information risk, some benefit of firm-produced diversification might not be reproduce able by individual investors acting on their own.

Investors with even modest resources, the stock of financial institutions should be relatively less attractive than the stock of that avoided extensive diversification costs by engaging in specialized activities

### **2.2.2 Review of Thesis:**

Shrestha (2008) has conducted a study on “A study on portfolio management of Nepalese commercial banks”. This study is concerned with portfolio analysis of four commercial banks BOK, HBL, NABIL and NIBL out of 25 on a random basis. The individual risk and return of the commercial banks for the period of five years has been calculated. Mr. Shrestha used secondary data obtained from Securities Board and NEPSE for this purpose. The objectives of the research were to analyze the return



and risk of the common stocks, to calculate proportion of diversifiable and un-diversifiable risk over total return on common stock, to analyze the portfolio return and risk of the sample commercial banks and to highlight the concept of investment and loans advances portfolio. He tries to suggest since the stocks of four sample banks are found under-priced, investors should buy or hold long position on stock at there. As the investment portfolio shows that all commercial banks are investing its more funds on government securities (i.e. risk free assets) which caused low return on investment, to increase its return banks should invest more funds on shares and debentures (i.e. risky assets). The investment risk can be significantly reduced with a well-diversified portfolio. Hence, he suggested to diversify the investment in different securities that behave differently i.e. with negative or low correlation for reducing poor portfolio performance.

Researcher Aryal, (2010) has conducted a study “Portfolio behavior of Nepalese commercial banks”, the study is based on four joint venture banks and they are NABIL, SCBNL, HBL and EBL. The main objective of the study is analysis of financial performance in terms of portfolio risk and return in Nepalese commercial banks. And some auxiliary objectives are to examine the risk and return of Nepalese commercial banks and to examine risk diversify-ness in investing portfolio. The study has used ratio analysis and statistical tools. In ratio analysis return on assets (ROA) and return on equity (ROE) are computed. The financial statements of the year 2003/2004 to 2007/2008 have used in the study as secondary source of data. The result of portfolio analysis lead to some important conclusions, the portfolio risk of four banks is found to be diversified less than the average risk based on assets & return on equity. At last the researcher recommends for improvement of the present financial portfolio position on Nepalese commercial banks.

- ) Since the return on assets ratio are lowest, HBL & EBL are recommended to make optimum management which reduces operating cost & improve financial performance.
- ) HBL is recommended to manage share capital & shareholders reserve & make attempts to increase net profit to achieve better financial performance.
- ) All banks are recommended to change their policy & strategy to make quick decision.

Shrestha (2009) has done research entitled “Portfolio analysis of Nepalese commercial banks”; this study is based on the data of four joint venture banks from 2003 to 2007. The objectives of the study are to examine the existing situation of portfolio management in commercial banks, to evaluate financial performance of sample banks, to analyze the investment and advance portfolio of commercial banks and to show the present position trend of loan, advance and investment of total deposit and forecast it. His research methodology is descriptive and analytical. Mr. Shrestha concluded following findings:

- ) NIBL has well and NBBL has poor liquidity position among banks.
- ) All sample banks have invested only two assets risky (share & debenture) and risk free (government securities). None of the banks have invested on NRB bond.
- ) All banks are granting very high amount of its loans and advances to private sector and very low amount to government enterprises.

After the conclusions, he has recommended the followings:

- ) The mean investment to total deposit ratio of NIBL is the lowest among the banks. So it needs to increase its investment to total deposit ratio 4.9% to meet the industrial average.
- ) The liquidity position of NIBL is the lowest so it has to increase its liquidity position to meet deposit withdrawals and current obligations.
- ) The common stock returns of commercial banks are sensitive to market and positively correlated. So, market condition should be analyzed.
- ) All banks stocks’ expected rate of return is greater than required rate of return. So stocks are under-priced and investor should purchase these.

A researcher Khadka, (2011) has studied ‘Portfolio Analysis of Nepalese Listed Companies with reference to the common stock investment’. She used yearly data from 2002/03 to 2007/08 extracted from NEPSE and websites of concerned banks. She used the holding period return, expected rate of return, standard deviation, beta-coefficient, portfolio risk and return, correlation co-efficient etc as financial and statistical tools. She found as per expected return of NABIL & EBL stocks preferable to invest among SCNBL, NABIL, EBL, NBBL and HBL. She recommends that to provide different types of securities at the same place to investors, NEPSE should

manage the trading of government securities. It will increase the opportunities for well diversification of funds to investors and it will increase the private investors' participation in government securities. She also recommends that NEPSE needs to modernize the trading system and effective information channel. It needs to develop different programs for private investors. These programs will contribute to increase investors' rationality as well as market efficiency.

### **2.3 Research Gap**

Based on the review of some of the major earlier studies, it is realized that portfolio analysis is not totally new concept in Nepalese context. Several researches have been done on portfolio analysis. There might be other researches using simple Sharpe portfolio optimization but the time gap and difference in tools and techniques have made the research different from other researches.

## Chapter 3

### RESEARCH METHODOLOGY

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. (Kothari, 2004).

#### 3.1 Research Design

A research design is a systematic plan to study a scientific problem. It is the arrangement of condition for collection and analysis of data in a manner that aim to combine reference to the research purpose with economy in procedure. The research design is followed to analyze the risk and return of investment securities of commercial banks. It is an integrated system that guides the researcher in formulating, implementing and controlling the study conceived so as to obtain answers to research questions and to control variance. The research design employed for the study is both descriptive and analytical based on historical data of last five years.

#### 3.2 Population and Sampling

Population refers to all items that have been chosen for the study. Population may be definite or infinite. A small portion chosen from the population for studying its properties is called sample. A sample is the representative of the population. Under the study of “Portfolio Analysis of Nepalese Commercial Banks”, the total no. of commercial banks including domestic and joint venture banks operating in Nepal is the population. At present, there are 31 commercial banks running in Nepal which is the population size. Out of them, the selected sample banks for the analysis in this study are Bank of Kathmandu Ltd, Kumari Bank Ltd, Nepal Investment Bank Ltd, Nepal SBI Bank Ltd and Standard Chartered Bank Ltd.

##### **Bank of Kathmandu Ltd (BOK)**

Bank of Kathmandu started its operation in 1995. It was listed in NEPSE in 1998. It's paid up capital is 1604.1873million. 58% share is holding by the promoter and 42% by the general public. It has 50 branches are operating around the country.

##### **Kumari Bank Ltd**

Kumari Bank Limited started its banking operation from 3 April 2001 as fifteenth commercial bank in Nepal. Since its inception, Kumari Bank has been

providing competitive and modern banking services to all Nepali consumers, and has stood as one of the most trusted banks in Nepal with paid up capital of Rs. 1603.8 million of which 70% is contributed from promoters and the rest 30% from the public.

### **Nepal Investment Bank**

Nepal Investment Bank Ltd, previously Nepal Indosuez Bank Ltd, was established in 1986 as a joint venture between Nepalese and French partners and later Nepalese group of companies holding its 50% stake. It was listed in NEPSE in 1987 A.D. Its paid up capital is Rs. 3012.9242 million. 50% of its share held by Nepalese group, 15% Rastriya Banijya Bank, 15% Rastriya Beema Sansthan and remaining 20% by the general public. It has 44 branches providing the facility to the public.

### **Nepal SBI Bank Ltd (NSBL)**

Nepal SBI Bank is the joint venture bank with State Bank of India and it was incorporated in 1993 A.D. NSBL listed in NEPSE in 1994 A.D. Its paid up capital is Rs. 2093.99 million. 50% of its share is hold by State Bank of India, 5% by Employees Provident Fund and remaining 30% by public. It has 56 full-fledged branches.

### **Standard Chartered Bank Ltd (SCBL)**

Standard Chartered Bank Ltd is the second joint venture bank in Nepal, established in the year 1985 A.D. and listed in NEPSE at 1988 A.D. as Grindlays Bank Ltd. Later ownership transferred to Standard Chartered Bank of England, in 2001 A.D. name changed from Grindlays Bank Ltd to Standard Chartered Bank Nepal Ltd, initially started as a joint venture and the status of the bank was changed to subsidiary of SCB in 2004. 75% of its share holds by Standard Chartered Group and 25% of share by Nepalese public. 18 branches are providing the banking facility to the public.

This report considers only five commercial banks of Nepal as sample for study purpose out of 31 banks which is 16.13%.

### **3.3 Sources of Data**

This study is mainly depends on the use of secondary data that consists of annual reports of the concerned banks. However besides the annual reports various other sources of data have also been used for the purpose of the study. The main source of data comprises annual reports of concerned banks, trading report of NEPSE,

related journals, newspapers, Internet, official publication, related studies and thesis etc.

### **3.4 Data Collection Procedure**

The annual reports of banks and NEPSE are downloaded from their official sites. The reviews of related studies are based on textbooks, official publications, various journals, and thesis and internet searches.

### **3.5 Methods and Tools of Data Analysis**

The collected data are classified into different categories as per their nature and purpose of the study. Later, they are thoroughly analyzed. The category of data are about to be descriptive cum analytical. The relevant data are presented in tabular form and their relationship is shown in diagram. The data are analyzed comparing them.

#### **Data Analytical Tools**

In order to make the study more reliable and authentic, statistical and financial tools are used which are believed to make the analysis more convenience.

