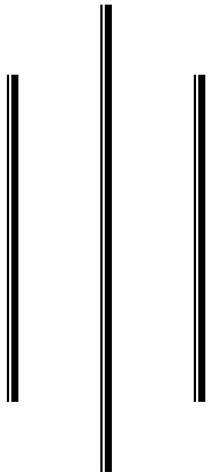
# INTEREST RATE STRUCTURE AND ITS RELATION WITH DEPOSIT, LENDING AND INFLATION IN NEPAL.



BY:
**SUHEET SHAKYA**
T.U. Registration No: 7-2-242-340-2004
Makwanpur Multiple Campus
Campus Roll No. 10/064/065

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# RECOMMENDATION

This is to certify that the thesis:

Submitted by

SUHEET SHAKYA

Entitled

INTEREST RATE STRUCTURE AND ITS EFFECT ON DEPOSIT, LENDING AND INFLATION

has been prepared as approved by this department in the prescribed format of Faculty of Management. This thesis is forwarded for examination. We recommend this thesis for acceptance.

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|---|---|
| ..... | ..... |
| **(Mr. Bin Bahadur Raut)** | **(Mr.Jayaram Devkota)** |
| Thesis Supervisor | Thesis Supervisor |
| . | |
| ..... | ..... |
| **(Mr. Uddav Prasad Sapkota)** | **(Mr. Bachhu Ram Adhikari)** |
| Co-ordinator, MBS Program | Campus Chief |

Date: ……..

# VIVA VOCE SHEET

We have conducted the viva-voce examination of the thesis presented by

SUHEET SHAKYA

Entitled

INTEREST RATE STRUCTURE AND ITS EFFECT ON DEPOSIT, LENDING AND INFLATION.

And found the thesis to the original work of the student written according to the prescribed format. We recommend the thesis to be accepted as partial fulfillment of the requirement for Master's Degree in Business Studies (M.B.S.)

Viva-voce Committee

Chairperson Research Committee ……

Member (Thesis Supervisor) ……

Member (Thesis Supervisor) ……

Member (External Expert) ……

Date:……...…….

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Faculty of Management
Makwanpur Multiple Campus

# DECLARATION

I hereby declare that the work reported in this thesis entitled **"Interest Rate Structure and Its Effect on Deposit, Lending and Inflation."** submitted to Makwanpur Multiple Campus, Faculty of Management, Tribhuvan University, is my original work done in the form of partial fulfillment of the requirement for the Master of Business Studies under the guidance of respected teachers Mr. Jayaram Devkota and Mr. Uddav Prasad Sapkota of Makwanpur Multiple Campus.

…….....

**Suheet Shakya**

Researcher

T.U. Registration No: 7-2-242-340-2004

# ACKNOWLEDGEMENT

Banking sector is a part of the financial market. It serves as the link between suppliers and users of capital funds. It is a mechanism for the mobilization for the public saving and channelizing them in productive investment. Development and expansion of banking sector is essential for the rapid economic growth of the country. In order to enhance the role of the banking sector in economic activities, it is essential to flow financial resource easily and in simple manner, which would, in turn, help to achieve the economic development of the country. For contributing to the development of the economy, banks should be financially sound. Moreover the competitive banking environment possesses challenges and it is hard especially for government banks where there is no co-operate culture to cope with such challenges. With this view, I hope it will be beneficial to stake holders including further academic researchers and other interested person as well. On the preparation course of this thesis, I got help from many personalities whom I hearty remember.

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Needless to say, to error is human kind and I am also no exception, so I am responsible for any error and deficiencies that may have remained in this work. I would also like to welcome any comments and suggestions, which will be the special guideline to me for research work in future.

**SUHEET SHAKYA**
Researcher

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# List of Abbreviation

| | | |
|---|---|---|
| A.D. | = | Anno Domini |
| ADB/N | = | Agriculture Development Bank/ Nepal |
| B.S. | = | Bikram Sambat |
| CPI | = | Consumer Price Index |
| d.f. | = | Degree of Freedom |
| e.t.c | = | Etcetra |
| e.g. | = | Example |
| FIFO | = | First in First Out |
| Fig. | = | Figure |
| FY | = | Fiscal Year |
| GDP | = | Gross Domestic Product |
| HBL | = | Himalayan Bank Limited |
| HMG | = | his Majesty Government |
| i.e. | = | That is |
| LIFO | = | Last in First Out |
| Ltd. | = | Limited |
| NBB | = | Nepal Bangladesh Bank |
| NBL | = | Nepal Bank Limited |
| NGO | = | Non Government Organization |
| NRB | = | Nepal Rastra Bank |
| No. | = | Number |
| p. | = | Page |
| p.p | = | pages |
| Pvt. | = | Private |
| RBB | = | Rastra Banijya Bank |
| Rs. | = | Rupees |
| T.U | = | Tribhuvan University. |
| T-Bill | = | Treasury Bills |
| Viz | = | Namely |

# CHAPTER ONE

# INTRODUCTION

## 1.1 General Background

Nepal is basically an agricultural, mountainous and landlocked country surrounded by two large, fast developing nations, China and India. More than 80% of the population is involve in the agricultural sector. The economic development of Nepal has been limited by the variety of geo-political and structural constraints. As such, country's land locked location; limited exportable resources, low economic growth, low savings, low income, higher rate of population growth, limited transportation facilities and infrastructure etc are the major factors that have proved obstacle in the economic development of the country.

As being developing country, Nepal is striving to develop and modernize her economy rapidly on rational and socially desired footings. But the structure of the economy has still remained primarily agricultural with very small manufacturing base. So it is essential to divert and modify agro based economy. Nepal has adopted mixed and liberal economic policy with the implicit objective to help the state and the private sector, on the ground of open and liberal eco-system. Especially after restoration of the democracy, the concept of the liberalization policies has been incorporated as directive principal and state policies. The continuing thrust to the development of nation has helped in establishing many company banks, financial institution and manufacturing industries. Thus these establishments helps the country for its development in some level but for actual economic development, capital formation and utilization are the two major things that should be essential for

the investment in a country. The formation and utilization of capital are shaped by many factors like prosperity of country, GDP of country, export-import of country, lending-deposit pattern, and interest rate and so on. In modern economy banks and financial institutions plays the major role for capital generation and utilization. In other words they take part actively in funds mobilization. Keeping other factors constant, interest rate also plays the dominant role in borrowing and lending.

Financial institution collects funds mainly from deposits (time and saving deposits) which are ultimately used as a part of capital investment in country. Thus the problem of inadequate of capital formulation is some how wipe out by collecting more deposits from the savers (households, business and government). More precisely personal saving is the part of disposable income, which is not consumed. Saving equals income minus expenditure. The people having more income save more than the people having less income do. In general, household saves more than that of business and government. For household, saving equals to current income minus current expenditure. For business sector savings include current earnings retained inside business firms after payment of taxes, stockholder's dividend and other expenses. Government saving arise where there is a surplus of current revenue over expenditure. To induce more saving, financial institution can play a vital role by providing attractive interest rate and offer a different scheme. The people of the least developed countries are not much concerned about saving as most parts of earnings are spent in hand to mouth consumption. Even if some people are able to save their money, they show their interest to invest such surplus funds on non-productive sectors like gold, land, vehicles and so on. Banks and financial companies, as intermediaries, can attract savers to save more by providing them attractive interest rate and accept the deposit. Banks provides loan to borrowers who are in need of money from the money accumulated in

the form of deposit and capital of bank while granting loan. Bank charges a certain percentage of interest to the borrower and borrower has to pay that interest for using banks money. Interest on loan also varies according to the nature of loan, whether loan is of short term or long term. An appropriate interest rate structure greatly affects the collection of deposits, mobilization of saving (only in productive sector) and profit position of any financial institution, which in turn, affects the economic upliftment of the whole country.

## 1.2 Interest rate:

Interest rate is one of the important tools for shaping economy. It plays the dominant role in borrowing and lending. Simply, interest rate is defined as- price a borrower must pay to secure scarce loanable funds from lender for an agreed-upon period. It is the price of credit. But unlike other prices in the economy, the rate of interest is really a ratio or two quantities: the money cost of borrowing divided by the amount of money actually borrowed, usually expressed on an annual percentage basis. The cost of borrowing money, measured in rupee per year per rupee borrowed, is the interest rate.[1] When we examine how money affects economic activity, we will focus on the interest rate, which is often called "The price of money". Interest is rent paid for the use of money. In other words, people must pay for opportunity to borrow money. Financial institutions, as financial intermediaries, collect money from savers in the form of deposit and provide that for business sector in the form of loan. These institutions pay the interest to the depositors for the money borrowed from them and charge interest from the borrower for money lend to them. As any price is determine, theoretically, by the interplay of demand and

[1] Samuelson, Paul A. & Nordhus, William D. "Economics", Sixteen edition, Tata Mc Graw Hill Publishing Company Limited, New Delhi, P. 469

supply in a market economy, the price of money- the interest rate- plays a vital role in the allocation of resources and in the decision making of consumers and businesses. For example, an increase in the interest rate provides additional incentives to individuals and others to postpone current consumption (Save) and thereby free resources for investment. Interest rates send price signals to borrowers, lenders, and savers. Higher interests rates generally bring forth a greater volume of savings and stimulate the lending of fund i.e. ***Substitution effect***. Lower rate of interest, on the other hand, tends to reduce the volume of borrowing and capital investment, and lower rates stimulate borrowing and investment spending.[2] Investment is function of interest rate. The quality and flow of investment determines the income in the economy. Therefore, the impact of interest rate is on both the saving and investment in the economy. Further the borrowings and savings are always influenced by the interest rates. The cost of production, which depends upon the production function, is influenced by the interest rate, since the credit is also one of the components of production process. The saving in investment in the economy, which are influenced by the interest rates, are the real economic variables. The incomes and expenditures of the variable sectors of the economy result in excess savings or excess investment in each of the sectors.[3]

## 1.3 Interest rate structure in Nepal:

Before studying the relationship of interest rate and other factors, it is better to know average structure of interest rate that were prevailed in the country during the past four years. Though the detail about analysis about this are

[2] Rose, Peter S.(1997), "Money and Capital Markets: Financial Institution and Instrumental in a Global Marketplace", Irwin, Chicago, 6th edition.
[3] Vaidya, Shakespeare, "Financial Market and Institution" Taleju prakashan, Kathmandu, p. 17

analyzed in chapter four, but the table no 1-1 below tries to give the glimpse of the lending rate and deposit rate of different financial institutions:

***Table: 1-1 Structure of Interest Rates (Percentage per Annum)***

| | Mid-July | | | | |
|---|---|---|---|---|---|
| | 2006 | 2007 | 2008 | 2009 | 2010 |
| **Nepal Rastra Bank** | | | | | |
| Bank Rate | 6.25 | 6.25 | 6.25 | 6.5 | 7.0 |
| Refinance Rates | 1.5-3.5 | 1.5-3.5 | 1.5-3.5 | 1.5-3.5 | 1.5-3.5 |
| **Government Securities** | | | | | |
| Treasury Bills (91 days) | 3.25 | 2.77 | 5.13 | 6.8 | 9.01 |
| National Saving Certificates | 6.0-8.5 | 6.0-8.5 | 6.0-7.75 | 6.0-10.0 | 6.0-10.0 |
| Development Bonds | 3.0-6.75 | 3.0-6.75 | 5.0-8.0 | 5.0- 9.0 | 5.0- 9.0 |
| **Inter bank Rate** | 2.13 | 3.03 | 3.61 | 5.07 | 7.74 |
| **Commercial Banks** | | | | | |
| **Deposit Rates** | | | | | |
| Saving Deposits | 2.0 -5.0 | 2.0 -5.0 | 2.0 - 6.5 | 2.0 - 7.5 | 2.0 –12.0 |
| Time Deposits | | | | | |
| 1 Months | 1.5-3.5 | 1.5-3.5 | 1.5-3.75 | 1.5-5.25 | 1.75-7.25 |
| 3Months | 1.5-4.0 | 1.5-4.0 | 1.5-6.75 | 1.5-6.0 | 1.75-9.5 |
| 6Months | 1.75-4.5 | 1.75-4.5 | 1.75-6.75 | 1.75-7.0 | 2.75-10.0 |
| 1 Years | 2.25-5.0 | 2.25-5.0 | 2.5-6.0 | 2.5-9.0 | 4.75-11.5 |
| 2Years and above | 2.5-6.4 | 2.5-5.5 | 2.75-6.75 | 2.75-9.5 | 5.0-13.0 |
| **Lending Rates** | | | | | |
| Industry | 8.0-13.5 | 8.0-13.5 | 7.0-13.0 | 8.0-13.5 | 8.0-13.5 |
| Agriculture | 9.5-13.0 | 9.5-13.0 | 9.5-12.0 | 9.5-12.0 | 9.5-13.0 |
| Export Bills | 5.0-11.5 | 5.0-11.5 | 4.0-11.0 | 4.0-11.0 | 4.0-18.0 |
| Commercial Loans | 8.0-14.0 | 8.0-14.0 | 8.0-14.0 | 8.0-14.0 | 8.0-14.0 |
| Overdrafts | 6.5-14.5 | 6.5-14.5 | 6.5-13.5 | 6.5-13.5 | 7.0-18.0 |
| **Cash Reserve Ratio (CRR)** | | | | | |
| With NRB | 5.0 | 5.0 | 5.0 | 5.5 | 5.5 |
| CPI | 8.0 | 6.4 | 7.7 | 13.2 | -- |

Source: Macroeconomics Indicators of Nepal, NRB, Research Department, Statistics Division, October 2010

[Note: The average lending rate of any sector is calculated by adding the two rates and divided it by 2 i.e. for example for industrial sector average lending rate it is calculated as (7% + 15%) ÷ 2 = 11%]

According to the structure of interest rate in presented in table 1-1, both lending and deposit rates are inclining during the period of 2006 to 2010 mid-July. This may be due to the incline in the interest rate on government securities i.e. Treasury Bills. According to table, the interest rate of T-Bills has been drastically increased from 3.25% per annum to 9.01%. As per principle, interest rates T-bills, are the bases for all kinds of interest rate, so incline in interest rate may leads to incline in interest rate of others. The interest rate of National Saving Certificates remains less volatile than other during the four

year periods. Similarly the interest rate of development bond remains almost same for the four periods.

The interbank interest was 2.13% on 2006 mid-July but it increased to 7.74% when it came during the Mid-July of 2010. It seems that Nepalese commercial banks have liquidity crunch. The most of the commercial bank classified their deposits into two sections –Saving Deposits and Time Deposits and offered the different interest rates on them. Talking about saving deposits, the interest rate range from 2.0% to 5.0% in the year of 2006 but this rate inclined to the range of 2.0% to 12% when it came to the year of 2010. This shows that the interest rate on saving deposit has increasing tendency. In the same way, the interest rate on time deposits also shows the increasing trend. In Nepalese economy, time deposits are classified in five categories: 1 month, 3 months, 6 months, 1 year and 2 years and above. In one month time deposits interest rate remains almost same. Though the table shows the decreasing in interest, but it shows that spread between maximum and minimum rates expands up by 6% when it comes from 2006 to 2010. For 3 months time deposit rate, the maximum interest rate range was 1.5% to 4% in 2006 where as this rate reached to the range of 1.75% to 9.5% in 2010. Similarly the 6 months time deposit rates also shows the increasing tendency. The lowest range was 1.75% at the beginning but it reached to and became stable at 10% up to 2010. In case of 1 year's rate, the highest range rate fluctuates more than minimum range of same. From figure it is clear that, in 2006 the highest range rate was 5% but this rate rises up to 11.5% when it was 2010. But there was less fluctuation in minimum range i.e. it raises to 2.25% from lowest to 4.75%. At last, for 2 years and above interest rate, minimum ranges rise by 2.5% whereas the maximum range rise by 6.5% during 5 years Period.

For lending also, the table shows that average interest also rise during the 5 years period. But in case of lending there was wide range in maximum and minimum range. The range or spread of maximum rate and minimum rate was low in case of deposit. The lending rate was categorized in five parts: Industry, Agriculture, Export Bills, Commercial Loans and Overdrafts. Among all, the highest rate was for overdrafts. It was up to 14.5% per annum similarly the lowest lending rate was on export bills. It shows that, on past five years the interest rate of industry was around 11% on average. Similarly for Agriculture sector the average interest rate was 11%, 11%, 11.5%, 12% and 12%. This shows that the industrial lending rate was dearer when it reaches to 2010. For Export bills the average rate was 8%, 8%, 8%, 8.25% and 11%. For Commercial loans this average lending rate was 11%, 11%, 11%, 11% and 11.5%. For Overdrafts it was 10.5%, 10.5%, 10.5%, 11% and 12.5% respectively.

## 1.4 Statement of the problems:

Interest has direct relation with economic growth and development. According to economic theory (other things remain constant), low interest rate is impetus for high investment. And this high investment leads to high production, high employment, more income and ultimately growth in economy. So by this study it is going to explore: Does decline in interest rate increases the lending activities? Or what is the actual condition on this regard in Nepalese financial market place? If the condition is not as per theory then -what are the possible causes for such effects? Focusing on the Nepalese context, the investment is low in productive sectors due to unavailability of sufficient finance, security and other factors. Nepal's main export is basically raw materials. It means that Nepal is exporting raw materials instead of producing goods and services from these. If cheap financing is available, many factories could be established to

reap benefits from utilization of resources, which would increase the employment, standard of living and status of country economy.

In same manner, market interest rate is the sum of real rate plus inflation premium. But this may or may not occur in real practice. So this study is going to identify: Is there any positive relation of interest rate and inflation as per theory? Similarly, high interest rate is stimulus for high savings (deposits) but this may not the case in real world as people use to deposit more even in less interest rate due to security, convenience and other reasons. Thus through this thesis, it is going to discover: what is the relation of deposit and interest rate? Or Does substitution effect is truly applicable in Nepalese context.
More specifically, this study seeks to solve the answer for following questions.

1) Does ***substitution effect*** is practical in the context of Nepal or not? In other words what is the effect of high interest rate on savings (deposits)?
2) Are borrowers of Nepalese market sensitive to the interest rate of credit? Alternately, what is the relationship between interest rate and borrowing amount?
3) What is the magnitude of correlation between interest rate and inflation? In other words, does inflation has high positive or negative relation with interest rate in Nepalese context?

## 1.5 Objectives of the study:

The major objective of the study is to investigate the relation of interest rate with other three variables viz, Deposit, Inflation and Credit (Lending) that are currently prevailing in Nepalese market. Similarly this study also aims to identify whether the theories that are taught in university courses are applicable

or not in Nepalese context. To fulfill this main objective following sub-objectives have been formulated:

1) To explore the relation of interest rate with deposit amounts (existence of substitution effect) in Nepalese market. In other word, the objective is to find out, whether the deposit amount (saving) increases with increase in interest rate or not. i.e. **Substitution effect.**
2) To identify the sensitivity of interest rate to the investment (borrowing). In other word, the objective is to find out whether the **inverse relation of interest rate and investment** is true or not.
3) To find out the relationship of interest rate with inflation in Nepalese market. In other word, other motive for this study is to access the applicability of **"Fisher's effect"** of inflation in Nepal.
4) To suggest for the improvement on the basis of findings of the study.

## 1.6 Significance of the study:

Interest rates send price signals to borrowers, lenders, savers and investor. For example, higher interest rates generally bring forth a greater volume of savings and stimulate the lending of funds. Lower rates of interest on the other hand, tend to dampen the flow of savings and reduce lending activity but increases the demand for loan. Higher interest rates tend to reduce the volume of borrowing and capital investment and lower rates stimulate borrowing and investment spending.[4] Hence economic growth depends upon circulation of money and financial system facilitates it.

Similarly inflation is also another important factors in the financial market. All countries in the world have some magnitude of inflation. While this study is being conducted, the existing inflation rate in our country is around 5%. According to Irving fisher, inflation rate is added to real rate of return to

[4] Rose, Peter S.(1997), "Money and Capital Markets: Financial Institution and Instrumental in a Global Marketplace", Irwin, Chicago, 6th edition

determine the market interest rate. So higher the inflation, higher will be the interest rate.

But in real world, the aforementioned theory may not come true, especially for developing country like Nepal because, most of the theories of financial markets are determined by the studies which had been conducted on developed countries like USA, Great Britain and so on. So it is quite necessary to develop some ideas about the interest rate and its impact upon deposits, credit and inflation in the Nepalese context. By doing so, more knowledge can be achieved about the true pictures of Nepalese market. This study is also considered to be useful to various parties such as further researchers, students, teachers, financial institutions, general individuals etc.

## 1.7 Limitations Of the study:

As a master degree thesis this study certainly has limitation. This study is limited by followings:

1) Only one factors -interest rate- is taken for the study. Impact of other aspects (factors) besides interest has not been studied.
2) Stipulated time and resources also may have existed as limitation of this study.
3) Reliability of this study depends upon the accuracy of published data and the genuineness of respondent.
4) The samples have been drawn at random for convenience, so there may exit some sampling error. And the sample size may not be sufficient to generalize the findings.
5) This study covers only seven fiscal years.
6) The sample are taken only from commercial banks, other financial intermediaries are not included in the study.

## 1.8 Organization of the Study

This research has been organized in the manner below:

**Chapter I: Introduction:** The first chapter deals with introduction. This includes background, statement of problem, objectives of the study, significance of the study, limitations of the study.

**Chapter II: Review of Literature:** Second chapter presents review of available literature. It includes review, book, reports, journal, previous thesis etc.

**Chapter III: Research Methodology:** Third chapter explains the research methodology used in the study, which includes research design, sources of data population and samples, methods of data collection and analysis etc.

**Chapter IV: Presentation and Analysis of Data:** The fourth chapter presents the data collected different sources. Based on the data, analysis of liabilities will be performed.

**Chapter V: Summary, Conclusion and Recommendation:** The fifth chapter summaries, concludes the whole study and offers suggestions for further improvement.

After completion of these five chapters, a list of literature that reviewed earlier has been included alphabetically in bibliography. Likewise, data, information, calculation sheet etc will be incorporated in appendix.

# CHAPTER TWO

# REVIEW OF LITERATURE

## 2.1 Introduction:

A literature review is an essential part of all studies. It is a way to discover what other researchers have covered and left in the area. A critical review of the literature helps the researcher to develop a thorough understanding and insight into previous research works that relates to the present study. It is also a way to avoid investigation problems that have already been definitely answered. Thus a literature review is the process of locating, obtaining, reading and evaluating the research literature in the area of the student's interest[3]. The purpose of literature review is to find out what research studies have been conducted in one's chosen field of study and what remains to do. The primary purpose of literature review is to learn not to accumulate. It enables the researcher to know[4].

◦ What research has been done in the subject?

◦ What others have been done in the study?

◦ What theories have been advanced?

◦ The approach taken by the other researchers

◦ Area of agreement or disagreement

◦Whether there are gaps that can fill through the proposed research?

## 2.2 Conceptual Review

2.2.1.1 Meaning of Interest:

[1] Howard K. Wolff and P.R. Pant (2005), Social Science research and Thesis writing, Buddha Academic publishing and distributors, Kathmandu, Nepal

[2] Ibid

The interest rate is the price of money; the price of renting the use of the resources that money commends for a specified by the free interplay of supply and demand in a market economy. The price of the money, the interest rate, plays a vital role in the allocation of resources and in the decision making of consumers and business. For example, an increase in the interest rate provides additional incentives for individuals and others to postpone current consumption (save) and thereby free resources for investment. Government policies intended to expand the volume of saving should aim at increasing the attractiveness of saving by increasing the return to saving – the interest rate.

#### 2.2.1.2 Theories of Interest:

In financial markets there are numerous interest rates exists. These differences are due to the risk premium associated with the issuer. Even securities issued by the same borrowers often carry a variety of interest rates. In this section, we focus upon those basic forces that influence the level of different interest rates.

To uncover these basic rate-determination forces, however, we must make a simplifying assumption. We assume in this chapter that there is one fundamental interest rate in the economy known as the pure or real rate of interest which is the component of all interest rates. The closest approximation to this pure rate in the real world is the market yield on the government bonds minus inflation. The rate of interest on Treasury bond is called risk free rate of interest which consists of real rate of interest plus premium for inflation. It is a rate of return presenting no risk of financial loss to the investor and representing the opportunity cost of holding idle cash, because the investor can always invest in no risk bonds and earn this minimum rate of return. Once pure rate of interest is determined, all other interest rates may be determined from it by examining the expected future inflation and special characteristics of the securities issued by individual borrowers. For example, only the government

can borrow at risk-free interest rate; other borrowers pay higher rates that due to the greater risk of loss attached to their securities. Difference in liquidity, marketability and maturities are other important factors causing interest rate to differ from the pure or risk free rates[5]

In this study mainly four theories of interest are reviewed. They are:

## THE CLASSICAL THEORIES OF INTEREST RATES[6]

This is one of the oldest theories concerning the determinants of pure or risk-free interest rate. It was propounded during the 18th and 19th century by a number of British economists and elaborated by Irving Fisher in 1930. The classical theory argues that the rate of interest is determined by two forces: 1) the supply of savings, derived mainly from households and 2) the demand for investments capital coming mainly from the business sector.

**Saving by Households:**

Generally most of the saving in modern industrialized economies is carried out by individual and families. For these households, saving is simply abstinence from consumption spending. Current savings, therefore, are equal to the difference between current income and current consumption expenditures. In making the decision on the timing and amount of saving to be done, households typically consider several factors: the size of current and long-term income, the desired savings target, and the desired proportion of income to be set aside in the form of savings (i.e. the propensity to save). Generally, the volume of household savings rises with income. Higher-income families and

[3] Rose, Peter S.(1997), "Money and Capital Markets: Financial Institution and Instrumental in a Global Marketplace", Irwin, Chicago, 6th edition.

[4] Ibid p.p. 193, 194, 195, 196

individuals tend to save more and consume less relative to their total income than families with lower incomes.

Although income levels probably dominate saving decisions, interest rate also plays an important role. Interest rates affect an individual's choice between saving and current consumption. The classical theory of interest assumes that individual have a definite time preference for current over future consumption. A rational individual, it is assumed, will always prefer current enjoyment of goods and services over future enjoyment. Therefore, the only way to encourage an individual or family to consume less now and save more is to offer a higher rate of interest on current savings. If more were saving in the current period at a higher rate of return, future consumption and future enjoyment would be increased. The classical theory considers the payment of interest as a reward for waiting the postponement of current consumption in favor of greater future consumption. Higher interest rate increase the attractiveness of saving (and future consumption) for some quantity of current consumption. This so-called **substitution effect** calls for a positive relationship between interest rates and the volume of savings. Higher interest rates bring forth a greater current volume of savings. If the rate of interest in the financial markets rises from 5 to 10 percent, the volume of current savings by households is assumed to increase from $ 100 to $200 billion[7]

**Saving by Business Firms:**

Not only households, but also businesses save and direct a portion of their savings into the financial markets to purchase securities and make loans. Most businesses hold savings balances in the form of retained earnings (as reflected in their equity or net worth accounts). In fact, the increase in retained earnings reported by business each year is a key measure of the volume of current

[7] Ibid p.p. 193

business saving. And these retained earnings supply most of the money for annual investment spending by business firms. The volume of business saving depends on two key factors: the level of business profits and the dividend policies of corporations. These two factors are summarized in the retention ratio, the ratio of retained earnings to net income after taxes. This ratio indicates the proportion of business profits retained in the business for investment purposes rather than paid out as dividends to the owners. The critical element in determining the amount of business savings is then the level of business profits. If profits are expected to rise, business will be able to draw more heavily on earnings retained in the firm and less heavily on the money and capital markets for funds. The result is a reduction in the demand for credit and a tendency toward lower interest rates. On the other hand, when profits falls but firms do not cut back on their investment plans, they are forced to make heavier use of the money and capital markets for investment funds. The demand for credit rises and interest rates may rise as well. Although the principal determinant of business saving is profits, interest rates also play a role in the decision of what proportion of current operating costs and long-term investment expenditures should be financed internally and what proportion externally. Higher interest rates in the money and capital markets typically encourage firms to use internally generated funds more heavily in financing projects. Conversely, lower interest rates encourage greater use of external funds from the money and capital markets.

**Saving by Government**

Governments also save, though less frequently than households and businesses. In fact, most government saving (i.e. a budget surplus) appears to be unintended saving that arises when government receipts unexpectedly exceed the actual amount of expenditures. Income flows in the economy (out of which government tax revenues arise) and the pacing of government spending

programs are the dominant factors affecting government savings. The total supply of fund is sum of above three elements as SS on figure no 2-1.

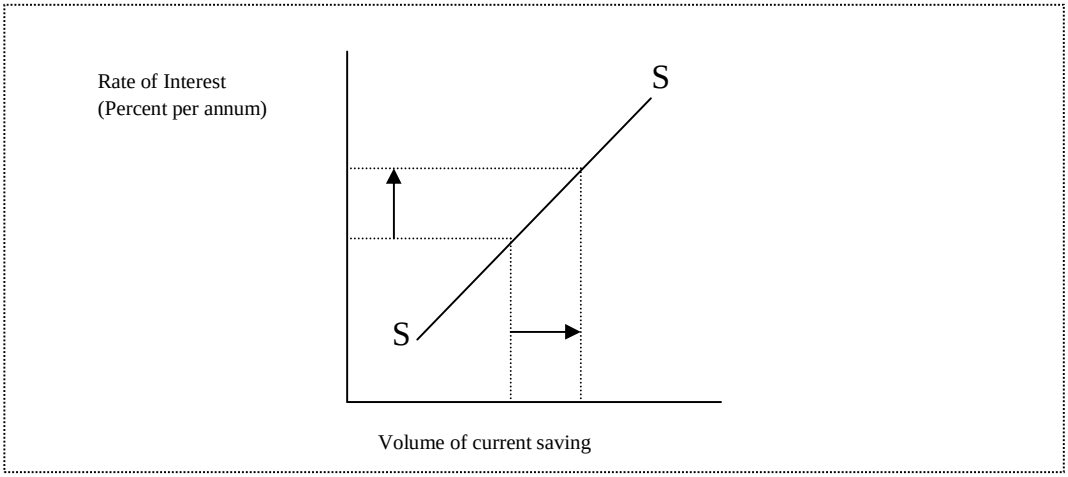


Fig No 2-1: The substitution effect relating saving and interest rates

**The demand for investment funds:**

The savings made by business, government and households are important determinants of interest rate but they are only one side of determinants. The factor is investment spending, made by business firms, government and in some case households. Business requires huge amounts of funds each year to purchase equipment, machinery and inventories and to support the construction of new buildings and other physical facilities. The majority of business expenditures for these purposes consist of what economists call replacement investment. But according to the classical economist, interest rate and invest able fund have inverse relationship. At low rates of interest, more investment projects become economically viable. On the other hand, if the rate of interest rises to high levels, fewer investment projects will be pursued and fewer funds will be required from the financial markets as figure no 2-2.

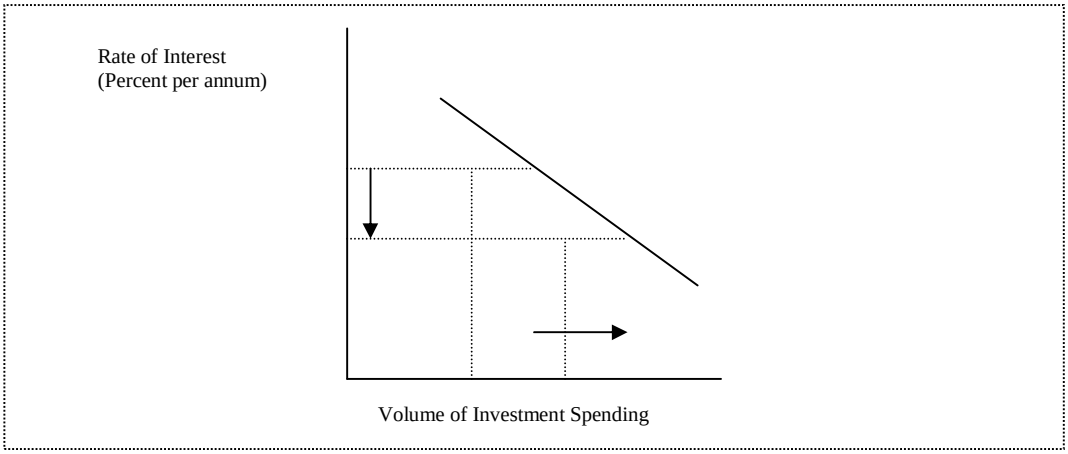


Fig No 2-2: The Investment Demand Schedule

## The Equilibrium Rate of Interest in the Classical Theory of Interest:

According to the classical economists, the interest rates in the financial markets were determined by the interplay of the supply of saving and the demand for investment. Specifically, the equilibrium rate of interest is determined at the point where the quantity of savings supplied to the market is exactly equal to the quantity of funds demanded for investment. To support this in figure no 2-3 this occurs at point E where the equilibrium rate of interest is $i_E$ and the equilibrium quantity of capital funds traded in the financial markets is $Q_E$.

The market rate of interest moves towards its equilibrium level. However, supply and demand forces change so fast that the interest rate rarely has an opportunity to settle in at a specific equilibrium level. At any given time, the rate is probably above or below its true equilibrium level but moving towards that equilibrium. If the market rate is temporarily above equilibrium, the volume of savings exceeds the demand for investment capital creating an excess supply of savings. Savers will offer their fund at lower and lower rates until the market interest rate approaches equilibrium. Similarly, if the market rate is temporarily below equilibrium, investment demand exceeds the quantity

of savings available. Business firm will bid up interest rate until it approaches the level at which the quantity saved equals to quantity of funds demanded for investment purpose.

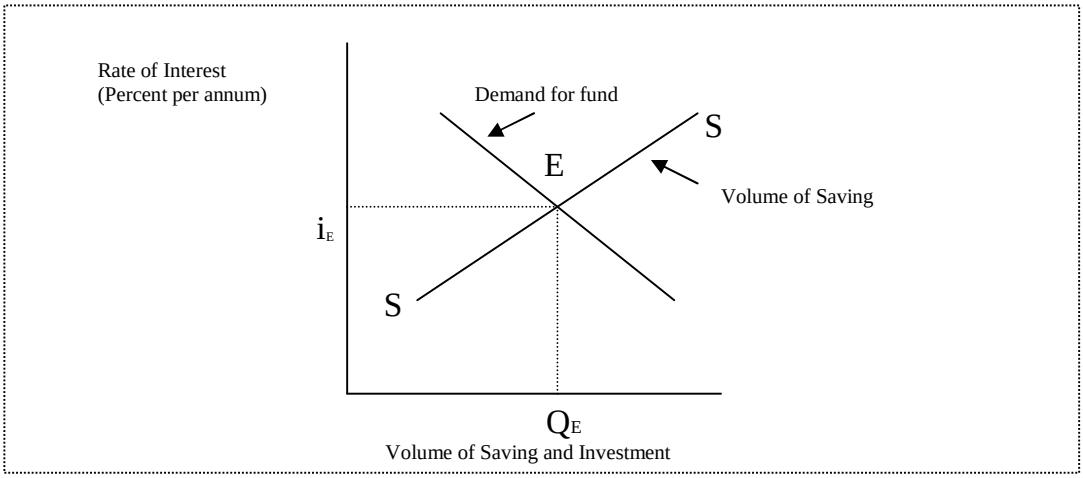


Fig No 2- 3: The Equilibrium rate of interest in the classical Theory

## THE LONABLE FUND THEORY:

In this theory, the main theme is the supply and demand for loanable funds (i.e. lending & borrowing) determines the interest rate. This explanation emphasizes the flow of funds by suppliers of loanable funds (lenders) and the flow of funds by the demanders of loanable funds (borrowers). It is a monetary theory of interest since it focuses on the financial factors that influence interest rates (i.e. borrowing and lending). In addition, the loanable fund theory is a short-run, partial equilibrium explanation in which some factor or factors produce a change in the interest rate, but there is no analysis of the long-run impact of this change in the interest rate on the level of employment, income, and production of the resulting impact of changes in employment, income and production on the interest rate. Rather, the loanable fund theory focuses on the factors that underlay the supply and demand schedules for loanable funds and on their interaction.

**Supply of Loanable Funds:**

The major sources of supply of loanable fund are from two sources: 1) The amount of saving by households, business, governments and 2) The amount of new money created by the commercial banking system.

**Saving:**

Saving refers to the postponement of current consumption. The decision to save is the decision to forgo current consumption in order to have a larger quantity of consumption in the future.[8] Individual or household save for a variety of reasons but there is little evidence to suggest that the quantity of loanable funds supplied through saving is clearly influenced by the level of the interest rate. A higher interest rate represents a greater reward to the saver for postponing current consumption and thus might be expected to produce a higher quantity of saving for some individuals. In general case, the quantity of savings supplied by individuals is principally determined by the level of income and it is influenced to a lesser degree by the level of interest rates.