#### **Statistical Tools**

There are various statistical tools have been used to carry out this study.

##### **a) Arithmetic Mean**

Mean, also known as arithmetic average, is the most common measure of central tendency. Arithmetic mean of a set of observations is the sum of all the observation divided by the number of observations. We can work it out as under:

$$\text{Arithmetic mean } (\bar{X}) = \frac{x}{n}$$

Where,

$x$  = Sum of total values of the variables

$n$  = no. of observations

$x$  = variable involved

##### **b) Standard Deviation (S.D or )**

Standard deviation measures the absolute dispersion. A small standard means a high degree of uniformity of the observation as well as homogeneity of a series and large standard deviation means just the opposite. Symbolically,

$$\dagger_j = \sqrt{\frac{(R_j - \bar{R}_j)^2}{n - 1}}$$

Where,

$\dagger_j$  = Standard deviation of return of stock j during period n.

### c) Coefficient of Variation (C.V)

Coefficient of variation is the relative measure of dispersion. The greater the volume of coefficient of variation less will be the uniformity or consistency and vice versa. C.V is defined as the ratio of the standard deviation to the mean expressed in percent.

Symbolically,

$$\text{Coefficient of Variation (C.V.)} = \frac{\dagger}{R}$$

## Financial Tools

The financial tools used in the study are as follows:

### a) Market Price of Stock (MPS)

There are mainly three types of MPS available in NEPSE annual report. They are high MPS, low MPS and closing MPS. Closing MPS is not an average price of high and low MPS but rather it is calculated by considering the whole years MPS. For the closing MPS trading report is followed.

### b) Dividend (D)

Dividend can be given in the form of cash or shares. If the company declares dividend in cash then there is no difficulty in calculation. But if the company declares stock dividend or bonus share then shareholders get shares as dividend instead of cash. So, there is little difficult to calculate the exact amount in cash. In case of stock dividend the formula for total dividend amount is considered as follows:

$$\text{Total Dividend} = \text{DPS} + \text{next year's closing price} * \text{stock dividend\%}$$

### c) Single Period Rate of Return(R)

This is the annual realized return received on an investment and any change in market price, usually expressed in a present at the beginning price of the investment. It is the summation of the dividend yield and the capital gain yield.

Symbolically,

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

Where,

R=Actual realized return on common stock at time t

D<sub>t</sub>= Cash dividend received at time t

P<sub>t</sub>= Price of a stock at time t

P<sub>t-1</sub>= Price of stock at time (t-1)

#### d) Expected Rate of Return on Common Stock

Expected return is simply arithmetic mean of the past years return. This is an average return on common stock.

Symbolically,

$$\bar{R} = \frac{R_j}{N}$$

Where,

(R<sub>j</sub>)= Expected rate of return on stock j

N = No. of years

#### e )Covariance (cov.)

Covariance is the joint variance of two securities. It measures how two random variables, such as the return on securities A and B move together. A positive value of covariance indicates that the securities returns tend to move in the same direction. A negative value of covariance indicates the return of securities move in the opposite direction and the zero value of covariance indicates no relationship between the securities return. It is the product of two different deviation divided by the number of observations.

Symbolically,

$$\text{Cov}_{j m} = \frac{(R_j - \bar{R}_j) * (R_m - \bar{R}_m)}{n - 1}$$

Where,

Cov<sub>j m</sub> = Covariance between security j and m.



#### **f) Beta Coefficient ( $\beta_j$ )**

Beta is an index of systematic risk. It measures how much systematic risk a stock  $j$  has relative to market portfolio.

Symbolically,

$$\beta_j = \frac{\text{Cov}(R_j, R_m)}{\text{Var}(R_m)}$$

Where,

$\beta_j$  = Beta coefficient of stock  $j$

$\text{Cov}(R_j, R_m)$  = Covariance between stock  $j$  and market return

Beta of market return equals to 1. If beta is greater than 1, then the asset is more volatile than market and is called aggressive beta. If the beta is less than 1, the asset is called defensive beta and its price fluctuation is less volatile than market.

#### **g) Systematic Risk**

Systematic risk is also known as non-diversifiable risk. It is those portions of total variability in return caused by market factor that simultaneously affect the price of all securities.

Symbolically,

$$\text{Systematic risk} = \beta_j^2 \sigma_m^2$$

Where,

$\beta_j^2$  = Beta coefficient of security.

$\sigma_m^2$  = Variance of market.

#### **h) Unsystematic Risk**

Unsystematic Risk is diversifiable. This type of risk is unique to an organization and can be largely eliminated by holding a diversified portfolio of investment.

Symbolically,

$$\text{Unsystematic risk} = \text{Total risk} - \text{Systematic risk}$$

Or

$$\text{Var}(e) = \sum_j^2 Z S_{jm}^2 \sum_m^2$$

Where,

Var(e) = variance of standard error

**i) Capital Assets Pricing Model (CAPM)**

Capital assets pricing model describes the relationship between risk and required return. A security's expected return is the risk free rate plus a premium based on the systematic risk of the security.

Symbolically,

$$(\bar{R}_j) = R_f + [(R_m) Z R_f] S_j$$

Where,

R<sub>f</sub> = The rate of return on risk less assets

R<sub>m</sub> = The expected return on the market portfolio

S<sub>j</sub> = cov (R<sub>j</sub>, R<sub>m</sub>) / Var R<sub>m</sub>

**j) Portfolio Return (R<sub>p</sub>)**

It is the weighted average return of the stocks in the portfolio of two or more securities.

Symbolically,

$$R_p = W_1 \bar{R}_1 + \dots W_n \bar{R}_n$$

Where,

$\bar{R}$  =return of the portfolio

W<sub>1</sub> = weight of stock 1

$\bar{R}_1$  = Expected return of stock 1

W<sub>n</sub> =weight of stock n

R<sub>n</sub> =expected return of stock n.

**k) Portfolio Standard Deviation (σ<sub>p</sub>)**

It is the combined standard deviation of the individual stocks return in the portfolio of two or more securities.

Symbolically,

$$\sigma_p^2 = W_1^2 \sigma_1^2 + W_2^2 \sigma_2^2 + 2W_1W_2 \text{Cov}_{12}$$

Where,

$\sigma_p^2$  = variance of the portfolio returns of stock

$W_1^2$  = weight of return of stock 1

$\sigma_1^2$  = variance of return of stock 1

$W_2^2$  = weight of return of stock 2

$\sigma_2^2$  = variance of return of stock

$\text{Cov}_{12}$  = covariance between returns of stock 1 and 2

### 1) Cut of Rate

The cut of rate gives the number of securities that can be added to construct the optimal portfolio.

Symbolically,

$$C_j = \frac{\sigma_m^2 \frac{(R_j - R_f) S_j}{\sigma_{ei}^2}}{1 + \sigma_m^2 \frac{S_j^2}{\sigma_{ei}^2}}$$

Where,

$\sigma_m^2$  = variance of the market index

$R_j$  = expected return of stock j

$R_f$  = risk free rate of return

$\sigma_{ei}^2$  = unsystematic risk of stock j

$S_j$  = beta of stock j

## Chapter 4

### ANALYSIS AND PRESENTATION OF DATA

This chapter analyzes the data collected from Nepal Stock Exchange and commercial banks of Nepal. This chapter contains 4.1 Risk and Return Analysis, 4.2 Analysis of Market Risk and Return, 4.3 Analysis of Market Sensitivity, 4.4 Systematic and Unsystematic Risk, 4.5 Analysis of Required Return, 4.6 Comparison of Required Return with Expected Return, 4.7 Portfolio Risk and Return Analysis and 4.8 Single Index Model.

#### 4.1 Risk and Return Analysis

A major purpose of investment is to get a return or income on the funds invested. The expected rate of return or holding period return is based upon the expected cash receipts over the holding period and the expected ending or selling price. The possible rates of return estimated by the investor are summarized in an expected rate of return. The expected rate of return must be equal or greater to the required rate of return.

Standard deviation is used to measure an associated risk of the securities. The high standard deviation represents high risk and low standard deviation represents a low risk.

Coefficient of variation measures on the base of risk per unit. It shows the risk per unit return and it provides a more meaningful basis for comparison when the expected return on two alternatives is not the same.

**Table 1**

**Expected Return ( $\bar{R}$ ), Standard Deviation ( $\dagger$ ), Coefficient of Variance (C.V.) of Banks.**

Fiscal Year	BOK	KBL	NIBL	NSBL	SCBL	Total	$\bar{R}$	$\dagger$	C.V.
06/07	0.64	1.33	0.86	1.81	1.49	6.13	1.25	0.47	0.38
07/08	1.24	0.67	0.69	0.28	0.68	3.56	0.71	0.34	0.48
08/09	-0.08	-0.26	-0.43	0.45	0.13	-0.19	-0.04	0.37	-9.25
09/10	-0.48	-0.31	-0.47	-0.57	-0.40	-2.23	-0.45	0.09	-0.20
10/11	-0.17	-0.39	-0.05	-0.12	-0.44	-1.17	-0.23	0.17	-0.74

Total	1.15	1.04	0.60	1.85	1.46				
$\bar{R}$	0.23	0.21	0.12	0.37	0.29				
†	0.69	0.76	0.62	0.89	0.81				
C.V.	3.0	3.62	5.17	2.41	2.79				

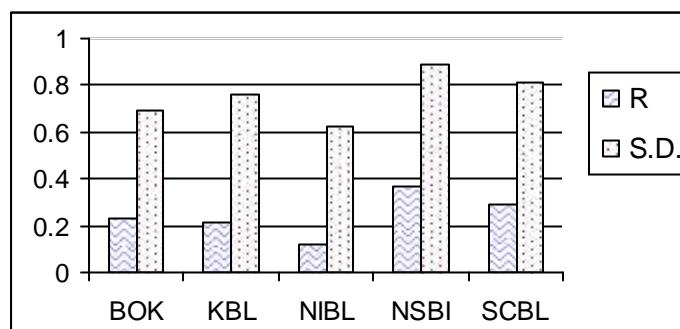
(Source: Annex 1, 2, 3, 4)

According to above table the expected rate of return of banks BOK, KBL, NIBL, NSBL and SCBL were 0.23, 0.21, 0.12, 0.37 and 0.29 respectively. Investors expect to get highest return from NSBL (i.e. 37%) and lowest return from NIBL (i.e. 12%). BOK stock is profitable among the stock. Standard deviation of NSBL is highest and standard deviation of NIBL is lowest.

Coefficient of variation (C.V.) reveals risk per unit of return and provides better possible values for risk. It is computed to measure risk in relative term. Higher C.V. exposes higher risk and lower C.V. exposes lower risk. C.V. defines that one unit change in risk will change 3.0, 3.62, 5.17, 2.41 and 2.79 unit change in the return of BOK, KBL, NIBL, NSBL and SCBL respectively. NSBL is the best security on the base of coefficient of variation.

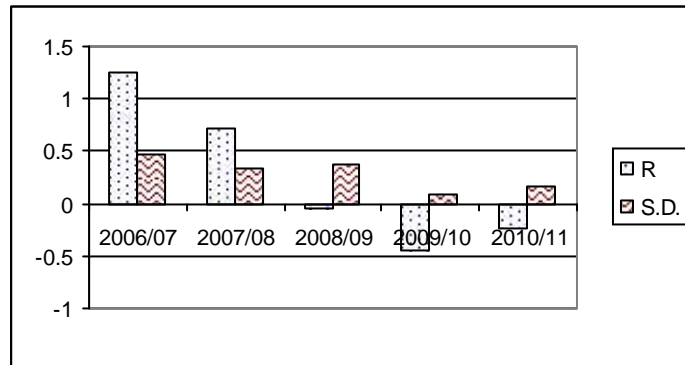
**Figure 6**

**Expected Risk and Return of Banks**



**Figure 7**

**Expected Risk and Return of the Year**



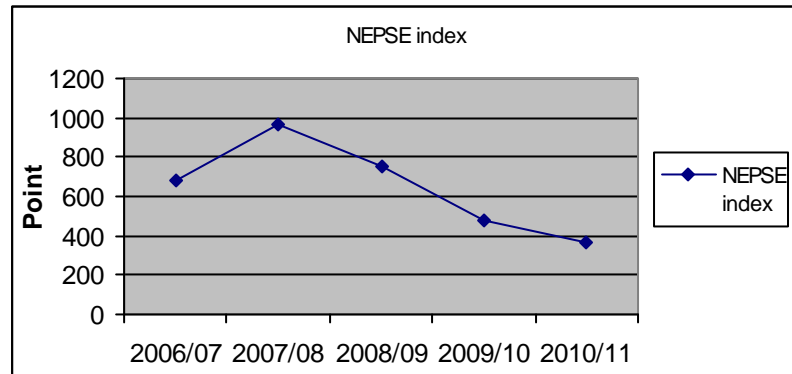
In the comparison of fiscal year, the expected rate of return ranged from -0.04 to 1.25. Above the graph presents that highest expected rate of return (1.25) in the year 2006/07. In years 2008/09, 2009/10 and 2010/11 it has negative return. On the base of return 2006/07 is the best year. Risk is also highest on same year.

**Findings:** The expected rate of return of banks BOK, KBL, NIBL, NSBL and SCBL are 0.23, 0.21, 0.12, 0.37 and 0.29 respectively and the standard deviations are 0.69, 0.76, 0.62, 0.89 and 0.81 of those. C.V. defines that one unit change in risk will change 3.0, 3.62, 5.17, 2.41 and 2.79 unit change in the return of BOK, KBL, NIBL, NSBL and SCBL respectively.

**4.2 Analysis of Market Risk and Return**

Nepal Stock Exchange (NEPSE) is the only secondary stock market in Nepal and overall market index is represented by NEPSE. Market risk and return are the most important factors to analyze the risk and return of individual stocks. Following is the calculation of market return, standard deviation and coefficient of variation of NEPSE from 2006/07 to 2010/11.

**Figure 8**  
**NEPSE index**



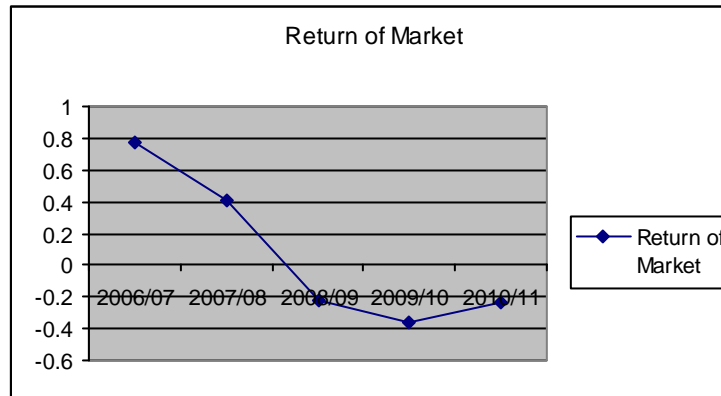
NEPSE index ranged from 362.85 to 963.36 during the research period. The index is decreasing after the year 2007/08.

**Table 2**  
**Calculation of NEPSE return**

Fiscal Year	NEPSE Index	$R_m = \frac{NI_t - ZNI_{t-1}}{NI_{t-1}}$	$R_m - \bar{R}_m$	$(R_m - \bar{R}_m)^2$
05/06	386.83			
06/07	683.95	0.77	0.70	0.49
07/08	963.36	0.41	0.34	0.12
08/09	749.10	-0.22	-0.29	0.08
09/10	477.73	-0.36	-0.43	0.18
10/11	362.85	-0.24	-0.31	0.09
Total		0.36		0.97
$\bar{R}_m$		0.07		
†	0.49			
C.V.	7.0			

(Source: NEPSE)

**Figure 9**  
**Return of Market**



The rate of return is highest in the year 2006/07 (0.77) and lowest in 2009/10 (-0.36). The table shows expected return is 7% and its standard deviation is 49% and coefficient of variation is 7 times.

**Findings:** The expected return of market is 0.07 very lower to expected return of selected banks BOK (0.23), KBL (0.12), NIBL (0.12), NSBL (0.37) and SCBL (0.29). The standard deviation is 0.49 and the C.V is 7. The C.V. of selected banks are 3 (BOK), 3.62 (KBL), 5.17 (NIBL), 2.41 (NSBL) and 2.79 (SCBL) lower than market C.V 7.

### 4.3 Analysis of Market Sensitivity

Sensitivity analysis is way to predict the outcome of a decision if a situation turns out to be different compared to key prediction(s). Beta coefficient is taken as the measurement of market sensitivity in the research. Higher the beta higher will be the market sensitivity and higher will be the reaction to the market movement. Beta coefficient represents systematic risk of particular assets relative to the market. It is the key element of the CAMP. Beta measures non-diversifiable risk. Beta shows how the price of a security responds to market forces. Market sensitivity looks how sensitive are stocks return to the average market returns by looking the percentage change in stock and market return during the same period. The following table shows the beta coefficient of each bank.



**Table 3**

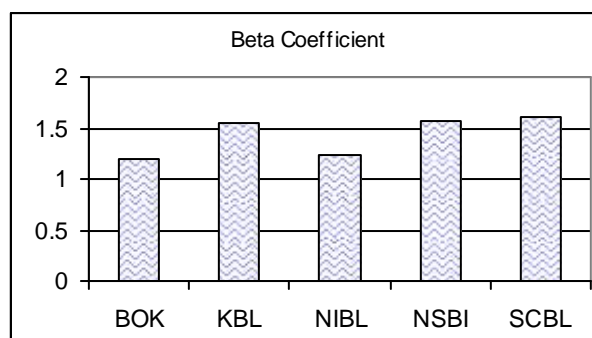
**Beta coefficient of banks**

S.N.	Name of Banks	Beta( S )
1	BOK	1.1975
2	KBL	1.5483
3	NIBL	1.2268
4	NSBL	1.5732
5	SCBL	1.6063

(Source: Annex 4)

**Figure 10**

**Beta Coefficient**



According to the diagram, all the beta coefficient of banks is positive. Beta of SCBL is the highest 1.61 which means the stock of SCBL is highly sensitive with the market return.

**Findings:** The beta coefficient of BOK, KBL, NIBL, NSBL and SCBL are 1.1975, 1.5483, 1.2268, 1.5732 and 1.6063 respectively.