Business saving refers to the net income after taxes of the firm, less any cash dividends i.e. retained earnings. There is little reason to believe that the volume of saving at business firm is strongly influenced by the level of interest rates.

For governments, the volume of saving is defined as the difference between revenues and expenditures such that saving exists when revenues exceed expenditures (a budget surplus).

To summarize, saving (the postponement of current consumption) may be done by households, business, and governments. The volume of saving of each of

[8] S. Kerry Cooper & Donald R. Fraser, (1983), The financial marketplace, Addison wesky publication p.160

these units is influenced by a variety of factors of which the interest rate is one. As a result, we might expect that the relationship between the interest rate and the volume of saving. For example, at an interest rate of r, the volume of saving would be Q, where as the higher interest rate of r', the volume of saving would be only a slightly higher Q'. The responsiveness of saving to change in interest rates is quite small.

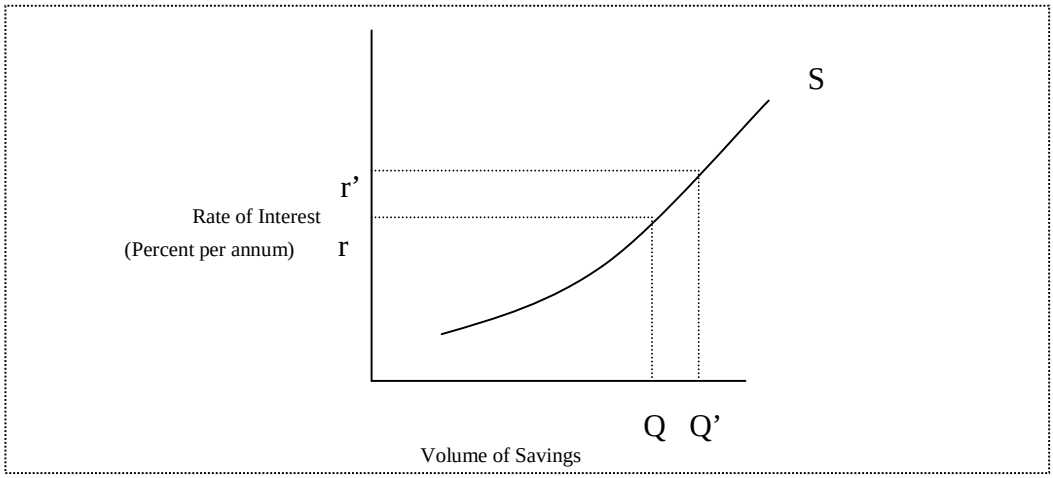


Fig no 2-4: The interest rate and volume of savings

**New Money:**

Although the volume of saving is the principal source of loanable funds in financial markets, the supply of the loanable funds may be increased through the creation of new money beyond the amount made possible by current saving. The amount of new money created is determined jointly by the actions of the commercial banking system and the central bank. Commercial banks use any excess reserves to make loans and purchase securities and create money (demand deposits) through the credit creation process. However, the ability of commercial bank to create money is limited by the central bank through the use of its monetary policy tools like open-market operations, reserve requirement changes, and discount rate changes.

There is little evidence that either the central bank or commercial banks are substantially influenced in the money creation process by the level of interest rates. The principal factor that determines the volume of new money created by the banking system is the amount of reserves, and the principal factors that determines the amount of reserve is central bank monetary policy. Neither of these factors should be directly influenced by the level of interest rates. We may therefore draw the relationship between the amount of new money created and interest rate as show in figure 2-4. The volume of new money supplied is Q and at the higher interest rate r', the amount of new money created is the same Q. Essentially, change in the money supply are determined by factors other than the interest rate.

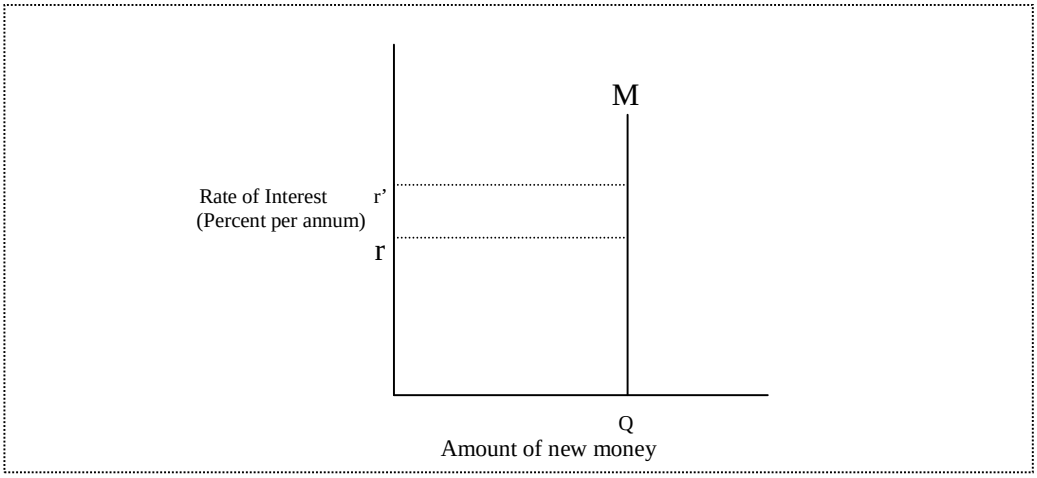


Fig No 2-5: The Supply of Loanable Funds

In summary, the supply of loanable fund is the sum of the supply of savings and the amount of new money created. This supply schedule of loanable fund may be increased by either an increase in the desire to save by business, households or governments or by the creation of more new money by commercial banking system. Conversely, the supply of loanable funds may fall

because of a reduction in the desire to save of a reduction in the amount of new money created.

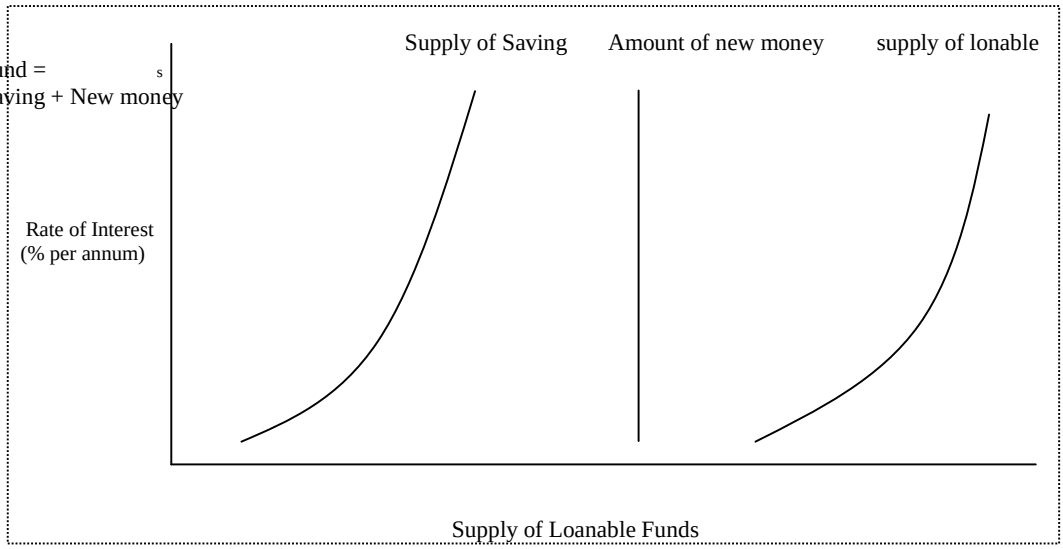


Fig No 2-6: Total Supply of Loanable Funds

**The Demand for Loanable Fund:**

The demand for loanable fund is composed of the demand by individual, business and governments.

**Consumer Demand:**

Domestic consumers demand loanable funds to purchase a wide variety of goods and service on credit. Recent research indicates that consumers are not particularly responsive to the rate of interest whey they seek credit but focus instead principally on the non price terms of a loan, such as the down payment, maturity and size or installment payments. This implies that consumer demand for credit is relatively inelastic with respect to the rate of interest. Certainly a rise in interest rate leads to some reduction in the quantity of consumer demand for loanable fund (particularly when home mortgage credit is involved)

whereas a decline in interest rates stimulates some additional consumer borrowing. However, along the consumer's relatively inelastic demand schedule, a substantial change in the rate of interest must occur before the quantity of consumer demand for funds changes significantly.

**Domestic Business Demand:**

The credit demands of domestic business generally are more responsive to changes in the rate of interest than in consumer borrowing. Most business credit is for such investment purposes as the purchase of inventories and new plant and equipment. As noted earlier in our discussion of the classical theory of interest, a high interest rate eliminates some business investment projects from consideration because their expected rate of return is lower than the cost of funds. On the other hand, at lower rates of interest, many investment projects look profitable with their expected returns exceeding the cost of funds. Therefore the quantity of loanable funds demanded by the business sector increases as the rate of interest falls.

**Government Demand:**

Government demand for loanable funds is a growing factor in the financial markets but doesn't depend significantly on the level of interest rates. Government decision on spending and borrowing depends in response to social needs and the public welfare, not the rate of interest. Moreover in case of central government, it has the power both to tax and to create money to pay its debts. State and local government demand on the other hand, is slightly interest elastic because many local governments are limited in their borrowing activities by legal interest rate ceilings. When open market rates rises above these ceilings, some state and local governments are prevented from offering their securities to the public.

**Total Demand for Loanable Fund:**

The total demand for the loanable fund is the sum of domestic consumer, business and government credit demands. These demand curve slopes downward and to the right with respect to the rate of interest. Higher rate of interest lead some businesses, consumers and governments to curtail their borrowing plans; lower rates bring forth more credit demand.

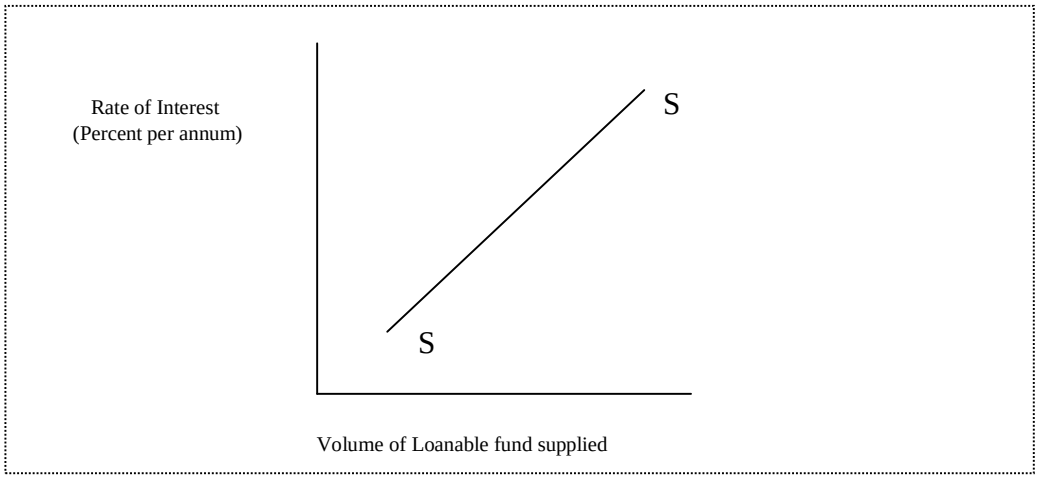


Fig No 2-7: The Supply of Loanable Funds

**The Equilibrium Rate of Interest in the Loanable Funds Theory:**

Two forces of supply and demand for loanable funds determine not only the volume of lending and borrowing in the economy but also the rate of interest. The interest rate tends towards the equilibrium point at which the supply of loanable funds equals the demand for loanable funds. If the interest rate is temporarily above equilibrium, the quantity of loanable funds supplied by domestic savers and foreign lenders, by banking system, and from the dis-hoarding of money exceeds the total demand for loanable funds and the rate of interest will be bid down. On the other hand, if the interest rate is temporarily below equilibrium, loanable funds demand will exceed the supply. The interest rate will be bid up by borrowers until it settles at equilibrium once again.

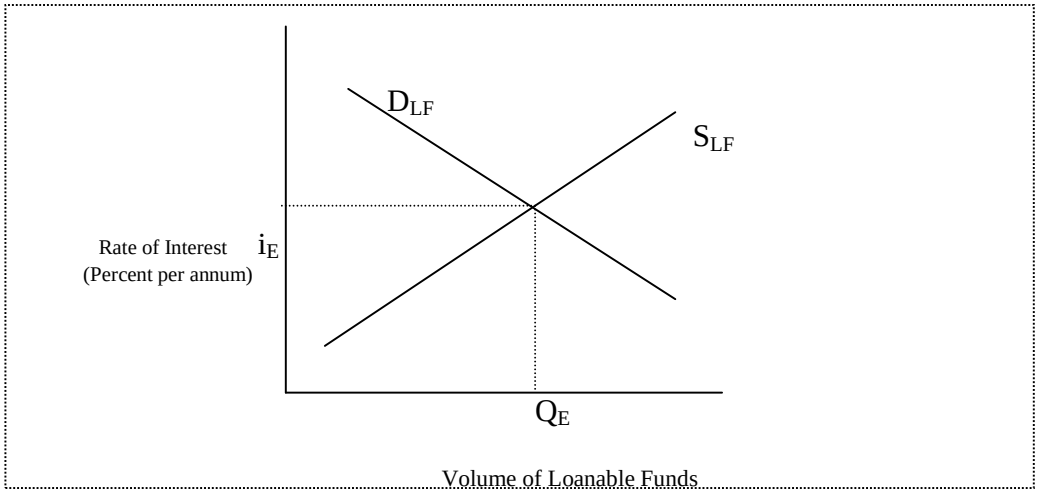


Fig No 2-8: Equilibrium rate of Interest in loanable funds theory

**THE LIQUIDITY PREFERENCE THEORY OF INTEREST RATE:**

The loanable funds approach to interest rate determination focuses on supply and demand for loanable fund. An alternative approach the liquidity preference view focuses instead on the supply and demand for money. It is assumed that individuals inherently prefer money among all financial assets since money can be used to make payments and is thus the most liquid assets. Wealth holders are persuaded to hold financial assets other than money only because these non-money assets offer an interest return greater than between the yields by money. Further, the greater the spread between the yields on non money financial assets and money, less the demand for money holdings and greater the demand for other financial assets and vice versa. The demand schedule for money can thus be depicted as a function of the rate of interest as shown in figure 2-9.

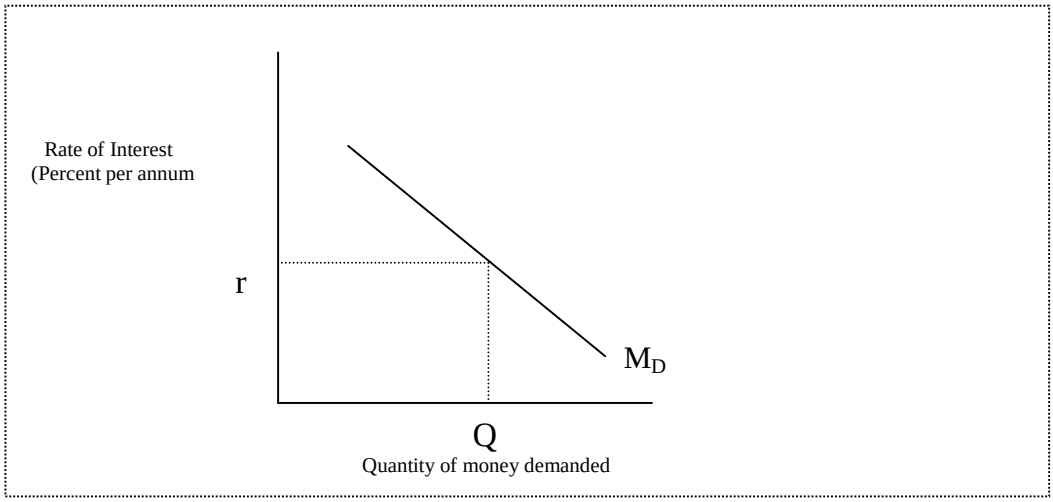


Fig No 2-9 The demand for money ($M_D$) as a function of the rate of interest

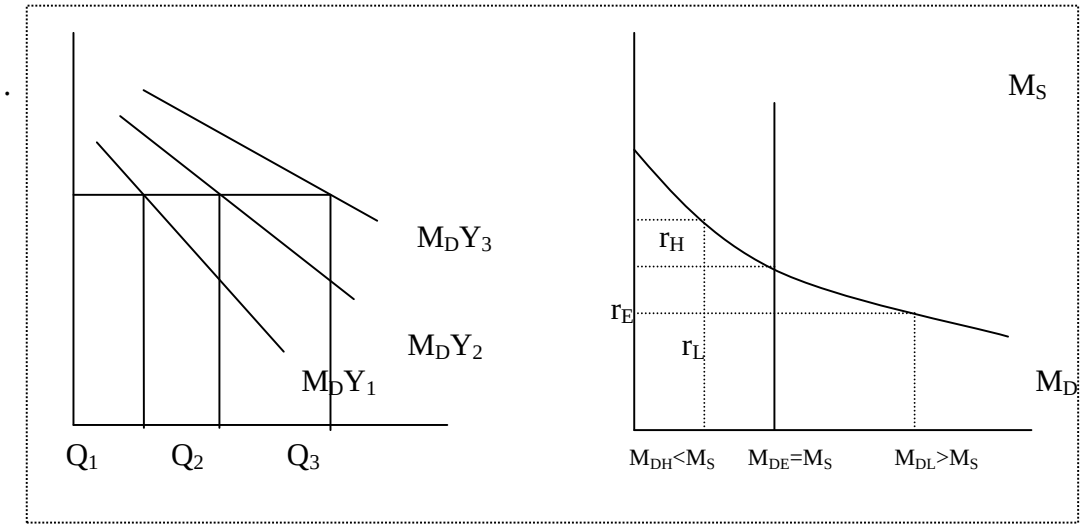


Fig 2-10: Quantity of Money Demanded Fig 2-11: Quantity of Money Demanded

Thus the greater the income, the greater will be the quantity of money demanded at a given rate of interest and vice versa. The relationship is depicted in figure number 2-10 where $M_DY_1$, $M_DY_2$, $M_DY_3$ represent the demand for

money at the successively higher income level $Y_1$, $Y_2$ and $Y_3$. Thus for a given income level, say $Y_2$ and a given money supply the rate of interest ($r_E$) is viewed as determined by the supply-demand equilibrium depicted in fig 2-11 where $M_S$ is the supply of money. The equilibrium interest rate $r_E$ is obtained by action of individuals seeking to maintain desired levels of cash balances. Since the amount of desired money holdings is a function of the rate of interest, there is only one rate of interest at which the demand for money balances is the same as the amount of the money supply. At a rate of interest higher than $r_E$ , say $r_H$ in fig no 2-11 individual in the aggregate will be holding more money ($M_S$) than they desire $M_{DH}$ at that rate of interest (the total supply of money must be held by the public.) To rid themselves of "excess" cash, individual purchase interest-bearing financial assets, driving their prices up and their interest rate down. This occurs until the rate of interest falls to $r_E$ at which $M_{DE} = M_S$

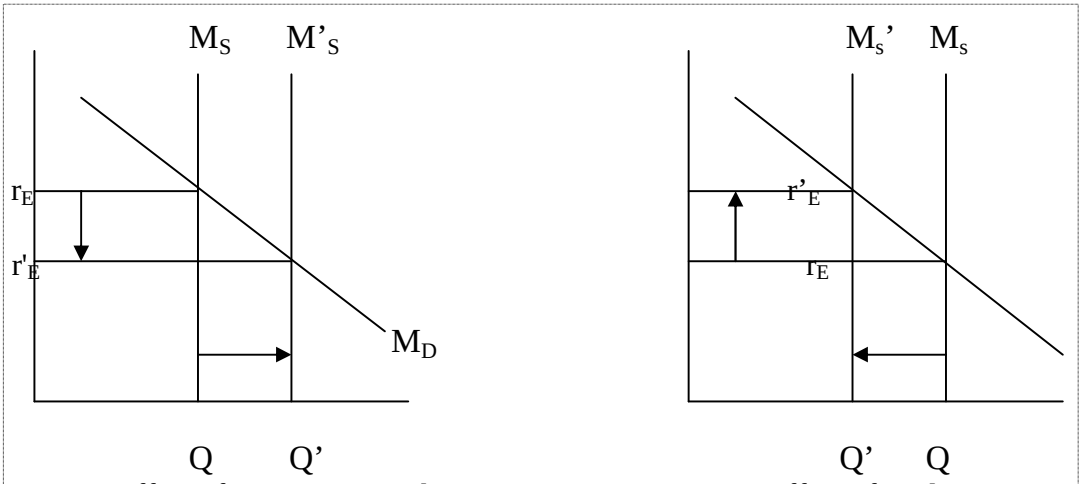


Fig 2-12: Effect of an increase in the money

Fig 2-13: Effect of an decrease in the money

The outcome of course, is that public still holds, in the aggregate, the same amount of money but at the lower rate of interest, this is now the desired amount. On the other hand, if the interest rate is lower than $r_E$ say $r_L$ in figure no 2-11 the public will be holding smaller money balance($M_S$) that they desire

($M_{DL}$) at that rate of interest. As a result, in order to obtain more cash in this situation individuals sell interest-bearing securities, the aggregate effect of which is lower security prices and higher interest rates. The interest rate will thus rise to $r_E$ at which point desired cash holdings equal the supply of cash.

A principal aspect of the liquidity preference model is that changes in the money supply affect the rate of interest. In the liquidity preference framework, with income and the price level assumed to be constant, an increase in the money supply will lower $r_E$ the equilibrium rate of interest (fig 2-12) and a decrease in the money supply will raise $r_E$ (fig 2-13).

In summary, when the money supply is $MS_1$ the rate of interest is $r_1$. As the money supply expands to $MS_2$ and $MS_3$, the rate of interest falls to $r_2$ and $r_3$ respectively. The process by which interest rates falls as $M_3$ expands can again be interpreted in terms of public preference for money holding relative to other financial assets such as interest bearing securities. For example, as in figure 2-14, when the money supply expands from $MS_1$ to $MS_2$ individual find themselves holding larger cash balance than they desire at interest rate $r_1$. As they seek to reduce money holdings by purchase of security, security price rise and interest rate fall until a new equilibrium is established at interest rate $r_2$ where $M_D=M_S$.

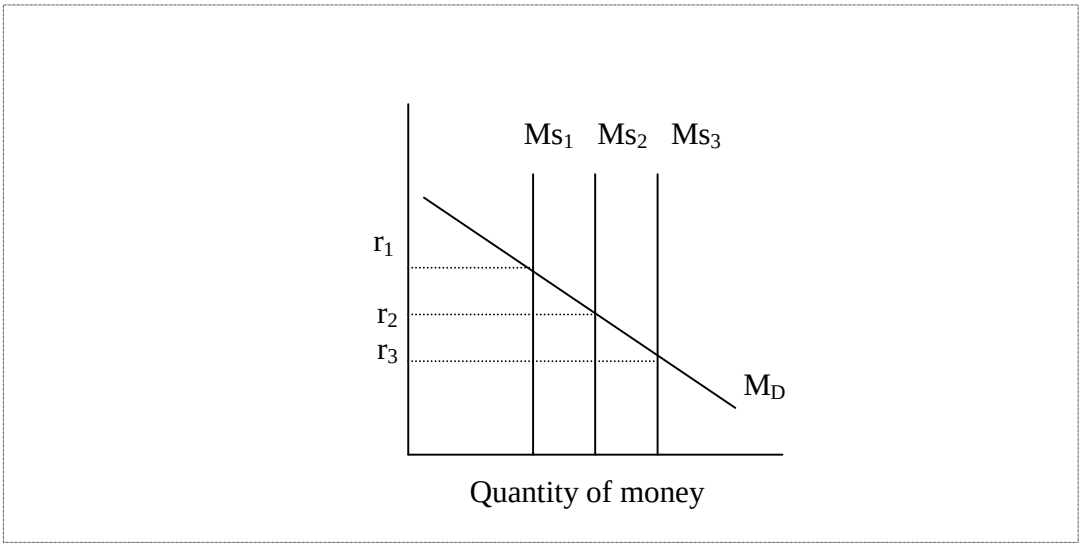


Fig- 2-14: Money supply and interest rate

## THE RATIONAL EXPECTATION THEORY:

This theory is new to the financial market so it is in still development stage. The main theme of this theory is that "money and capital markets are highly efficient institutions in digesting new information affecting interest rates and security prices."[9] This theory assumes that equilibrium interest rate depends upon the change in investor's expectation regarding future security prices and return. Investor's decision towards the borrowing and lending funds come from the availability of new information. When new information appears about investment, saving or the money supply, investors begin immediately to translate that new information into decision to borrow and lend funds. So rapid is the process of the market digesting new information that security prices and interest rates presumably impound the new data from virtually the moment they appear. In the absence of new information, next period's interest rate will be equal to current periods interest rate. In other words, the knowledge of past interest rate will not be a reliable forecast of future interest rate. In a perfect efficient market it is impossible to win excess returns continuously by trading on publicly available information.

The important assumptions and conclusions of the rational expectation theory are that[10] 1) the price of securities and interest rates should reflect all available information and the market uses all this information to establish a probability distribution of expected future prices and interest rates 2) change in rates and security prices are correlated only with unanticipated information 3) the correlation between rates of return in successive time periods is zero 4) no unexploited opportunities for profit can be found in the securities' markets 5)

[9] Rose, Peter S.(1997), "Money and Capital Markets: Financial Institution and Instrumental in a Global Marketplace", Irwin, Chicago, 6th edition p. 211
[10] I.bid. P. 211

transaction and storage costs for securities are negligible and information costs are small relative to the value of securities traded and 6) expectation concerning future security prices and interest rates are formed rationally and efficiently.

If the money and capital markets are highly efficient in the way we have described, this implies that interest rates will always be at or very near their equilibrium levels. Any deviation from equilibrium rate dictated by demand and supply forces will almost instantly eliminate security trader who hope to consistently earn windfall profits from correctly guessing whether interest rate are "too high" (and therefore will probably rise) are unlikely to be successful in the long run. Interest rates fluctuations around equilibrium are likely to be random and momentary. If market participants were expecting increased demand for credit (with supply unchanged), an unexpected announcement of reduced credit demand implies lower interest rates in the future. Similarly, a market expectation of less credit demand in the future (with supply unchanged) when confronted with an unexpected announcement of higher credit demand, implies that interest rate will rise.

We can illustrate the foregoing points about the rational expectation theory of interest by modifying the loanable funds theory of interest so that its demand and supply schedules reflect not just actual demand and supply but also the expected demand for and supply of loanable funds. The figure no 2-15 depicts the equilibrium rate of interest under rational expectation theory. '$D_o$' and '$S_o$' reflect the actual demand and supply of loanable funds in current period, while '$D_f$' reflects the actual demand for loanable funds that will prevail in the next future time period. The supply of loanable funds is assumed to be the same in both time periods, ($S_O$=$S_f$).

Now imagine that during the current period, the government makes an unexpected announcement of its increased need to borrow more money in future period 'F' but as viewed by borrowers and lenders today in time period '0'. In this case, the equilibrium interest rate in the current period will not be '$I_0$', but rather '$I_e$', where the expected demand curve '$D_e$' intersects the actual supply curve '$S_o$'. The equilibrium quantity of loanable funds traded in the current period then will be '$C_e$' not '$C_o$'. This is because, according to the rational expectation theory, borrowers and lenders will act as rational agents, using all the information they posses (including expected events) to price financial assets today. When the future period arrives, the equilibrium interest rate will rise to rate '$I_f$' then quantity of loanable funds traded will be '$D_f$'. The equilibrium rate moves upward because the demand for loanable funds in period 'f' is more than the expected future loanable-funds in period 'F' is more than the expected further loanable-funds demanded as seen by market participants in period 'o'. Suppose, on the other hand, the actual loanable-funds demanded in period 'F' increases upward and beyond '$D_o$' but by a smaller amount than was anticipated by investors in the market in period 'o'.

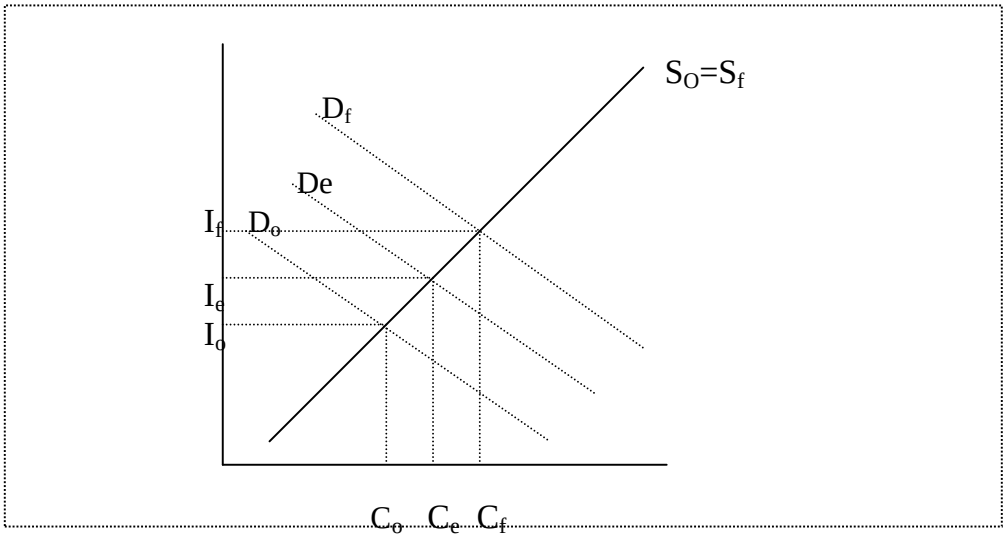


Figure 2-15: Equilibrium interest rates under rational expectation theory

Demand schedule '$D_f$' would then fall somewhere between '$D_o$' and '$D_e$'. The equilibrium interest (with supply curve unchanged) would be lower than i.e. laying somewhere between 'Io' and 'Ie'

### 2.2.1.3. Functions of Interest rate in the economy:

The interest rate has opposite relation with the value of financial assets. It means that if the interest rate increases, the value of assets decreases and vice versa. This concept is very useful for the valuation of the investable securities. Besides this there are some important functions that interest plays in the economy.[11]

- ❖ It helps guarantee that current savings will flow into investment to promote economic growth.
- ❖ It rations the available supply of credit, generally providing loanable funds to those investment projects with the highest expected returns.
- ❖ It brings into balance the supply of money with the public's demand for money.
- ❖ It is also important tool of government policy to stimulate or discourage saving and investment through its influence on the volume of saving and investment. If the economy is growing too slowly and unemployment is rising, the government can use its policy tools to lower interest rates in order to stimulate borrowing and investment. On the other hand, an economy experiencing rapid inflation has traditionally called for a government policy of higher interest rates to slow both borrowing and spending.

[11] I. bid p 193

### 2.2.1.4 Change in interest & its effect upon value of an asset:

The price of the security and its yield (rate of interest) has inverse relationship. It means that a rise in yield implies a decline in price; conversely, a fall in yield is associated with a rise in the security's price.

The investing funds in financing assets can be viewed from two different perspectives, the borrowing and lending of money or the buying and selling of securities. Similarly the equilibrium rate of interest from the lending of funds can be determined by the interaction of the supply of loanable funds and the demand for loanable funds. Demanders of loanable funds (borrowers) supply securities to the financial marketplace and suppliers of loanable funds (lenders) demand securities as an investment. Therefore, the equilibrium rate of return or yield on a security and the equilibrium price of that security are determined at one and the same instant and are simply different aspects of the same phenomenon, the borrowing and lending of loanable funds.

This can be cleared with the help of figure. The fig 2-16 and 2-17 show the demand and supply curves for both the rate of interest and the price of securities. The supply of loanable funds curve (representing lending) in the interest rate diagram 2-16 is analogous to the demand for securities curve (also representing lending) in the price of securities diagram 2-17. Similarly the demand for loanable funds curve (representing borrowing) in the interest diagram is analogous to the supply of securities curve (also representing borrowing) in the price of securities diagram.

We note in figure 2-17 the borrowers are assumed to issue a larger volume of securities at a higher price and that lenders will demand more securities at a lower price. In figure 2-16, on the other hand, borrowers demand a smaller

quantity of loanable funds at a higher interest rate, while the lenders supply fewer loanable funds at a lower interest rate. The equilibrium interest rate in

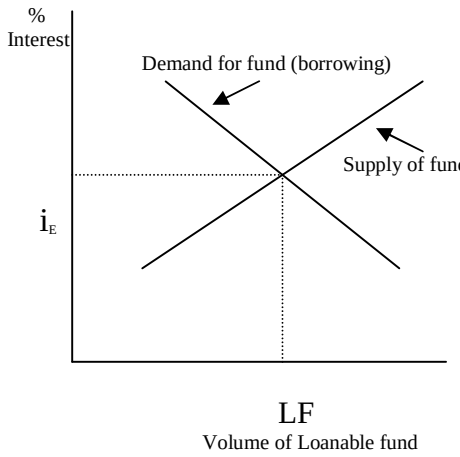


Figure 2-16: interest rate determination

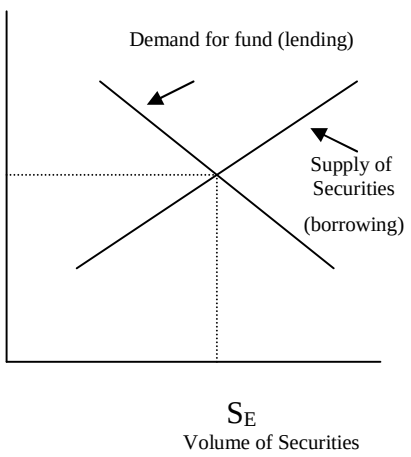


Figure 2-17: Security price etermination

figure number 2-16 is determined at a point $i_E$ where the demand for loanable funds equals the supply of loanable funds. Similarly, in figure 2-17, the equilibrium price for securities lies at point $p_E$ where the demand for and supply of securities are equal. Only at the equilibrium interest rate and equilibrium security price will both borrowers and lenders be content with the volume of lending and borrowing taking place in the financial system.

The inverse relationship between interest rates and security prices can be seen quite clearly when we allow the supply and demand curves of figure 2-16 and 2-17 to change. For example, suppose that in the face of continuing inflation, consumers and business firms accelerate their borrowings, increasing the demand for loanable funds. The demand for loanable curve slides upward and to the right with the supply of loanable funds unchanged. This increasing demand for loanable funds also means that the supply of securities must expand by a shift in the supply curve. Both a new loanable equilibrium price for securities and a higher equilibrium interest rate for loanable funds result.

Conversely, suppose that consumers decide to save more, expanding the supply of loanable funds. Then the supply of loanable funds curve slide downward. But with more savings, the demand for securities curve must rise, sliding upward as those added savings are invested in securities. The result is a rise in the equilibrium price of securities and a decline in the equilibrium interest rate.

### 2.2.1.5 Factors influencing the difference in interest rates:

Though it is assumed deposit increases as interest increases but interest rate is affected by numerous factors. In real world, different financial institution quotes different interest rate. It means that the same types of instrument carries different interest rate so there is presence of interest spread. For this difference there are numbers of factors influencing the difference in interest rates.[12]

1) Credit or default risk
2) Marketability or liquidity risk
3) Call or prepayment risk
4) Servicing costs
5) Exchange rate risk
6) Taxability

**1) Credit of Default Risk:**

Credit or default risk involves the potential that a saver will receive less principal and interest on the financial claim that the contract specifies. Default risk is related to the probability that some or all of the initial investment will not be returned. The degree of default risk is closely related to the financial

[12] Thygerson, Kenneth J. (1993) Financial markets and institutions, Harper college publisher, New York, p.38

condition of the company.[13] Credit risk requires making estimates of the potential for loss. This probability is then converted into an interest rate premium, the credit or default risk premium and added to the saver's required nominal yield. Typically, the securities issued by the government, (esp. T-bills), are considered to be credit risk free.

**2) Marketability Risk:**

Marketability is the capability of being sold quickly at low transaction cost.[14] Marketability risk deals with the degree of difficulty in being able to convert a financial claim into cash at its most recent transaction price or very close to it. Savers who purchase investments with poor marketability expect to be compensated for the lack of marketability. This represents an additional interest spread and is referred to as the marketability or liquidity risk premium.

**3) Call or prepayment Risk:**

Some financial claims offer the borrower the right to repay the principal debt prior to maturity, on financial claims like bond, these provision are referred to as call provision. On financial claims such as home mortgage and installment auto loans, they are called pre-payment provisions. These provisions are options. The borrower has the option to call or prepay the debt. The investor in the financial claim that is callable or subject to repayment accepts risk. The risk is that if interest rates fall, the borrower will call the bond or prepay the mortgage. The investor receiving the cash funds that he or she cannot reinvest it at an interest rate as high as the rate on the previous investment. This risk is called a call or prepayment risk. The compensation that investors demand to

[13] Cheney, John M & Moses, Edward A., Fundamental of Investment, West publishing company, New York. P 38

[14] Kohn, Meir, (1999)Financial Institution and markets, Tata McGraw Hill publishing, New Delhi, P. 174

accept this risk is an additional interest spread reoffered to as the call option premium.