**4.4 Systematic and Unsystematic Risk**

Systematic risk is the portion of the total risk of an individual security caused by market factor that simultaneously affects the prices of all securities. It is beyond the control of the people working in the market. It is also called market risk or unavoidable risk or beta risk.

Unsystematic risk is the portion of total risk that can be diversified away. It is also called non-market risk or avoidable risk or diversifiable risk

**Table 4**

**Calculation of Systematic and Unsystematic Risk**

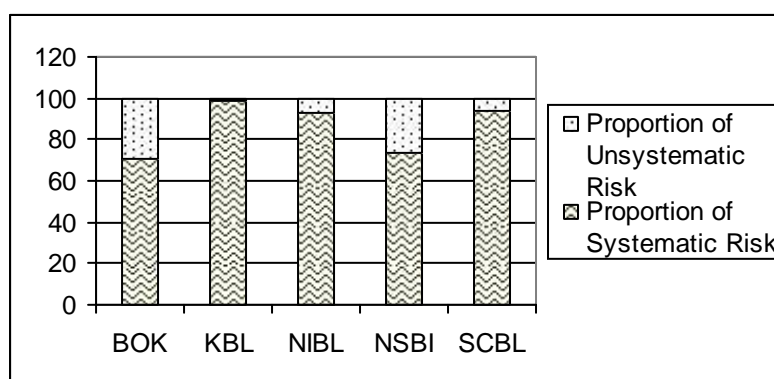
Banks	Total Risk	Systematic Risk	Proportion	Unsystematic Risk	Proportion
BOK	0.4871	0.3442	71	0.1429	29
KBL	0.5794	0.5753	99	0.0041	1
NIBL	0.388	0.3612	93	0.0268	7
NSBL	0.8030	0.5940	74	0.209	26
SCBL	0.6567	0.6192	94	0.0375	6

(Source: Annex 5)

The systematic risk of BOK, KBL, NIBL, NSBL and SCBL are 0.32, 0.57, 0.36, 0.59 and 0.62 and unsystematic risks are 0.14, 0.004, 0.027, 0.21 and 0.04 respectively. SCBL has the highest systematic risk and NSBL has the highest unsystematic risk.

**Figure 11**

**Proportion of Systematic and Unsystematic Risk**



**4.5 Analysis of Required Rate of Return**

Required rate of return is the minimum annual percentage earned by an investment that will induce investors to put money into particular security. Investors should know whether the capital they are investing is safe or not. Study of required rate of return is necessary for investors before investing. Following table shows the required return of each bank.

**Table 5**  
**Analysis of Required Rate of Return**

Banks	$R_m$	$R_f$	$R_m - R_f$	Beta( S )	Required Return [ $R_j \times R_f + \beta(R_m - R_f) + R_f$ ]
BOK	0.07	0.031	0.039	1.1975	0.078
KBL	0.07	0.031	0.039	1.5483	0.091
NIBL	0.07	0.031	0.039	1.2268	0.079
NSBL	0.07	0.031	0.039	1.5732	0.092
SCBL	0.07	0.031	0.039	1.6063	0.094

The required return for securities of BOK, KBL, NIBL, NSBL and SCBL are 0.078, 0.091, 0.079, 0.092 and 0.094 respectively which are higher than the market return.

#### 4.6 Comparison of Required Return with Expected Return

Expected return is the average of a probability distribution of possible returns. And the required return is the minimum return the investor will accept for particular investment. In order to find out whether the securities are overvalued or undervalued we need to compare the required and expected return.

**Table 6**  
**Comparison of Required Return with Expected Return**

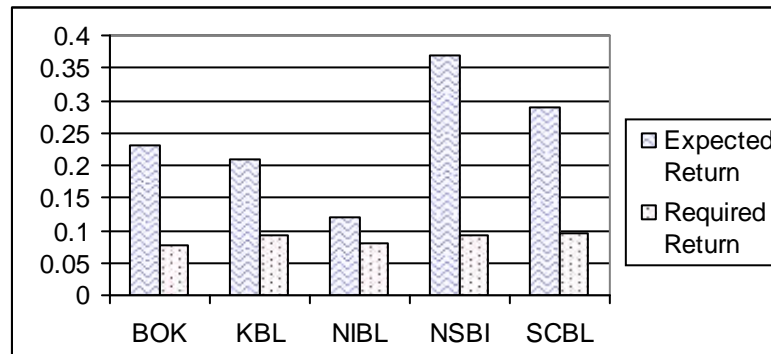
Banks	Beta	Expected Return	Required Return	Remarks
BOK	1.1975	0.23	0.078	Undervalued
KBL	1.5483	0.21	0.091	Undervalued
NIBL	1.2268	0.12	0.079	Undervalued
NSBL	1.5732	0.37	0.092	Undervalued
SCBL	1.6063	0.29	0.094	Undervalued

The table 5 shows that the average risk free rate of five years as given by the interest rate on short-term government treasury bills is 0.031(source: NRB, 26 Dec

2011). Similarly, the table 6 shows that the required rate of returns on market of BOK, KBL, NIBL, NSBL and SCBL are 0.078, 0.091, 0.079, 0.092 and 0.094 which are very low in comparison to expected rate of return 0.23, 0.21, 0.12, 0.37 and 0.29 respectively. Since the required rate of return is very low to expected rate of return the stocks of all five sampled banks are undervalued.

**Figure 12**

**Comparison of Required Return with Expected Return**



**Findings:** The required rate of returns on market of BOK, KBL, NIBL, NSBL and SCBL are 0.078, 0.091, 0.079, 0.092 and 0.094 which are very low in comparison to expected rate of return 0.23, 0.21, 0.12, 0.37 and 0.29 respectively.

#### 4.7 Portfolio Risk and Return Analysis

Portfolio analysis of risk and return are based on the investment of single assets. Investor had constructing a portfolio to minimize risk and increase its return. The analysis of risk and return made up was only a point of view on individual investors, that if he/she should invest in which banks securities? Which banks securities is more risky to comparing with each other? Constructing of portfolio or making an investment on more than one asset, which are negatively correlated, can reduce unsystematic risk without losing any return.

**Table 7**

**Calculation of Portfolio Risk and Return**

Proportion	Proportion	$R_p$	$\uparrow_p$
BOK 1	KBL 0	0.23	0.69
0.75	0.25	0.23	0.43
0.50	0.50	0.22	0.44

0.25	0.75	0.22	0.48
0	1	0.21	0.76
BOK 1	NIBL 0	0.23	0.69
0.75	0.25	0.20	0.44
0.5	0.5	0.18	0.26
0.25	0.75	0.15	0.39
0	1	0.12	0.62
BOK 1	NSBL 0	0.23	0.69
0.75	0.25	0.27	0.42
0.5	0.5	0.30	0.35
0.25	0.75	0.34	0.58
0	1	0.37	0.89
BOK 1	SCBL 0	0.23	0.69
0.75	0.25	0.25	0.32
0.5	0.5	0.26	0.50
0.25	0.75	0.28	0.56
0	1	0.29	0.81
KBL 1	NIBL 0	0.21	0.76
0.75	0.25	0.19	0.51
0.5	0.5	0.17	0.46
0.25	0.75	0.14	0.42
0	1	0.12	0.62
KBL 1	NSBL 0	0.21	0.76
0.75	0.25	0.25	0.59
0.5	0.5	0.29	0.41
0.25	0.75	0.33	0.70
0	1	0.37	0.89

KBL	1	SCBL	0	0.21	0.76
	0.75		0.25	0.23	0.59
	0.5		0.5	0.25	0.87
	0.25		0.75	0.27	0.63
	0		1	0.29	0.81
NIBL	1	NSBL	0	0.12	0.62
	0.75		0.25	0.18	0.42
	0.5		0.5	0.25	0.50
	0.25		0.75	0.31	0.62
	0		1	0.37	0.89
NIBL	1	SCBL	0	0.12	0.62
	0.75		0.25	0.16	0.42
	0.5		0.5	0.21	0.42
	0.25		0.75	0.25	0.56
	0		1	0.29	0.81
NSBL	1	SCBL	0	0.37	0.89
	0.75		0.25	0.35	0.74
	0.5		0.5	0.33	0.70
	0.25		0.75	0.31	0.67
	0		1	0.29	0.81

The portfolio risk and return in terms of securities proportion invested in portfolio mean return and standard deviation have been calculated for 10 sets of banks and 50 portfolios are presented in table 7. Among 50 portfolios, in between BOK and KBL portfolio 0.75 (BOK) and 0.25 is better than others as it has 0.23 the highest return and 0.43 the lowest portfolio risk.

Similarly between BOK and NIBL portfolio, 1.0 (BOK) and 0.0 (NIBL) has highest portfolio return 0.23 with the highest portfolio risk 0.69. Other portfolio 0.75

(BOK) and 0.25 (NIBL) has portfolio risk 0.44 but the return is reduced to 0.20. The lowest risk 0.26 is between 0.50 (BOK) and 0.50 (NIBL) but the return is also lower i.e.0.18.

BOK (0) and NSBL (1) portfolio has highest risk 0.89 and return 0.37. As the proportion of NSBL decreases to 0.75 and increases the proportion of BOK to 0.25, the risk also decreases to 0.58 but the return reduces to 0.34. BOK (0.5) and NSBL (0.5) portfolio has even lower risk 0.35 but the return is also lower 0.30.