**4) Servicing cost:**

Some financial claims are difficult to service. This means that the process of collecting interest and principal payments providing accurate records or monitoring the ongoing credit position of the borrowing involves considerable operating costs. Lenders must be compensated for the servicing costs. This cost is included in the interest rate charged and is referred to as the servicing cost[15]

**5) Exchange Rate Risk:**

As our financial markets have become more global, there has been a significant growth in the borrowing and investing in foreign denominated financial claims. A Nepalese company establishing a manufacturing facility in Belgium might be inclined to issue bonds denominated in Belgium francs rather than Nepali Rupees. Investors also have available to them many investments that are denominated in foreign currencies. This transaction involves exchange rate risk. This risk relates to the potential that the rate of exchange between the domestic currency and foreign denominated currency will change as a result of any number of factors. The primary risk for the borrower is that the value of the domestic currency. This results in an unexpected cost on the international loan. Since the loan would have to be repaid in the foreign currency that has risen in value relative to the domestic currency. This potential change in currency values must be reflected in computing the cost of borrowing.

**6) Taxability:**

The final factor influencing the change in interest rate is taxability. Financial claim income is typically subject to taxation. Since the value of a financial

[15] Thygerson, Jenneth J, P 40

claim is based on its anticipated cash flow, taxation acts to reduce those cash flows. Not all incomes are taxable equally.

### 2.2.2.1 Concept of Deposit:

Deposit is a sum of money lodged with a bank, discount house or other financial institution[16]. Deposit is nothing more than the assets of an individual which is given to the bank for safe-keeping with an obligation to get something (interest) from it. To a bank these deposits are liabilities. Commercial bank Act 2031 (1974) defines "Deposits" as the amount deposited in a current, savings or fixed accounts of a bank or financial institution. [17] The deposits are subject to withdrawals by means of cheques or on a short notice by customers. There are several restrictions on these deposits, regarding the amount of deposit, number of withdrawal etc. They are used more as investments and hence they earn some interest. The rate of interest varies depending on the nature of the deposits. The bank attracts deposits from customers by offering different rates of interest and different kinds of facilities. Though the bank plays an important role in influencing the customer to part with his funds and open deposit accounts with it, it is ultimately the customer who decides whether s/he should deposit his surplus funds in current deposit a/c, saving deposits or fixed/time deposit a/c. Bank deposits arise in two ways. When the banker receives cash, it credits the customer's account, it is known as a primary or a simple deposit. People deposit cash in the banking system and thereby convert one form of money, cash, into another form, bank money. They prefer to keep their money in deposit accounts and issue cheques against them to their creditors. Deposits also arise when customers are granted accommodation in the form of loans. When a bank grants a loan to a customer it doesn't usually pay cash but simply

[16] Shrestha Manohar K & Bhandari, Dipak B, Financial Markets and Institutions, Asmita Books Publishers & Distributors, putalisadak, Kathmandu, P. 281

[17] Bhandari, Dilli Raj, (2003), Banking and Insurance Principle & Practice, Aayush Publictation, Kathmandu, p. 73

credits the customers account with the amount of loan. Of course, there is nothing that prevents the borrower from withdrawing the entire amount of borrowing in cash but quite often s/he retains the amount with the bank in a deposit.

### 2.2.2.2 Types of Deposit

There are different types of deposits. But for this study, major three types of deposit are taken. They are:

**Current Deposit:**

A current deposit is a running account with amounts being paid into and drawn out of the account continuously. These accounts are also called demand deposits or demand liabilities since the banker is under an obligation to pay money in such deposits on demand. The account never becomes time barred, because the limitation does not run until a demand is made by the customer on the bank for the payment of deposit. These accounts are generally opened by business houses, public institutions, corporate bodies and other organization whose banking transactions are numerous and frequent. As these deposits are payable on demand, banker is obliged to keep larger cash reserves than are needed in the case of fixed and savings deposits. This type of account is just a facility offered by the bank to its customers. So such deposit doesn't yield any interest return.

The deposit in which an amount is immediately paid at the time of any account holder's demand is called demand deposit.[18] Its transaction is continual & a very small portion of such deposit can be invested in the productive sector. Though the bank cannot gain significant profit by investing it in new sector,

[18] I.bid

this is one of the facilities given to the customer. Therefore, the bank doesn't give interest on this account. For this study this types of deposit is not suitable.

**Saving Deposit:**

According to Commercial Bank Act 2031 (1974) saving account means "An account of amounts deposited in a bank for savings purposes." The saving deposit bears the features of both of the current and fixed period's deposits. Saving accounts are mainly meant for non-trading customers who have some potential for saving and who don't have numerous transactions entering their account. While opening the account the minimum compensating balance differ according to the banks rule. Similarly there is also divergence as to how much amount of money can be withdrawn. But if the customers want to withdraw more money from the bank which is not allowed by it but if s/he gives pre-information to the banks, s/he can withdraw more money. The bank fixes the minimum and maximum amount of withdraw able through a cheque from this deposit. If the bank goes into liquidation, priority is given to the saving deposit than current and fixed deposits while repaying the liabilities.

**Fixed Deposit:**

Fixed deposits constitute a very important resource for banks as bank need not keep greater reserve in respect of such deposits. Under the commercial Bank Act 2031 (1974), "Fixed account means as account of amounts deposited in a bank for certain period of time." The customers opening such account deposit their money in the account for a fixed period. Usually, only the person or institution who wants to gain more interest opens such type of account. High interest rate is paid to this deposit as compare to saving deposits. The bank and the customer can take benefit from this deposit. The bank invests this money on the productive sector and gains profit and the customer too can be made his financial transaction stronger by getting more interest from this deposit. The

principal amount with interest must be returned to the customer after expiry of fixed time.

In England these deposits are repayable subject to a period of notice and hence known as time deposit or time liabilities means that these are withdraw able subject to a period of notice and not on demand.[19] Fixed deposit receipt is not transferable by endorsement and certainly not negotiable. However the debt covered by the fixed deposit receipts can be assigned. Bank generally gives loans up to 90% of the deposit against the security of the deposit. For this bank charge some interest higher than the interest allowed on the deposit.

### 2.2.2.3 Importance of Deposit:

Deposit arises from saving. An individual's income equals consumption plus saving. S/he deposits the saved part of income in the bank and gets interest from it. Banks in turn lend this money and earn profit by charging high interest rates. And the borrowers from banks, invests this fund in productive sectors yielding more return than the borrowed interest. This investment leads to create new employment opportunity in the economy. Ultimately due to new employment the purchasing power of the economy increases and finally GDP and growth of the country occurs. It means that the deposit has very important role in the economy. There is a direct relationship between deposit of banks and the investment in the economy. If the volume of deposit is low, the investment in the economy also lags behind due to lack of resources. The deposit of banks is the accumulated capital which can directly be invested. There is a great need of such deposit in the developing countries. Deposit includes the idle money of the public, bank being the inter-mediator to accept this sort of money and help to chanalize this in productive sector. So the importance of banks and financial intermediaries is larger in present context.

[19] Radhaswamy, M. & VasuDevan S. V, (1979), Text book of bank, S chand & company Ltd, New Delhi, P.72

### 2.2.3.1 Concept of Lending (Credit):

Another important function of commercial bank is to provide different types of loans or credit. The word 'credit' means 'trusting'. In credit transaction the lender (or banks) must have confidence in the borrower that s/he will be able to repay the money. In credit transactions, the creditor turns over to the debtor to repay an equivalent amount usually money in future plus as added sum called interest. In other words the commercial bank earns profit by lending the amount in terms of loan or credit and in return it gets interests. Banks loan are classified as: A) Loans and advances, b) Overdrafts c) cash credit d) discounting of bills and so on.[20] But besides this, the other forms of credit are: Bills of Exchange, cheques, Drafts, Promissory Note, Letter of Credit (LC), Travelers' cheque, Treasury Bills (T-Bills), Book Credit e.t.c.

If credit is made to the government the credit is known as public credit and if credit is transacted by the private for his own purposes the credit becomes private. There are certain distinctions between public and private credit. Bank credit refers to the credit taken by the banks. Bank is the major source of credit to both private and public debtor. Sometimes bank also take credit. There is another type of credit know as investment credit and commercial credit which can be divided according to the purposes of using credit. The former refers to the credit which is used for investment and the latter for trade purposes. Similarly, another classification is consumer's credit and producers' credit. The latter type of credit is the advances made to individuals firms, companies and governments, which are used to facilitate the carrying on of the various branches of utility creation.

[20] Shrestha Manohar K & Bhandari, Dipak B, Financial Markets and Institutions, Asmita Books Publishers & Distributors, putalisadak, Kathmandu, P 255

### 2.2.3.2 Factors affecting the volume of Lending

The volume of credit within a country depends upon different factors. For this study only the effect of interest rate is taken into consideration and other factors are not considered. Some of the factors affecting the volume of credit are as follows:

**1) Credit (Lending) Rate:**

If the bank credit rate is very high then, the volume of credit expansion is less and vice versa. It means that volume of credit and interest rate of credit has inverse relation. People invest very little in productive sectors when the interest rate is high in the market economy.

**2) Rate of Return:**

If the rate of return is high people inclined to invest more. People earn more profit and they become able to afford higher rate of interest along with timely repayment of loan.

**3) Investment Opportunity:**

If the investment opportunity within the country is high, the volume of credit becomes high. The basic thing for investment stimulation is easy and cheap credit etc.

**4) Pace of Financial Development:**

If there are enough banking facilities to provide loans in easy terms, the volume of credit may be high. It is due to the lack of cheap money lenders that rural people are deprived of loan. If the banking facilities within the nation is expanded, the volume of credit rises.

**5) Basic Infrastructure:**

Like transportation, marketability, availability of raw materials also plays an important role in raising the volume of credit in the country.

**6) Political Condition:**

Political condition, especially political in-stability, is also one of the major causes of low volume of credit. In such a case none would like to risk his capital in new ventures. The present condition of the country is the glaring example of this.

In addition to aforementioned point, other factors like trade condition, currency condition are also the factors affecting the volume of credit.

### 2.2.4.1 Concept of Inflation:

Inflation in common sense is increment in general or average price level in the whole economy. It means that it is the increase in general price level, not the increase in individual prices. Inflation is not a temporary fluctuation in price but it is a sustained and appreciable increase in price[21]. Due to the increase in general level in price, the value of purchasing power of money declines as there is an inverse relationship between the general level of price and value of money. According to Economist Crowther "Inflation means a state in which the value of money is falling i.e. prices are increasing." Inflation is a general rise in prices across the economy. This is distinct from a rise in the price of a particular good or service. Individual prices rise and fall all the time in a market economy, reflecting consumer choices and preferences, and changing

[21] Joshi, Shyam, (2056), Micro and macro Economic Analysis, Taleju Pustak Bitarak, Kathmandu, p. 364

costs. If the price of one item - say a particular model of car - increases because demand for it is high, we do not think of this as inflation. Inflation occurs when most prices are rising by some degree across the whole economy[22].

During inflation, the cost of living increases rapidly, so inflation severely hurts the people who depend on the income from fixed income securities like bonds, and preferred stock. Similarly as purchasing power of money falls as well as the **debtors** gain, and the **creditor** loses.

Inflation has severe social, political and economic effects. Hence, some like to call it 'worst than taxes' and 'legal robbery.' During last 30- 40 years, almost all countries of the world have experienced some degree of inflation. For example, Germany, Russia, Austria in 1920s and Hungary, Romania, China and again Germany in 1940s had experienced the strain of hyper-inflation. Inflation brings political instability. According to Milton Friedman the rise of Hitler was due to hyper-inflation. Today each and every nation of the world is suffering from the economic evil of inflation. The trend of rising prices has the general phenomenon of every country. The most developed and industrialized countries have adopted various method like credit control via bank interest rate, checking money supply and various other price control policies yet they have not been able to remain aloof from this disease. On the other hand the developing nations who have much less sufficient type of economy are suffering severely from both domestic as well as imported inflation.

If the rate of increase in money incomes overcomes the rate of increase in production, there is excess purchasing power in the hands of public. Inflation is reflected in high prices and increased imports.

[22] http://www.bankofengland.co.uk/targettwopointzero/inflation/whatsInflation.htm

There are many theories regarding how inflation occurs in an economy. Some of these theories are demand-pull inflation, cost-push inflation, wage-push inflation etc. similarly there are various methods of checking inflation, such as, government spending, taxes which lie under fiscal tool of checking inflation and higher reserve requirements, open market operation etc. which lie under the monetary method of checking inflation. But these are not going to be discussed here because these are not the concern of our present study.

### Inflation in Nepal:

According to the "National Urban Consumer Price Index", published by Research Department of Nepal Rastra Bank, the inflation rate on different fiscal years are as follows (Table 2-1).

***Table no 2-1: CPI and Inflation Rate during last five FY***

| FY | Overall Index | |
|---|---|---|
| | Index | % Change |
| 2004/05 | 161.8 | 4.5 |
| 2005/06 | 174.7 | 8.0 |
| 2006/07 | 185.9 | 6.4 |
| 2007/08 | 200.2 | 7.7 |
| 2008/09 | 226.7 | 13.2 |
| 2009/10 | -- | 10.5 |

Source: NRB Research Department.

### 2.2.4.2 **Inflation and Interest Rates**:

Inflation occurs when the average price level in the economy rises. Interest rates represent the "price" of credit. Are they also affected by inflation? The answer is yes. There is positive correlation between interest rates and inflation.

In other words, increase in inflation increases the interest rates. But the exact effect of inflation on interest rate is not identified yet. On this regards, there are many theories. Here in this case, mainly two theories are going to be discussed.

## The Nominal and Real Interest rates:

Before exploring the **relationship between inflation and interest rates**, several key terms must be understood. In this connection one should be familiar with nominal rate and real rate of interest. The **nominal rate** is published or quoted interest rate on a security or loan. These rates are the actual rates that are used to transact with the customers. In other words, "nominal rate of return are money rates of return that are not adjusted for the effect of inflation"[23] For example an announcement in the financial press that major commercial banks have raised their prime lending rate to 10 percent per annum indicates what nominal interest rate is now being quoted by banks to their best customers. [24]. Similarly, the real interest rate is the return to the lender or investor measured in terms of its actual purchasing power. In a period of inflation, of course, the real rate will be lower than the nominal rate. An investment's real rate of interest during some period is calculated by removing the rate of inflation from the nominal return i.e. by using following equation:

$$(1+\text{rr}) = \frac{(1+r)}{(1+q)}$$

Where

rr = real rate of return

r = nominal rate of return

q = inflation rate

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[23] Francis, Jack Clark, Investment analysis and management, eleventh edition, post graduate publication, p 438.

[24] Rose, Peter S.(1997), "Money and Capital Markets: Financial Institution and Instrumental in a Global Marketplace", Irwin, Chicago, 6th edition p. 240

## The Fisher Effect:

Economic theory tells us that interest rates reflect expectations about likely future inflation rates. In countries where inflation is expected to be high, interest rate also will be high, because investors want compensation for the decline in the value of the money. This relationship was first formalized by economist Irvin Fisher and is referred to as the Fisher effect.[25] According to Fisher effect, nominal interest rate is related to the real rate by the following equation:

Nominal interest rate = Expected real rate + Inflation Premium + (Expected real rate ×Inflation Premium)

According to Fisher, the cross-product term in the above equation (i.e. Expected real rate ×Inflation Premium) is often eliminated because it is usually quite small except in countries experiencing severe inflation. So the fisher's equation can be written as

Nominal Interest Rate = Expected real rate + Inflation Premium

Clearly, if the expected real interest rate is held fixed, changes in nominal rate will reflect shifting inflation premium. It means that if inflation premium increases then nominal rate also increases. But this does not necessarily means that an increase in expected inflation automatically increase nominal interest rates. There are several different views on this matter but according to Fisher expected rate of return tends to be relatively stable over time because it depends on such long term factors as the productivity of capital and the volume of savings in the economy. Therefore, a change in the inflation premium is likely to influence only the nominal interest rate, at least in the short run. The nominal rate will rise by the full amount of the expected increase in the real rate of inflation.

[25] Shrestha Manohar K & Bhandari, Dipak B, Financial Markets and Institutions, Asmita Books Publishers & Distributors, putalisadak, Kathmandu, P 176

If this view, known today as the Fisher effect, is correct, it suggests a method of judging the direction of future interest rate changes. To the extent that a rise in the actual rate of inflation causes investors to expect greater inflation in the future, higher nominal interest rates will soon result. Conversely, a decline in the actual rate of inflation may cause investors to revise downward their expectations of future inflation, leading to lower nominal rates. This will happen because, in an efficient market, investors will be compensated for the risk of expected changes in the purchasing power of their money.

## The Harrod-Keynes Effect of Inflation:

There is another view about **inflation-interest rate relationship** propounded originally by British economist Sir Roy Harrod. This view conflict with that of Fisher's effect. It is based upon the Keynesian liquidity preference theory of interest rate. Harrod argues that the real rate will be affected by inflation but the nominal rate need not be. Following the liquidity preference theory, the nominal interest rate is determined by the demand for and supply of money. Therefore unless inflation affects either the demand for and supply of money, the nominal rate must remain unchanged regardless of what happens to inflationary expectations. According to this principle, Harrod argues that a rise in inflationary expectations will lower the real rate of interest. In liquidity preference theory, the real rate measures the inflation-adjusted return on bonds. However, conventional bonds, like money, are not a hedge against inflation, because their rate of return is fixed by contract. Therefore, a rise in the expected rate of inflation lowers investors' expected real return from holding bonds. If the nominal rate of return on bonds remains unchanged, the expected real rate must be squeezed by expectations of rising prices.

### 2.2.4.3 Tools to measure Inflation:

There is no completely satisfactory way to summarize the price changes that have occurred over a given time period for the large number of goods and services available in the country. Nevertheless, the government has attempted to do so by measuring the cost of specific mix of major items (a basket of goods, consisting of specified quantities and qualities of various items of food, clothing, housing and health care products bought by the average urban household.[26]) at various point of time. The "overall" price level computed for this representative combination of items is termed as cost-of-living index. The percentage change in this index over a given time period can be viewed as a measure of the inflation that took place from the beginning of the period to the end of the period.[27]

Similarly most governments compute a number of alternative price indices in order provide a wider choice for analysis. Nevertheless, many people tend to focus on one index as an indicator of the price level .Generally, in most of the countries, Consumer price Index, CPI, is used as this tools to calculate the inflation rate. The percentage change in the CPI over time measures the rate of inflation, as shown below in equation. The inflation rate is denoted by q.

$$q = \frac{CPI_1 - CPI_0}{CPI_0}$$

Where $CPI_1$ = Consumer price index of period 1

$CPI_0$ = Consumer price index of period 0

Nepal Rastra Bank too, uses CPI as the tools to measure inflation in the country taking 1995/96 fiscal year as base index.

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[26] Francis, Jack Clark, Investment analysis and management, eleventh edition, post graduate publication, p 438

[27] Sharpe W.F., Alexander G.J., Bailey J.V. Investments, sixth edition, Prentice Hall of India, New Delhi, 2003, p. 322

## 2.3 Review of Unpublished Thesis:

Prior to this study, there are very few thesis and research papers submitted to the libraries of Tribhuvan University and its wing colleges on the same topics. But beside this, there are some other theses which are related to this study to some extents. The review and the extract from them are presented in this section.

A study by **Kishore Khatri Chettri's** on "Interest rate structure and its relation with deposits, inflation and credits in Nepal"[28], 1995, tried to identify the relationship of interest rate with three other factors, deposit, credit and inflation. Though this study has similar topic as of Mr. Chettri's but some of his objectives were different than this study. According that thesis, the objectives were:

- To present a concrete picture of the interest rate structure in Nepal.
- To predict the relationship between interest rate and other economic variables like deposit, inflation and credit flow in Nepal.
- To analyze the impact and implementation of the policy of interest rate of Nepal Rastra Bank.
- To provide suggestions and recommendations for improvement in the rate structure in Nepal.

Keeping above mentioned objectives, Mr. Chettri found that interest rate is the important explanatory variables to influence the volume of real deposits and the variables like inflation and the real income are not significant variable to influence the volume of real deposits.

[28] Chettri, Kishor khatri, "Interest rate structure and its relation with deposits, inflation and credit in Nepal", an unpublished M.A. economics thesis, T.U. Kathmandu.

Similarly, he found that rate of interest is directly affected by the rate of inflation. For loan rate of interest and loan amount, he found that loan rate of interest also affects the credit flows. It means that they have inverse relationship but rate of interest doesn't have so much influence upon credit flows like that of deposit rates on deposits.

Finally in his conclusion, he found that deposit depends upon numerous factors besides income, inflation and interest rates. If other variables are kept constant, the institutional interest rate is the important explanatory variable to influence the volume of deposit in Nepal. It means that, at the time of disseminators study, i.e. during 1995s, increase in the deposit interest rates increases the volume of deposit. Similarly the relationship with income and inflation could not come significant. According to him, the fixation of attractive interest rates on deposits has been responsible for the substantial growth in the volume of deposits in recent years. In the same manner for inflation, he has concluded:

"The inflation within the country is very high since few years. In fact the prices in Nepal are affected by the movement in Indian price level than by domestic monetary expansion. Prices in Nepal are linked with Indian because of the 500 miles open boarder and the availability of Indian goods and currency. There is no consolidated type of money and capital markets in Nepal. Commercial bank branches are concentrated in the urban areas. Regarding deposit mobilization in the present context the urban area has occupied more than 80% and the flow of credit is also centralized only in urban areas. On the other hand, the volume of deposits have overcome the volume of credit which means to say that banks are not getting new investment opportunities."

Finally the relationship between credit flow and loan rates was found out to be negative. If the loan rate of interest is concessional, there is the possibility of raising investment and thus the volume of credit.

Another study was made by **Sashi Bhatta** on 2002 in the topic "Interest Rate and its effect on Deposit and Lending"[29]. In this study, the disseminator tries to portrait the relation of interest rate with deposit and lending amount. Her findings and the findings made by Mr chettri are seems to be different. According to Mr chettri's finding, all the relation matches with the theory but Mrs Bhatta's finding on deposit was not as per theory. But other matters are same as Mr Chettri's. The conclusion drawn by Mrs Bhatta is:

- Deposit rates of all sample banks under study are in decreasing trend; meaning that every year deposit rates of sample banks under study have decreased.
- Lending rates of all sample banks under study are also in decreasing trend; means that every year lending rates of sample banks under study have decreased.
- Analysis shows that interest rates on lending are far higher than deposit rates of sample banks. The correlation coefficient between these two variables, (deposit rate and lending rate) of sample banks comes highly positive.
- The simple correlation coefficient between deposit rate and deposit amount of sample banks were highly negative. But out of them, correlation coefficient analysis of one sample bank is found to be negative. It means that in that case the theory doesn't match the analysis. So writer conclude that the result appears in that study was different than the theory.
- The correlation analysis between lending rate and lending amount of all sample banks under study comes highly negative. This relation between two variables (lending rate and lending amount) of sample banks matches with the theory which says with the increase in lending rate,

[29] Bhatta, Sashi, "Interest Rate and its effect on Deposit and Lending", an unpublished M.B.S thesis, T.U. Kathmandu.

lending amount decreases and vice-versa. So she concluded that lending rate is the most important determinant of loan and advances of all commercial banks. This makes clear that borrower's seem more interest conscious.

Finally her conclusion about her study, in her own words, as follow:

> "There is significant relationship between deposit rate and deposit amount and lending rate and lending amount of almost all commercial banks except one. Test of significance for correlation coefficient between inflation rate and deposit and lending rate shows that these variables are not correlated."

A study made on the topics "Determinants of Interest Rates in Nepalese Financial Markets"[30], by **Mr. Jhabindra Pokharel** (2004) also give some ideas about the interest rates in Nepalese markets. Though, this thesis tried to identify the factors that shape the interest rates in Nepalese markets, it also tried to explore the relationship between the interest rate, deposits, credit rates and inflation. Among different objectives, some objectives that match to this study are:

- To show the relationship between the liquidity position and interest rate on deposit and lending.
- To identify the effect of inflation on interest rate charged and offered by various Nepalese financial institutions.
- To identify the different methods used by Nepalese financial institutions to calculate interest on lending.

During the study, Mr. Pokharel found similar result as discovered by the Mrs. Bhatta. According to Mr. Pokharel, the major findings of the study are:

[30] Pokharel, Jhabindra, "Determinants of Interest Rates in Nepalese Financial Markets", an unpublished M.B.S thesis, T.U. Kathmandu.

The correlation coefficient between interest rate on deposit and amount of deposit collected of all sample organizations were highly negative. It means that, deposit amount of all sample banks are found to increase even if the interest rate of deposit, the attracting factors for deposit, is decreasing. This is against the theory. According to theory, there must be positive relationship. Similarly in case of lending rate and lending amount, Mr. Pokharel found the result as suggested by the theory. It means, the correlation coefficient between amount loaned and interest rate on lending of 10 sample bank is found to be highly negative. In other words, negative coefficient of other organizations means that more amounts is demanded at lower interest which means that when demand increases, price (interest rate on lending) also increases.

Similarly considering about the relationship between interest rate on deposit and on lending for all sample banks, disseminator found it to be highly positive correlated. In his own words, it is "Variation in one rate also brings variation in another rate in same direction." Therefore it is concluded both interest rate are determining factor of each other.

In same manner, the researcher explored that the relation between interest rate on deposit and inflation rate is little positive. Theoretically there should be positive correlation between these two variables. Due to little positive correlation, it is concluded that the interest rate in Nepalese Financial market is affected by inflation rate to some extent. Similarly the same result is obtained when it is tried to explore the relationship between lending rate and inflation rate. It means, theoretically there should be a positive and perfect relationship between them. Practically, the researcher found it but the degree of positive correlation is somewhat less. So on this the researcher concluded that "Interest rate on lending in Nepalese Financial Market is affected by inflation only to some extent." Finally, the relationship of interest rate on lending with risk-free

rate is both positive and negative. It means that interest rate on lending in Nepalese Financial Markets in not affected by risk-free rate of interest.

**Narendra Bahadur Rajbhandary**, 2005, conducted a study on "The Interest Rate Structure of Commercial Banks in Nepal"[31]. The objective of his study was to show the relation of interest rate with saving and fixed deposits; with loans and advances and with interest earning (i.e. interest received on loan minus interest paid on deposits.)

His analysis concludes that the time deposits are positively and significantly correlated with the interest rates. There is significant correlation between the saving deposits and the rate of interest. Fixed deposit is more sensitive to the interest rate revision done by NRB. The correlation between the growth of fixed deposits and the interest rate particularly from 2000 to 2005 is most significant. But the relation between the interest rates and the loan and advances is less significant. Among all the sectors, the private sector seems most sensitive to interest rate change. Most of the loans too correlated positively if absolute cumulative figures are taken. But the growth rate of total loans and advances except investment on HMG securities is negatively correlated more with the weighted average rate of interest since 2004. The growth of loans to private sector is also negatively correlated with interest rate since 2001. Negative correlation between loans and interest rate meant that loans decrease at higher interest rate and vice-versa.

The net interest earning is depended upon interest coverage. The total interest received and the total interest paid significantly correlated in the case of both

[31] Rajbhandary, Narendra B., "The Interest Rate Structure of Commercial Banks in Nepal", an unpublished M.A economics thesis, T.U. Kathmandu.

of the banks i.e. Nepal Bank Limited and Rastriya Banijya Bank, the sample organizations of the study. He is in view that NRB can well monitor the credit flow and profits of the commercial banks in Nepal by manipulating the rates of interest. It can also manipulate the demand for and supply of money.

Another study conducted by **Shree Krishna Shrestha** in 2007 upon the title of "Interest Rate and its Impact upon Resource Mobilization and Utilization"[32] is also seems to be relevant to review here. Since his study is too old, interest rate at that time was purely the central bank's phenomenon. In this study, it has concluded that the frequent change in interest rates was disliked by customers except changing the interest rates as directed by NRB. Shrestha suggested the commercial banks to quote stable rates as far as possible. He also recommended that the method of calculating interest should be used in such a way that the previous customers and depositors who are already involved in banking transaction should not be affected adversely. He also suggested to charge high interest rate on loan to luxurious goods as in unproductive sectors and a lower rate on productive and small scale industries.

**Deepak Raj Bhandari**, 2008, in his study entitled "The Impact of Interest Rate Structure on Investment Portfolio of Commercial Banks of Nepal"[33] has concluded followings:

i) Rates of commercial banks have been fluctuating. Deposits and lending rates were increased immediately after liberalization of the interest rate on August 31, 2008 but however, started to decline which have helped in increasing the credit flow.

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[32] Shrestha Shree Krishan, "Interest Rate and its Impact Upon Resource Mobilization and Utilization" an unpublished M.A economics thesis, T.U. Kathmandu.

[33] Bhandari Deepak Raj, "The Impact Of Interest Rate Structure on Investment Portfolio of Commercial Banks of Nepal" an unpublished M.B.S thesis, T.U. Kathmandu.

ii) Interest rate structure has direct influence on profitability of commercial banks. Decreasing lending rate helps to increase the profitability through increasing the credit.

iii) Deposits are more interest rate conscious and positively co-related.

iv) Loans and advances of commercial banks have been found to be continuously increasing with the decline in interest rates.

v) Effective interest rate structure helps in proper utilization of resources as measured by loan to deposit ratio.

vi) Most of the banks are having similar interest rate structure which lessens the importance of liberalization of interest rate.

Another Study conducted by **Neeta Dangol** in 2008 on the "Impact of Interest Rate on Financial Performance of Commercial Banks"[34] concludes:

i) Most of the commercial banks contradict the general financial theories.

ii) The relation between amount of deposits and interest rae on deposit, in general concept, must be positive. But deposits are increasing despite the decrease in the general level of interest. The result of such phenomenon is that there are fewer investment opportunities for the banking sectors as well as general investors.

iii) The relation between total amount of loan and the lending rate is negative and significant. However, the change in the total amount of loan flow is not proportionate with the change in the lending rate.

iv) Correlation between interest rate and inflation is not significant.

[34] Dangol, Neeta, "Impact of Interest Tate on Financial Performance of Commercial Banks" an unpublished M.B.S thesis, T.U. Kathmandu.

v) Not only interest rate is responsible to shape the profitability of banks but also the operating efficiency also has major influence on it.

**Yam Lal Bhoosal**, carried out a study entitled "An Analysis of Causes of Inflation in Nepal"[35] in 2009. He has shown the relationship of inflation with various factors like growth rate, Indian Inflation and price level, income level, cost of holding money, deficit financing. But all of these, he didn't mentioned any relationship of inflation with interest rate.

## 2.4 International Articles Related to this Subject:

**Inflation: Inflation and Interest Rates**[36]

Whenever it is hear the latest inflation update on the news, chances are that interest rates are mentioned in the same breath. In the United States, interest rates are decided by the Federal Reserve. The Fed meets eight times a year to set short-term interest rate targets. During these meetings, the CPI is one significant factors in the Fed's decision. Interest rates directly affect the credit market (loans) because higher interest rates make borrowing more costly. By changing interest rates, the Fed tries to achieve maximum employment, stable prices, and a good level growth. As interest rates drop, consumer spending increases and this in turn stimulates economic growth.

Contrary to popular belief, excessive economic growth can in fact be very detrimental. At one extreme, an economy that is growing too fast can experience hyperinflation, resulting in the problems already mentioned earlier.

[35] Bhoosal, Yam Lal, "An Analysis of Causes of Inflation in Nepal" an unpublished M.A. thesis, T.U. Kathmandu.

[36] http://www.investopedia.com/pdf/tutorials/inflation.pdf

At the other extreme, an economy with no inflation has essentially stagnated. The right level of economic growth, and thus inflation, is somewhere in the middle. It's the Fed's job to maintain that delicate balance. A tightening, or rate increase, attempts to head off future inflation. An easing, or rate decrease, aims to spur on economic growth.

While inflation is a major issue, it is not the only factor informing the Fed's decisions on interest rates. For example, the Fed might ease interest rates during a financial crisis to provide liquidity (flexibility to get out of investments) to U.S. financial markets, thus preventing a market meltdown.

**Inflation and Investment:** When it comes to inflation, the question on many investors' minds is: "How will it affect my investments?" This is an especially important issue for people living on a fixed income, such as retirees. The impact of inflation on your portfolio depends on the type of securities you hold. If you invest only in stocks, worrying about inflation shouldn't keep you up at night. Over the long run, a company's revenue and earnings should increase at the same pace as inflation. The exception to this is stagflation. The combination of a bad economy with an increase in costs is bad for stocks. Also, a company is in the same situation as a normal consumer -- the more cash it carries, the more its purchasing power decreases with increases in inflation. The main problem with stocks and inflation is that a company's returns tend to be overstated. In times of high inflation, a company may look like it's prospering, but in reality inflation is the reason behind the growth. When analyzing financial statements, it is also important to remember that inflation can wreak havoc on earnings depending on what technique the company is using to value inventory. We discuss this in detail in our article, "Inventory Valuation for Investors: FIFO and LIFO." Fixed-income investors are the hardest hit by inflation. Suppose that a year ago you invested $1,000 in a T-bill

that yielded 10%. You are about to collect the $1,100 owed to you. Is your $100 (10%) return real? Of course not! Assuming inflation was positive for the year; your purchasing power has fallen, and thus so has your real return. We have to take into account the chunk inflation has taken out of your return. If inflation was 4%, then your return is really 6%. This example highlights the difference between nominal interest rates and real interest rates. The nominal interest rate is the growth rate of your money, while the real interest rate is the growth of your purchasing power. In other words, the real rate of interest is the nominal rate reduced by the rate of inflation. In our example, the nominal rate is 10% and the real rate is 6% (10% - 4% = 6%). As an investor, you must look at your real rate of return. Unfortunately, investors often look only at the nominal return and forget about their purchasing power altogether.

**Real Interest Rates and the Fisher Equation**[37]

A common use of this measure of inflation is to add an inflation premium to interest rates to allow for expectations about future inflation. As stated above inflation erodes the **purchasing power** of money over time. Individual lending money in an inflationary environment will be repaid in dollars which possess less purchasing power upon maturity of the debt contract. An inflation premium is often built in to **nominal interest rates** to protect against this loss of purchasing power. However, at the time the debt contract is developed the inflation premium is based on expected rates of future inflation. If these expectations differ from actual inflation rates during the life of the debt contract either the lender or borrower can be adversely affected.

The inflation premium represents the difference between nominal market interest rates '$i_{market}$' (i.e., those interest rates published in the paper or posted on the wall at a bank) and the desired real rate of interest 'r*' which usually

[37] http://www.digitaleconomist.com/inf_4020.html

reflects the rate of **real economic growth** (the amount of reward that should accrue to the lender for lending to a productive economy). Thus the nominal rate of interest (holding risk constant) on a short-term debt contract (one year or less) is developed as follows:

$i_{market} = r^* + E[\pi_t]$ (5)

where '$E[\pi_t]$' represents the expected rate of inflation.

At the termination of the debt contract an ex-post **real rate of interest** 'r' can be developed as follows:

$r = i_{market} - \pi$ (6)

Thus the **Real Interest Rate** represents the real return to lenders measured in terms of the **purchasing power** of interest paid.

If $E[\pi(_t)]$ is greater than $\pi_t$ then 'r' will exceed 'r*' to the benefit of lenders (real returns to lending greater than desired and perhaps greater than the rate of real economic growth) as shown by the following operation -- substituting (5) into (6) we have:

$r = r^* + E[\pi\ ] - \pi$

If the opposite is true, then benefits will accrue to the borrower.

During the 1980's, many economists have felt that the real rate of interest was abnormally high (i.e., in excess of 2.5-3%). This may be explained in part due to the inflationary expectations that built up in the late 1970's and early 1980's. Nominal interest rates have taken these expectations into account. Over time, changes in market interest rates may be attributed to changes either in the real desired rate 'r* or due to changes in inflationary expectations. Changes in the desired real rate reflect the behavior in the market for loanable funds. If the

supply of these funds (public and private savings) exceeds the demand for these funds (public and private borrowing) then the desired rate should fall in reaction to a surplus of these funds. In periods of economic growth the opposite is true. The growing economy is sustained in part by increased borrowing activity for inventory investment and investment in new capital stock to allow for increased production to meet growth in aggregate demand.

**C**hanges in inflationary expectations tend to be a more complicated matter. One may hypothesize that current inflationary expectations are based on the history of past actual rates of inflation. A formal model that may help in understanding the development of these expectations is that of the **Adaptive Expectations** model. This model is based on the notion that economic agents slowly adapt to a changing inflationary environment. This may have been the case in the late 1960's and early 1970's. During the 1960's, the inflation rate was relatively low in the 2-4% range. Basically, during this period time inflation was not considered to be a major economic problem. Thus in the next decade when actual inflation began to creep up towards the double-digits, many individuals and institutions were surprised. Forecasts of future inflation (based on recent historical experience) consistently lagged behind an accelerating actual rate of inflation.

In the early to mid-1980 the actual rate of inflation was de-accelerating, a phenomenon known as **disinflation**. During this period, economic agent's expected rates of inflation were greater than what actually occurred. These agents were slow to adapt thus putting upward pressure on ex-post real interest rates.

## 2.5 NRB Directives and Interest rate in Nepal.

Taking the reference of history on interest rates, we observe different changes in interest rate. The sole controller for regulating interest rate in Nepal is

central bank, Nepal Rastra Bank. In the beginning, the interest rate charged and offered by banks and financial institutions was mentioned at a lower level with a view to stimulate real income and employment. However, dramatic change had been made time to time. Regulation of interest rate by Nepal Rastra Bank is made in the early stage of financial market development taking the period from 1955 to 1965. But NRB gradually began to liberalize the determination of interest rate on a phase-wise basis according to compatibility of the banks and the financial institutions that have developed in the country. In the early mid 1980's the county has adapted liberal economic policy. Number of finance companies and commercial banks began to develop and government made the liberal policy in maintaining the interest rate were encouraged for commercial banks, established under joint venture in association with foreign banks in private sectors. Similarly, deregulated of interest rate was applied to under financial companies established finance company acts. Likewise other financial institutions like development banks, micro financial institutions. NGOs and licensed cooperative under, NRB were also made competitive in the determination of interest. The central bank, the sole institution authorized to determine the interest rate as per NRB act. There are full discretions to NRB in determining interest rate structure of banks and financial institutions taking from the period 1960 to 1975.

On 16 November 1984 government had provided autonomy in offering the interest rate on saving and time deposit to the extent of 1.5% and 1% points respectively above the prevailing rates. In 1986 financial institutions got freedom in fixing their interest rates in their deposits and loans. In addition, there was also limitation on the interest rate on different loans provided for the productive and priority and full deprived sector. However there was limitation imposed on certain sectors of lending such as the rate of maximum of 15% on the priority sectors loan. And for other kinds of loans financial institutions

were given freedom to maintain the interest rate structure. In this way government provided freedom as well as limitation on the determination of interest rate.

On August 22, 1992, Nepal Rastra Bank issued some directives to commercial banks and financial institutions to clearly spell out the interest rate on deposits. Nepal Rastra Bank also instructed the bank and financial institutions to limit their interest rate spread on deposit and credit at 6 percent within the mid-December 1993. A further instruction to banks and financial institutions was issued in 2002, and now the interest rate spread required to be maintained by commercial banks and financial institutions has also been removed.

The interest rate regime in Nepalese perspective change from rigid control and monopoly of NRB from 1960-1980 to that of ultimate deregulation of interest rate and removal of spread from 1986 to 2002. At present there is complete freedom to have competitive system an important part of government's financial liberalization policy. In this way, the interest rate became a market determined phenomena rather than a regulated phenomena. The process of interest rate deregulation became a major indicative factor of the financial sector reform in the country.

The following table no 2-3 shows the development of interest rate in the Nepalese Financial Markets:[38]

[38] Shrestha Manohar K & Bhandari, Dipak B, Financial Markets and Institutions, Asmita Books Publishers & Distributors, putalisadak, Kathmandu, P 173

***Table No. 2-2: Phase-wise development of Interest rate.***

| | |
|---|---|
| 1960 | Sole monopoly of NRB to fix interest rate on deposit and loans. |
| 1976 | NRB empowered to determine interest rate. |
| 1980 | Process continued for NRB to fix interest rate and banks and financial institution to follow it. |
| 1986 | Freedom to commercial banks to offer higher interest rates from the minimum level of interest rate fixed by NRB |
| 1989 | Interest rate fully deregulated. |
| 1992 | Issue directive to commercial banks to spell out interest rate policy encouraging competition in interest rate. |
| 1993 | Spread not to exceed 6 percent. |
| 1999 | Decrease spread to 5 percent. |
| 2002 | Removal of spread restriction. |
| 2005 | Maintain CRR of 5% |
| 2009 | SLF penal rate above 3% |
| 2009 | Restriction in Home and Real Estate loan |
| 2009 | CD ratio maintain |

Source: Financial Markets and Institutions, Dr. Manohar K. Shrestha and Dipak B. Bhandari

## 2.3 Research Gap

This research has focused particularly on deposit interest rate, lending interest rate and inflation rate of commercial banks. Various aspects of commercial banks have been analyzed in previous studies but has not been explored the other factors affecting interest rate that depth till now even though it has been studied partially only. The latest data used in the research and its comparison with industry norm- the average data of only the sample commercial banks operating in Nepal, has made the study more reliable and conclusive. Previous studies have given emphasis on several aspects but focused emphasis on effect of inflation in interest rate of deposit. This research has addressed the same by taking latest data and making them more reliable and comparable.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1 Introduction:

Research methodology is a systematic way to solve the research problem. In other words, research methodology describes the methods and process applied in the entire aspect of the study. Research methodology refers to the various sequential steps (along with a rational of each steps) to be adopted by a researcher in studying a problem with certain objectives in view.[39] Thus the overall approach to the research is presented in this chapter. Testing of hypothesis is one of the most important aspects of the research study. It is the quantitative statement about the population parameter. In other words, it is an assumption that is made about the population parameter and then its validity is tested. By testing the hypothesis we can find out whether it deserves the acceptance or rejection of the hypothesis. The acceptance of hypothesis means there is no any sufficient evidence provided by the sample to reject it and does not necessarily imply that it is true. The main goal of testing of hypothesis is to test the characteristics of hypothesized population parameter based on sample information whether the difference between the population parameter and sample statistic is significant or not.[40]

The hypotheses formulated for this study are as follows:

*First Hypothesis:*

[39] Kothari, C.R., (1994), "Research Methodology, Methods and Techniques", Vikash Publication House Pvt. Ltd, New Delhi, p. 9

[40] Sharma P. K. & Chaudhary A.K. "Statistical Methods," Khanal Books Prakashan, Katmandu, P.229

**Null hypothesis $H_o$: $\rho = 0$.** That is, population correlation coefficient is zero. In other words, the variables (deposit interest rate and deposit amounts) are uncorrelated in Nepalese financial market.

**Alternative hypothesis $H_1$: $\rho \neq 0$**. That is population correlation coefficient is not equal to zero. In other words, the variables (deposit interest rate and deposit amounts) are correlated.

*Second Hypothesis:*

**Null hypothesis $H_o$: $\rho = 0$.** That is, population correlation coefficient is zero. In other words, the variables (Credit interest rate and credit or loan amounts) are not correlated in Nepalese financial market.

**Alternative hypothesis $H_1$: $\rho \neq 0$.** That is population correlation coefficient is not equal to zero. In other words, the credit interest rate and credit or loan amounts are correlated.

*Third Hypothesis:*

**Null hypothesis $H_o$: $\rho = 0$.** That is, population correlation coefficient is zero. In other words, there does not exit any correlation between interest rate on deposit and interest rate on lending.

**Alternative hypothesis $H_1$: $\rho \neq 0$.** That is population correlation coefficient is not equal to zero. In other words, there exit correlation between interest rate on deposit and interest rate on lending.

*Fourth Hypothesis:*

**Null hypothesis $H_o$: $\rho = 0$.** Population correlation coefficient is zero. In other words, the variables in population (inflation and interest rate on deposit) in Nepalese financial market are not correlated.

**Alternative hypothesis $H_1$: $\rho \neq 0$.** That is the variables in population (inflation rate and interest rate on deposit) in Nepalese financial market are correlated.

*Fifth Hypothesis:*

**Null hypothesis $H_o$: $\rho = 0$**. The variables in population (inflation rate and interest rate on lending) in Nepalese financial market are not correlated.

**Alternative hypothesis $H_1$: $\rho \neq 0$.** That is the variables in population (inflation rate and interest rate on lending) in Nepalese financial market are correlated.

This chapter consists of research design, sample size and selection process, data collection procedure and data processing techniques and tools.

## 3.2 Research Design

A research design is the specification of methods and procedures for acquiring the information needed. It is the overall operational pattern of framework for the project that stipulates what information is to be collected, form which sources and by what procedures.[41] Thus a research design is a plan for the collection an analysis of data. For research there exits different types of research design like; Historical research, Descriptive research, Case study research, Field study research, analytical research, True experimental research and so on. This study mainly concerned with historical research. If applicable, sometime descriptive and analytical approach may also be used. But generally, to show the relationship of interest rate with deposit amount, lending (credit) amount and inflation rate, past historical data are used. The relevant and needed data has been collected from various publications of different commercial banks and Nepal Rastra Bank.

[41] Paul, E. Green and Donald. S. Till; Research for Marketing Decisions.

## 3.3 Population and Samples:

The term "population" or universe for research means the universe of research study in which the research is based.[42] Since the research topic is about interest rate, all the lending and depository institution of Nepal are the member of population study. The population for the study comprises 29 commercial banks, 67 development banks, 67 finance companies, 34 saving and credit co-operatives, one employee provident fund and other 40 non-government financial organizations.[6] Among the total population only some selected institutions are taken as sample on random basis. Similarly, due to unavailability of data from all sectors, only commercial banks are chosen for this study. So precisely saying, all 29 commercial banks are the population of this study and among them, only 5 commercial banks are chosen as samples from total population. For selecting the samples, simple random sampling method is used here among different methods. Organization under study are as follows, whose general introduction and major objectives are presented in chapter one.

- Nepal Bank Limited.
- Rastriya Banijya Bank.
- Agriculture Development Bank/Nepal
- Himalayan Bank limited
- Nepal Bangladesh Bank.

## 3.4 Sources of data and Collection Procedure:

For this study, mainly secondary data are used. These secondary data are collected mainly from published sources like annual report, prospectus,

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[42] Wolf, Howard K. & Pant, P.R. (2000), "Social Science Research & Thesis Writing" second edition, Buddha Academic Enterprises Pvt. Ltd, Kathmandu, p. 75

[6] Pokharel, Jhapindra, "Determination of interest rates in Nepalese Financial Market", an unpublished MBS thesis, TU. Kathmandu.

balance sheet, newspaper, journal, Internet and other sources. Besides this in some case, if needed, primary data can also be used. They can be collected through direct interview and observation.

Secondary data published on annual reports of concerning organizations, like interest rate as well as amount and their organizational profiles are collected through personal visit of respective organization as well as from their web sites. Some secondary data like source and use of funds of respective bank, comparative study, and inflation rates are collected from Nepal Rastra Bank.

## 3.5 Data Processing and Presentation:

The information or data obtained from the different sources are in raw form. From that information, direct presentation is not possible. So it is necessary to process data and converts it into required form. After then only, the data are presented for this study. This process is called data processing. For this study, only required data are taken from the secondary source (bank's publication) and presented in this study. For presentation, different tables are used. Similarly, in some case graphical presentation is also made. For reference, the photocopies of raw data are attached in the last portion of this thesis. So far as the computation is concerned, it has been done with the help of scientific calculator and computer software program.

## 3.6 Data Analysis Tools:

In order to get the concrete results from this research, data are analyzed by using different types of tools. As per topic requirements, emphasis is given on statistical tools rather than financial tools. So for this study following statistical tools are going to use.

**Arithmetic Mean:**

It is the sum of all the observations divided by the number of observations. In such a case all the items are equally important.[43] As arithmetic mean is most common and popular tools for data analysis, here in this study also, arithmetic mean is used. It is computed by using following formula:

Mean ( $\overline{X}$ ) = $\frac{\sum X}{n}$ Where $\overline{X}$ = Mean

$\sum$ X = Sum of all the Variable X

n = Variables involved

**Standard Deviation:**

The standard deviation is the best tools to study fluctuation in any data. It is usually denoted by the letter sigma (δ). Karl Pearson suggested it as a widely used measure of dispersion and is defined as the positive square root of their arithmetic mean of squares of the deviation of the given observations from their arithmetic mean of a set of value.[44] It can be computed by using following formula.

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

Greater the magnitude of standard deviation, higher will be the fluctuation and vice versa.

**Coefficient of Correlation:**

By this statistical tool, the degree of relationship between to variables is identified. In other words, this tool is used to describe the degree to which one variable is linearly related to other variables. Two or more variables are said to be correlated if change in the value of one variable appears to be linked with the change in the other variables. The correlation analysis refers the closeness

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[43] Pant, G.D. & Chaudhary, A.K. (1999), "Business Statistics and Mathematics," Bhandupuran Prakashan, Kathmandu, P. 91

[44] Gupta, S.C. "Fundamental of Statistics," Himalyan Publishing House, Bombay, P.380

of the relationship between the variables.[45] Correlation may be positive or negative and ranges from -1 to +1. Simple correlation between interest rate and deposit amount, interest rate and credit or lending amount and interest rate (both deposit rate and lending rate) and inflation is computed in this thesis. For example, let's say that the correlation between interest rate and inflation is positive. It indicates that when inflation increases, interest rate also increases in same direction and vice versa. For our study following reference is used[46]

- Correlation may be positive or negative and ranges from -1 to +1. When r = +1, there is positive perfect correlation; when r = -1, there is perfect negative correlation; when r = 0, there is no correlation and when r < 0.5 then there is low degree of correlation.
- When 'r' lies between 0.7 to 0.999 (or -0.7 to -0.999), there is high degree of positive (or negative) correlation.
- When 'r' lies between 0.5 to 0.699, there is a moderate degree of correlation.

The simple correlation coefficient, r, is calculated by using following formula:

$$\text{Simple Correlation Coefficient (r)} = \frac{n\Sigma X_1 X_2 - (\Sigma X_1)(\Sigma X_2)}{\sqrt{n\Sigma X_1{}^2 - (\Sigma X_1)^2}\sqrt{n\Sigma X_2{}^2 - (\Sigma X_2)^2}}$$

Alternately,

$$r = \frac{Cov(X_1 X_2)}{VarX_1, VarX_2}$$

Where,

$$\text{Covariance } (X_1, X_2) = \frac{1}{n}\sum (X_1 - \overline{X}_1)(X_2 - \overline{X}_2)$$

n = Total number of observations.

$X_1$ and X2 = two variables, correlation between them are calculated.

[45] Sharma, P.K. and Chaudhary, A.K. (2000), "Stastical Methods," Khanal Books Prakashan, Kathmandu, P. 420

[46] Pant, G.D. and Chaudhary A.K. (2053)"Statistics and Quantitative Techniques" 2nd edition, Nepal Sahitya Prakashan Kendra, Kathmandu, P.306

Multiple Correlation Coefficient ($R_{1.23}$) = $\sqrt{\frac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1 - r_{23}^2}}$

Where $r_{12}$ = correlation coefficient between variables one and two.

$r_{23}$ = correlation coefficient between variables two and three.

$r_{13}$ = correlation coefficient between variables one and three.

Multiple correlation is used for the measure of degree of association between one variable and a group of other variables as the independent variable. It lies between 0 and 1. The close it is to '1', the better the linear relationship between the variables. The closer it is to '0', the worse is the linear relationship.[47]

**Coefficient of Multiple Determination:**

The square of the multiple correlation coefficients is called coefficient of multiple determination. It is very useful tools to intreprate the value of multiple correlation coefficients. The main significance of the coefficient of multiple determinations is to represent the portion of total variation sin the dependent variable which is explained by the variations in the two independent variables.

Coefficient of multiple determination = $R_{1.23}^2$

t-test for significance of sample correlation coefficient:

If 'r' is the observed sample correlation coefficient of 'n' pairs of observations from bivariate normal population, the test statistics for significance of correlation under null hypothesis is given by

$$t = \frac{r}{\sqrt{1 - r^2}} \times \sqrt{n - 2} \quad \sim t_n - 2$$

[47] Gupta, S.P (2000), "Statistical Methods," Sultan Chand & Sons Educational Publishers, New Delhi, p 1115

i.e. t follows t-distribution with n-2 degree of freedom (d.f.), ‘n’ being the sample.

The (1-α) % confidence limits for estimating population correlation coefficient (ρ) are given by

$$r \pm t_{\alpha}\,(n\text{-}2) \times \text{S.E.}\,(r)$$

$$= r \pm t_{\alpha}\,(n\text{-}2) \times \frac{1-r^2}{\sqrt{n}}$$

# CHAPTER FOUR

# DATA PRESENTATION AND ANALYSIS

## 4.1 Introduction:

This is the section where, the filtered data are presented and analyzed. This is the one of the major chapter of this study because it includes detail analysis and interpretation of data from which concrete result of Nepalese market can be obtained. In this chapter, the relevant data and information necessary for the study are presented and analyzed keeping the objectives set in mind. This chapter consists of various calculation made for the analysis of interest rate and its effects on deposit amount lending amount, and inflation rate for the sample banks. To make our study effective and precise as well as easily understandable, this chapter is categorized in three parts; presentation, analysis and interpretation. The analysis is fully based on secondary data available. In presentation section data are presented in terms of table, graph chart of figures, according to need. The presented data are then analyzed using different statistical tools mentioned in chapter three. At last the results of analysis are interpreted. Though there is no distinct line of demarcation for each section (like presentation section, analysis section & interpretation section) but the arrangement of writing is made by aforementioned way. Similarly it is also noted that almost all data used for analysis are of secondary type.

For our simplicity, in this thesis, presentation analysis and interpretation of data are made according to the nature. In other words, at first relationship of deposit and interest rate of all 5 sample banks are analyzed. After then, the relationship between interest rate and credit (lending) amount is made. Lastly the relationship between interest rate and inflation is presented. While

analyzing, different statistical tools like correlation coefficient, coefficient of determination, t-statistics for significance are employed.

## 4.2 Analysis of Deposit and Interest Rate:

In this section, detail study is made about deposit amount and interest rate of various banks. For this study only saving and fixed deposits are considered because current deposit doesn't earn any interest.

### 4.2.1 **Rastra Banijya Bank**:

Prior to entering into the main topics, it is preferable to take a glance on the interest rate structure on different types of deposits. This is essential because the interest rates are generally different in magnitude for every sample banks. These differences are due to the numerous factors like maturity period, policy of bank, goodwill of organization and so on. In real world government owned bank and banks with high reputation and goodwill have lower deposit rates. Similarly, finance companies, co-operative & development bank quotes higher interest rate on deposits than commercial banks do.

***Table no 4-1: Interest rate structure on deposit of RBB as on Mid-July***

| Deposit | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| **Savings** | 3% | 2% | 2% | 2% | 2% | 2% |
| **Fixed** | | | | | | |
| 3 Months | 5.50 | 2.25 | 2.25 | 2.25 | 2.25 | 2.25 |
| 6 Months | 6.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 1 Years | 8.50 | 4.25 | 3.50 | 3.50 | 3.50 | 3.25 |
| Above 2Yrs | 10.00 | - | - | - | - | - |
| **Whole Mean** | **5.25** | **2.5** | **2.35** | **2.35** | **2.35** | **2.30** |
| **Fixed Deposit Mean** | **7.5** | **3** | **2.75** | **2.75** | **2.75** | **2.65** |

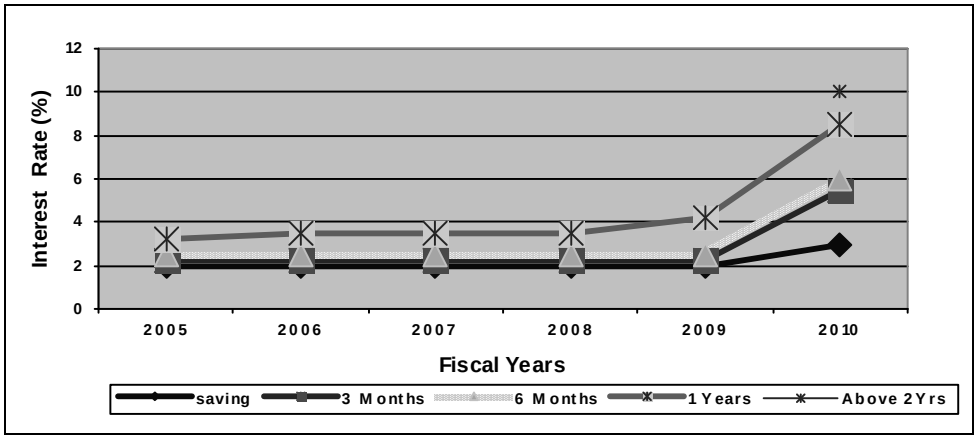
Source: Banking and Financial Statistics, No: 38-43, NRB

Table no 4-1 shows the deposit interest rate of RBB in 6 different FY. For this study 2005 is taken as initial year & 2010 as final years. The table portraits the interest rate that were prevailed in the Nepalese financial markets during last

past 6 FYs. The data shows the increasing tendency of interest rate. The interest rate on saving deposit in the beginning year was 2% and increased to 3% in 2010. This is 33% increment during the 6 years period. In same manner, the bank used to quote the interest rate of fixed deposit in different short term period like 3 months, 6 months, 1- year and so on. For the graph purpose, in this study the average of 7 days to 3 months is taken to make the figure clearer. For other periods also the fixed deposit rate was in increasing trend. During the 6 year period the incline percentage is 144%, 140% and 161% respectively for 3 months, 6 months and 1 year period. The increasing tendency is high for shorter period interest rate. If the mean is taken of all (both fixed and saving) then average interest rate on deposit was 2.3% for 2005, 2.35% for 2006, 2007 and 2008, 2.5% for 2009 and 5.25% for 2010. Similarly if average of fixed deposits of different period is taken, then the result is almost similar with "whole average". It means the average interest rate for fixed deposit only was 2.65%, 2.75%, 2.75%, 2.75%, 3% and 7.5% respectively for the year 2005, 2006, 2007, 2008, 2009 and 2010. The average figures also show the increasing tendency in interest rate. All the above described matters can be shown on figure 4-1 as follows.

The graph 4-1 reveals that, the interest rates are on increasing trend. Saving interest rate remains constant for 2005 to 2009 and rises in 2010 but for fixed deposit, interest rate rises in 2006 and remains constant up to the period 2008 and rises in 2009 and 2010. For year 2010, the fixed interest rate increased by high percentage than 2009.

***Figure No 4-1: Interest Rate of RBB on Deposits during Different FY***




**Correlation Coefficient, Coefficient of Determination and t-statistics of RBB**

***Table No 4-2: Relationship between Interest Rate and Deposit amount of RBB***

| Year (1) | Saving Deposit Interest Rate (2) | Saving Deposits Amounts (3) 'mio | | Fixed Deposit Interest Rate(4) | Fixed Deposit Amounts (5) 'mio | |
|---|---|---|---|---|---|---|
| 2005 | 2.0 | 26848.2 | | 2.65 | 9001.5 | |
| 2006 | 2.0 | 29494.9 | | 2.75 | 8103.8 | |
| 2007 | 2.0 | 32909.4 | | 2.75 | 6997.5 | |
| 2008 | 2.0 | 40213.0 | | 2.75 | 4479.8 | |
| 2009 | 2.0 | 46102.8 | | 3.0 | 3207.8 | |
| 2010 | 3.0 | 45665.3 | | 7.5 | 2924.9 | |
| Correlation | $r_{23} = 0.52$ | | | $r_{45} = -0.58$ | | |
| Coefficient of determination | $r^2_{23} = 0.2704$ | | | $r^2_{45} = 0.3364$ | | |
| t-statistic | t-cal= 1.218 | t-tab= 2.776 | Insignificant | t-cal= -1.42 | t-tab= 2.776 | Significant |

Source: Banking and Financial Statistics, No: 38-43, NRB

The table 4-2 shows the total amount of fixed deposit and saving deposits and the interest rates offered on such deposits by RBB on six fiscal years starting from FY 2005 to FY 2010. The table portrays that the both interest rate has been increased by greater magnitude. Saving Deposit amount has been increased by more than 1.5 times during the study period whereas fixed deposit amount decline by about 3 times. Overall total deposit has been increased by about 1.35 times which means they move in same direction i.e. increase in

interest rate increases the amount of deposit and vice versa. Therefore they should have positive relationship. It can be quantified by calculating correlation coefficient between them. This relationship can also be shown in graph as shown in figures 4-2 and 4-3.

***Figure No: 4-2 Deposit Amount of RBB during different FY***

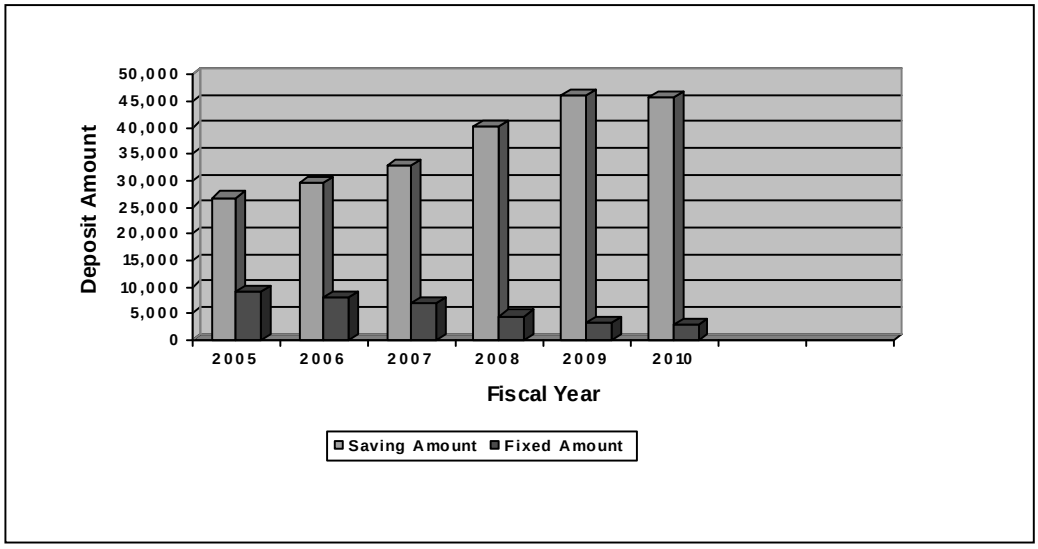
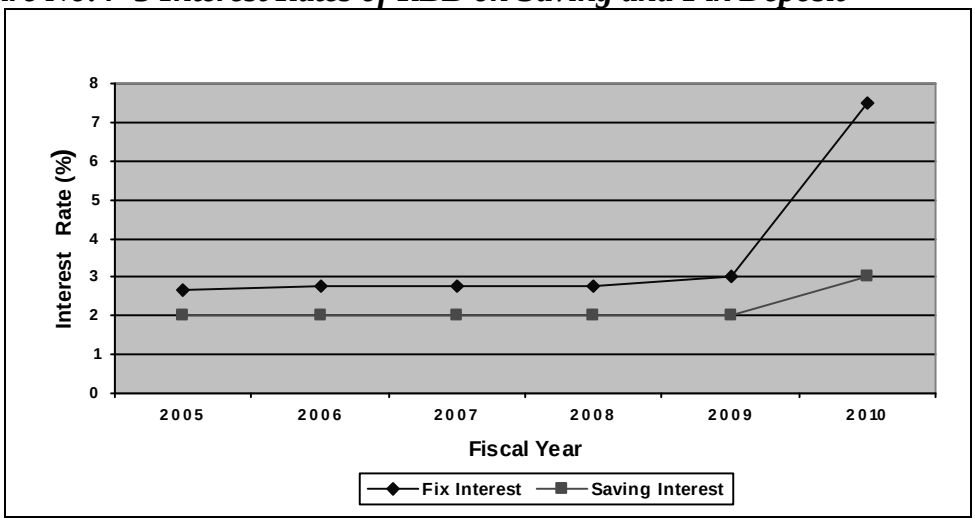



***Figure No:4- 3 Interest Rates of RBB on Saving and Fix Deposit***




According to table no 4-2, the interest rate on average saving deposit has been increased from 2% to 3% during 6 FYs. In same period the deposit amount was Rs 26848.2 million but this amount increases to Rs. 45665.30 millions. It means interest rates rise by 50%, whereas deposit amount rises by 70% within

the period of six years. Deposit amount rise in saving inspite of less rise in interest rate because RBB is government owned bank and government most of transaction is from RBB and it has got faith from local peoples,

Similarly, for fixed deposit the table 4-2 shows that total amount of fixed deposit and interest rate on fixed deposit offered by RBB on six consequent FY started from 2005 to FY 2010. The table reveals that average fixed interest rate has been increased drastically during the six FYs. At the FY 2005 the average interest rate was 2.65% on fixed deposit but later on every year this interest rate started to increase and at 2010 it remained at 7.5% per annum on average. On contrary of this increment, the amount of fixed deposit decreased. This might be due to fixed deposit rate offered by other private owned bank is higher than the RBB so the fund might have shifted in other bank as fixed deposit. The table shows that, there is negative effect on fixed deposit amount by the increment of interest rate i.e. the amount decrease with the interest rate. In this regards, the substitution effect does not holds true in the case of fixed deposit.

To verify the above trend, it is necessary to calculate the correlation coefficient and t-statistics. If correlation coefficient is calculated for saving deposit and deposit amount, then it is (r) =0.52. This moderate positive correlation coefficient indicates that they have moderate relationship among each other. This shows that the substitution effect in case of RBB for saving account is moderately applicable. The coefficient of determination between these two variables is $r^2 = 0.2704$, which means that total variation in dependent variable (saving deposit amount) has been explained by independent variable (interest rate) to the extent of 27.04% and remaining is the effect of other factors. The t-value for testing the significance of the correlation coefficient between variables is 1.218 (/t/ = 1.218). Since the tabulated t-value at 5% level of

significance for 4 degree of freedom (t-tab = 2.776) is more than calculated value (t-cal = 1.218), the null hypothesis is accepted, i.e. the variables in the population are not correlated. This means the variables mentioned (interest rate on saving deposit & amount of saving deposit) for RBB are significantly not correlated which means in spite of constant interest rate there is increase in deposit amount and when there is increase in interest rate there causes decrease in saving deposit amount in the year 2010.

In the same manner, the correlation coefficient between interest rate on fixed deposit and fixed deposit amount ($r_{45}$) is -0.58. This means that these two variables are negatively co-correlated. When interest rate on fixed deposit increases the deposit amount decreases. This is exactly opposite the matter what the theory (substitution effects) says. The coefficient of determination between these two variables is $r^2_{45}$ = 0.3364, which means 33.64% of total variables in dependent variables (deposit unit) is explained by the independent variable (deposit rate) & remaining is due to the effect of other factors. Similarly test of significance of correlation coefficient between deposit rate and deposit amount gives the value of t = 1.42. The tabulated value at 5% significant level with d.f. 4 is 2.776 (i.e. t-tab = 2.776). Here $t_{cal}<t_{tab}$ so $H_0$ is accepted i.e. there is no significant correlation between two variables. T-statistics clarifies that their relationship is not so significant which means increase in interest rate doesnot causes increase in the fixed deposit amount.

### 4.2.2 **Nepal Bank Limited:**

The general structure of deposit interest rate of Nepal Bank Limited (NBL) is shown below on table no 4-3.

The table shows the interest rate of NBL during the last six FYs. The trend of interest rate shows that it is in fluctuating trend. The interest rate on saving deposit shows that it was 2.5% during the period of 2005 and decreases by

0.5% in 2010. However the interest rate on fixed deposit rises during the six fiscal years. The interest rate fell by little spread in first few years but on later years, the interest rises by huge spread as compared to the previous years.

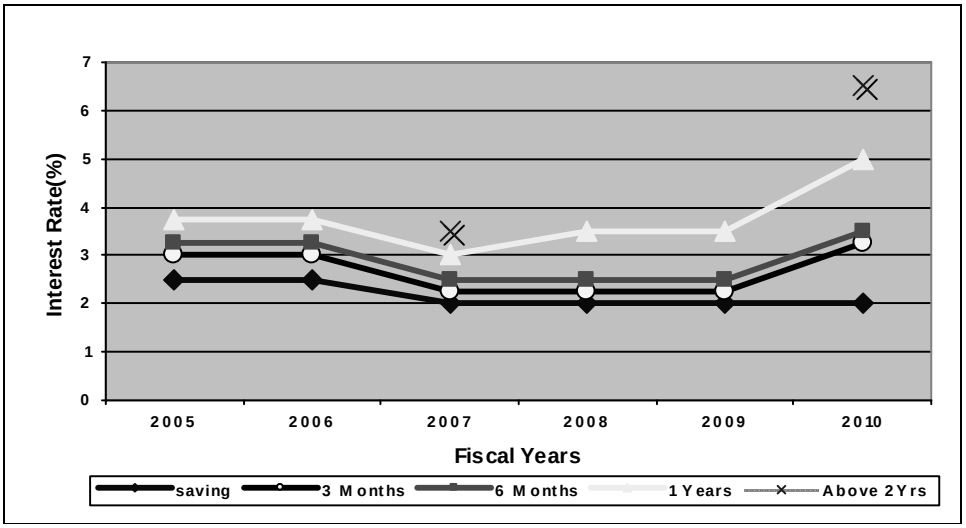
***Figure 4-3: Interest rate structure on deposit of NBL on Mid-July***

| Deposit | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Savings | 2.00 | 2.00 | 2.00 | 2.00 | 2.50 | 2.50 |
| **Fixed** | | | | | | |
| 3 Months | 3.25 | 2.25 | 2.25 | 2.25 | 3.00 | 3.00 |
| 6 Months | 3.50 | 2.50 | 2.50 | 2.50 | 3.25 | 3.25 |
| 1 Years | 5.00 | 3.50 | 3.50 | 3.00 | 3.75 | 3.75 |
| Above 2Yrs | 6.50 | - | - | 3.50 | - | - |
| **Whole Mean** | **3.25** | **2.35** | **2.35** | **2.4** | **2.9** | **2.9** |
| **Fixed Deposit Mean** | **4.55** | **2.75** | **2.75** | **2.80** | **3.30** | **3.30** |
| **Std. Deviation** | 0.2345% | | | | | |

Source: Banking and Financial Statistics, No: 38-43, NRB

Both long term and short term interest rate fall is similar in initial year but in later year the rising rate is high for long term fixed deposit whereas rising rate was slow for short term fixed deposit. These tendencies can also be shown in graph no 4-4 as follows:

***Figure No 4-4: Interest Rate of NBL on Deposits during Different FY***



By graph 4-4 also it is clear that inclining tendency in later period is higher than declining trend in the initial year of study. However the interest rate of saving deposit does not rise as compared to the increment in interest rate of fixed deposit.

**Correlation Coefficient, Coefficient of Determination and t-statistics of NBL**

***Table No 4-4:*** ***Relationship between Interest Rate and Deposit amount of NBL***

| Year (1) | Saving Deposit Interest Rate (2) | Saving Deposits Amounts (3) | Fixed Deposit Interest Rate(4) | Fixed Deposit Amounts (5) |
|---|---|---|---|---|
| 2005 | 2.5 | 22671.8 | 3.3 | 6269.3 |
| 2006 | 2.5 | 23547.9 | 3.3 | 5790.9 |
| 2007 | 2 | 26425.4 | 2.8 | 5393.2 |
| 2008 | 2 | 28545.1 | 2.75 | 4757.9 |
| 2009 | 2 | 31079.7 | 2.75 | 3579.4 |
| 2010 | 2 | 30303.3 | 4.55 | 3290.1 |
| Correlation | $r_{23}$ = -0.89 | | $r_{45}$ = 0.353 | |
| Coefficient of determination | $r^2_{23}$ = 0.7921 | | $r^2_{45}$ = 0.1246 | |
| t-statistic | t-cal= 3.9038 | t-tab= 2.776 Significant | t-cal= 0.755 | t-tab= 2.776 Insignificant |

In table no 4-4 saving amount and deposit rates are arranged in systematic order. The outlook of the table shows that the interest on saving has been falling since 2006 whereas the interest rate on fixed deposit decline from 3.3% in 2006 to 2.75% in 2009 but again rises to 4.55% in 2010. But the amount of saving deposit has not been in decreasing trend. It is increasing every year. This indicates that the condition for NBL is opposite to the substitution theory. This is because NBL is also government owned bank like RBB and most of its deposit is government organizations like school, police, army and revenue of government.

But the pictures for fixed deposit are somewhat different. Up to 2009 the deposit amount had been decreased with the decline in interest rate. But it still

decline in 2010 in spite of increase in interest rate in 2010. The deposit amount has been in decreasing trend for fixed deposit in the study period. It indicates that with decrease in interest rate, fixed deposit amount also decreases. This is due to like RBB the fixed deposit amount might have shifted to higher rate paid commercial bank in fixed deposit. But the declining speed of deposit amount is quite higher than that of declining speed of interest rate. The case for 2010 is the exception of substitution effect. This suggest that they may have positive relationship but to determine the magnitude of relation, correlation coefficient should be calculated and to identify the strong ness or weakness of relationship it is necessary to calculate the t-test. But prior to all it is clear if we show these relations on graph 4-5 & 4-6.