Similarly, BOK and SCBL portfolio's has highest portfolio risk and return is 0.29 and 0.81 respectively when the BOK proportion is 1 and SCBL 0. KBL (0.21) and NIBL (0.76) portfolio's highest return is 0.21 when the risk is also highest 0.76. KBL and NSBL portfolio has highest return 0.37 when the risk is highest 0.89. KBL and SCBL portfolio has highest return 0.29 when KBL proportion is 0 and risk is 0.81. In between NIBL and NSBL, the portfolio risk and return both are highest i.e. 0.37 and 0.89 respectively when proportion of NIBL is 0 and NSBL is 1. NIBL and SCBL portfolio has 0.29 and 0.81 as highest portfolio risk and return respectively when NIBL (0) and SCBL (1). At last, among NSBL and SCBL portfolios highest portfolio return and risk is 0.37 and 0.89 respectively when NSBL (1) and SCBL (0).

The highest portfolio risk and return in these entire 10 portfolios is 0.37 and 0.89 respectively which is common when NSBL proportion is 1 with BOK, KBL, NIBL and SCBL.

#### **4.8 Single Index Model**

Under Sharpe model a single number measures the desirability of including a stock in the optimal portfolio. Under this model, the stocks are ranked by excess return to beta ratio (from highest to lowest), and the ranking represents the desirability of any stock's inclusion in a portfolio. The number of stocks selected depends on a unique cutoff rate such that all stocks with higher ratios of  $\frac{R_i - R_f}{\sigma_i}$  will be included and all stocks with lower ratios excluded. To determine which stocks are included in optimal portfolio, the cutoff rate, Z value and the weight are calculated as follows:

**Table 8**

**Calculation of Cut off Rate, Z value and Weight**

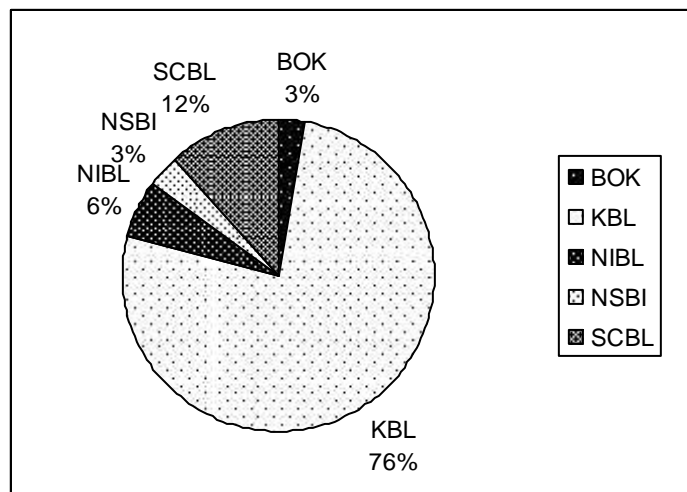
Banks	Cut of Rate	Z value	Weight
BOK	0.0039	1.3601	0.0273
KBL	0.0149	38.0278	0.7643
NIBL	0.0088	2.9159	0.0586
NSBL	0.0060	1.5770	0.0317
SCBL	0.0241	5.8726	0.1180
Total		49.7534	

(Source: Annex 7)

To construct the optimum portfolio, the percentage invested for each security in the optimum portfolio is to be calculated. To find out the weight of selected securities in portfolio, z value is calculated. Weight is the proportion of z value on the base of total z value of portfolio.

**Figure 13**

**Optimum Portfolio Composition**



Above chart shows the proportion of optimum portfolio of securities. We would invest our fund 76% in KBL, 12% in SCBL, 6% in NIBL, 3% in NSBL and 3% in BOK.



## **Chapter 5**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This chapter contains summary, conclusions and recommendations that resulted from this study as well as the findings that came to light in the research results as discussed in chapter four.

#### **5.1 Summary**

The present study entitled “Portfolio Analysis of Nepalese Commercial Banks” was divided in five chapters namely introduction, literature review, research methodology, analysis and presentation of data and summary, conclusion and recommendations. The main purpose of this study was to analyze and examine the portfolio followed by investors on their investment in various securities. The study has six objectives. They are: to analyze the risk and return of selected banks, to examine the market risk and return of commercial banks, to study the market sensitivity of sampled banks, to compare required return and expected return of commercial banks, to analyze portfolio risk and return of selected banks, to find out optimal portfolio of sampled commercial banks for an investor. To ensure that this study is also an appraisal of a process and not only a description based on a framework, the findings made in the preceding chapters on the various objectives are summarized in this chapter in order to draw conclusion.

The data used in the study are mainly secondary data from the year 2006/7 to 2010/11. Five commercial banks listed in NEPSE are taken as sample. The research design employed for the study is both descriptive and analytical. With the help of expected rate of return, standard deviation, variance and coefficient of variation, market sensitivity, expected risk and return of commercial banks are analyzed. With the help of beta of the stocks, covariance with the market, systematic and unsystematic risk, the required rate of return of commercial banks is evaluated. Sharpe’s optimum portfolio model/single index model used to find out the optimum portfolio among the sample securities. To make the analysis easy to understand some related studies are reviewed.

## 5.2 Conclusion

The data used in the study are mainly secondary data from the year 2006/7 to 2010/11. Five commercial banks listed in NEPSE are taken as sample. The research design employed for the study is both descriptive and analytical. The conclusions of the study are based on findings which are as follow:

- ) **The risk and return of commercial banks:** The first objective was to examine the risk and return of commercial banks. The expected rate of return of banks BOK, KBL, NIBL, NSBL and SCBL were 0.23, 0.21, 0.12, 0.37 and 0.29 respectively. Investors expect to get highest return from NSBL and lowest return from NIBL. The standard deviations were 0.69, 0.76, 0.62, 0.89 and 0.81 for BOK, KBL, NIBL, NSBL and SCBL respectively. Standard deviation of NSBL is highest and standard deviation of NIBL is lowest. Coefficient of variation (CV) defined that one unit change in risk will change 3.0, 3.62, 5.17, 2.41 and 2.79 unit change in the return of BOK, KBL, NIBL, NSBL and SCBL respectively.
- ) **The market risk and return of commercial banks:** The second objective was to examine the market risk and return of commercial banks. For this purpose, the market return for the period was 0.07. Standard deviation of market was 0.49 and the CV was 7 times.
- ) **The market sensitivity of sampled banks:** The third objective was to study the market sensitivity of sampled banks. The beta coefficient was taken as the measurement of market sensitivity which was 1.1975, 1.5483, 1.2268, 1.5732 and 1.6063 for BOK, KBL, NIBL, NSBL and SCBL respectively. Beta of SCBL was highest i.e. 1.6063.
- ) **Required return and expected return of commercial banks:** The fourth objective of this research was to compare required return and expected return of commercial banks. The required rate of returns on market of BOK, KBL, NIBL, NSBL and SCBL were 0.078, 0.091, 0.079, 0.092 and 0.094 and expected rate of returns were 0.23, 0.21, 0.12, 0.37 and 0.29 respectively.
- ) **Portfolio risk and return of selected banks:** The fifth objective was to analyze portfolio risk and return of selected banks. For this purpose the portfolio return and risk in terms of securities proportion invested in portfolio,

the mean return and standard deviation had been calculated for ten sets of banks and fifty portfolios. Among fifty portfolios the lowest risky portfolio was the combination of BOK and NIBL investing 50 percent in both banks share with portfolio standard deviation 0.26. The highest portfolio risk and return in those entire 10 portfolios were 0.37 and 0.89 respectively which was common when NSBL proportion was 1 with BOK, KBL, NIBL and SCBL.

- ) **Optimal portfolio of sampled commercial banks:** The last objective was to find out optimal portfolio of sampled commercial banks for an investor. The proportion of optimum portfolio of securities determined by single index model was investing 76% in KBL, 12% in SCBL, 6% in NIBL, 3% in NSBL and 3% in BOK.

### 5.3 Recommendations and Suggestions

It provides recommendations for organizations and investors and suggestions for further studies.

**Recommendations:** On the basis of findings, the following recommendations are suggested to the organizations and investors. The specific risks of banks are higher than the risk of NEPSE or market. This can be reduced by risk diversification. Therefore, it is recommended to bankers to diversify the portfolio in the sense that return of any investment tool is appropriate for the degree of its risk, i.e. there will be a trade-off between return and risk. Although the risks are higher, the required rates of return of sampled banks are less than expected rates of return. As the stocks are undervalued, investors are suggested to purchase the securities.

**Suggestions:** In an ever-changing world, however, no research can ever claim to be the last word on specific topic. In this regard, areas for further research have been identified and its hope that other researchers will take these up in the future.

- ) Though the study covers only commercial banks portfolio, several areas where the investment activities are involved, the future researches could be conducted such as insurance companies, mutual funds, provident fund, cooperatives and finance companies.
- ) The data range used in the study is only five years (from 2006/7 to 2010/11). For more analytical result, further studies could be followed the data more than five years.

- ) The difference or gap in time period might obtain different result in research. The study could be done using same methodology for another time period.
- ) The data used in the thesis are only secondary data. Further study could be conducted using primary data.
- ) The sample size used in the research is only five commercial banks. The sample size for future research could be increased for more reliable and accurate result.