***Figure No 4-5: Deposit Amount of NBL during different FY***

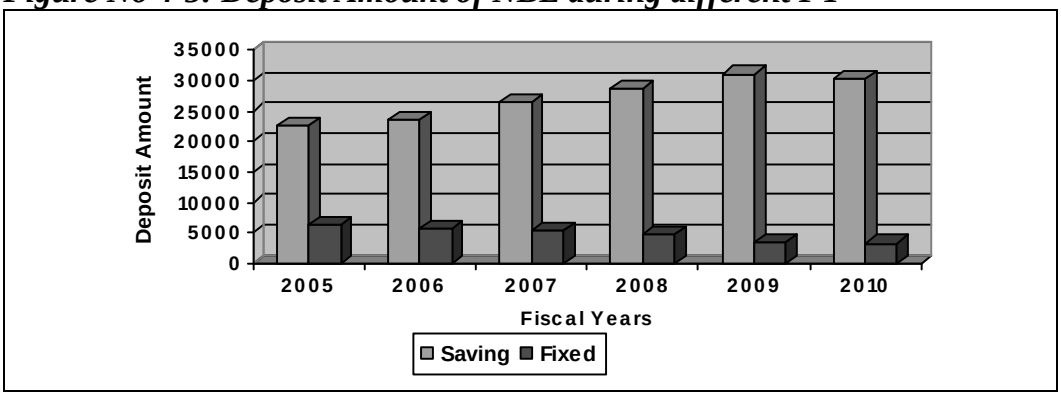
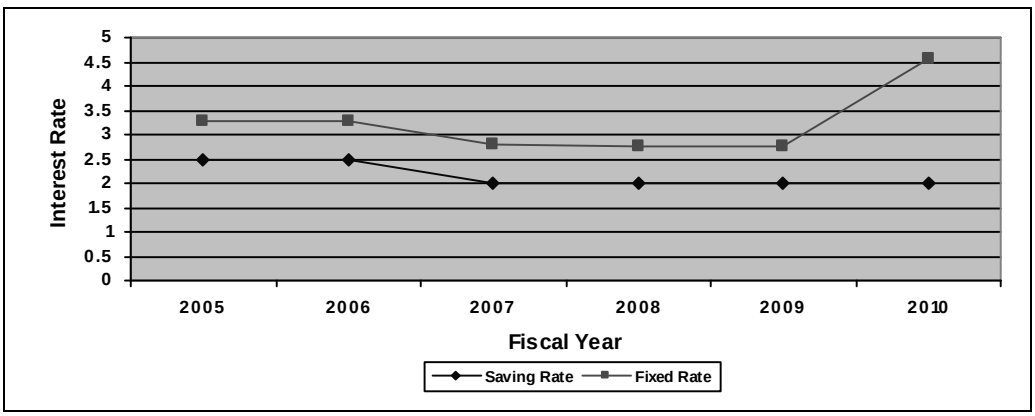



***Figure No 4-6: Interest Rates of NBL on Saving and Fix Deposit***



The correlation coefficient (using excel program) for saving interest rate and deposit amount, $r_{23}$, is found to be negative of = -0.89. This value indicates that they two have very high negative or inverse relationship. Increase in one variables lead to decrease in other variables. This is extremely against the theory suggested by the "substitution effect". Similarly, the coefficient of determination between two variables, $r^2_{23}$, is 0.7921 which means that total variation in interest rate on deposit has been explained by supply of deposits to the extent of 79.21 percent and remaining is the effect of other factors. The t-value for testing the significance of the correlation coefficient between variables is 3.9038 (t-cal=3.9038), which is significantly greater than tabulated t value (t-tab = 2.776) at 5 percent level of significance with 4 degree of freedom. Since the calculated value is significantly greater than table value, the conclusion is drawn that correlation coefficient between variables is significant. This means that the interest rate on saving deposit and deposit amount of NBL are significantly correlated and increase in the supply of fund (deposit) brings the decrease in interest rate on deposit. That is the substitution theory is not applicable for the saving deposit of NBL.

Similarly, correlation coefficient for fixed deposit interest rate and fixed deposit amount, $r_{45}$, is found to be -0.353. This shows that they have negative correlation. It means that the increase in deposit interest rate decrease amount on fixed deposit. This relation can be clearly explained by the coefficient of determination, which is 0.1246, means that total variation in interest rate on fixed deposit has been explained by supply of deposits to the extent of 12.46 percent and remaining 87.54 percent is the effect of other variables. The t-value for testing the significance of the correlation coefficient between variables is 0.755 (t-cal=0.755), which is significantly lesser than tabulated t value (t-tab = 2.776) at 5 percent level of significance with 4 degree of freedom. Since the calculated value is significantly less than tabulated value,

the conclusion can be drawn that correlation coefficient between variables is insignificant. This means that there is no correlation between interest rate on fixed deposit and deposit amount of NBL which shows the negative correlation, the t-test indicates that there is no significant correlation between them. It means increase or decrease of fixed deposit amount is not affected by the fixed deposit interest rate for NBL.

### 4.2.3 **Agriculture Development Bank/ Nepal**

The general interest rate structure of ADB/N for last fiscal years is given on the table 4-5.Though the ADB/N has transaction on both agriculture sector and non- agriculture (commercial) sectors, here for this study only the interest rate of commercial sector is taken in consideration.

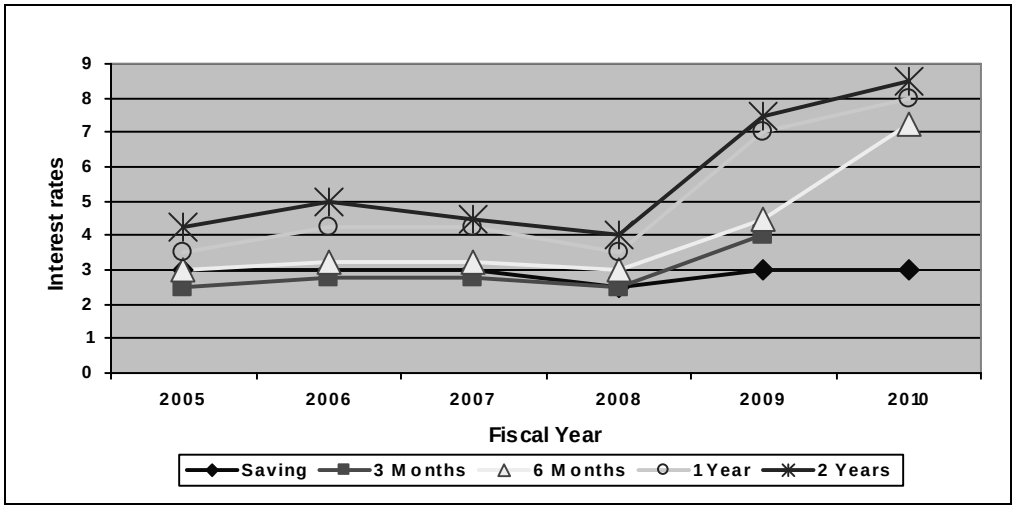
***Table no 4-5: Interest rate structure on deposit of ADB/N as on Mid-July***

| Deposit | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Savings | 3.00 | 3.00 | 2.5 | 3.0 | 3.0 | 3.0 |
| **Fixed** | | | | | | |
| 3 Months | - | 4.0 | 2.5 | 2.75 | 2.75 | 2.5 |
| 6 Months | 7.25 | 4.5 | 3.0 | 3.25 | 3.25 | 3.0 |
| 1 Years | 8.0 | 7.0 | 3.5 | 4.25 | 4.25 | 3.5 |
| Above 2Yrs | 8.5 | 7.5 | 4.0 | 4.50 | 5.0 | 4.25 |
| **Whole Mean** | 5.45 | 4.35 | 2.85 | 3.35 | 3.4 | 3.15 |
| **Fixed Deposit Mean** | 7.90 | 5.75 | 3.25 | 3.70 | 3.80 | 3.30 |
| **Std. Deviation** | 0.187% | | | | | |

Source: Banking and Financial Statistics, No: 38-43, NRB

The table 4-5 shows the interest rate structure of ADB/N on saving deposits and fixed deposits. The interest rates are in increasing trends. For saving deposit, it is found that the interest rate has been same as 2005. For fixed deposit there is increase in interest rate every year except for 2008. The interest rate had declined in 2008. This can be illustrated on graph as figure no 4-7:

***Figure No 7: Interest Rate of ADB/N on Deposits during Different FY***




The figure no 4-7 shows that all interest rates are in inclining condition, but uniqueness is not seen in the graph. That is the interest rate started to fall in initial year of study and again inclined sharply in latest 2 year of study. Saving interest rate and 3 months fixed deposit interest rate remains less volatile than other categories interest.

## Correlation Coefficient, Coefficient of Determination and t-statistics of ADB/N

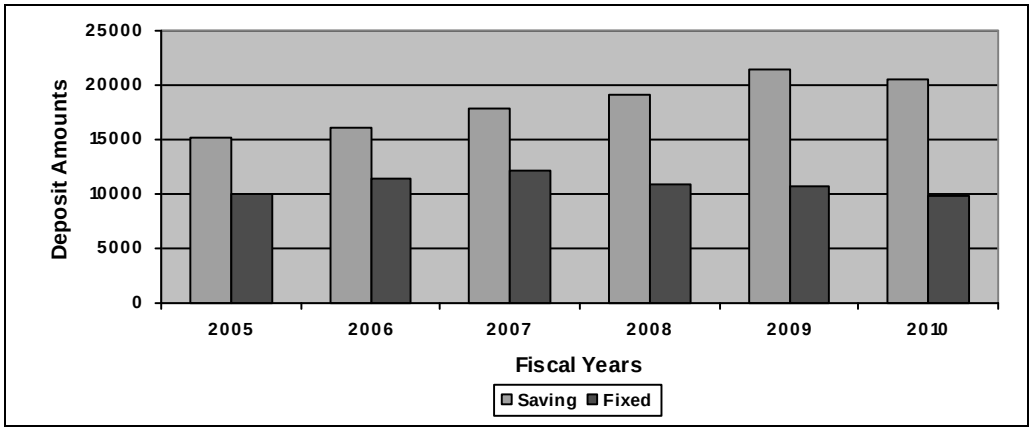
***Table No 4-6:*** ***Relationship between Interest Rate and Deposit amount of ADB/N***

| Year (1) | Saving Deposit Interest Rate (2) | Saving Deposits Amounts (3) | Fixed Deposit Interest Rate(4) | Fixed Deposit Amounts (5) |
|---|---|---|---|---|
| 2005 | 3.0 | 15121.7 | 3.3 | 10087.0 |
| 2006 | 3.0 | 16087.9 | 3.8 | 11443.4 |
| 2007 | 3.0 | 17922.4 | 3.7 | 12102.5 |
| 2008 | 2.5 | 19175.4 | 3.25 | 10981.0 |
| 2009 | 3.0 | 21381.3 | 5.75 | 10672.6 |
| 2010 | 3.0 | 20618.4 | 7.9 | 9884.4 |
| Correlation | $r_{23}$ = -0.155 | | $r_{45}$ = -0.54 | |
| Coefficient of determination | $r^2_{23}$ = 0.024 | | $r^2_{45}$ = 0.2916 | |
| t-statistic | t-cal= 0.3138 | t-tab= 2.776 | Insignificant | t-cal= 1.283 | t-tab= 2.776 | Insignificant |

Source: Banking and Financial Statistics, No: 38-43, NRB

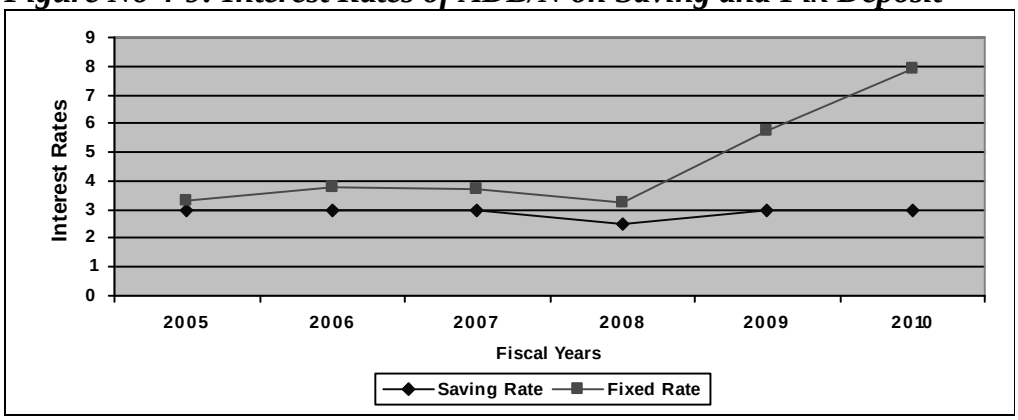
Table no 4-6 shows that interest rate and deposit amount are moving in opposite direction. To get the exact relation it is necessary to calculate the correlation coefficient and t-test. Here the data shows that both saving and fixed deposits are out of substitution effect. To verify it, the value or correlation and t-statistics is necessary. But prior to this it is effective if tabular value can be shown on graph as figure 4-8.

***Figure No 4-8: Deposit Amount of ADB/N during different FY***




Similarly the relationship between interest rate of saving and fixed deposit can be shown in figure no 4-9 as:

***Figure No 4-9: Interest Rates of ADB/N on Saving and Fix Deposit***




The figure no 4-8 shows that the deposit amount of ADB/N is in increasing trend. The increasing tendency is high for saving deposit but for fixed deposit,

the trend is decreasing slowly. Similarly figure 4-9 shows that the interest rate of fixed deposit is in increasing tendency in the study period and saving deposits remains constant in the study period except for 2008 where interest rate decline and again rises in 2009. Their fluctuating pattern is different which can be seen clearly on the graph no 4-9.

The correlation coefficient for saving deposit and its interest rate is found to be $r_{23}$ = -0.155 which means that deposit amount and its interest rate have higher degree of negative correlation. It means increase in one variable result the decrease in other variables. Similarly the coefficient of determination, $r^2_{23}$ = 0.024 which means that the value of dependent variables is dependent on independent variables to the extent of 2.4 percent. Similarly the t-test for same shows that the calculated value of t is 0.3138 (t-cal = 0.3138). This value is very lesser than the t-tabulated value (t-tab = 2.776) at 4 degree of freedom and 5% level of significance. Therefore when t-tab > t-cal, then $H_0$ or null hypothesis is accepted i.e. the variables are significantly non correlated or their relationship is not significant. Deposit amount is not affected by the interest rate given. The increase in saving deposit is due to the large number of its branches resulting collection of huge deposit as saving deposit, but fixed deposit is seems shifted in privately owned commercial and development banks which provides higher interest rate.

Similarly for fixed deposit, the coefficient of correlation ($r_{45}$) is -0.54, which is negative with high degree of inverse relationship. This is the extremely same case as compare to the correlation coefficient of RBB and NBL. The t-statistics for fixed deposit shows that its calculated value for t is 1.283, which is lesser than the tabulated value of t i.e. t-cal < t-tab. In such case null hypothesis is accepted and alternative hypothesis is rejected. This indicates that the two variables are not correlated or their relationship is insignificant.

The analysis of ADB/N also shows that substitution effect is not applicable for bank. That is the case is similar for all three government owned banks, meaning that there is no substitution effect for all three banks- RBB, NBL and ADB/N.

### 4.2.4 **Himalayan Bank Limited (HBL):**

The general interest rate structure for HBL for saving deposit and fixed deposits during past six fiscal years is as follows:

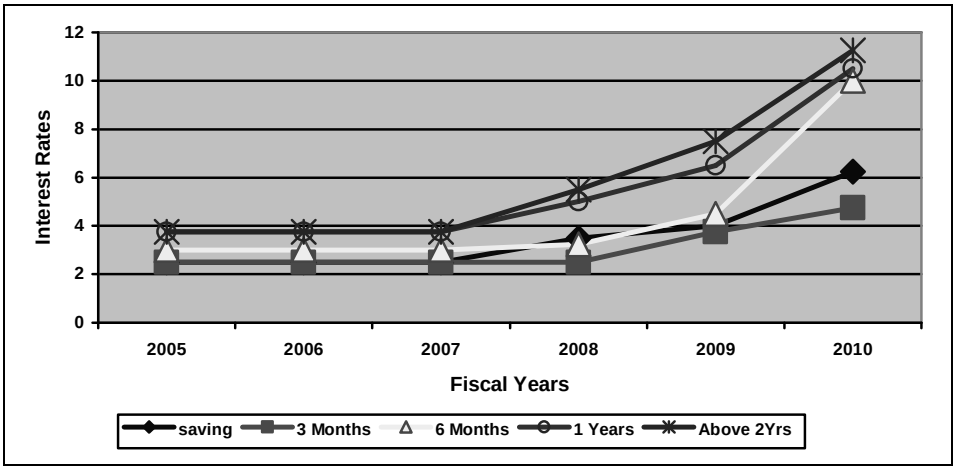
***Table no 4-7: Interest rate structure on deposit of HBL as on Mid-July***

| Deposit | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Savings | 6.25 | 4.0 | 3.5 | 2.5 | 2.5 | 2.5 |
| **Fixed** | | | | | | |
| 3 Months | 4.75 | 3.75 | 2.50 | 2.5 | 2.5 | 2.5 |
| 6 Months | 10.0 | 4.5 | 3.25 | 3.0 | 3.0 | 3.0 |
| 1 Years | 10.5 | 6.5 | 5.0 | 3.75 | 3.75 | 3.75 |
| Above 2Yrs | 11.25 | 7.50 | 5.5 | 3.75 | 3.75 | 3.75 |
| **Whole Mean** | **7.7** | **4.8** | **3.8** | **2.9** | **2.9** | **2.9** |
| **Fixed Deposit Mean** | **9.10** | **5.55** | **4.05** | **3.25** | **3.25** | **3.25** |
| **Std. Deviation** | 1.34% | | | | | |

Source: Banking and Financial Statistics, No: 38-43, NRB

From table 4-7 it is clear that the interest rate on deposit of HBL is also in increasing trend. But during last fiscal year the incline rate shows high slope than in the initial year. During the first period out of six FYs, the interest rate remains constant for three years and then in last three years there is inclination in the average interest rate. The whole average interest rate is 2.9% in 2005 to 2007 but it was 3.80%, 4.80% and 7.7% in FY 2008, 2009 and 2010 respectively. Similarly the average fixed deposit rate is 3.25% in 2005 to 2007, 4.05%, 5.55% and 9.10% in FY 2008, 2009 and 2010 respectively. It means that incline speed of deposit interest rate of HBL geared up from 2007. This phenomenon can be portrayed in the graph as figure no 4-10.

***Figure No 4-10: Interest Rate of HBL on Deposits during Different FY***




The graph no 10 also shows that up to FY 2007 the slope is constant and after then the interest rate slope gear up sharply.

## Correlation Coefficient, Coefficient of Determination and t-statistics of HBL

***Table No 4-8:*** ***Relationship between Interest Rate and Deposit amount of HBL***

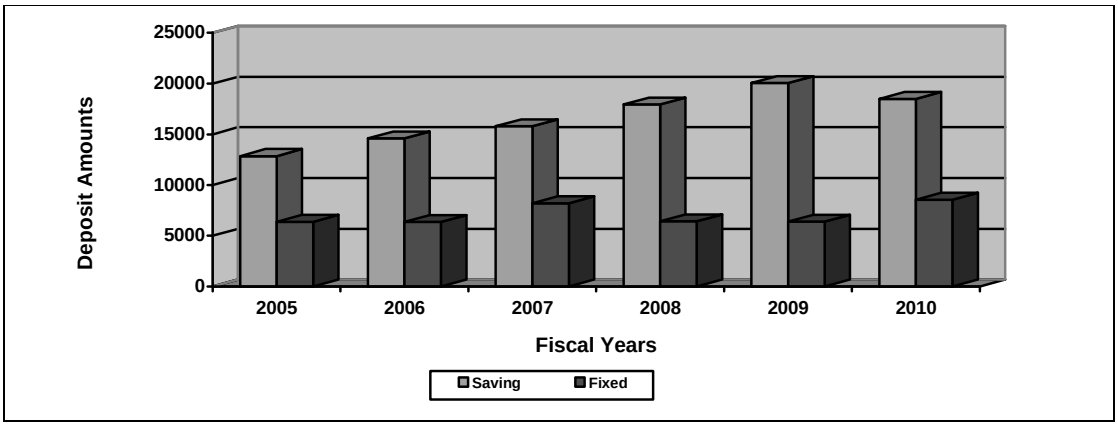
| Year (1) | Saving Deposit Interest Rate (2) | Saving Deposits Amounts (3) | Fixed Deposit Interest Rate(4) | Fixed Deposit Amounts (5) |
|---|---|---|---|---|
| 2005 | 2.5 | 12852.4 | 3.25 | 6364.3 |
| 2006 | 2.5 | 14582.8 | 3.25 | 6350.2 |
| 2007 | 2.5 | 15784.4 | 3.25 | 8201.1 |
| 2008 | 3.5 | 17935.0 | 4.05 | 6423.9 |
| 2009 | 4.0 | 20061.0 | 5.55 | 6377.1 |
| 2010 | 6.25 | 18489.2 | 9.1 | 8556.2 |
| Correlation | $r_{23}$ = 0.684 | | $r_{45}$ = 0.5657 | |
| Coefficient of determination | $r^2_{23}$ = 0.4678 | | $r^2_{45}$ =0.32 | |
| t-statistic | t-cal= 1.875 | t-tab= 2.776 Insignificant | t-cal= 1.372 | t-tab= 2.776 Insignificant |

Source: Banking and Financial Statistics, No: 38-43, NRB

The table 4-8 shows the amount of saving deposit and its interest rate as well as amount of fixed deposit and its interest rate for six fiscal year. The table indicates that, both deposit rate and interest rate inclined in each fiscal year. This suggests that interest rate and deposit amount have positive relationship,

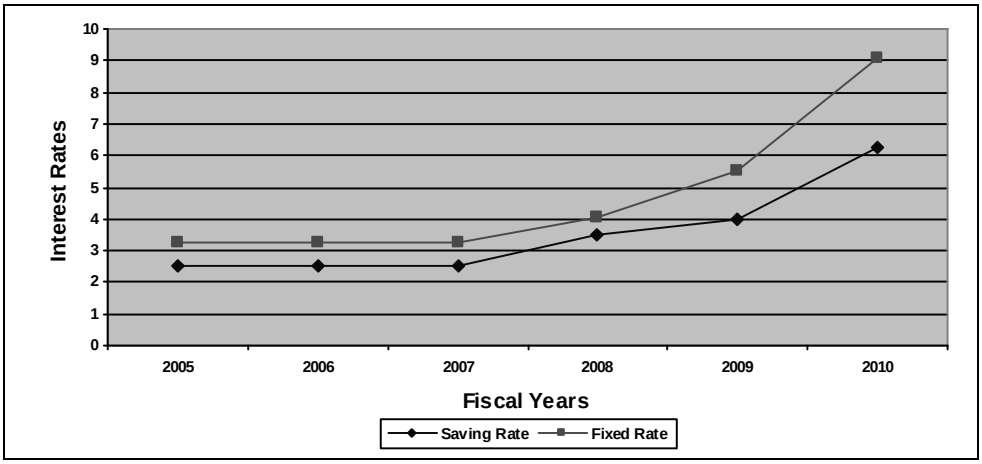
i.e. when one variable is found to be increased, other variable is also found to be increased and vice versa. This situation can be revealed in graph as figure no 4-11 in following ways:

***Figure No 4-11: Deposit Amount of HBL during different FY***




The graph 4-11 shows saving deposit amount is continuously rising each year except for 2010 but fixed deposit amount is seems to grow each year with some fluctuation. It means that there is rise and fall for fixed deposit amount. Similarly the interest rate of fixed deposit and saving deposit can also be shown on figure 4-12 as:

***Figure No 4-12: Interest Rates of HBL on Saving and Fix Deposit***



To quantify the exact relationship between interest rate and deposit amount, it is necessary to calculate the co-relation coefficient. The correlation coefficient of saving deposit amount and its interest rate is 0.684. It means that these two variables have moderate relationship. The correlation coefficient for fixed deposit rate and amount is 0.5657 ($r_{23}$ = 0.5657), which is also moderate correlation. Therefore for both saving and fixed deposit, the case satisfies the substitution effect. The coefficient of determination of correlation coefficient of saving deposit is 0.4679 ($r^2_{23}$ = 0.4679) which indicates that the relation between deposit and interest rate is tied up to the level of 46.79 percent and remaining other percentage by other factors. In same manner for fixed deposit the value of coefficient of determination is 0.32 which indicates that the relation between deposit and interest rate is tied up to the level of 32 percent and remaining other percentage by other factors.

The value of t-statistics for saving deposit and saving interest is found to be 1.875 (t-cal = 1.875). The tabulated value for this condition at 5% level of significance with 4 degree of freedom is 2.776. It means that in this case t-calculated is less than t-tabulated. So null hypothesis is accepted, which means that there is no significant correlation between saving deposit and interest rate. Similarly for fixed deposit, the calculated value for t is 1.372 (t-cal = 1.372). This value is also less than t-tabulated. So in this case also the magnitude of correlation coefficient is highly insignificant.

Thus for saving deposit it clearly satisfies the substitution effect which means as the interest rate increases the deposit amount also increased. The saving deposit might rise due to swift of deposit of government owned bank to HBL with higher interest rate. However the fixed deposit amount increases with the increase in interest rate but there is seen fluctuation in the deposit amount in 2008 and 2009. Thus fixed deposit does not properly satisfy the substitution effect in the context of HBL. The fixed deposit also might increased due to higher interest rate than government owned commercial banks.

### 4.2.5 **Nepal Bangladesh Bank (NBB):**

As similar to previous part, it is better to present the general interest rate structure before entering to the main analysis. The interest rate structure for NBB on saving and fixed deposits for past six FYs are as presented on table 4-9.

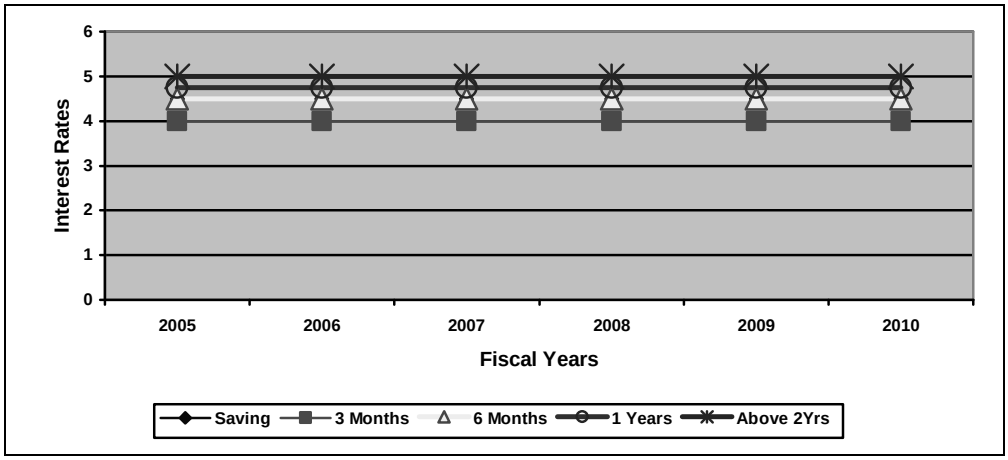
***Table no 4-9: Interest rate structure on deposit of NBB as on Mid-July***

| Deposit | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Savings | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| **Fixed** | | | | | | |
| 3 Months | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 6 Months | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| 1 Years | 4.75 | 4.75 | 4.75 | 4.75 | 4.75 | 4.75 |
| Above 2Yrs | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| **Whole Mean** | **4.5** | **4.5** | **4.5** | **4.5** | **4.5** | **4.5** |
| **Fixed Deposit Mean** | **4.55** | **4.55** | **4.55** | **4.55** | **4.55** | **4.55** |
| **Std. Deviation** | 0% | | | | | |

Source: Banking and Financial Statistics, No: 38-43, NRB

The table 4-9 portrays the interest rate of NBB on saving deposit and fixed deposits. All the interest rate on deposit is constant. But this case doesn't not match with the government owned bank; RBB, NBL & ADB/N. In the six years fiscal periods, the interest rate for every deposit is constant. This can be shown clearly if average of all interest rate is taken. The average interest rate for whole (both fixed and saving) account is 4.5% for all period of study. This tendency can be exhibited in the pictorial form as in figure no 4-13 as follows.

*Figure No 4-13: Interest Rate of NBB on Deposits during Different FY*




The figure 4-13 shows that during 2005 to 2010 interest rate on different term period is in uniform pattern. The overall figure shows that the interest rate is on constant trend.

**Correlation Coefficient, Coefficient of Determination and t-statistics of NBB**

***Table No 4-10:*** ***Relationship between Interest Rate and Deposit amount of NBB***

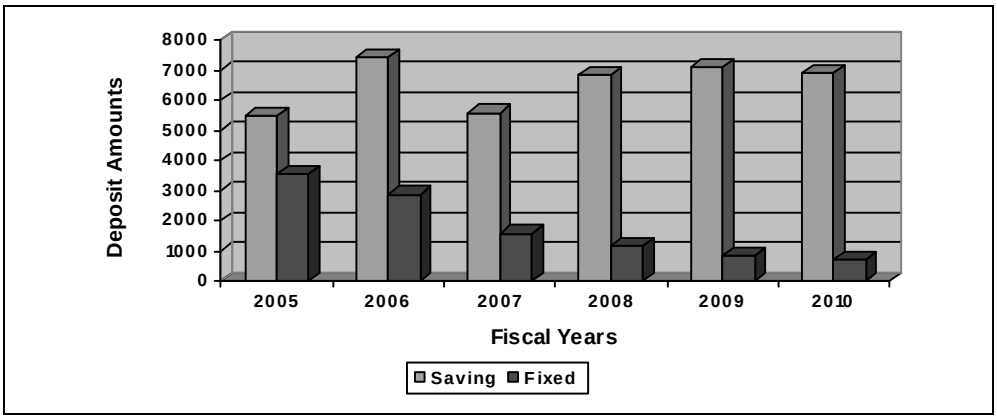
| Year (1) | Saving Deposit Interest Rate (2) | Saving Deposits Amounts (3) | Fixed Deposit Interest Rate(4) | Fixed Deposit Amounts (5) |
|---|---|---|---|---|
| 2005 | 4.50 | 5475.2 | 4.55 | 3536.6 |
| 2006 | 4.50 | 7414.8 | 4.55 | 2867.0 |
| 2007 | 4.50 | 5582.9 | 4.55 | 1578.1 |
| 2008 | 4.50 | 6867.2 | 4.55 | 1166.7 |
| 2009 | 4.50 | 7099.3 | 4.55 | 813.2 |
| 2010 | 4.50 | 6886.7 | 4.55 | 697.6 |
| R | $r_{23} = 0$ | | $r_{45} = 0$ | |
| $r^2$ | $r^2_{23} = 0$ | | $r^2_{45} = 0$ | |
| t-statistic | t-cal= 0 | t-tab= 2.776 Insignificant | t-cal= 0 | t-tab= 2.776 Insignificant |

Source: Banking and Financial Statistics, No: 38-43, NRB

The table 4-10 also shows saving deposit amount in increasing trend with the fluctuation whereas the fixed deposit amount is in decreasing trend. It means interest rate and deposit amount have inverse relationship. There is seen

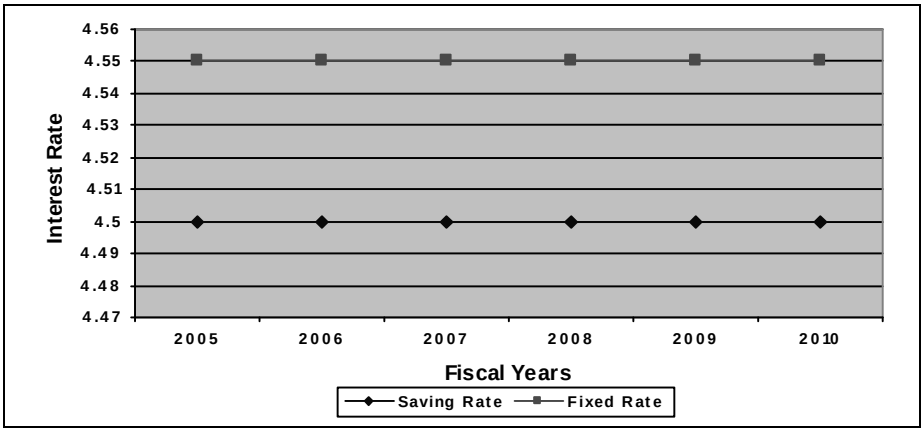
fluctuation in deposit amount although the interest rate is constant. This might be due to the NBB has been declared in trouble in the study period and the management of NB group has been take over by the management of NRB for few years. In that period huge amount has been withdrawn by individual from the bank and the loan was also almost closed in that year of action taken by NRB. But to find exact quantity of inverse relationship it is necessary to compute the correlation coefficient. Prior to this it is helpful if the data are presented on graph no 4-14.

***Figure No 4-14: Deposit Amount of NBB during different FY***




The graph shows that NBB collected more funds on saving deposit than fixed deposits in all FYs. Similarly the relationship of saving interest rate and deposit interest rate can be shown on figure no 4-15 as follow.

***Figure No 4-15: Interest Rates on Saving and Fix Deposit of NBB***



If the excel sheet is used to compute the correlation coefficient, then the value for correlation between saving deposit and interest rate is 0 ($r_{23} = 0$). There is no any correlation between deposit rate and deposit amount. It means that during the last six fiscal years, there was sharp increase in saving deposit amount even though there was no change in saving and fixed interest rates. The coefficient of determination $r^2_{23} = 0$. Similarly the calculated value for t is 0 for both fixed and saving account. The value of tabulated t at 4 d.f. and 5% level of significance is only 2.776. So for both account t-cal < t-tab, and hence null hypothesis is accepted. It means that there is no significant relationship between two variables (deposit amount and interest rate).

Thus from the both study it reveals that substitution effect is not applicable for NBB.

## 4.3 **Analysis of Lending and Interest Rate:**

This is second area of the analysis where mainly the relationship between lending interest rate and its effect upon lending amount is measured. Generally, when there is higher interest rate (esp. lending or credit rate) in the economy, people normally borrow lesser amount than the period when lending interest rate is low. According to theory, when there is low lending rate, then there should be higher amount of borrowing. Higher amount of borrowing indicates higher investment in the country or higher transaction in trade. This is necessary for the growth of the economy. So this study tries to explore the relationship between lending rate and lending amount in Nepalese context.

### 4.3.1 **Rastra Banijya Bank:**

The sector where RBB grant its credit during last seven FYs and their corresponding interest rate, average interest rate and lending amount are presented in the table 4-11 below.

***Table 4-11: Lending Rate of RBB on Different Sectors during Seven FYs.***

| **Sector** | **2010** | **2009** | **2008** | **2007** | **2006** | **2005** |
|---|---|---|---|---|---|---|
| Overdraft | 12.5 | 11 | 11 | 11 | 11 | 11 |
| Export Credit | 10 | 8 | 8 | 8 | 8 | 8 |
| Import LC | 10 | - | 8 | 8 | 8 | 8 |
| HMG Bond | 11 | 7 | 7 | 5 | 7 | 7 |
| BG/CG | 11 | 7 | 7 | 8.5 | 8.5 | 8.5 |
| Other Guarantee | - | - | 6 | - | - | - |
| Term Loan | 14 | 11 | 11 | 11 | 11 | 11 |
| Priority Sector Loan | 11.5 | 11.5 | 11.5 | 13 | 11.5 | 13 |
| Working Capital | 13.5 | - | - | - | - | - |
| Hire Purchase | 13 | 10 | 9 | 7 | 11 | 11 |
| Others | 13 | 11 | 11 | 11 | 10 | 10 |
| **Average Int. Rate(1)** | **11.95** | **9.56** | **8.95** | **9.17** | **9.56** | **9.72** |
| **Lending Amount(2)** | **28543.80** | **31464.10** | **27353.60** | **25214.80** | **26863.80** | **28614.00** |
| Correlation ( $r_{12}$) | 0.25 | | | | | |
| Coefficient of determination ($r_{12}^2$) | 0.0632 | | | | | |
| **t-statistics** | t-cal = 0.516 | | t-tab = 2.776 | | Insignificant. | |
| **Std. Deviation** | 2.35% | | | | | |

Source: Banking and Financial Statistics, No: 38-43, NRB

[Note: For all case, the higher ceiling of interest rate is taken from the table, as per suggestion of NRB research department.]

Lending activity of commercial banks can be diversified into different sectors. But according to the publication of Nepal Rastra Bank- Banking & Financial statistics- the loan of commercial banks are classified in different sub-sectors like overdraft, export credit, Import LC, commercial loan and so on. Besides this there are other section (area) when bank provides loan and these areas are placed in the topic of "others". For this study, lending area are categorized as classified by NRB.