## Reference

- Aryal, K. (2010). *Portfolio behavior of Nepalese commercial banks*. Master Degree Thesis, Lumbini Banijya Campus, Tribhuwan University.
- Bailey, J., Gordon, J. & Sharpe, W.F. (1995). *Investment*. New Jersey: Prentice Hall Inc.
- Baral, K.J., Dahal, G.B., Gautam, R.R., Paudel, R.B. & Rana, S.B. (2064). *Fundamentals of financial management*. Kathmandu: Asmita Publication.
- Besley, S., Brigham, E.F. & Weston, J.F. (n.d.). *Essentials of managerial finance*. New York: The Dryden Press.
- Bhandari, D.B. & Shrestha, M.K.(2008). *Financial markets and institutions*. Kathmandu: Asmita Books Publishers and Distributors
- Bodie, Z., Kane, A., Marcus, A. J., & Mohanty, P. (2009). *Investment*. New Delhi: Tata McGrawHill Education P (Ltd).
- Brealey & Meyers, (2003). *Principles of corporate finance*. New York: The McGraw-Hill Companies.
- Busher, A. S. & Kane, E. J. (1979). *Portfolio Diversification at Commercial banks*. The Journal of Finance, Vol. 34, Issue 1, (19-34).
- Chaudhary, A.K. & Sharma P.K.(2064). *Statistical methods*. Kathmandu: Khanal Books and Stationery.
- Copeland, T.E. & Weston, J. F. (1992). *Managerial Finance*. New York: The Dryden Press.
- Holton, G. (2013) *Capital asset pricing model*. Risk Encyclopedia. Retrieved Jan 12, 2014.
- Joshi, B., Kadariya, S., Nyaupane, R.P. & Subedi, P.P. *Investor Awareness and Investment on Equity in Nepalese Capital Market*. Banking Journal, Vol. 2 (Issue 1)
- Khadka, S. (2011). *Portfolio analysis of Nepalese listed companies*. Master Degree Thesis, St. Xavier's College, Trivuan University.

- Koirala, S. & Paudel R. B. (2006). *Application of Markowitz and Sharpe Models in Nepalese Stock Market*. Journal of Nepalese Business Studies, Vol.3, No.1. (18-35).
- Kothari, C. R. (2004). *Research methodology methods and techniques*. New Delhi: New Age International Publications.
- Markowitz, H. M. (1952). *Portfolio Selection*. Journal of Finance, p. 77-91.
- Nepal Stock Exchange Limited. (2007). *Annual Trading Report 2006-2007*. Kathmandu: Nepal Stock Exchange Limited.
- Nepal Stock Exchange Limited. (2008). *Annual Trading Report 2007-2008*. Kathmandu: Nepal Stock Exchange Limited.
- Nepal Stock Exchange Limited. (2009) *Annual Trading Report 2008-2009*. Kathmandu: Nepal Stock Exchange Limited.
- Nepal Stock Exchange Limited. (2010) *Annual Trading Report 2009-2010*. Kathmandu: Nepal Stock Exchange Limited.
- Nepal Stock Exchange Limited. (2011). *Annual Trading Report 2010-2011*. Kathmandu: Nepal Stock Exchange Limited
- Orabi, M.M. Assessment of Investment Portfolio of Jordanian Banks. European Scientific Journal, Vol. 8, No. 12.
- Oxford Advanced Learner's Dictionary. (1996): Oxford University Press.
- Pant, P.R. (2009). *Social science and research writing*. Kathmandu: Buddha Academic Enterprises Pvt. Ltd.
- Parajuli, B. & Thapa, K. (2011). *Financial institutions & markets*. Kathmandu: Januka Publication.
- Paudel, N. P. (n. d). *Investing in Shares of Commercial Banks in Nepal: An Assessment of Return and Risk Element*. Kathmandu: Nepal Rastra Bank.
- Rana, S. B. & Thapa, K.(2011). *Investment management*. Kathmandu: Asmita Books Publishers and Distributors (P) Ltd.
- Ray, S. (2013). *Overviewing the Scope of International Portfolio Investment*. Advances in Applied Economics and Finance(AAEE), Vol. 4, No. 1.
- Securities Board of Nepal. (2006). *Annual Report 2005-2006*. Kathmandu: Securities Board of Nepal.

- Securities Board of Nepal. (2007). *Annual Report 2006-2007*. Kathmandu: Securities Board of Nepal.
- Securities Board of Nepal. (2008). *Annual Report 2007-2008*. Kathmandu: Securities Board of Nepal.
- Securities Board of Nepal. (2009). *Annual Report 2008-2009*. Kathmandu: Securities Board of Nepal.
- Securities Board of Nepal. (2010). *Annual Report 2009-2010*. Kathmandu: Securities Board of Nepal.
- Securities Board of Nepal. (2011). *Annual Report 2010-2011*. Kathmandu: Securities Board of Nepal.
- Sharpe, W. F. (1972). *Risk, Market Sensitivity and Diversification*. Financial Analyst Journal, Vol.28, No.1.
- Shrestha, S. (2008). *A study on portfolio management of Nepalese commercial banks*. Master Degree Thesis, Shanker Dev Campus, Tribhuwan University.
- Shrestha, S. (2009). *Portfolio analysis of Nepalese commercial banks*. Master Degree Thesis, Shanker Dev Campus, Tribhuwan University.
- Turkmen, S. Y. & Yigit, I. (2012). *Diversification in Banking and its Effects on Banks*. American International Journal of Contemporary Research, Vol. 2, No. 12. (634-638).
- Van Horne, J. C. (n. d.). *Financial management and policy*. Delhi: Dorling Kindersley (India) Pvt. Ltd.
- [www.bok.com.np](http://www.bok.com.np)
- [www.investopedia.com](http://www.investopedia.com)
- [www.investorwords.com](http://www.investorwords.com)
- [www.kumaribank.com](http://www.kumaribank.com)
- [www.nepalsbi.com.np](http://www.nepalsbi.com.np)
- [www.nepalstock.com](http://www.nepalstock.com)
- [www.nibl.com.np](http://www.nibl.com.np)
- [www.nrb.org.np](http://www.nrb.org.np)
- [www.sc.com/np/en/](http://www.sc.com/np/en/)
- [www.wikipedia.com](http://www.wikipedia.com)

**Annex 1**  
**Calculation of Total Dividend**

**BOK**

Fiscal Year	Closing MPS	DPS	Stock Dividend%	Total Dividend	EPS
05/06	850	-	-	-	-
06/07	1375	20	-	20	43.50
07/08	2350	2.11	40	732.11	59.94
08/09	1825	7.37	40	343.37	54.68
09/10	840	15	15	100.5	43.08
10/11	570	16.75	18	129.79	44.51

**KBL**

Fiscal Year	Closing MPS	DPS	Stock Dividend%	Total Dividend	EPS
05/06	443	-	-	-	-
06/07	830	1.05	20	202.05	22.70
07/08	1005	0.53	10	385.53	16.35
08/09	700	0.55	10.03	47.49	22.04
09/10	468	12	-	12	24.24
10/11	266	0.44	8	19.8	15.67

**NIBL**

Fiscal Year	Closing MPS	DPS	Stock Dividend%	Total Dividend	EPS
05/06	1260	-	-	-	-
06/07	1729	5	25	617.5	62.57
07/08	2450	7.5	33.33	470.12	57.9
08/09	1388	20	-	20	37.4
09/10	705	25	-	25	52.5
10/11	515	25	25	152.75	39.1

**NSBI**

Fiscal Year	Closing MPS	DPS	Stock Dividend%	Total Dividend	EPS
05/06	612	-	-	-	-
06/07	1176	12.59	35	541.44	39.35
07/08	1511	-	-	-	28.33
08/09	1900	2.11	40	298.51	36.18
09/10	741	5	12.5	75.63	23.69
10/11	565	5	12.5	84.38	24.85



SCBL

Fiscal Year	Closing MPS	DPS	Stock Dividend%	Total Dividend	EPS
05/06	3775	-	-	-	-
06/07	5900	80	50	3495	167.37
07/08	6830	80	50	3085	131.92
08/09	6010	50	50	1689.5	109.99
09/10	3279	55	15	325	77.65
10/11	1800	50	-	50	69.51

**Annex 2**  
**Single Year Holding Period Return**

**BOK**

Fiscal Year	Closing MPS	Total Dividend	$R = \frac{D_t \Gamma(P_t Z P_{tZ})}{P_{tZ}}$
05/06	850	-	-
06/07	1375	20	0.64
07/08	2350	732.11	1.24
08/09	1825	343.37	-0.08
09/10	840	100.5	-0.48
10/11	570	129.79	-0.17

**KBL**

Fiscal Year	Closing MPS	Total Dividend	$R = \frac{D_t \Gamma(P_t Z P_{tZ})}{P_{tZ}}$
05/06	443	-	-
06/07	830	202.05	1.33
07/08	1005	385.53	0.67
08/09	700	47.49	-0.26
09/10	468	12	-0.31
10/11	266	19.8	-0.39

**NIBL**

Fiscal Year	Closing MPS	Total Dividend	$R = \frac{D_t \Gamma(P_t Z P_{tZ})}{P_{tZ}}$
05/06	1260	-	-
06/07	1729	617.5	0.86
07/08	2450	470.12	0.69
08/09	1388	20	-0.43
09/10	705	25	-0.47
10/11	515	152.75	-0.05