According to table 4-11 it shows that interest rate on lending on different area are in declining stage in the initial year of the study and again incline in the latest year. The table shows that the maximum interest rate is 11.95% in FY 2010 and, minimum rate is 8.95% on FY 2008. This shows that the interest rate was decline during the 2005 to 2008 period and again it rises in the period 2009 and 2010. Generally there is high fluctuation in consumer loan like hire purchase. For example during the last six FYs increase in overdraft for 2010 than 2005 is 13.6%, export import loan is 25%, BG/CG is 29.4% etc. Similarly for term loan increases by 27.27%, Hire Purchase by 18.18% and other loan by 30%. According to theory, in order to induce the investment in the country or expansion of trade, the productive sector loan should be available at cheaper rate. But the figure shows that these sectors loan were somewhat costlier than other nonproductive loan.

If the average of each fiscal year is taken, then it shows average lending interest rate was 9.72% (2005), 9.56 %( 2006), 9.17 %( 2007), 8.95 %( 2008), 9.56% (2009) & 11.95% (2010). The standard deviation for average interest rate was 0.988%, which shows the deviation from mean return. The average rate is also in decreasing trend in initial year and accelerates in later period of

the study. The decreasing tendency was not smooth. It means the rate declined each year with different rate and inclined in later year sharply. In later year the inclination was quite fast whereas the declining tendency was little in preceding year. This concludes that interest rate on lending is also in decreasing tendency for past few years although the interest rate is seems higher in the end year of study than of start year of study. With harmony to interest rate, the lending amount of RBB is also seen to be in increasing tendency but with some fluctuation. These can also be present in figure no 4-16 and 4-17.

***Figure no 4-16: Lending Amount Of RBB During Different FYs.***

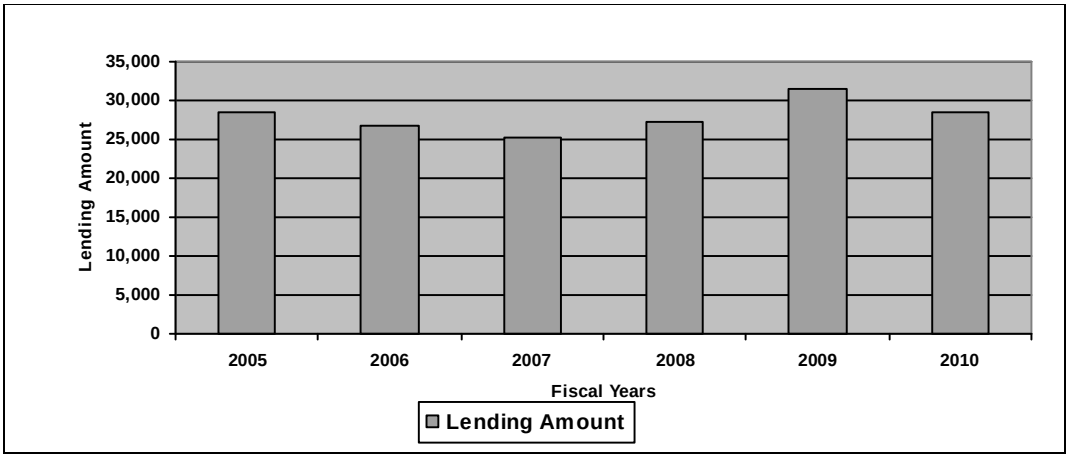
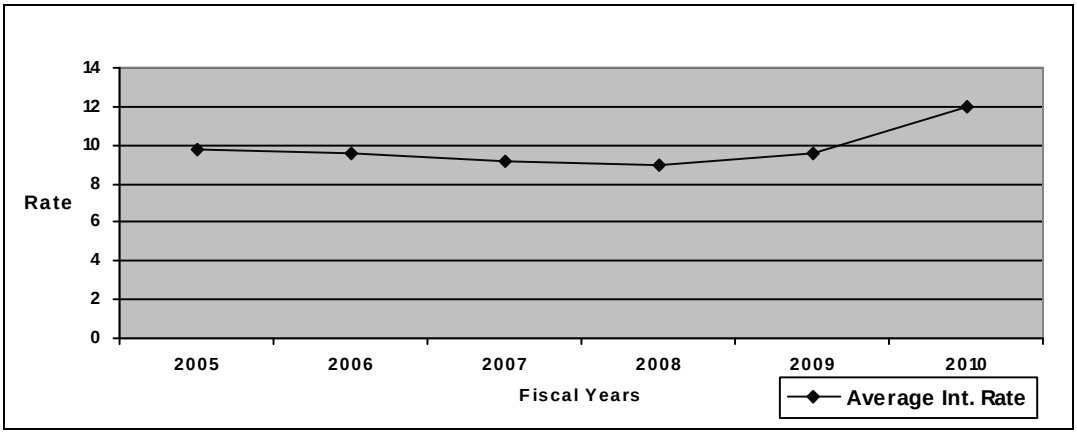



***Figure no 4-17: Average Lending Rate of RBB during Different FYs***



**Correlation Coefficient, Coefficient of Determination and t-Statistics of RBB**

From table 4-11 the correlation coefficient (simple correlation) between lending rate and lending amount ($r_{23}$) is 0.25. According to our classification, this correlation is "moderate degree" correlation. In this case it is clear that interest rate on lending & lending amount has positive relationship. It means they move in same direction i.e. increase in lending rate result increase in total lending amount. This situation does not match with the actual theory. According to the theoretical concept of lending rate and lending amount, people prefer or use more money when the market interest rate is low in the market. But the case is not true for RBB. The simple determination of correlation coefficient ($r_{12}^2$) is 0.0632. When total lending amount is taken as dependent variable and lending rate as independent variables, then 6.32% of total variation in dependent variable is explained by lending rate and remaining percentage is due to the effect of other variables in the economy. This case is due to the expansion of economy, inflation and more demand of money for consumption and commodity purpose.

Test of significance of correlation coefficient between lending rate and lending amount also verify the fact. The calculated value of t-statistics is 0.516 (t-cal = 0.516). This value is less than tabulated value, t-tab = 2.776 with level of significance 5% and d.f. 4. In this condition, $H_O$ is accepted. It means that there is no significant correlation between the two variables. In other words their relation is insignificant. Though the correlation coefficient shows that these two variables have moderate level of correlation, but t-statistics verify that their relation is insignificant. In conclusion, the positive relationship between lending rate and lending amount is not exactly applicable for RBB.

### 4.3.2 **Nepal Bank Limited:**

The sector where NBL grant its credit during last six FYs and their corresponding interest rate, average interest rate and lending amount are presented in the table 4-12 below.

Table 4-12 shows the lending interest rate structure of NBL on different sectors. This interest rate is somewhat lower in value as compare to interest rate of RBB (table 4-11). It means that there was some difference in interest rate between the two government run banks. For example in overdraft the RBB quoted the interest rate 12.5% per annum on FY 2010 where as in same period the NBL quoted the interest rate of 10% per annum for overdraft. In same manner the figure18 and figure19 indicates that the lending interest rate of NBL was lesser the lending interest rate of RBB. The average interest rate with standard deviation 0.261% also verifies the above statement about two banks' lending interest rate.

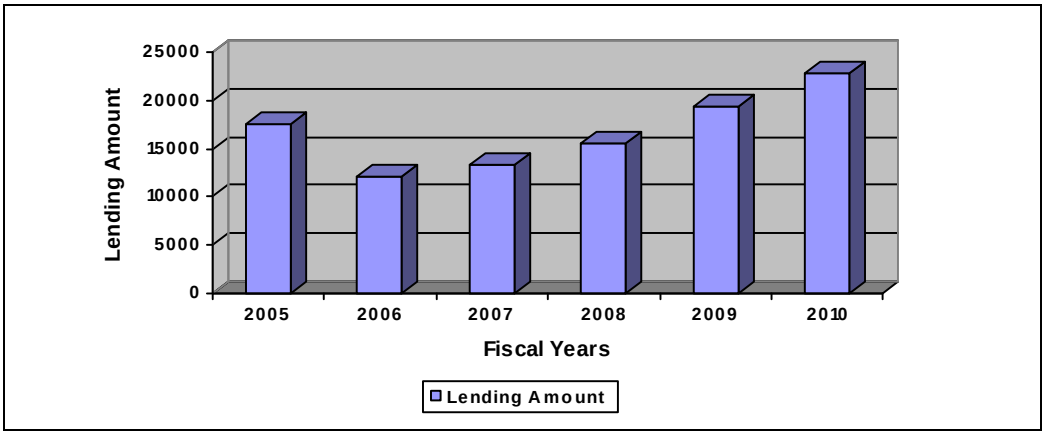
***Table 4-12: Lending Rate NBL on Different Sectors during Seven FYs.***

| **Sector** | **2010** | **2009** | **2008** | **2007** | **2006** | **2005** |
|---|---|---|---|---|---|---|
| Overdraft | 10 | 10 | 10 | 10 | 10 | 10 |
| Export Credit | 9 | 8 | 8 | 8 | 8 | 8 |
| Import LC | - | - | - | - | - | - |
| HMG Bond | 9 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 |
| BG/CG | 8.5 | 7 | 7 | 7 | 7 | 7 |
| Other Guarantee | 6 | - | - | - | - | - |
| Term Loan | 12.5 | 11 | 11 | - | - | - |
| Priority Sector Loan | 7.5 | 10 | 10 | 10 | 10 | 10 |
| Working Capital | 12 | 10 | 10 | 10 | 10 | 10 |
| Hire Purchase | 11.5 | 9 | 9 | 10.5 | 10.5 | 10.5 |
| Others | 12.5 | 11 | 11 | 11 | 11 | 11 |
| **Average Int. Rate(1)** | **9.85** | **9.17** | **9.17** | **9.13** | **9.13** | **9.13** |
| **Lending Amount(2)** | **22715.00** | **19261.00** | **15480.60** | **13377.50** | **12180.40** | **17456.00** |
| Correlation ( $\mathbf{r_{12}}$) | 0.778 | | | | | |
| Coefficient of determination ($\mathbf{r_{12}^2}$) | 0.605 | | | | | |
| **t-statistics** | t-cal = 2.477 | | t-tab = 2.776 | | Insignificant. | |
| **Std. Deviation** | 0.261 | | | | | |

According to the table 4-12, it is clear that all the lending interest rate rises by 1.50% to 7% within the six FYs. During first phase of six FYs, the average

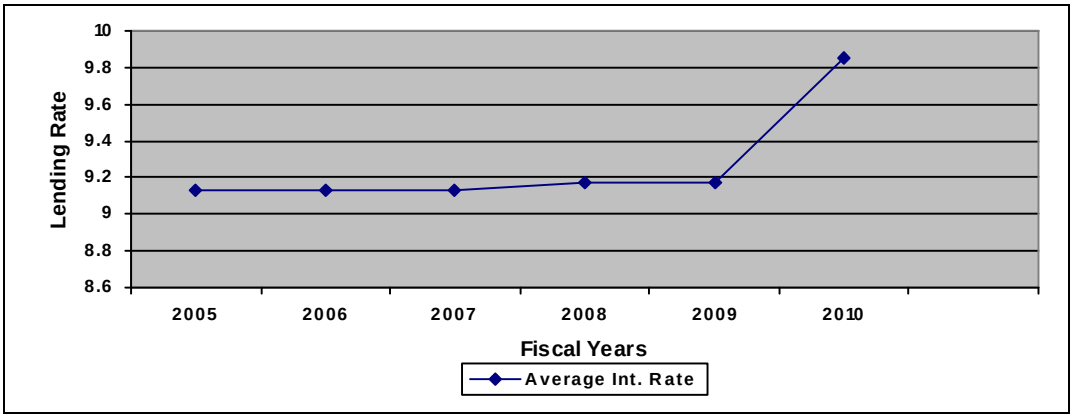
interest rate remains steady but in middle of the FY it inclined steadily. During the period especially hire purchase rate, against government bond rate, BG/CG rate and working capital lending rate rises drastically. They rises by 5% to 7% on average. Whereas other sector lending rate of NBL also rises but their magnitude was less. It means that commercial sector loan rate, industrial loan rate were not increased by large percentage. So it can be said that only non-productive sector loan rates were inclined drastically during the six FYs as compare to productive sector loan. The case is similar with the RBB. With rhythm to lending interest rate, the study of lending amount shows that, it is also in decreasing trend in initial year of study but it rises drastically in the later year. The trend shows that it is fluctuating. In other words, up to the FY 2007, the lending amount was in decreasing tendency but after 2007 onward the amount seems to be increasing. The average lending rate of each FY and their corresponding lending rate can be exhibited in the figures 4-18 and figure 4-19 as follows:

***Figure no 4-18: Lending Amount Of NBL during Different FYs.***




Similarly the graph of average interest rate of last seven FYs is

***Figure no 4-19: Average Lending Rate of NBL during Different FY***




**Correlation Coefficient, Coefficient of Determination and t-Statistics of NBL**

To find the exact relationship between the lending interest rate and lending amount, it is necessary to use some of the statistical tools like correlation coefficient, coefficient of determination. Similarly, to verify the correlation coefficient, student t-statistics is applied. For this case, the correlation coefficient between NBL's average interest rate and lending amount is 0.778 ($r_{12} = 0.778$). It means that, according to our classification, this is low degree of positive correlation. Increase in one variable result the increase in other variables but in low magnitude. In other words, if one variable increases by one percentage, then other variable increases by 0.78%. The result of correlation is against the theory. Because according to theory there should negative correlation. In other word, decrease in interest rate should be followed by increase in lending amount. But this case doesn't happen for NBL. The coefficient of determination $r_{12}^2 = 0.605$, which means that the relationship between two variable (lending amount and rate) is defined up to 60.5% only.

Similarly, the calculation of t statistics gives the value to t as 2.477 i.e. t-cal = 2.477. The tabulated value for t at 4 d.f. and 5% level of significance is 2.776. Therefore, in this case t-calculated is less than t-tabulated. Hence, null hypothesis is accepted. It indicates that the relationship shown by correlation coefficient is not significant.

In conclusion, it can be said that the lending interest rate and lending amount don't have inverse relationship. This is not as per theory suggests.

### 4.3.3 **Agriculture Development Bank/Nepal (ADB/N):**

As previously mentioned, ADB/N grants the loan broadly in two sectors; agricultural and non-agricultural (commercial) sectors. But for this study only the lending of commercial sector is focused. The general lending interest rate, lending area, average lending rate and lending amount during the six fiscal years are presented in the figure 4-13.

***Table 4-13: Lending Rate ADB/N on Different Sectors during Six FYs.***

| **Sector** | **2010** | **2009** | **2008** | **2007** | **2006** | **2005** |
|---|---|---|---|---|---|---|
| Overdraft | 13 | 13 | 12 | 12.5 | 12.5 | 15.5 |
| Export Credit | - | 11 | 11 | - | - | - |
| Import LC | - | 11 | 11 | - | - | - |
| HMG Bond | 8 | 6 | 6 | 6.5 | 6.5 | - |
| BG/CG | - | - | - | - | - | - |
| Commercial Loan | 12 | 12.5 | 10.5 | 11 | 11 | 14 |
| Term Loan | 12 | - | - | - | - | - |
| Priority Sector Loan | 9 | 7.5 | 7 | - | - | - |
| Working Capital | - | - | - | - | - | - |
| Hire Purchase | - | 10 | 10 | 10 | 10 | 13 |
| Others | 14 | 12.5 | 12 | 12 | 12.5 | 15.5 |
| **Average Int. Rate(1)** | **11.33** | **10.44** | **9.94** | **10.40** | **10.50** | **14.50** |
| **Lending Amount(2)** | **40052.30** | **38271.00** | **36585.40** | **34225.00** | **11040.60** | **10746.40** |
| Correlation ( $\mathbf{r_{12}}$) | -0.578 | | | | | |
| Coefficient of determination ($\mathbf{r_{12}^2}$) | 0.334 | | | | | |
| **t-statistics** | t-cal = 1.417 | | t-tab = 2.776 | | Insignificant. | |
| **Std. Deviation** | 1.538% | | | | | |

Source: Banking and Financial Statistics, No: 38-43, NRB

The table 4-13 shows the lending interest rate of ADB/N on different sectors in different FY. It is also notable matter that for commercial purpose, ADB/N had granted credit only on certain sectors in past FY. They are shown on the table 4-13. Comparing the lending rate of three banks, RBB, NBL and ADB/N it is found that ADB/N had the highest lending interest rate among all. After this

RBB had second highest interest rate and NBL had the least interest rate. Even though the interest rate on lending of ADB/N is high in first period of six FYs, on later years interest rate gradually starts to decrease and again in the later year it starts inclining. Every year interest rate is decline by few percentage points until 2008 and it starts rising after 2008. For the case of ADB/N in all sectors declining rate was similar. It means that there was equal fall in interest rate on each loan sector. But this is not the case for RBB and NBL because in those banks, there was rapid fall on nonproductive sector and less fall on non-productive sectors. In past six FYs the highest interest rate was 15.5% on overdraft. This is the maximum rate among all. Later within six FYs this rate fell to 13% p.a. when it approached to FY 2010. In same manner most of the rate fell by on average 2% from the previous lending rate in the starting period. But after 2008 there is again rise of average 2% till 2010. To see the position, it is better to give glance on average lending rate during last six even FYs. The average interest rate was 14.5%, 10.5%, 10.4%, 9.94%, 10.44% and 11.33% in FY 2005, 2006, 2007, 2008, 2009 and 2010 respectively.

In effect of fluctuation in interest rate, the lending amount of ADB/N is also found to be increasing drastically during the six fiscal years. During the period of six years, the lending amount was tripled. But to know the exact relationship it is necessary to compute the correlation coefficient. Prior to all it is rational if the data on the table 4-13are present on the graph no 4-20.

***Figure no 4-20: Lending Amount Of ADB/N During Different FYs.***

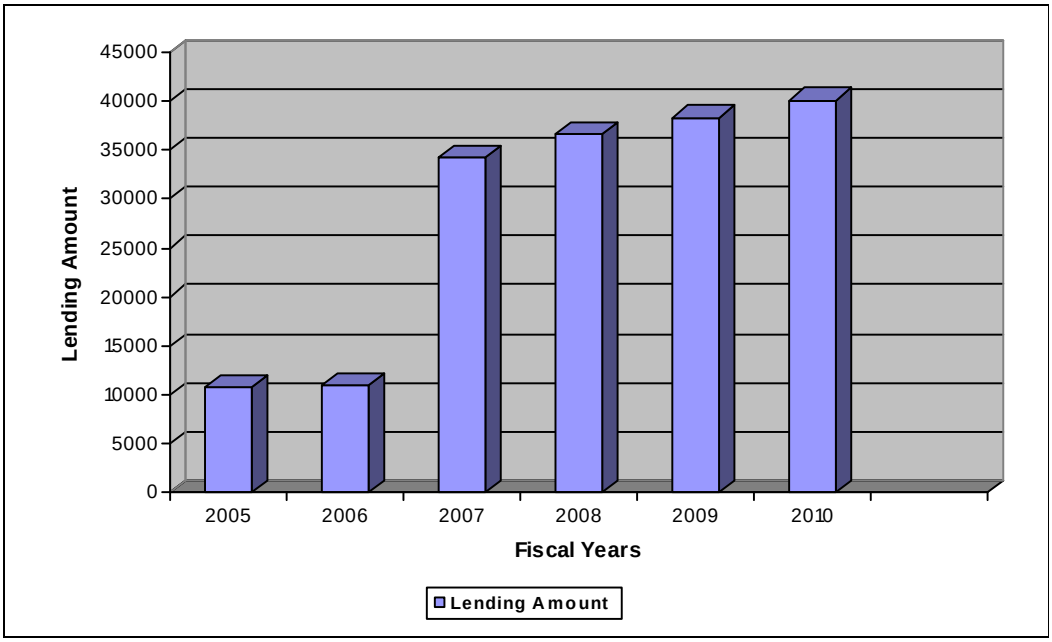
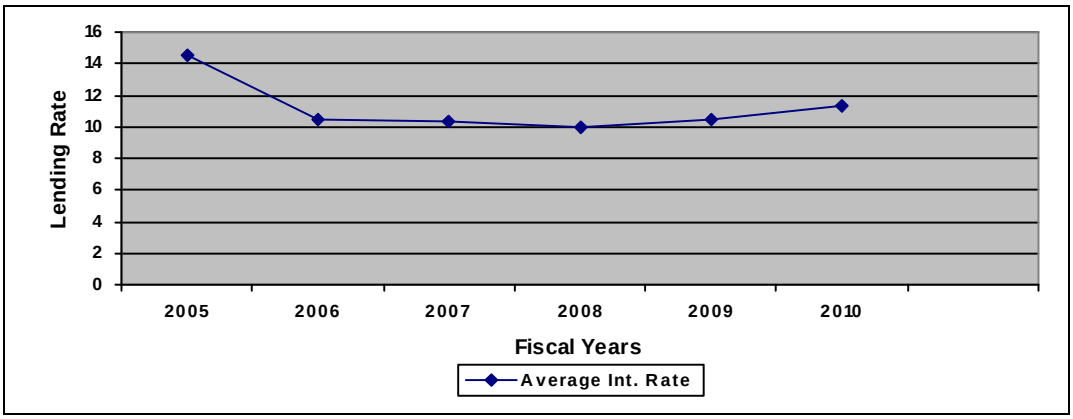



***Figure no 4-21: Average Lending Rate of ADB/N during Different FY***




**Correlation Coefficient, Coefficient of Determination and t-Statistics of ADB/N**

By using excel spread sheet, correlation coefficient, average, standard deviation and other necessary statistics can be calculated. The correlation coefficient between lending rate and lending amount for ADB/N is -0.578. This is very high degree of correlation. The negative sign indicates that, the two variables have opposite or inverse relationship, meaning decrease in one variables leads to increase in other variables. For this case, decrease in interest rate stimulates the lending amount or vice versa. The coefficient of

determination for correlation coefficient is 0.334. It indicates that lending amount depends upon lending amount by 33.4%. In other words, the relationship between one variable is defined by another is up to the level of 33.4%. As the interest rate on loan decline people demands for more and more fund as loan.

To verify the correlation coefficient statistically, it is better if t-statistics is used. The calculated value for t is 1.417 i.e. t-cal = 1.417. Similarly the tabulated value for t at 4 degree of freedom with 5% level of significance is 2.776 i.e. t-tab = 2.776. Comparing t-cal and t-tab, it is found that t-cal < t-tab so in such case null hypothesis is accepted meaning the relation shown by the correlation coefficient is highly insignificant. In other words, two variables are significantly uncorrelated or the increase in lending amount is not defined by the interest rate. This means there is rise in lending amount either the interest rate decrease or increase, the fluctuation in interest rate does not affect the lending amount. The rise in lending amount is due to reasons other than the loan interest rate. The reasons like low interest in loan than other financial institutions, large number of branches, ease in financing, lending in small amount etc. might cause the increase in the loan amount of ADB. From this analysis, it is verifies that theory does not matches with the lending case of ADB/N.

### 4.3.4. **Himalayan Bank Limited (HBL):**

HBL also grant credit on different area like commercial loan, industrial loan, overdraft, working capital and so on. These rates on the different fiscal years are as follows:

***Table 4-14: Lending Rate HBL on Different Sectors during Seven FYs.***

| **Sector** | **2010** | **2009** | **2008** | **2007** | **2006** | **2005** |
|---|---|---|---|---|---|---|
| Overdraft | 18 | 10.75 | 10 | 10 | 12 | 12 |
| Export Credit | 16 | 10.75 | 9.75 | 8.75 | 8.75 | 8.75 |
| Import LC | 16 | 10.25 | 9.5 | 9.5 | 11.75 | 11.75 |
| HMG Bond | 11 | 6 | 7 | 6.5 | 6 | 6 |
| BG/CG | 16 | 8 | 8 | 8 | 9.25 | 9.25 |
| Other Guarantee | - | - | - | - | - | - |
| Term Loan | 16 | 12.5 | 10.5 | 10.5 | 11.75 | 11.75 |
| Priority Sector Loan | 11 | 10 | 8.75 | 10 | 12 | 12 |
| Working Capital | - | - | - | - | - | - |
| Hire Purchase | 17 | 12 | 9.5 | 9 | 11.5 | 11.5 |
| Others | 18 | 11.25 | 10.5 | 12 | 13.5 | 13.5 |
| **Average Int. Rate(1)** | **15.44** | **10.17** | **9.28** | **9.36** | **10.72** | **10.72** |
| **Lending Amount(2)** | **30602.50** | **25292.10** | **19985.20** | **17672.00** | **15515.70** | **13245.00** |
| Correlation ( $r_{12}$) | 0.67 | | | | | |
| Coefficient of determination ($r_{12}^2$) | 0.4489 | | | | | |
| **t-statistics** | t-cal = 1.805 | | t-tab = 2.776 | | Insignificant. | |
| **Std. Deviation** | 2.089% | | | | | |

Source: Banking and Financial Statistics, No: 38-43, NRB

The table 4-14 shows the interest rate of HBL on lending on six fiscal years granted in different sectors. With comparison to above aforementioned bank, HBL lending rate was somewhat higher than quoted by those above bank. This may be due to the competition because those aforementioned banks are government owned bank where as HBL is private sector leading commercial bank. The maximum interest rate quoted by the HBL during six FYs was 18% on "overdraft and other" categories. The interest rate of HBL is also in increasing trend. But the increasing magnitude is very little. This is so because, the interest rate of HBL during FY 2005 was very low as compare to other three banks. It means that at 2005 the average interest rate of HBL was 10.72% where as other banks had average lending rate less than this. During six years period the interest rate rises to 15.44% on average. It means that interest rate rises by 4.72% on average. Similarly, the lending amount of HBL is seen to be in increasing trend. With compare to 2005 lending, lending of 2010 is three times more. So it can be said that lending of HBL was expanded rapidly within

that six fiscal periods. These phenomenon shows that lending interest rate and lending amount have positive relationship.

To quantify this relationship, it is necessary to calculate correlation coefficient and t-statistics. But prior to this it is fruitful if the trend of lending interest rate and lending amount is shown in the figure as in figure no 4-22.

***Figure no 4-22: Lending Amount Of HBL During Different FYs.***

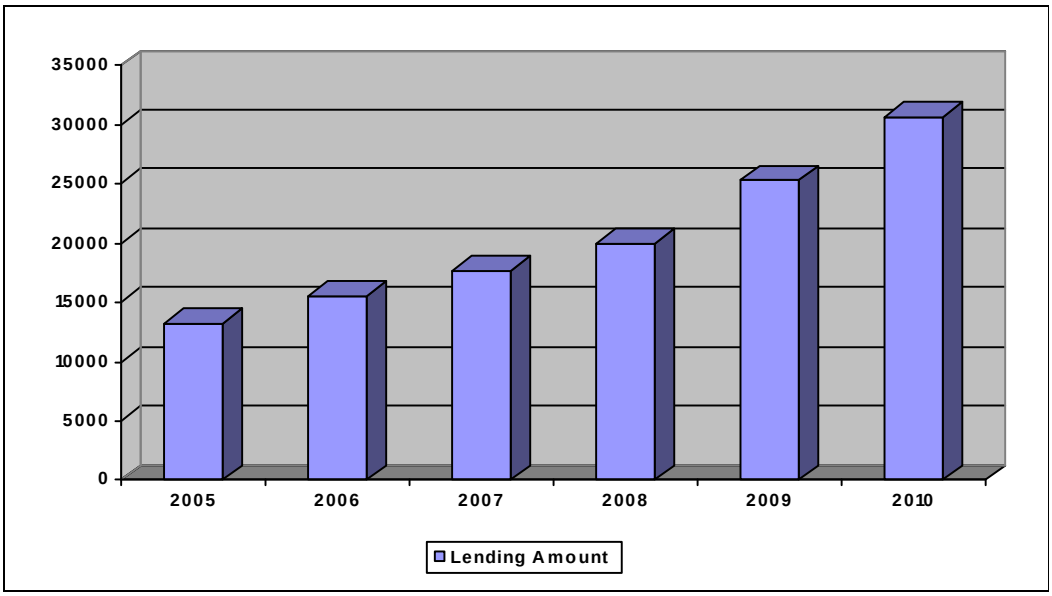
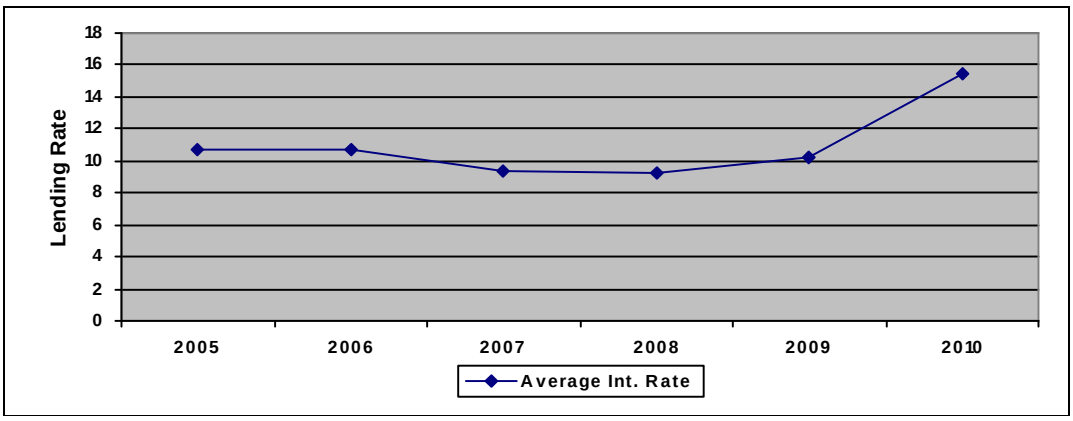



***Figure no 4-23: Average Lending Rate of HBL during Different FY***



The figure 4-23 shows that interest rate of lending falls slightly in middle of study period from 2006 to FY 2008. It falls from average 10.72% to average 9.28%. But after FY 2008, the inclining speed was very high. It means the interest rate falls only by decimal percentage point but rises by higher integer.

**Correlation Coefficient, Coefficient of determination and t-Statistics of HBL**

The correlation coefficient of HBL between lending amount and lending rate is 0.67. It is moderate degree correlation. It indicates that increment in one variable result the increment in other variables or vice versa. In this case decrease in lending interest rate increases the lending amount at the starting and middle period of the study. However in the later period of the study rise in interest rate could not affect the higher demand of loan amount. People preferred more credit from the HBL in the span of time regardless of the fall or rise in the lending interest rate. This is opposite with the saying of theory. Similarly the coefficient of determination between two variable ($r^2_{12}$) = 0.4489. It means that the relationship between dependent variable and independent variable is defined up to the extent of 44.89%. In other words, the increase in lending amount by decrease in interest rate is defined up to the extent of 44.89% whereas remaining percentage is due to other factors.

Similarly the t-statistics for HBL is 1.805 (i.e. t-cal = 1.805). The tabulated value at 5% level of significance with 4 d.f. is 2.776. Comparing the t-tab and t-cal, it is clear that t-cal < t-tab, so null hypothesis is accepted and alternative hypothesis is rejected. It means that the relation shown by correlation coefficient is highly insignificant. That is, the positive relation shown by two variables – lending rate & lending amount – is weak. The increase in demand of lending amount is not due to the increase or decrease in lending rate. Therefore, according to t-statistics, the lending rate is not the major factors that

shape the lending amount. The increase in lending amount is due to the diversification in loan products made by HBL and huge lending in industrial and housing sectors. In conclusion the positive relation of HBL on two variables is not accordance with theory.

### 4.3.5 **Nepal Bangladesh Bank (NBB):**

At last, another bank for analysis is Nepal Bangladesh Bank. This bank also grants the credit to its customers in different sectors. But according the NRB bulletin "Banking and Financial Statistics" the bank provided the loan to its customer on following sectors.

***Table 4-15: Lending Rate NBB on Different Sectors during Six FYs.***

| **Sector** | **2010** | **2009** | **2008** | **2007** | **2006** | **2005** |
|---|---|---|---|---|---|---|
| Overdraft | - | - | - | - | - | - |
| Export Credit | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 |
| Import LC | - | - | - | - | - | - |
| HMG Bond | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| BG/CG | 8 | 8 | 8 | 8 | 8 | 8 |
| Industrial Loan | 10.5 | 10.5 | 10.5 | 12 | 12 | 12 |
| Term Loan | - | - | - | - | - | - |
| Priority Sector Loan | 10 | 10 | 10 | 10 | 10 | 10 |
| Working Capital | 9 | 9 | 9 | - | - | - |
| Hire Purchase | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 |
| Others | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| **Average Int. Rate(1)** | **9.31** | **9.31** | **9.31** | **9.57** | **9.57** | **9.57** |
| **Lending Amount(2)** | **9348.80** | **8507.90** | **8420.00** | **8302.00** | **9010.70** | **8739.80** |
| Correlation ( $r_{12}$) | -0.104 | | | | | |
| Coefficient of determination ($r_{12}^2$) | 0.0108 | | | | | |
| **t-statistics** | t-cal = 0.209 | | t-tab = 2.776 | | Insignificant. | |
| **Std. Deviation** | 0.129% | | | | | |

Source: Banking and Financial Statistics, No: 38-43, NRB

The table 4-15 shows the lending interest rate structure of NBB on six FYs on different sectors. From table it is clear that the interest rates of NBB are in falling stage. During the first phase of FY the interest rate remains constant and at middle of study period the interest rate fell down and again remains constant in later year of study period. This phenomenon can be seen clearly with the study of average interest rate. The average interest rate for FY 2005, 2006, 2007, 2008, 2009 and 2010 are 9.57%, 9.57%, 9.57%, 9.31%, 9.31% and

9.31% respectively. The average interest rate shows that the interest remains constant for first three years and it fells down and remains constant for later three years. In this bank also, lending interest of nonproductive loan falls more than lending interest of productive sector loan. In same manner, for lending amount, the lending amount of NBB increased each year except for year 2007. This shows that the lending amount and interest have moderate relationship. But to get the exact numerical result of relationship correlation should be necessary to calculate. The figure for changing trend of interest rate and lending amount is given on figure no 4-24 and figure no 4-25.

***Figure no 4-24: Lending Amount Of NBB During Different FYs.***

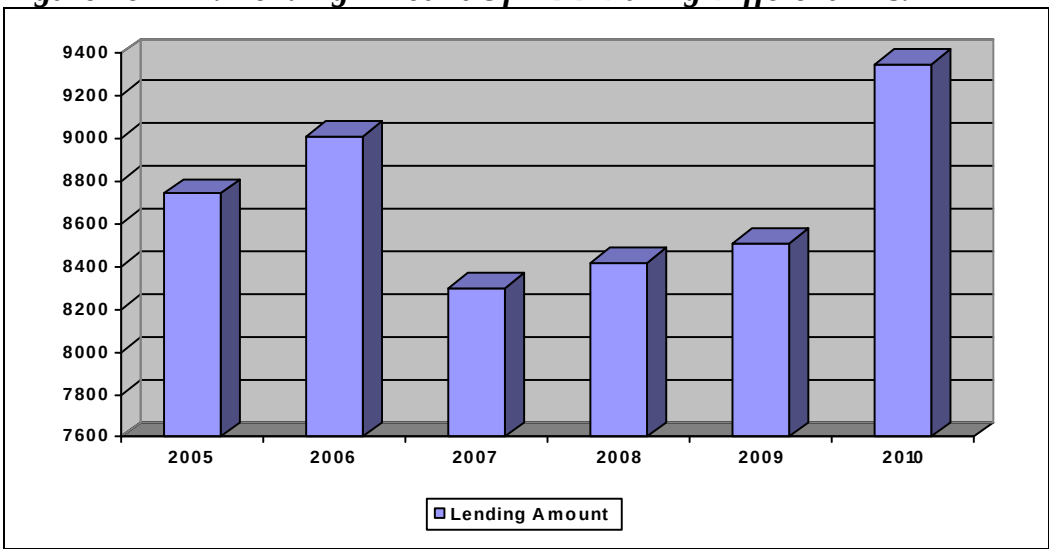
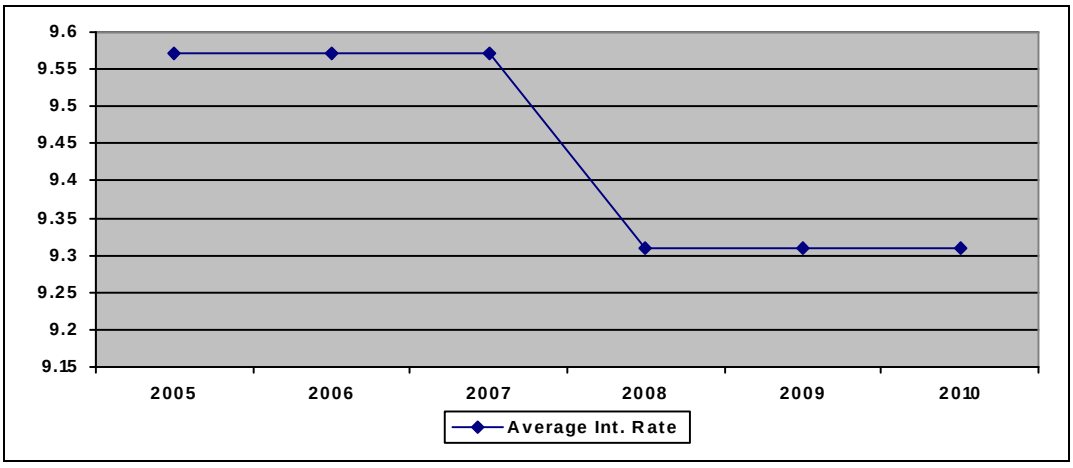



***Figure no 4-25: Average Lending Rate of NBB during Different FY***



**Correlation Coefficient, Coefficient of Determination and t-Statistics of NBB**

The correlation coefficient of NBB between lending amount and lending rate is -0.104. It is negative correlation. It indicates that increment in one variable result the decrement in other variables or vice versa. Decrement in lending interest rate increases the lending amount because people preferred more credit from the NBB when bank reduced the lending interest rate. This condition matches with the theory. Similarly the coefficient of determination between two variable ($r^2_{12}$) = 0.01089. It means that the relationship between dependent variable and independent variable is defined up to the extent of 1.09%. The remaining percentage is due to other factors.

Similarly the calculate t-value for NBB is 0.209 (i.e. t-cal = 0.209). The tabulated value of t-statistics at 5% level of significance with 4 d.f. is 2.776. Comparing the t-tab and t-cal, it is clear that t-cal < t-tab, so null hypothesis is accepted and alternative hypothesis is rejected. It means that the relation shown by correlation coefficient is highly insignificant. That is the inverse relation shown by two variables – lending rate & lending amount – is weak. In conclusion the inverse relation of NBB on two variables is accordance with theory.

## 4.4 Analysis of Inflation and Interest Rate (Deposit & Lending Rate)

Another variable that affects the interest rate in the economy is the inflation. In general condition, inflation and interest rate have positive effect. It means that, when inflation increases in the economy, the interest rate also increases. On this ground, different theory has been propounded like Fisher effect, Harrod-Keynes effect and so on. This all phenomenon have been already explained in

the chapter two. To measure the actual relationship, the prevailing situation of each bank is going to observe.

### 4.4.1 Rastra Banijya Bank (RBB):

The interest rate on deposit, interest rate on lending of RBB and inflation of the country during the six FYs were tabulated on table 4-16.

***Table no 4-16: Inflation Rate and Interest Rate of RBB***

| **Fiscal Year** | **CPI (1)** | **Inflation (2) %** | **Deposit Rate(3)** | **Lending Rate (4)** |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 2.3 | 9.72 |
| 2006 | 179.6 | 9.1 | 2.35 | 9.56 |
| 2007 | 187.6 | 4.5 | 2.35 | 9.17 |
| 2008 | 208.3 | 11.0 | 2.35 | 8.95 |
| 2009 | 234.0 | 12.3 | 2.5 | 9.56 |
| 2010 | 256.4 | 9.6 | 5.25 | 11.95 |

| | | | |
|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **0.175** | Coefficient of Determination | **0.0306** |
| Correlation coefficient. $r_{24}$ | **0.116** | Coefficient of Determination | **0.0134** |

| | | | |
|---|---|---|---|
| **t-statistics** | **t-cal (Deposit) =0.355** | **t-tab = 2.776** | **Insignificant** |
| | **t-cal (Lending) =0.234** | **t-tab = 2.776** | **Insignificant** |

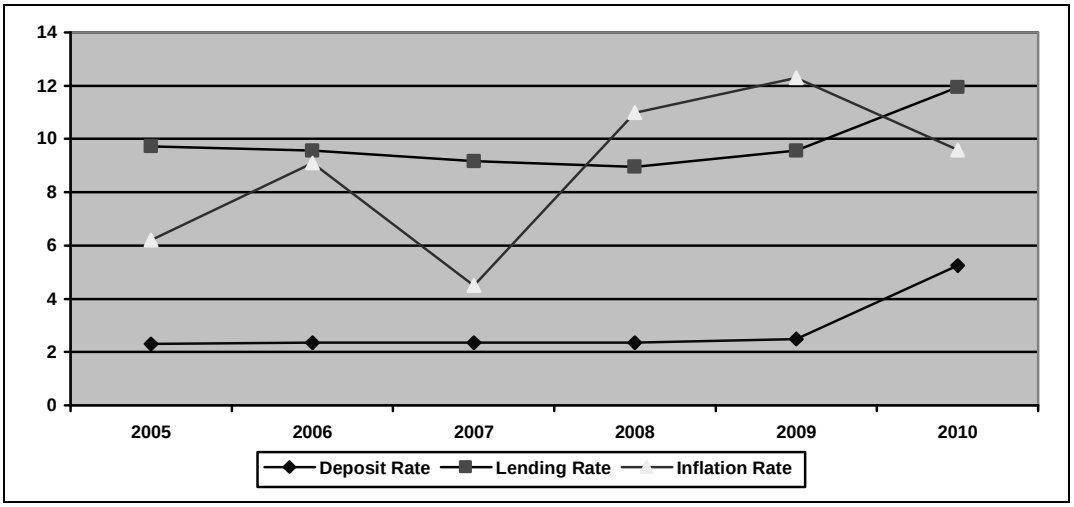
Source: NRB, Research Department

Note: The average interest rate of deposit and lending is taken from "Whole Mean" and "average lending rate" respectively. (For this case, values are taken from table4-1 and table 4-11)

From table 4-16 it is clear that the inflation rate during the last six FYs was in fluctuating trend. Though it seems to increasing but it has some variation. With similar to inclining inflation, the interest rate of both lending and deposit are seems to be inclining. The relationship among these three elements can be portrayed in the figure no 4-26 as follows.

From figure no 4-26, it is clear that during the FY 2005 the inflation rate 6.2%, was higher than deposit interest rate 2.30%. This inflation rate increases to 9.1% during 2006 and after that started to decline in 2007 to 4.5%. But after 2007 the inflation started to rise and at FY 2008 inflation remains at 11%, in 2009 12.3% and in 2010 it remains 9.6%. In all cases the inflation rate is higher than the deposit rate. These all indicates that the actual earning or real rate or return for the deposit holder was negative. In those periods, when inflation rate exceed the deposit rate, the deposit holder loosed their income rather than earn. But for the case of lending rate, it was very close to the inflation rate. So bankers don't lose their income as compare to deposit holder. Due to this the interest spread between the deposit and lending was very high during the first part of the six FYs.

***Figure No 4-26: Inflation Rate, Deposit Rate and Lending Rate of RBB***




If correlation coefficient of between deposit and inflation is taken, the value of r is 0.175 i.e. $r_{23}$=0.175. This positive correlation indicates that the deposit rate and inflation have moderate level of similar relationship. Increase in inflation increases the deposit interest rate but very little in magnitude.

In order to verify the strong ness or weakness of relationship, calculation of t-statistics is necessary. The calculated value of t for given correlation coefficient is 0.355. The tabulated value for it with 5% level of significance with 4 d.f. is 2.776. Here in this case tabulated value of t is greater than calculated value of t. in such case, null hypothesis is accepted which means that the correlation coefficient between deposit and lending is not significance. In other words, the deposit rate of RBB is not correlated with the inflation rate and movement in inflation rate does not affect the interest rate on deposit significantly.

In same manner, the correlation between lending rate and inflation is found to be 0.116. ($r_{24}$ = 0.116) This is also moderate level correlation. It means the two variables move in same direction but not in similar manner. Their movement is weak In order to verify the significance of correlation coefficient, t-statistic is calculated. The calculated value of t is 0.234 and tabulated value is 0.234. Here the case is similar with deposit. It means that, whatever the correlation coefficient reveals for the relationship of two variables, but the two variables are not significantly correlated.
This concludes that fisher effect is not practically applicable for RBB.

### 4.4.2 **Nepal Bank Limited (NBL):**

The interest rate on deposit, interest rate on lending of NBL and inflation of the country during the seven FYs were tabulated on table no 4-17.

***Table no 4-17: Inflation Rate and Interest Rate of NBL***

| **Fiscal Year** | **CPI (1)** | **Inflation (2) %** | **Deposit Rate(3)** | **Lending Rate (4)** |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 2.9 | 9.13 |
| 2006 | 179.6 | 9.1 | 2.9 | 9.13 |
| 2007 | 187.6 | 4.5 | 2.4 | 9.13 |
| 2008 | 208.3 | 11.0 | 2.35 | 9.17 |
| 2009 | 234.0 | 12.3 | 2.35 | 9.17 |
| 2010 | 256.4 | 9.6 | 3.25 | 9.85 |

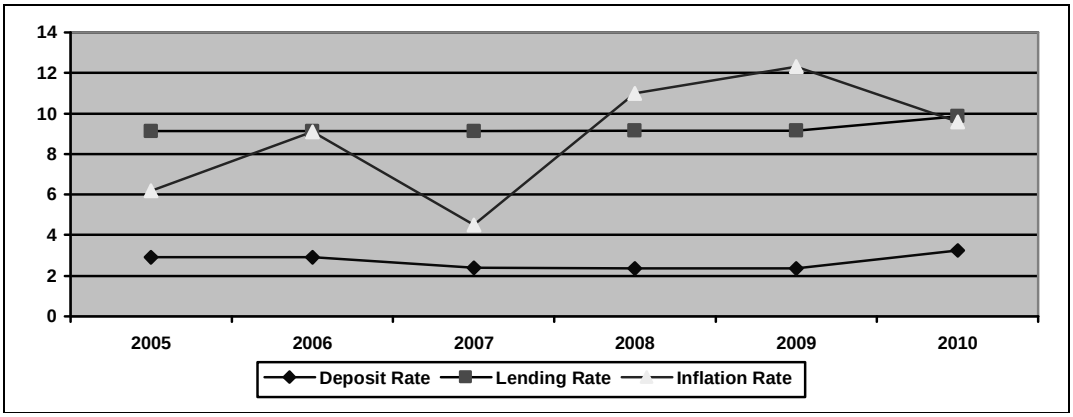
| | | | |
|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **-0.131** | Coefficient of Determination | **0.017** |
| Correlation coefficient. $r_{24}$ | **0.193** | Coefficient of Determination | **0.037** |

| | | | |
|---|---|---|---|
| **t-statistics** | **t-cal (Deposit) =-0.264** | **t-tab = 2.776** | **Insignificant** |
| | **t-cal (Lending) =0.393** | **t-tab = 2.776** | **Insignificant** |

Source: NRB, Research Department

From table 4-16 it is clear that the inflation rate during the last six FYs was in fluctuating trend. Though it seems to increasing but it has some variation. With similar to inclining inflation, the interest rate of both lending and deposit are seems to be inclining. The relationship among these three elements can be portrayed in the figure no 4-26 as follows.

***Figure No 4-27: Inflation Rate, Deposit Rate and Lending Rate of NBL***




Similarly, the correlation coefficient between deposit interest rate and inflation, $r_{23}$, is found to be -0.131 and correlation coefficient between lending rate and

inflation, $r_{24}$, is 0.193. It indicates that lending rate have positive correlation between inflation rates. But their level of correlation is moderate. In other words, when there is rise in inflation both interest rates rises but with fluctuation. To find out the strong ness or weakness of relationship, t-statistics is necessary.

The calculated value of t is -0.264 for deposit and 0.393 for lending. They both are lesser than the tabulated value of t at 5% level of significance with 4 d.f. In such condition null hypothesis is accepted and alternative hypothesis is rejected. That is coefficient of correlation is statistically insignificant. It can be inferred that the variables, both interest rate and inflation are not correlated even if analysis shows the positive or negative correlation coefficient of -0.131 and 0.193 for deposit and lending respectively.

### 4.4.3 **Agriculture Development Bank/Nepal (ADB/N)**:

The inflation rate during the last seven fiscal years, deposit rate of ADB/N, lending rate of ADB/N are tabulated in table no 4-18

***Table no 4-18: Inflation Rate and Interest Rate of ADB/N***

| **Fiscal Year** | **CPI (1)** | **Inflation (2) %** | **Deposit Rate(3)** | **Lending Rate (4)** |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 3.15 | 14.5 |
| 2006 | 179.6 | 9.1 | 3.4 | 10.5 |
| 2007 | 187.6 | 4.5 | 3.35 | 10.4 |
| 2008 | 208.3 | 11.0 | 2.85 | 9.94 |
| 2009 | 234.0 | 12.3 | 4.35 | 10.44 |
| 2010 | 256.4 | 9.6 | 5.45 | 11.33 |

| | | | |
|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **0.327** | Coefficient of Determination | **0.107** |
| Correlation coefficient. $r_{24}$ | **0.432** | Coefficient of Determination | **0.187** |

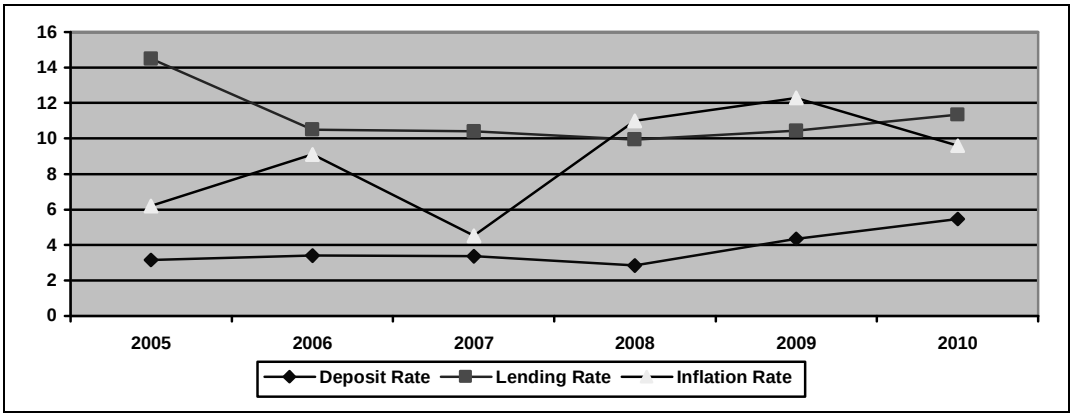
| | | | |
|---|---|---|---|
| **t-statistics** | **t-cal (Deposit) =0.692** | **t-tab = 2.776** | **Insignificant** |
| | **t-cal (Lending) =0.958** | **t-tab = 2.776** | **Insignificant** |

Source: NRB, Research Department

According to the table 4-18 the average interest rate (average of both fixed and saving deposit) was 3.15% in 2005 and 3.4% in 2006. But after FY 2006 onward the deposit interest remains decline for two years and again it inclined to 5.45% in 2010. On comparing the deposit rate and inflation, deposit remained lower than inflation. This situation decreases the deposit holders earning position. Similarly the lending rate declined from FY 2005 but the declination occurred with some stagnancy in each year and it inclined again from 2009 till 2010. As similar with other banks, the lending rate of last six FYs was higher than inflation rate. To make more precise, it is benefit, if the above table are plot on the graph as figure no 4-28.

The graph no 4-28 shows that the fisher effect was applicable for the interest rate of ADB/N because both the interest rate increases with the increase with inflation and decrease with the decrease in inflation. The inflation started to rise after the year 2007 in steep way.

***Figure No 4-28: Inflation Rate, Deposit Rate and Lending Rate of ADB/N***




The correlation coefficient between deposit interest rate and inflation for the case of ADB/N is found to be positive number i.e. $r_{23}$ = 0.327. This indicates that whenever inflation rise in the country the ADB/N also raised its deposit

rate and vice versa. In this manner, the depositor holders of ADB/N never get negative real return during the last six fiscal years. To verify this, if the value of t-statistics is calculated then it is 0.692. The tabulated value for same at 5% level of significance and 4 d.f. is 2.776. So in this case t-calculated is less than t-tabulated. This indicate that the relationship between two i.e. correlation coefficient is insignificant.

For lending rate and inflation rate, the correlation coefficient is 0.432. This is moderate level of correlation. Similarly the value of t-calculated is 0.958. Since the value of t-calculated is less than tabulated value at 5% level of significance and 4 d.f. it can be said that the correlation coefficient is insignificant. Thus it can be inferred that for ADB/N the deposit interest rate and inflation have positive relationship as suggested by Fisher but for the lending interest rate and inflation don't have the relationship as suggested by Fisher.

### 4.4.4 **Himalayan Bank Limited (HBL):**

The interest rate on deposit, interest rate on lending of HBL and inflation of the country during the seven FYs were tabulated on table 4-19. The table 4-19 shows that the interest rate of deposit was fallen below the inflation rate. It means that during these periods, the depositor's actual earning position didn't increase. Inflation rate was higher than average deposit rate. Similarly, it is also seen that the lending rate was higher than inflation rate in every FY. This situation protects the lender but hurt the borrower because nominal rate (market rate) is computed by adding inflation premium to real rate of return. So when inflation rate is greater than market rate then real rate is negative.

***Table no 4-19: Inflation Rate and Interest Rate of HBL***

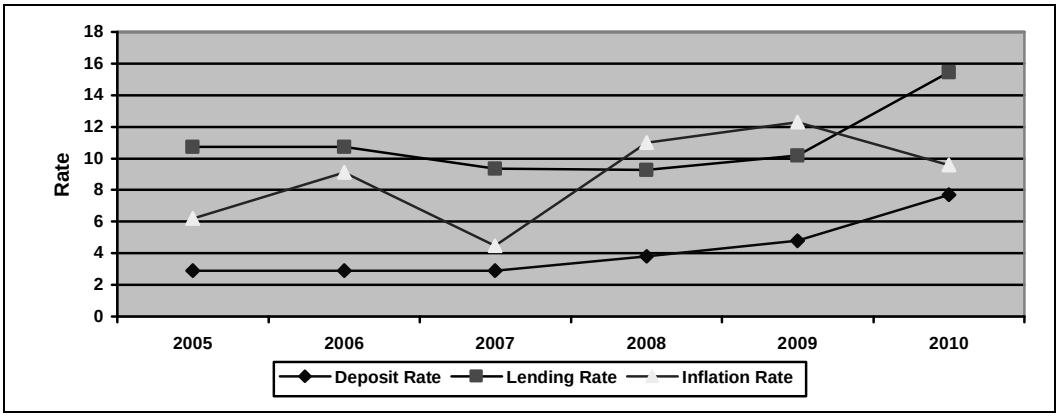
| **Fiscal Year** | **CPI (1)** | **Inflation (2) %** | **Deposit Rate(3)** | **Lending Rate (4)** |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 2.9 | 10.72 |
| 2006 | 179.6 | 9.1 | 2.9 | 10.72 |
| 2007 | 187.6 | 4.5 | 2.9 | 9.36 |
| 2008 | 208.3 | 11.0 | 3.8 | 9.28 |
| 2009 | 234.0 | 12.3 | 4.8 | 10.17 |
| 2010 | 256.4 | 9.6 | 7.7 | 15.44 |

| | | | |
|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **0.455** | Coefficient of Determination | **0.207** |
| Correlation coefficient. $r_{24}$ | **0.135** | Coefficient of Determination | **0.018** |
| **t-statistics** | **t-cal (Deposit) =1.022** | **t-tab = 2.776** | **Insignificant** |
| | **t-cal (Lending) =0.272** | **t-tab = 2.776** | **Insignificant** |

Source: NRB, Research Department

The same phenomenon can be expressed by the help of graph 4-29.

***Figure No 4-29: Inflation Rate, Deposit Rate and Lending Rate of HBL***




The correlation coefficient between interest rate on deposit an inflation rate, $r_{23}$ is 0.455 which means that these two variables are positively correlated. An increment in inflation brings increment in interest rate on deposit and vice-versa. In general concept also, there is positive correlation between these variables. The coefficient of determination $r^2_{23}$ = 0.207 means that of the total

variation in dependent variable (deposit interest rate); only 20.7% has been explained by the variation in independent variable (inflation rate). Similarly the t-value for testing the significance of the correlation coefficient is 1.022 which is less than the tabulated t-value for the 4 degree of freedom at 5 percent level of significance, 2.776. Since the calculated value is less than the tabulated value the correlation coefficient is not significant which means that interest rate on deposit of HBL is not correlated with the inflation rate and movement in inflation rates doesn't affect the interest rate on deposit significantly.

Similarly the relationship of interest rate on lending of HBL with inflation has also been examined. The coefficient of correlation between inflation and interest rate on lending, $r_{24}$ is 0.135 which shows that the variables are positively correlated. Movement in inflation rate leads movement in interest rate on lending in same direction. The t-value for testing the significance of correlation coefficient is 0.272. Since the calculated t-value is smaller than the tabulated t-value for 4 degree of freedom at 5 percent level of significance 2.776, the variables are not correlated significantly. This means that the lending rate of HBL is not significantly correlated with the inflation rate.

### 4.4.5 **Nepal Bangladesh Bank (NBB):**

The inflation rate during the last six fiscal years, deposit rate of ADB/N and lending rate of NBB are tabulated in table no 4-20. The table shows the structure of inflation, deposit rate and lending rate. During the six FYs, inflation rate exceed the deposit rate in all year except for 2007 where inflation rate was equal to deposit rate. Similarly for lending rate, in early three years, interest rate of lending exceeds the inflation rate and inflation rate exceeds lending rate in the later year. If the value of the table 4-20 is plotted in the graph then it will be seen like figure no 4-30.

***Table no 4-20: Inflation Rate and Interest Rate of NBB***

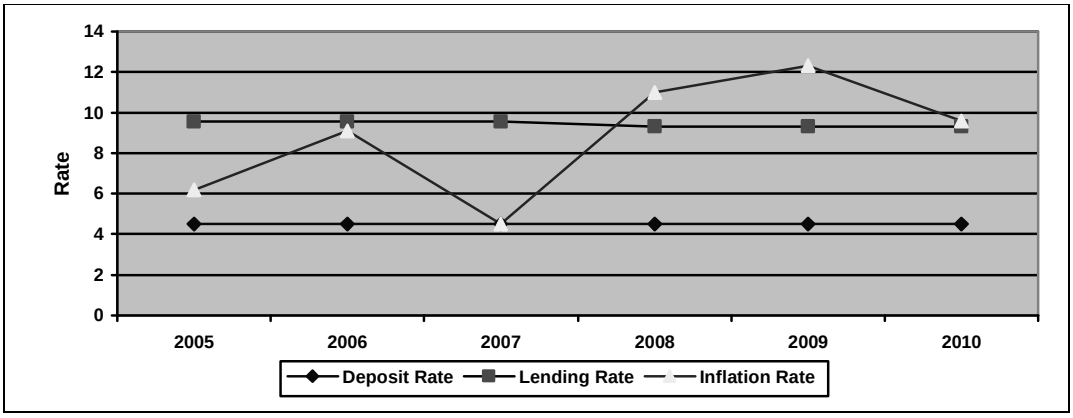
| **Fiscal Year** | **CPI (1)** | **Inflation (2) %** | **Deposit Rate(3)** | **Lending Rate (4)** |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 4.5 | 9.57 |
| 2006 | 179.6 | 9.1 | 4.5 | 9.57 |
| 2007 | 187.6 | 4.5 | 4.5 | 9.57 |
| 2008 | 208.3 | 11.0 | 4.5 | 9.31 |
| 2009 | 234.0 | 12.3 | 4.5 | 9.31 |
| 2010 | 256.4 | 9.6 | 4.5 | 9.31 |

| | | | |
|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **0** | Coefficient of Determination | **0** |
| Correlation coefficient. $r_{24}$ | **-0.813** | Coefficient of Determination | **0.661** |

| | | | |
|---|---|---|---|
| **t-statistics** | **t-cal (Deposit) =0** | **t-tab = 2.776** | **Insignificant** |
| | **t-cal (Lending) =2.795** | **t-tab = 2.776** | **Significant** |

Source: NRB, Research Department

***Figure No 4-30: Inflation Rate, Deposit Rate and Lending Rate of NBB***




The correlation coefficient between interest rate on deposit and inflation rate, $r_{23}$ is 0 which shows that there is no correlation between these two variables. When inflation increases, the interest rate on deposit offered by NBB remains constant. The value of t for testing the significance of the correlation coefficient is 0 which is smaller than the table value. Since the calculated value is smaller than the tabulated value at 4 d.f. and 5% level of significance, 2.776,

the variables are not significantly correlated. So we can say that change in inflation has not any significant impact on interest rate on deposit of NBB.

In same manner the correlation coefficient between inflation and interest rate on lending $r_{24}$ shows that the variables are correlated and relationship is negative. Increase in inflation causes decrease in interest rate on lending. But in similar manner the t-value for testing significance of correlation coefficient (t-cal = 2.795) is greater than the tabulated value at 4 d.f and 5% level of significance (t-tab = 2.776). As the calculated value is greater than the tabulated value, the correlation coefficient is significant which means that the variables, interest rate on lending and inflation rate, are correlated even if the analysis shows a negative correlation of -0.813.

## 4.5 Findings of this Study:

This study is conducted to identify the practical applicability of some of the theories in the context of Nepal that are taught on the University and colleges. With this motive, this study is mainly focused on three objectives. First one is to determine the actual situation of substitution effect in the context of Nepalese financial markets. Similarly, next objective is to determine the relationship between lending rate and corresponding lending amount. And lastly, the next objective is to explore the actual relationship of inflation rate and interest rate.

From the study, the three major findings are obtained. They are:

- The analysis of substitution effect for both fixed and saving deposit shows that substitution effect does not work for fixed deposit of RBB but it is moderately applicable in case of saving deposit. But t test proves that there is no correlation between interest rate and the deposit amount of RBB. This means that, people are oriented to deposit more

amounts even if the interest rates on deposit are falling every year and vice versa. The increasing saving deposit and decreasing fixed deposit amount clarifies this fact.

- The substitution effect is not applicable completely in case of NBL. The rise in interest rate in fixed deposit attracts no fixed deposit rather there is shift of fixed deposit amount in other banks. Similarly, there is rise in saving deposit amount instead of fall in saving deposit rate.
- Like that of NBL, another government owned organization ADB also does not satisfy the theory of substitution effect. The case is similar to NBL.
- For HBL the relation between saving deposit rate and deposit amount is tied up to 46.79% and fixed deposit and interest rate is tied up to 32%. The t test shows that there is no significant relation between interest rate and deposit amount. The rise in deposit amount proves the substitution effect but finding shows that there rise is due to factors other than the interest rate.
- The interest rate of NBB remains constant in both deposits. However the saving deposit amount increase in the study period and fixed deposit amount decreases. This bank completely not satisfies with the theory of substitution effect. There is fluctuation in deposit amount due to factors other than interest rate.
- According to theory, lending interest rate and lending amount should have inverse relationship. People demand for more of loan as the lending rate fall down. From this study, it is found that all sample banks does not satisfy with the theory. The lending amount is not significantly correlated with the lending rate. But among them, three banks have strong relationship as required by theory. The increment in demand of loanable fund for NBL, ADB and HBL is not affected by the incline in

lending rate because they have very high value of t-statistics. But for RBB and NBB, the relation is weak.

- Although there is seen some correlation among deposit rate and inflation rate, the t test shows that for the entire sample bank deposit rate and inflation rate are not correlated significantly though the Fisher theory suggests there should be positive relationship. The case is same for lending rate and Inflation rate too.
- There is no adjustment in interest rate as change in the inflation rate. Due to which the depositors are in loss although they get some interest from bank. Saving interest rate is less than the inflation rate and fixed deposit rate is also not adjusted as inflation rate.
- The real rate of return is found to be negative in some years. The negative real return indicates that depositor, instead of earning money, they lose their money in real sense, if they deposit in the bank paying certain percentage of interest. This is due to deposit interest rate lower than inflation rate. This condition hurts the depositors.
- During the study period, it is found that, there exist the high spread between deposit interest rate and lending interest rate. In the beginning of the six FY this spreads was large but on later years, the spread declined to some extent.

# CHAPTER FIVE

## SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter is the important chapter for the research because this chapter is the extracts of all the previously discussed chapters. This chapter consists of mainly three parts: Summary, conclusion and recommendation. In summary part, revision or summary of all four chapters is made. In conclusion part, the result from the research is summed up and in recommendation part, suggestion and recommendation is made based on the result and experience of thesis. Recommendation is made for improving the present situation to the concerned parties as well as for further research.

## 5.1 Summary

Nepal is orienting towards the development. Natural resources of the country remain unused and unutilized due to the lack of financing and technical know-how. In order to mobilize the limited capital, the government of Nepal adopted the liberalization policy. As result up to now 31 commercial banks, 85 development banks, 5 rural development banks, 6 micro credit development banks, 76 finance companies and 44 financial NGOs are established within the financial system of Nepal. Financial system is hoped to develop the economy and help to raise the living standard of the people. Financial intermediaries mobilize the fund by collecting the scattered resources from the savers and provide the collected funds to the users. The intermediaries of financial systems sustain by lending the fund on higher interest rate and paying the deposit holder a little interest. It means that such organization survive by making profit through a large interest spread on deposit and lending. The decision made to charge and provide interest on lending and deposit affects the

profit position of the organization. Depositors are generally attracted by offering the higher interest rates. Similarly high credit rates de-motivate the investors as a result investment in the country shrinks down. Though there are various factors in the economy that affects the deposit amount and lending amount; interest rate is one of the major factor that affect deposit and lending amount. With the major objective of showing relationship between deposit rate and deposit amount i.e. substitution effect, lending rate and lending amount, inflation and interest rate, this study is undertaken.

After the liberal policy adopted by the government, NRB slowly loosen the rigid ness to fix the interest rate that financial intermediaries charge and offer. But time to time, NRB use to issue directives regarding overall performance of the financial institutions. Therefore, in past few years back, banks and other financial institutions get freedom to quote the interest rate on lending and deposit. This creates the competition in the Nepalese economy. In this sense, this study is conducted to identify whether some of the theories of finance and economics are applicable or not in the Nepalese financial markets. These major theories are like substitution effect, fisher effect and inverse relationship between interest rate and lending amount. For this purpose brief introduction about Nepalese economy, interest rate, sample organizations, statement of problem, significance of the study, research hypothesis, and so on are made in the first chapter of this dissertation.

In second chapter, theoretical review as well as review of previous research has been made. Different views about interest, function of interest, theories of interest, factors affecting interest rate and so on are reviewed on that chapter. On the theories of interest, mainly four theories- The Classical Theory, Liquidity Preference Theory, Loanable Fund Theory and Rational Expectancies Theory - are reviewed. Similarly the factor affecting interest rate

like default risk, marketability risk, exchange rate risk and so on are explained. Similarly, the in order to identity the relationship of interest rate and inflation, Fisher effect, Harrod-Keynes effect are also studied on the second chapter.

Research design used is mainly analytical. Out of the total financial system, five commercial banks are chosen for sample purpose; mainly secondary data are used for the analysis. These all are made on third chapter. Lastly on fourth chapter, collected data are presented in tabular and graphic form and analyzed using various statistical tools like mean, standard deviation, correlation coefficient and t-statistics.

## 5.2 Conclusion

From the presentation and analysis of data; using different financial tools the major findings can be tabulated as follows:

***Table No 5-1: Unified (Integrated) results of all data analysis.***

| **Particulars** | | **RBB** | **NBL** | **ADB/N** | **HBL** | **NBB** |
|---|---|---|---|---|---|---|
| Substitution Effect (Deposit and Interest Rate) | r (Saving rate & Deposit) | 0.52 | -0.89 | -0.155 | 0.684 | 0 |
| | r (Fixed rate and Deposit) | -0.58 | 0.353 | -0.54 | 0.566 | 0 |
| | t-cal (Saving & Deposit) | 1.218 | 3.904 | 0.314 | 1.875 | 0 |
| | t-cal (Fixed & Deposit) | 1.42 | 0.755 | 1.283 | 1.372 | 0 |
| Lending and Interest | r (lending) | 0.25 | 0.778 | -0.578 | 0.67 | -0.104 |
| | t-cal (lending) | 0.516 | 2.477 | 1.417 | 1.805 | 0.209 |
| Inflation and Interest Rate. (Fisher Effects.) | r (inflation & deposit) | 0.175 | -0.131 | 0.327 | 0.455 | 0 |
| | r (inflation & lending) | 0.116 | 0.193 | 0.432 | 0.135 | -0.813 |
| | t-cal (inflation & deposit) | 0.355 | 0.264 | 0.692 | 1.022 | 0 |
| | t-cal (inflation & lending) | 0.234 | 0.393 | 0.958 | 0.272 | 2.795 |

- The interest rates on both deposit and lending of sample banks are found to be in increasing trend except for NBB. But contrary to this, saving deposit amount and lending amount is increasing every year except on fixed deposit of RBB and ADB. The government run bank's fixed deposit is found to be decreasing every year.

- The saving deposit amount and saving interest rate have negative relationship ranging from -0.89 to 0.684. It means that they have highly relationship, if one variable increases, other variable also increases and vice-versa. This case is the theory of substitution effect. This may be due to the fact that, in last six FYs, people accumulated most of their funds on fixed deposits switches to saving accounts though they don't get appropriate interest on it. It may be just because of unavailability of other acceptable investment opportunity, in which a separate study can be made. Similarly, the convenience of using saving accounts provokes the investor to deposit more on saving account.
- To clarify the aforementioned conclusion, the t-statistic of positive correlation between saving deposit amount and saving interest rate is significant. It means that they have strong positive relationship. Therefore it is concluded that for saving deposit, there is substitution effect.
- Analysis of fixed deposit amount and fixed interest rate shows negative relationship except HBL and NBL. The correlation coefficient for HBL and NBL is 0.566 and 0.353. The HBL has moderate level of correlation where as NBL has low degree of correlation. According to correlation coefficient, the substitution effects occur for both HBL and NBL in case of fixed deposit. But for other three banks - ADB/N, RBB and NBB – the correlation coefficient is negative meaning people deposit more money even if the bank offer the lower yield rate on fixed deposit. The magnitude of correlation is very high negative value for three banks.
- Even though, the correlation coefficient of HBL and NBL for fixed deposit amount and fixed deposit interest rate is positive, the t-statistics clarify that their relationship is not strong. The calculated value of t is found to be less than the tabulated value of t, so t-test indicates that

there is no significant relationship between those two variables. Thus the increase in deposit is not due to the increase in interest rate but due to the other reasons. Therefore it is concluded that for fixed deposit, there is no substitution effect at all.

- One of the variables that affect the demand of fund (lending activity) is lending interest rate. Theoretically, there is negative relationship between lending interest rate and lending amount. In this study for the 5 sample bank, it is found that all sample banks except ADB and NBB have negative correlation between these two variables. By using correlation tools, it can be inferred that all the sample banks except ADB and NBB have inverse relationship as suggest by theory.
- The t-test for correlation coefficient of each sample banks for negative relationship between lending interest rate and lending amount shows that the t value is insignificant which means that though the correlation coefficient shows the moderate relationship but their relationship is not strong i.e. not significant relationship. So Increase in lending amount is not due to the increase in lending interest rate but due to the other reason. So it can be concluded that lending interest rate is also an important factor for expansion or contraction of lending amount.
- The relationship between interest rate on deposit and inflation rate is positive except for NBL and NBB. It ranges from 0.175 to 0.455. According to Fisher effect, there should be positive correlation between these two variables but the interest rate in Nepalese financial market is affected by inflation rate to some extent only. In conclusion it can be said that, the Fisher effect is not properly applicable in Nepalese financial market.
- The correlation between interest rate on lending and inflation rate is found to be moderately positive except for NBB. The correlation coefficient among sample banks lies between 0.116 and 0.432. For all

samples, the correlation coefficients are insignificant except for NBB because their value lies below the tabulated value of t but for NBB calculated value is higher than tabulated value. So it can be said that lending interest rate in Nepalese financial market is affected by inflation only to some extent even though the theory says to exit a positive relationship.

- The real rate of return is found to be negative in some years. The negative real return indicates that depositor, instead of earning money, they lose their money in real sense, if they deposit in the bank paying certain percentage of interest. This is due to deposit interest rate lower than inflation rate. This condition hurts the depositors.
- During the study period, it is found that, there exist the high spread between deposit interest rate and lending interest rate. In the beginning of the six FY this spreads was large but on later years, the spread declined to some extent.
- It is also found that, lending interest rate of the productive sector loan such as commercial loan, industrial loan, trade credit, working capital loan were decreased lesser in magnitude in comparison to the non productive sector loan.