**NSBI**

Fiscal Year	Closing MPS	Total Dividend	$R = \frac{D_t \Gamma(P_t Z P_{tZ})}{P_{tZ}}$
05/06	612	-	-
06/07	1176	541.44	1.81
07/08	1511	-	0.28
08/09	1900	298.51	0.45
09/10	741	75.63	-0.57
10/11	565	84.38	-0.12

SCBL

Fiscal Year	Closing MPS	Total Dividend	$R = \frac{D_t \Gamma(P_t Z P_{tZ})}{P_{tZ}}$
05/06	3775	-	-
06/07	5900	3495	1.49
07/08	6830	3085	0.68
08/09	6010	1689.5	0.13
09/10	3279	325	-0.40
10/11	1800	50	-0.44

**Annex 3**  
**Standard Deviation and Variance**

BOK

Year	$R_j$	$R_j \bar{Z}R$	$(R_j \bar{Z}R)^2$
06/07	0.64	0.41	0.1681
07/08	1.24	1.01	1.020
08/09	-0.08	-0.31	0.0961
09/10	-0.48	-0.71	0.5041
10/11	-0.17	-0.40	0.16
Total			1.9483

$$\dagger^2 \times \frac{1.9483}{5 \text{ ZI}} \times 0.4871$$

$$\dagger = 0.6979$$

KBL

Year	$R_j$	$R_j \bar{Z}R$	$(R_j \bar{Z}R)^2$
06/07	1.33	1.13	1.2769
07/08	0.67	0.47	0.2209
08/09	-0.26	-0.46	0.2116
09/10	-0.31	-0.51	0.2601
10/11	-0.39	-0.59	0.3481
Total			2.3176

$$\dagger^2 \times \frac{2.3176}{5 \text{ ZI}} \times 0.5794$$

$$\dagger = 0.7612$$

NIBL

Year	$R_j$	$R_j \bar{Z}R$	$(R_j \bar{Z}R)^2$
06/07	0.86	0.74	0.5476
07/08	0.69	0.57	0.3249
08/09	-0.43	-0.55	0.3025
09/10	-0.47	-0.59	0.3481
10/11	-0.05	-0.17	0.0289
Total			1.552

$$\dagger^2 \times \frac{1.552}{5 \text{ ZI}} \times 0.388$$

$$\dagger = 0.6229$$

NSBI

Year	$R_j$	$R_j \bar{Z} \bar{R}$	$(R_j \bar{Z} \bar{R})^2$
06/07	1.81	1.44	2.0736
07/08	0.28	-0.09	0.0081
08/09	0.45	0.08	0.0064
09/10	-0.57	-0.94	0.8836
10/11	-0.12	-0.49	0.2401
Total			3.2118

$$t^2 \times \frac{3.2118}{5 \times 1} \times 0.8030$$

$$t = 0.8961$$

SCBL

Year	$R_j$	$R_j \bar{Z} \bar{R}$	$(R_j \bar{Z} \bar{R})^2$
06/07	1.49	1.198	1.4352
07/08	0.68	0.388	0.1505
08/09	0.13	-0.162	0.0262
09/10	-0.40	-0.692	0.4789
10/11	-0.44	-0.732	0.5358
Total			2.6266

$$t^2 \times \frac{2.6266}{5 \times 1} \times 0.6567$$

$$t = 0.8103$$

**Annex 4**  
**Covariance and Beta coefficient**

**BOK**

Fiscal Year	$R_j$	$(R_j \overline{ZR_j})$	$R_m$	$(R_m \overline{ZR_m})$	$(R_j \overline{ZR_j}) * (R_m \overline{ZR_m})$
06/07	0.64	0.41	0.77	0.70	0.287
07/08	1.24	1.01	0.41	0.34	0.3434
08/09	-0.08	-0.31	-0.22	-0.29	0.0899
09/10	-0.48	-0.71	-0.36	-0.43	0.3053
10/11	-0.17	-0.40	-0.24	-0.31	0.124
Total					1.1496

$$\text{Covariance } (R_j, R_m) = \frac{(R_j \overline{ZR_j}) * (R_m \overline{ZR_m})}{n Z1} = \frac{1.1496}{5 Z1} = 0.2874$$

$$\text{Beta } (s) = \frac{\text{Covariance}(R_j, R_M)}{\text{Var}R_m} = \frac{0.2874}{0.24} = 1.1975$$

**KBL**

Fiscal Year	$R_j$	$(R_j \overline{ZR_j})$	$R_m$	$(R_m \overline{ZR_m})$	$(R_j \overline{ZR_j}) * (R_m \overline{ZR_m})$
06/07	1.33	1.13	0.77	0.70	0.7910
07/08	0.67	0.47	0.41	0.34	0.1598
08/09	-0.26	-0.46	-0.22	-0.29	0.1334
09/10	-0.31	-0.51	-0.36	-0.43	0.2193
10/11	-0.39	-0.59	-0.24	-0.31	0.1829
Total					1.4864

$$\text{Covariance } (R_j, R_m) = \frac{1.4864}{5 Z1} = 0.3716$$

$$\text{Beta } (s) = \frac{0.3716}{0.24} = 1.5483$$

**NIBL**

Fiscal Year	$R_j$	$(R_j \overline{ZR_j})$	$R_m$	$(R_m \overline{ZR_m})$	$(R_j \overline{ZR_j}) * (R_m \overline{ZR_m})$
06/07	0.86	0.74	0.77	0.70	0.518
07/08	0.69	0.57	0.41	0.34	0.1938
08/09	-0.43	-0.55	-0.22	-0.29	0.1595
09/10	-0.47	-0.59	-0.36	-0.43	0.2537
10/11	-0.05	-0.17	-0.24	-0.31	0.0527
Total					1.1777

$$\text{Covariance } (R_j, R_m) = \frac{1.1777}{5 Z1} = 0.2944$$

$$\text{Beta } (s) = \frac{0.2944}{0.24} = 1.2268$$

**NSBI**

Fiscal Year	$R_j$	$(R_j \overline{ZR_j})$	$R_m$	$(R_m \overline{ZR_m})$	$(R_j \overline{ZR_j}) * (R_m \overline{ZR_m})$
06/07	1.81	1.44	0.77	0.70	1.0080
07/08	0.28	-0.09	0.41	0.34	-0.0306
08/09	0.45	0.08	-0.22	-0.29	-0.0232
09/10	-0.57	-0.94	-0.36	-0.43	0.4042
10/11	-0.12	-0.49	-0.24	-0.31	0.1519
Total					1.5103

$$\text{Covariance } (R_j, R_m) = \frac{1.5103}{5 Z1} = 0.3776$$

$$\text{Beta } (s) = \frac{0.3773}{0.24} = 1.5732$$

**SCBL**

Fiscal Year	$R_j$	$(R_j \overline{ZR_j})$	$R_m$	$(R_m \overline{ZR_m})$	$(R_j \overline{ZR_j}) * (R_m \overline{ZR_m})$
06/07	1.49	1.198	0.77	0.70	0.8386
07/08	0.68	0.388	0.41	0.34	0.1319
08/09	0.13	-0.162	-0.22	-0.29	0.047
09/10	-0.40	-0.692	-0.36	-0.43	0.2976
10/11	-0.44	-0.732	-0.24	-0.31	0.2269
Total					1.5420

$$\text{Covariance } (R_j, R_m) = \frac{1.5420}{5 Z1} = 0.3855$$

$$\text{Beta } (s) = \frac{0.3855}{0.24} = 1.6063$$

## Annex 5

### Systematic Risk

Banks	$S_j$	$S_j^2$	$\dagger_m^2$	Systematic Risk
BOK	1.1975	1.4340	0.24	0.3442
KBL	1.5483	2.3972	0.24	0.5753
NIBL	1.2268	1.5050	0.24	0.3612
NSBI	1.5732	2.4750	0.24	0.5940
SCBL	1.6063	2.5802	0.24	0.6192

$$\text{Systematic Risk} = \dagger_m^2 * S_j^2$$

### Unsystematic Risk

Banks	Total Risk( $\dagger_j^2$ )	Systematic Risk	Unsystematic Risk (Total risk- Systematic risk)
BOK	0.4871	0.3442	0.1429
KBL	0.5794	0.5753	0.0041
NIBL	0.388	0.3612	0.0268
NSBI	0.8030	0.5940	0.209
SCBL	0.6567	0.6192	0.0375



## Annex 6

### Calculation of Co variances between Banks

#### Covariance between BOK and KBL

Fiscal Year	$(R_j \overline{ZR_j})_{bok}$	$(R_j \overline{ZR_j})_{kbl}$	$(R_j \overline{ZR_j})_{bok} * (R_j \overline{ZR_j})_{kbl}$
06/07	0.41	1.13	0.4592
07/08	1.01	0.47	0.4646
08/09	-0.31	-0.46	-0.1457
09/10	-0.71	-0.51	0.3692
10/11	-0.40	-0.59	0.24
Total			1.3873

$$\text{Cov}(bok, kbl) = \frac{\sum R_j \overline{ZR_j} A_{bok} * \sum R_j \overline{ZR_j} A_{kbl}}{n Z1} = \frac{1.3872}{5 Z1} = 0.3468$$

#### Covariance between BOK and NIBL

Fiscal Year	$(R_j \overline{ZR_j})_{bok}$	$(R_j \overline{ZR_j})_{nibl}$	$(R_j \overline{ZR_j})_{bok} * (R_j \overline{ZR_j})_{nibl}$
06/07	0.41	0.74	0.3034
07/08	1.01	0.57	0.5757
08/09	-0.31	-0.55	0.1705
09/10	-0.71	-0.59	0.4189
10/11	-0.40	-0.17	0.0680
Total			1.5365

$$\text{Cov}(bok, nibl) = \frac{1.5365}{5 Z1} \times 0.3841$$

#### Covariance between BOK and NSBI

Fiscal Year	$(R_j \overline{ZR_j})_{bok}$	$(R_j \overline{ZR_j})_{nsbi}$	$(R_j \overline{ZR_j})_{bok} * (R_j \overline{ZR_j})_{nsbi}$
06/07	0.41	1.44	0.5904
07/08	1.01	-0.09	-0.0909
08/09	-0.31	0.08	-0.0248
09/10	-0.71	-0.94	0.6674
10/11	-0.40	-0.49	0.1960
Total			1.1149

$$\text{Cov}(bok, nsbi) = \frac{1.1149}{5 Z1} \times 0.2787$$

**Covariance between BOK and SCBL**

Fiscal Year	$(R_j \overline{ZR_j})_{bok}$	$(R_j \overline{ZR_j})_{scbl}$	$(R_j \overline{ZR_j})_{bok} * (R_j \overline{ZR_j})_{scbl}$
06/07	0.41	1.198	0.4912
07/08	1.01	0.388	0.3919
08/09	-0.31	-0.162	0.0502
09/10	-0.71	-0.692	0.4913
10/11	-0.40	-0.732	0.2928
Total			1.7174

$$\text{Cov} ( bok, scbl ) = \frac{1.7174}{5 Z1} \times 0.4294$$

**Covariance between KBL and NIBL**

Fiscal Year	$(R_j \overline{ZR_j})_{kbl}$	$(R_j \overline{ZR_j})_{nibl}$	$(R_j \overline{ZR_j})_{kbl} * (R_j \overline{ZR_j})_{nibl}$
06/07	1.13	0.74	0.8362
07/08	0.47	0.57	0.2679
08/09	-0.46	-0.55	0.2530
09/10	-0.51	-0.59	0.3009
10/11	-0.59	-0.17	0.1003
Total			1.7583

$$\text{Cov} ( kbl, nibl ) = \frac{1.7583}{5 Z1} \times 0.4396$$

**Covariance between KBL and NSBI**

Fiscal Year	$(R_j \overline{ZR_j})_{kbl}$	$(R_j \overline{ZR_j})_{nsbi}$	$(R_j \overline{ZR_j})_{kbl} * (R_j \overline{ZR_j})_{nsbi}$
06/07	1.13	1.44	1.6272
07/08	0.47	-0.09	-0.0423
08/09	-0.46	0.08	-0.0368
09/10	-0.51	-0.94	0.4794
10/11	-0.59	-0.49	0.2891
Total			2.3166

$$\text{Cov} ( kbl, nsbi ) = \frac{2.3166}{5 Z1} \times 0.5792$$

**Covariance between KBL and SCBL**

Fiscal Year	$(R_j \overline{ZR_j})_{kbl}$	$(R_j \overline{ZR_j})_{scbl}$	$(R_j \overline{ZR_j})_{kbl} * (R_j \overline{ZR_j})_{scbl}$
06/07	1.13	1.198	1.3537
07/08	0.47	0.388	0.1824
08/09	-0.46	-0.162	0.0745
09/10	-0.51	-0.692	0.3529
10/11	-0.59	-0.732	0.4319
Total			2.3954

$$\text{Cov}(kbl, scbl) = \frac{2.3954}{5 Z1} \times 0.5988$$

**Covariance between NIBL and NSBI**

Fiscal Year	$(R_j \overline{ZR_j})_{nibl}$	$(R_j \overline{ZR_j})_{nsbi}$	$(R_j \overline{ZR_j})_{nibl} * (R_j \overline{ZR_j})_{nsbi}$
06/07	0.74	1.44	1.0656
07/08	0.57	-0.09	-0.0513
08/09	-0.55	0.08	-0.0440
09/10	-0.59	-0.94	0.5546
10/11	-0.17	-0.49	0.0833
Total			1.6082

$$\text{Cov}(nibl, nsbi) = \frac{1.6082}{5 Z1} \times 0.4021$$

**Covariance between NIBL and SCBL**

Fiscal Year	$(R_j \overline{ZR_j})_{nibl}$	$(R_j \overline{ZR_j})_{scbl}$	$(R_j \overline{ZR_j})_{nibl} * (R_j \overline{ZR_j})_{scbl}$
06/07	0.74	1.198	0.8865
07/08	0.57	0.388	0.2212
08/09	-0.55	-0.162	0.0891
09/10	-0.59	-0.692	0.4083
10/11	-0.17	-0.732	0.1244
Total			1.7295

$$\text{Cov}(nibl, scbl) = \frac{1.7295}{5 Z1} \times 0.4324$$

### Covariance between NSBI and SCBL

Fiscal Year	$(R_j \overline{ZR_j})_{nsbi}$	$(R_j \overline{ZR_j})_{scbl}$	$(R_j \overline{ZR_j})_{nsbi} * (R_j \overline{ZR_j})_{scbl}$
06/07	1.44	1.198	1.7251
07/08	-0.09	0.388	-0.0349
08/09	0.08	-0.162	-0.0130
09/10	-0.94	-0.692	0.6505
10/11	-0.49	-0.732	0.3587
Total			2.6864

$$\text{Cov}(nsbi, scbl) = \frac{2.6864}{5 \times 1} \times 0.6716$$

### Annex 7

#### Calculation of Cut of Rate ( $C_j$ )

$$\text{Cut of Rate } (C_j) = \frac{\dagger_m^2 (R_j \overline{ZR_j}) S_j}{\dagger_{ei}^2} \div \frac{1 \Gamma \dagger_m^2 \frac{S_j}{\dagger_{ei}^2}}$$

$$\text{BOK} = \frac{0.24 \frac{(0.23 \times 0.031) \times 1.1975}{14.29}}{1 \Gamma 0.24 \frac{1.1975}{14.29}} \times \frac{0.004}{1.02} \times 0.0039$$

$$\text{KBL} = \frac{0.24 \frac{(0.21 \times 0.031) \times 1.5483}{4.1}}{1 \Gamma 0.24 \frac{1.5483}{4.1}} \times \frac{0.0162}{1.0906} \times 0.0149$$

$$\text{NIBL} = \frac{0.24 \frac{(0.12 \times 0.031) \times 1.2268}{2.68}}{1 \Gamma 0.24 \frac{1.2268}{2.68}} \times \frac{0.0098}{1.1099} \times 0.0088$$

$$\text{NSBI} = \frac{0.24 \frac{(0.37 \times 0.031) \times 1.5732}{20.9}}{1 \Gamma 0.24 \frac{1.5732}{20.9}} \times \frac{0.0061}{1.0181} \times 0.0060$$

$$SCBL = \frac{0.24 \frac{(0.29 Z0.031)1.6063}{3.75}}{1 \Gamma 0.24 \frac{1.6063}{3.75}} X \frac{0.0266}{1.1028} X 0.0241$$

### Calculation of Z value

$$Z_j X \frac{S_j}{\uparrow_{ei}^2} \frac{R_j Z R_f}{S_j} Z C^*$$

$$BOK = \frac{1.1975}{0.1429} \frac{0.23 Z0.031}{1.1975} Z0.0039 X 1.3601$$

$$KBL = \frac{1.5483}{0.0041} \frac{0.21 Z0.031}{1.5483} Z0.0149 X 38.0278$$

$$NIBL = \frac{1.2268}{0.0268} \frac{0.12 Z0.031}{1.2268} Z0.0088 X 2.9159$$

$$NSBI = \frac{1.5732}{0.209} \frac{0.37 Z0.031}{1.5732} Z0.006 X 1.5770$$

$$SCBL = \frac{1.6063}{0.0375} \frac{0.29 Z0.031}{1.6063} Z0.0241 X 5.8726$$

## Annex 8

### List of Nepalese Commercial Banks

S. No.	Name of Commercial Banks	S. No.	Name of Commercial Banks
1	Nepal Bank Ltd	25	Janata Bank
2	Rastriya Banijya Bank	26	Mega Bank
3	Agriculture Development Bank Ltd	27	Commerz and Trust Bank
4	Nabil Bank Ltd	28	Civil Bank
5	Nepal Investment Bank	29	Century Bank
6	Standard Chartered Bank	30	Sanima Bank
7	Himalayan Bank	31	NIC Asia Bank
8	Nepal SBI Bank		
9	Nepal Bangladesh Bank		
10	Everest Bank Ltd		
11	Bank of Kathmandu Ltd		
12	Nepal Credit and Commerce Bank Ltd		
13	Lumbini Bank Ltd		
14	Machhapuchre Bank Ltd		
15	Kumari Bank Ltd		
16	Laxmi Bank Ltd		
17	Siddhartha Bank Ltd		
18	IME Global Bank		
19	Citizen Bank International		
20	Prime Commercial Bank		
21	Sunrise Bank		
22	Grand Bank Ltd		
23	NMB Bank		
24	Kist Bank		