## 5.3 Recommendation

Based on the analysis, interpretation & conclusions, certain recommendation can be made here so that the concerned authorities, future researchers, academicians, bankers can get some insights on the present conditions on above topics. It is considered that this research will fruitful for them to improve the present condition as well as for further research. The major recommendations after this study are:

- More saving are deposited in RBB, NBL and ADB in lower interest rate. But fixed deposit is shifting to other higher interest paid private banks. So the fixed deposit rate is recommended to increase as compared to the other financial institutions to attract more of fixed deposit amount. Generally 35% of total deposit must be in form of fixed deposit for safe liquidity position of the financial institutions.
- Since the theory of substitution effect is not applicable in HBL and NBB, the management is recommended to think in other service factors to increase deposit other than the interest rate. The number of branches should be expanded in rural areas as of three government organizations and the service cost must be reduced to minimal.
- The service of RBB, NBL and ADB is found very poor. Still many of its branches remaining to be interconnected. Many branches are having manual operating system and the ATM is also lacking. Management is recommended to provide new services like ATM, ABBS, e banking and modern software to attract new technology seeker customers.
- Average credit deposit ratio of government banks seems higher than of private banks this is due to very high ratio of government funds. Other two banks RBB and NBB have comparative lower ratio. So it will be sound effective for them to utilize the deposit for loaning and advancing at reasonable rate of interest to the borrowers as a view point of effective management of assets. It is better RBB, NBL and NBL to loosen the credit policy to utilize the deposit as loan and advances.
- The lending rate is higher in productive sectors of all sample banks. This will hamper the economic development of the country. So all the sample banks are recommended to lower the interest rate in productive sectors.
- The government banks share is not listed in stock market so market related analysis cannot be made. In the light of this inconveniency

government banks are advised to make arrangements for listing of securities in the market.

- In order to generate more capital for the development of the economy, more deposit need to be collected by the financial institutions. For this the financial institutions are suggested to quote higher deposit interest rate as far as possible. Though this situation reduces their profit opportunities, but it will enhance the economic condition of the country in the long run.
- The high spread between deposit interest rate and lending interest rate is another factor to be considered. Higher spread merely increases the profit figures of the banks but at the same time it reduces the deposit collection and investment in the country. So the financial institutions are suggested to reduce the interest spread as minimum as possible.
- As the central bank of the country, NRB has power to specify the range or spread between lending rate and deposit rate. So NRB is suggested to specify the spread whenever there is higher gap between two interest rates in the country.
- Though the interest rate in free market is determined by the interplay of demand and supply, the concerned parties who fixed the interest rates are suggested to include the inflation premium as far as possible while fixing the interest rates. If the rate of inflation is not considered & real rate comes out to be negative then depositors may withdraw their money and utilize it on non-productive sectors.
- While reducing the lending rate, it is suggested to reduce more on productive sectors than non-productive sectors. If not possible then bankers can reduce the rate of all sectors proportionately.
- The lending rates of same bank on same sector are found to be different i.e. quoted on range. These types of inconsistency may bring

misconception about that organization. So banks are suggested to quote one consistent rate than on range.

- Lending institutions are suggested to invest on new areas as well as to introduce competitive customer oriented schemes on lending and borrowing so that more lending and borrowing can be promoted and over liquidity problem may be solved.
- From the experience of collecting the secondary data, it is suggested that NRB should pay special attention to publish detail information on timely manner. The untimely publication of the bulletins handicaps the research workers and students
- Sample institutions are also suggested to include their interest rate structure in their annual report as well as kindly requested for the co-operation and sincere support to the research students.
- During the study period, it is found that, there exist the high spread between deposit interest rate and lending interest rate. In the beginning of the six FY this spreads was large but on later years, the spread declined to some extent.
- As this research is made by highlighting only one variable- interest rate, it is suggested for further research.

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# Appendix

## 1. Calculation of Average Interest Rate on Deposit of RBB

| Deposit | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| **Savings** | 3% | 2% | 2% | 2% | 2% | 2% |
| **Fixed** | | | | | | |
| 3 Months | 5.50 | 2.25 | 2.25 | 2.25 | 2.25 | 2.25 |
| 6 Months | 6.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| 1 Years | 8.50 | 4.25 | 3.50 | 3.50 | 3.50 | 3.25 |
| Above 2Yrs | 10.00 | - | - | - | - | - |
| **Whole Mean** | **5.25** | **2.5** | **2.35** | **2.35** | **2.35** | **2.30** |
| **Fixed Deposit Mean** | **7.5** | **3** | **2.75** | **2.75** | **2.75** | **2.65** |

Mean ( $\overline{X}$ ) = $\frac{\sum X}{n}$

Whole Mean = Fixed deposit mean + saving deposit mean$= \frac{7.5+3}{2}$

$=5.25$

Fixed Deposit Mean = $\frac{\sum(5.5+6+8.5+10)}{4}$ = 7.5% and so on.

**Calculation of Variance for saving deposit:**

| Year | X | (X- $\overline{X}$ ) | (X- $\overline{X}$ )$^2$ | Y | (Y- $\overline{Y}$ ) | (Y- $\overline{Y}$ )$^2$ | (X- $\overline{X}$ )(Y- $\overline{Y}$ ) |
|---|---|---|---|---|---|---|---|
| 2005 | 2 | -0.17 | 0.03 | 26848.20 | -10024.07 | 100481979.36 | 1704.09 |
| 2006 | 2 | -0.17 | 0.03 | 29494.90 | -7377.37 | 54425588.12 | 1254.15 |
| 2007 | 2 | -0.17 | 0.03 | 32909.40 | -3962.87 | 15704338.64 | 673.69 |
| 2008 | 2 | -0.17 | 0.03 | 40213.00 | 3340.73 | 11160476.93 | -567.92 |
| 2009 | 2 | -0.17 | 0.03 | 46102.80 | 9230.53 | 85202684.08 | -1569.19 |
| 2010 | 3 | 0.83 | 0.69 | 45665.30 | 8793.03 | 77317376.58 | 7298.21 |
| | 13 | | **0.83** | 221233.60 | | **344292443.71** | **8793.03** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\bar{X})(Y-\bar{Y})}{\sqrt{\Sigma(X-\bar{X})^2}\sqrt{\Sigma(Y-\bar{Y})^2}}$

$= \frac{8793.03}{\sqrt{0.83}\sqrt{344292443.7}}$

= 0.52

**Calculation of Standard Deviation of Saving deposit of RBB:**

$S.D(\delta) = \sqrt{\frac{1}{n}\sum\left(X-\overline{X}\right)^2} = \sqrt{\frac{0.83}{6}}$ = 0.37%

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

t = $\frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$

$= \frac{0.52 \times \sqrt{6-2}}{\sqrt{1-0.52^2}}$

= 1.218

**Calculation of variance for fixed deposit of RBB**

| Year | X | (X- $\overline{X}$ ) | (X- $\overline{X}$ )$^2$ | Y | (Y- $\overline{Y}$ ) | (Y- $\overline{Y}$ )$^2$ | (X- $\overline{X}$ )(Y- $\overline{Y}$ ) |
|---|---|---|---|---|---|---|---|
| 2005 | 2.65 | -0.92 | 0.85 | 9001.5 | 3215.62 | 10340211.98 | -2958.37 |
| 2006 | 2.75 | -0.82 | 0.67 | 8103.8 | 2317.92 | 5372753.13 | -1900.69 |
| 2007 | 2.75 | -0.82 | 0.67 | 6997.5 | 1211.62 | 1468023.02 | -993.53 |
| 2008 | 2.75 | -0.82 | 0.67 | 4479.8 | -1306.08 | 1705844.97 | 1070.99 |
| 2009 | 3 | -0.57 | 0.32 | 3207.8 | -2578.08 | 6646496.49 | 1469.51 |
| 2010 | 7.5 | 3.93 | 15.44 | 2924.9 | -2860.98 | 8185206.56 | -11243.65 |
| | 21.4 | | **18.63** | 34715.30 | | **33718536.15** | **-14555.75** |

Simple Correlation Coefficient (r) = $$\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$$

$$= \frac{-14555.75}{\sqrt{18.63}\sqrt{33718536.15}}$$

= -0.58

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$$

$$= \frac{-0.58 \times \sqrt{6-2}}{\sqrt{1-0.58^2}}$$

= -1.42

**Calculation of Standard Deviation of Fixed deposit of RBB:**

$$S.D(\delta) = \sqrt{\frac{1}{n}\sum\left(X-\overline{X}\right)^2} = \sqrt{\frac{18.63}{6}} = 1.76\%$$

## 2. Calculation of Average Interest Rate on Deposit of NBL

| **Deposit** | **2010** | **2009** | **2008** | **2007** | **2006** | **2005** |
|---|---|---|---|---|---|---|
| Savings | 2.00 | 2.00 | 2.00 | 2.00 | 2.50 | 2.50 |
| **Fixed** | | | | | | |
| 3 Months | 3.25 | 2.25 | 2.25 | 2.25 | 3.00 | 3.00 |
| 6 Months | 3.50 | 2.50 | 2.50 | 2.50 | 3.25 | 3.25 |
| 1 Years | 5.00 | 3.50 | 3.50 | 3.00 | 3.75 | 3.75 |
| Above 2Yrs | 6.50 | - | - | 3.50 | - | - |
| **Whole Mean** | **3.25** | **2.35** | **2.35** | **2.4** | **2.9** | **2.9** |
| **Fixed Deposit Mean** | **4.55** | **2.75** | **2.75** | **2.80** | **3.30** | **3.30** |

Mean ( $\overline{X}$ ) = $\frac{\sum X}{n}$

Fixed Deposit Mean = $\frac{\sum(3.25+3.5+5+6.5)}{4}$ = 4.55% and so on.

Whole Mean = Fixed deposit mean + saving deposit mean / 2 = $\frac{4.55+2}{2}$

=3.25

**Calculation of Variance for saving deposit:**

| Year | X | (X- $\overline{X}$ ) | (X- $\overline{X}$ )$^2$ | Y | (Y- $\overline{Y}$ ) | (Y- $\overline{Y}$ )$^2$ | (X- $\overline{X}$ )(Y- $\overline{Y}$ ) |
|---|---|---|---|---|---|---|---|
| 2005 | 2.5 | 0.33 | 0.11 | 22671.8 | -4423.73 | 19569387.11 | -1459.83 |
| 2006 | 2.5 | 0.33 | 0.11 | 23547.9 | -3547.63 | 12585678.62 | -1170.72 |
| 2007 | 2 | -0.17 | 0.03 | 26425.4 | -670.13 | 449074.22 | 113.92 |
| 2008 | 2 | -0.17 | 0.03 | 28545.1 | 1449.57 | 2101253.18 | -246.43 |
| 2009 | 2 | -0.17 | 0.03 | 31079.7 | 3984.17 | 15873610.59 | -677.31 |
| 2010 | 2 | -0.17 | 0.03 | 30303.3 | 3207.77 | 10289788.37 | -545.32 |
| | 13 | | **0.33** | 162573.20 | | **60868792.09** | **-3985.68** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\bar{X})(Y-\bar{Y})}{\sqrt{\Sigma(X-\bar{X})^2}\sqrt{\Sigma(Y-\bar{Y})^2}}$

$= \frac{-3985.68}{\sqrt{0.33}\sqrt{60868792.09}}$

= -0.89

**Calculation of Standard Deviation of Saving deposit of NBL:**

$S.D(\delta) = \sqrt{\frac{1}{n}\sum(X-\bar{X})^2} = \sqrt{\frac{0.33}{6}}$ = 0.2345%

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

t = $\frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$

$= \frac{-0.89 \times \sqrt{6-2}}{\sqrt{1-0.89^2}}$

= -3.9038

**Calculation of variance for fixed deposit of NBL**

| Year | X | (X- $\overline{X}$ ) | (X- $\overline{X}$ )$^2$ | Y | (Y- $\overline{Y}$ ) | (Y- $\overline{Y}$ )$^2$ | (X- $\overline{X}$ )(Y- $\overline{Y}$ ) |
|---|---|---|---|---|---|---|---|
| 2005 | 3.3 | 0.06 | 0.00 | 6269.3 | 1422.50 | 2023506.25 | 85.35 |
| 2006 | 3.3 | 0.06 | 0.00 | 5790.9 | 944.10 | 891324.81 | 56.65 |
| 2007 | 2.8 | -0.44 | 0.19 | 5393.2 | 546.40 | 298552.96 | -240.42 |
| 2008 | 2.75 | -0.49 | 0.24 | 4757.9 | -88.90 | 7903.21 | 43.56 |
| 2009 | 2.75 | -0.49 | 0.24 | 3579.4 | -1267.40 | 1606302.76 | 621.03 |
| 2010 | 4.55 | 1.31 | 1.72 | 3290.1 | -1556.70 | 2423314.89 | -2039.28 |
| | 19.45 | | **2.40** | 29080.80 | | **7250904.88** | **-1473.11** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\bar{X})(Y-\bar{Y})}{\sqrt{\Sigma(X-\bar{X})^2}\sqrt{\Sigma(Y-\bar{Y})^2}}$

$= \frac{-1473.11}{\sqrt{2.4}\sqrt{7250904.88}}$

= -0.353

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$$

$$= \frac{-0.253 \times \sqrt{6-2}}{\sqrt{1-0.253^2}}$$

= -0.755

**Calculation of Standard Deviation of Fixed deposit of NBL:**

$$S.D(\delta) = \sqrt{\frac{1}{n}\sum (X - \overline{X})^2} = \sqrt{\frac{2.4}{6}} = 0.63\%$$

## 3. Calculation of Average Interest Rate on Deposit of ADB/N

| Deposit | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Savings | 3.00 | 3.00 | 2.5 | 3.0 | 3.0 | 3.0 |
| **Fixed** | | | | | | |
| 3 Months | - | 4.0 | 2.5 | 2.75 | 2.75 | 2.5 |
| 6 Months | 7.25 | 4.5 | 3.0 | 3.25 | 3.25 | 3.0 |
| 1 Years | 8.0 | 7.0 | 3.5 | 4.25 | 4.25 | 3.5 |
| Above 2Yrs | 8.5 | 7.5 | 4.0 | 4.50 | 5.0 | 4.25 |
| **Whole Mean** | 5.45 | 4.35 | 2.85 | 3.35 | 3.4 | 3.15 |
| **Fixed Deposit Mean** | 7.90 | 5.75 | 3.25 | 3.70 | 3.80 | 3.30 |

Mean ( $\overline{X}$ ) = $\frac{\sum X}{n}$

Fixed Deposit Mean = $\frac{\sum(7.25+8+8.5)}{3}$ = 7.90% and so on.

Whole Mean = $\frac{\text{Fixed deposit mean + saving deposit mean}}{2} = \frac{7.90+3}{2}$

=5.45

**Calculation of Variance for saving deposit:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 3 | 0.09 | 0.01 | 15121.7 | -3262.82 | 10645994.35 | -293.65 |
| 2006 | 3 | 0.09 | 0.01 | 16087.9 | -2296.62 | 5274463.42 | -206.70 |
| 2007 | 3 | 0.09 | 0.01 | 17922.4 | -462.12 | 213554.89 | -41.59 |
| 2008 | 2.5 | -0.41 | 0.17 | 19175.4 | 790.88 | 625491.17 | -324.26 |
| 2009 | 3 | 0.09 | 0.01 | 21381.3 | 2996.78 | 8980690.37 | 269.71 |
| 2010 | 3 | 0.09 | 0.01 | 20618.4 | 2233.88 | 4990219.85 | 201.05 |
| | 17.5 | | **0.21** | 110307.10 | | **30730414.07** | **-395.44** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$$= \frac{-395.44}{\sqrt{0.21}\sqrt{30730414.07}}$$

= -0.155

**Calculation of Standard Deviation of Saving deposit of ADB/N:**

$$S.D(\delta) = \sqrt{\frac{1}{n}\sum (X - \overline{X})^2} = \sqrt{\frac{0.21}{6}} = 0.187\%$$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$$

$$= \frac{-0.155 \times \sqrt{6-2}}{\sqrt{1-0.155^2}}$$

= -0.3138

**Calculation of variance for fixed deposit of ADB/N**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 3.3 | -1.32 | 1.74 | 10087 | -774.82 | 600346.03 | 1022.76 |
| 2006 | 3.8 | -0.82 | 0.67 | 11443.4 | 581.58 | 338235.30 | -476.90 |
| 2007 | 3.7 | -0.92 | 0.85 | 12102.5 | 1240.68 | 1539286.86 | -1141.43 |
| 2008 | 3.25 | -1.37 | 1.88 | 10981 | 119.18 | 14203.87 | -163.28 |
| 2009 | 5.75 | 1.13 | 1.28 | 10672.6 | -189.22 | 35804.21 | -213.82 |
| 2010 | 7.9 | 3.28 | 10.76 | 9884.4 | -977.42 | 955349.86 | -3205.94 |
| | 27.7 | | **17.17** | 65170.90 | | **3483226.13** | **-4178.59** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$$= \frac{-4178.59}{\sqrt{17.17}\sqrt{3483226.13}}$$

= -0.54

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$$

$$= \frac{-0.54 \times \sqrt{6-2}}{\sqrt{1-0.54^2}}$$

= -1.283

**Calculation of Standard Deviation of Fixed deposit of ADB/N:**

$$S.D(\delta) = \sqrt{\frac{1}{n}\sum\left(X-\overline{X}\right)^2} = \sqrt{\frac{17.17}{6}} = 1.69\%$$

## 4. Calculation of Average Interest Rate on Deposit of HBL

| **Deposit** | **2010** | **2009** | **2008** | **2007** | **2006** | **2005** |
|---|---|---|---|---|---|---|
| Savings | 6.25 | 4.0 | 3.5 | 2.5 | 2.5 | 2.5 |
| **Fixed** | | | | | | |
| 3 Months | 4.75 | 3.75 | 2.50 | 2.5 | 2.5 | 2.5 |
| 6 Months | 10.0 | 4.5 | 3.25 | 3.0 | 3.0 | 3.0 |
| 1 Years | 10.5 | 6.5 | 5.0 | 3.75 | 3.75 | 3.75 |
| Above 2Yrs | 11.25 | 7.50 | 5.5 | 3.75 | 3.75 | 3.75 |
| **Whole Mean** | **7.7** | **4.8** | **3.8** | **2.9** | **2.9** | **2.9** |
| **Fixed Deposit Mean** | **9.10** | **5.55** | **4.05** | **3.25** | **3.25** | **3.25** |
| **Std. Deviation** | 1.34% | | | | | |

Mean ( $\overline{X}$ ) = $\frac{\sum X}{n}$

Fixed Deposit Mean = $\frac{\sum(4.75+10+10.5+11.25)}{4}$ = 9.10% and so on.

Whole Mean = Fixed deposit mean + saving deposit mean$\over 2$ = $\frac{9.10+6.25}{2}$

= 7.7

**Calculation of Variance for saving deposit:**

| Year | X | (X- $\overline{X}$ ) | (X- $\overline{X}$ )$^2$ | Y | (Y- $\overline{Y}$ ) | (Y- $\overline{Y}$ )$^2$ | (X- $\overline{X}$ )(Y- $\overline{Y}$ ) |
|---|---|---|---|---|---|---|---|
| 2005 | 2.5 | -1.04 | 1.08 | 12852.4 | -3765.07 | 14175752.10 | 3915.67 |
| 2006 | 2.5 | -1.04 | 1.08 | 14582.8 | -2034.67 | 4139882.01 | 2116.06 |
| 2007 | 2.5 | -1.04 | 1.08 | 15784.4 | -833.07 | 694005.62 | 866.39 |
| 2008 | 3.5 | -0.04 | 0.00 | 17935 | 1317.53 | 1735885.30 | -52.70 |
| 2009 | 4 | 0.46 | 0.21 | 20061 | 3443.53 | 11857898.86 | 1584.02 |
| 2010 | 6.25 | 2.71 | 7.34 | 18489.2 | 1871.73 | 3503373.19 | 5072.39 |
| | 21.25 | | **10.80** | 99704.80 | | **36106797.09** | **13501.83** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

= $\frac{13501.83}{\sqrt{10.8}\sqrt{36106797.09}}$

= 0.684

**Calculation of Standard Deviation of Saving deposit of HBL:**

$S.D(\delta) = \sqrt{\frac{1}{n}\sum\left(X-\overline{X}\right)^2} = \sqrt{\frac{10.8}{6}}$ = 1.34%

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

t = $\frac{r}{\sqrt{1-r^2}}\times\sqrt{n-2}$

= $\frac{0.684\times\sqrt{6-2}}{\sqrt{1-0.684^2}}$

= 1.875

**Calculation of variance for fixed deposit of HBL**

| Year | X | (X- $\overline{X}$ ) | (X- $\overline{X}$ )$^2$ | Y | (Y- $\overline{Y}$ ) | (Y- $\overline{Y}$ )$^2$ | (X- $\overline{X}$ )(Y- $\overline{Y}$ ) |
|---|---|---|---|---|---|---|---|
| 2005 | 3.25 | -1.49 | 2.22 | 6364.3 | -681.17 | 463992.57 | 1014.94 |
| 2006 | 3.25 | -1.49 | 2.22 | 6350.2 | -695.27 | 483400.37 | 1035.95 |
| 2007 | 3.25 | -1.49 | 2.22 | 8201.1 | 1155.63 | 1335480.70 | -1721.89 |
| 2008 | 4.05 | -0.69 | 0.48 | 6423.9 | -621.57 | 386349.26 | 428.88 |
| 2009 | 5.55 | 0.81 | 0.66 | 6377.1 | -668.37 | 446718.46 | -541.38 |
| 2010 | 9.1 | 4.36 | 19.01 | 8556.2 | 1510.73 | 2282305.13 | 6586.78 |
| | 28.45 | | **26.80** | 42272.80 | | **5398246.49** | **6803.29** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$$= \frac{6803.29}{\sqrt{26.80}\sqrt{3393246.49}}$$

$$= 0.5657$$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$$

$$= \frac{0.5657 \times \sqrt{6-2}}{\sqrt{1-0.5657^2}}$$

= 1.372

**Calculation of Standard Deviation of Fixed deposit of HBL:**

$$S.D(\delta) = \sqrt{\frac{1}{n}\sum\left(X - \overline{X}\right)^2} = \sqrt{\frac{26.8}{6}} = 2.11\%$$

## 5. Calculation of Average Interest Rate on Deposit of NBB

| **Deposit** | **2010** | **2009** | **2008** | **2007** | **2006** | **2005** |
|---|---|---|---|---|---|---|
| Savings | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| **Fixed** | | | | | | |
| 3 Months | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 6 Months | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| 1 Years | 4.75 | 4.75 | 4.75 | 4.75 | 4.75 | 4.75 |
| Above 2Yrs | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| **Whole Mean** | **4.5** | **4.5** | **4.5** | **4.5** | **4.5** | **4.5** |
| **Fixed Deposit Mean** | **4.55** | **4.55** | **4.55** | **4.55** | **4.55** | **4.55** |
| **Std. Deviation** | 0% | | | | | |

Mean ( $\overline{X}$ ) = $\frac{\sum X}{n}$

Fixed Deposit Mean = $\frac{\sum(4+4.5+4.75+5)}{4}$ = 4.55% and so on.

Whole Mean = $\frac{\text{Fixed deposit mean + saving deposit mean}}{2} = \frac{4.55+4.5}{2}$

= 4.5

**Calculation of Variance for saving deposit:**

| Year | X | (X- $\overline{X}$ ) | (X- $\overline{X}$ )$^2$ | Y | (Y- $\overline{Y}$ ) | (Y- $\overline{Y}$ )$^2$ | (X- $\overline{X}$ )(Y- $\overline{Y}$ ) |
|---|---|---|---|---|---|---|---|
| 2005 | 4.5 | 0 | 0.00 | 5475.2 | -1079.15 | 1164564.72 | 0.00 |
| 2006 | 4.5 | 0 | 0.00 | 7414.8 | 860.45 | 740374.20 | 0.00 |
| 2007 | 4.5 | 0 | 0.00 | 5582.9 | -971.45 | 943715.10 | 0.00 |
| 2008 | 4.5 | 0 | 0.00 | 6867.2 | 312.85 | 97875.12 | 0.00 |
| 2009 | 4.5 | 0 | 0.00 | 7099.3 | 544.95 | 296970.50 | 0.00 |
| 2010 | 4.5 | 0 | 0.00 | 6886.7 | 332.35 | 110456.52 | 0.00 |
| | 27 | | **0.00** | 39326.10 | | **3353956.18** | **0.00** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\bar{X})(Y-\bar{Y})}{\sqrt{\Sigma(X-\bar{X})^2}\sqrt{\Sigma(Y-\bar{Y})^2}}$

$= \frac{0}{\sqrt{0}\sqrt{3331998.18}}$

$= 0$

**Calculation of Standard Deviation of Saving deposit of NBB:**

$S.D(\delta) = \sqrt{\frac{1}{n}\sum(X-\bar{X})^2} = \sqrt{\frac{0}{6}} = 0\%$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$

$= \frac{0 \times \sqrt{6-2}}{\sqrt{1-0^2}}$

$= 0$

**Calculation of variance for fixed deposit of NBB**

| Year | X | (X- $\bar{X}$ ) | (X- $\bar{X}$ )$^2$ | Y | (Y- $\bar{Y}$ ) | (Y- $\bar{Y}$ )$^2$ | (X- $\bar{X}$ )(Y- $\bar{Y}$ ) |
|---|---|---|---|---|---|---|---|
| 2005 | 4.55 | 0 | 0.00 | 3536.6 | 1760.07 | 3097846.40 | 0.00 |
| 2006 | 4.55 | 0 | 0.00 | 2867 | 1090.47 | 1189124.82 | 0.00 |
| 2007 | 4.55 | 0 | 0.00 | 1578.1 | -198.43 | 39374.46 | 0.00 |
| 2008 | 4.55 | 0 | 0.00 | 1166.7 | -609.83 | 371892.63 | 0.00 |
| 2009 | 4.55 | 0 | 0.00 | 813.2 | -963.33 | 928004.69 | 0.00 |
| 2010 | 4.55 | 0 | 0.00 | 697.6 | -1078.93 | 1164089.94 | 0.00 |
| | 27.3 | | **0.00** | 10659.20 | | **6790332.95** | **0.00** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\bar{X})(Y-\bar{Y})}{\sqrt{\Sigma(X-\bar{X})^2}\sqrt{\Sigma(Y-\bar{Y})^2}}$

$= 0$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$

$= \frac{0 \times \sqrt{6-2}}{\sqrt{1-0}}$

$= 0$

**Calculation of Standard Deviation of Fixed deposit of NBB:**

$S.D(\delta) = \sqrt{\frac{1}{n}\sum(X-\bar{X})^2} = \sqrt{\frac{0}{6}} = 0\%$

## 6. Calculation of Average Interest Rate on Credit of RBB

| Sector | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Overdraft | 12.5 | 11 | 11 | 11 | 11 | 11 |
| Export Credit | 10 | 8 | 8 | 8 | 8 | 8 |
| Import LC | 10 | - | 8 | 8 | 8 | 8 |
| HMG Bond | 11 | 7 | 7 | 5 | 7 | 7 |
| BG/CG | 11 | 7 | 7 | 8.5 | 8.5 | 8.5 |
| Other Guarantee | - | - | 6 | - | - | - |
| Term Loan | 14 | 11 | 11 | 11 | 11 | 11 |
| Priority Sector Loan | 11.5 | 11.5 | 11.5 | 13 | 11.5 | 13 |
| Working Capital | 13.5 | - | - | - | - | - |
| Hire Purchase | 13 | 10 | 9 | 7 | 11 | 11 |
| Others | 13 | 11 | 11 | 11 | 10 | 10 |
| **Average Int. Rate(1)** | **11.95** | **9.56** | **8.95** | **9.17** | **9.56** | **9.72** |
| **Lending Amount(2)** | **28543.80** | **31464.10** | **27353.60** | **25214.80** | **26863.80** | **28614.00** |
| Correlation ( $r_{12}$) | 0.25 | | | | | |
| Coefficient of determination ($r_{12}^2$) | 0.0632 | | | | | |
| **t-statistics** | t-cal = 0.516 | | | | | |

**Calculation of Variance for credit of RBB:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 9.72 | -0.1 | 0.01 | **28614** | 604.98 | 366000.80 | -60.50 |
| 2006 | 9.56 | -0.26 | 0.07 | **26863.8** | -1145.22 | 1311528.85 | 297.76 |
| 2007 | 9.17 | -0.65 | 0.42 | **25214.8** | -2794.22 | 7807665.41 | 1816.24 |
| 2008 | 8.95 | -0.87 | 0.76 | **27353.6** | -655.42 | 429575.38 | 570.22 |
| 2009 | 9.56 | -0.26 | 0.07 | **31464.1** | 3455.08 | 11937577.81 | -898.32 |
| 2010 | 11.95 | 2.13 | 4.54 | **28543.8** | 534.78 | 285989.65 | 1139.08 |
| | 58.91 | | **5.86** | 168054.10 | | **22138337.89** | **2864.48** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$= \frac{2864.48}{\sqrt{5.86}\sqrt{22138337.89}}$

$= 0.25$

**Calculation of Standard Deviation of Credit rate of RBB:**

$S.D(\delta) = \sqrt{\frac{1}{n}\sum(X-\overline{X})^2} = \sqrt{\frac{5.86}{6}} = 0.988$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$t = \frac{r}{\sqrt{1-r_{12}^2}} \times \sqrt{n-2}$

For RBB t-calculation for lending rate and lending amount is

$t = \frac{0.25}{\sqrt{1-(0.25)^2}} \times \sqrt{6-2}$

$= 0.516$

## 7. Calculation of Average Interest Rate on Credit of NBL

| Sector | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Overdraft | 10 | 10 | 10 | 10 | 10 | 10 |
| Export Credit | 9 | 8 | 8 | 8 | 8 | 8 |
| Import LC | - | - | - | - | - | - |
| HMG Bond | 9 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 |
| BG/CG | 8.5 | 7 | 7 | 7 | 7 | 7 |
| Other Guarantee | 6 | - | - | - | - | - |
| Term Loan | 12.5 | 11 | 11 | - | - | - |
| Priority Sector Loan | 7.5 | 10 | 10 | 10 | 10 | 10 |
| Working Capital | 12 | 10 | 10 | 10 | 10 | 10 |
| Hire Purchase | 11.5 | 9 | 9 | 10.5 | 10.5 | 10.5 |
| Others | 12.5 | 11 | 11 | 11 | 11 | 11 |
| **Average Int. Rate(1)** | **9.85** | **9.17** | **9.17** | **9.13** | **9.13** | **9.13** |
| **Lending Amount(2)** | **22715.00** | **19261.00** | **15480.60** | **13377.50** | **12180.40** | **17456.00** |
| Correlation ( $r_{12}$) | 0.778 | | | | | |
| Coefficient of determination ($r_{12}^2$) | 0.605 | | | | | |
| **t-statistics** | t-cal = 2.477 | | | | | |

**Calculation of Variance for credit of NBL:**

| Year | X | $(X-\bar{X})$ | $(X-\bar{X})^2$ | Y | $(Y-\bar{Y})$ | $(Y-\bar{Y})^2$ | $(X-\bar{X})(Y-\bar{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 9.13 | -0.13 | 0.02 | **17456** | 710.92 | 505407.25 | -92.42 |
| 2006 | 9.13 | -0.13 | 0.02 | **12180.4** | -4564.68 | 20836303.50 | 593.41 |
| 2007 | 9.13 | -0.13 | 0.02 | **13377.5** | -3367.58 | 11340595.06 | 437.79 |
| 2008 | 9.17 | -0.09 | 0.01 | **15480.6** | -1264.48 | 1598909.67 | 113.80 |
| 2009 | 9.17 | -0.09 | 0.01 | **19261** | 2515.92 | 6329853.45 | -226.43 |
| 2010 | 9.85 | 0.59 | 0.35 | **22715** | 5969.92 | 35639944.81 | 3522.25 |
| | 55.58 | | **0.41** | 100470.50 | | **76251013.73** | **4348.40** |

Simple Correlation Coefficient (r) = $$\frac{\Sigma(X-\bar{X})(Y-\bar{Y})}{\sqrt{\Sigma(X-\bar{X})^2}\sqrt{\Sigma(Y-\bar{Y})^2}}$$

$$= \frac{4348.4}{\sqrt{0.41}\sqrt{76251013.73}}$$

= 0.778

**Calculation of Standard Deviation of Credit rate of NBL:**

$$S.D(\delta) = \sqrt{\frac{1}{n}\sum\left(X-\bar{X}\right)^2} = \sqrt{\frac{0.41}{6}} = 0.261$$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^2}} \times \sqrt{n-2}$$

For NBL t-calculation for lending rate and lending amount is

$$t = \frac{0.778}{\sqrt{1-(0.778)^2}} \times \sqrt{6-2}$$

= 2.477

## 8. Calculation of Average Interest Rate on Credit of ADB

| Sector | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Overdraft | 13 | 13 | 12 | 12.5 | 12.5 | 15.5 |
| Export Credit | - | 11 | 11 | - | - | - |
| Import LC | - | 11 | 11 | - | - | - |
| HMG Bond | 8 | 6 | 6 | 6.5 | 6.5 | - |
| BG/CG | - | - | - | - | - | - |
| Commercial Loan | 12 | 12.5 | 10.5 | 11 | 11 | 14 |
| Term Loan | 12 | - | - | - | - | - |
| Priority Sector Loan | 9 | 7.5 | 7 | - | - | - |
| Working Capital | - | - | - | - | - | - |
| Hire Purchase | - | 10 | 10 | 10 | 10 | 13 |
| Others | 14 | 12.5 | 12 | 12 | 12.5 | 15.5 |
| **Average Int. Rate(1)** | **11.33** | **10.44** | **9.94** | **10.40** | **10.50** | **14.50** |
| **Lending Amount(2)** | **40052.30** | **38271.00** | **36585.40** | **34225.00** | **11040.60** | **10746.40** |
| Correlation ( $r_{12}$) | -0.578 | | | | | |
| Coefficient of determination ($r_{12}^2$) | 0.334 | | | | | |
| **t-statistics** | t-cal = 1.417 | | | | | |

**Calculation of Variance for credit of ADB/N:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | **14.5** | 3.31 | 10.96 | **10746.40** | -17740.38 | 314721082.54 | -58720.66 |
| 2006 | **10.5** | -0.69 | 0.48 | **11040.60** | -17446.18 | 304369196.59 | 12037.86 |
| 2007 | **10.4** | -0.79 | 0.62 | **34225.00** | 5738.22 | 32927168.77 | -4533.19 |
| 2008 | **9.94** | -1.25 | 1.56 | **36585.40** | 8098.62 | 65587645.90 | -10123.28 |
| 2009 | **10.44** | -0.75 | 0.56 | **38271.00** | 9784.22 | 95730961.01 | -7338.17 |
| 2010 | **11.33** | 0.14 | 0.02 | **40052.30** | 11565.52 | 133761252.87 | 1619.17 |
| | 67.11 | | **14.20** | 170920.70 | | **947097307.69** | **-67058.25** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$= \frac{-67058.25}{\sqrt{14.20}\sqrt{947097307.69}}$

= -0.578

**Calculation of Standard Deviation of Credit rate of ADB/N:**

$S.D(\delta) = \sqrt{\frac{1}{n}\sum(X-\overline{X})^2} = \sqrt{\frac{14.20}{6}}$ = 1.538

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$t = \frac{r}{\sqrt{1-r_{12}^2}} \times \sqrt{n-2}$

For ADB/N t-calculation for lending rate and lending amount is

$t = \frac{-0.578}{\sqrt{1-(0.578)^2}} \times \sqrt{6-2}$

= -1.417

## 9. Calculation of Average Interest Rate on Credit of HBL

| Sector | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Overdraft | 18 | 10.75 | 10 | 10 | 12 | 12 |
| Export Credit | 16 | 10.75 | 9.75 | 8.75 | 8.75 | 8.75 |
| Import LC | 16 | 10.25 | 9.5 | 9.5 | 11.75 | 11.75 |
| HMG Bond | 11 | 6 | 7 | 6.5 | 6 | 6 |
| BG/CG | 16 | 8 | 8 | 8 | 9.25 | 9.25 |
| Other Guarantee | - | - | - | - | - | - |
| Term Loan | 16 | 12.5 | 10.5 | 10.5 | 11.75 | 11.75 |
| Priority Sector Loan | 11 | 10 | 8.75 | 10 | 12 | 12 |
| Working Capital | - | - | - | - | - | - |
| Hire Purchase | 17 | 12 | 9.5 | 9 | 11.5 | 11.5 |
| Others | 18 | 11.25 | 10.5 | 12 | 13.5 | 13.5 |
| **Average Int. Rate(1)** | **15.44** | **10.17** | **9.28** | **9.36** | **10.72** | **10.72** |
| **Lending Amount(2)** | **30602.50** | **25292.10** | **19985.20** | **17672.00** | **15515.70** | **13245.00** |
| Correlation ( $r_{12}$) | 0.67 | | | | | |
| Coefficient of determination ($r_{12}^2$) | 0.4489 | | | | | |
| **t-statistics** | t-cal = 1.805 | | | | | |

**Calculation of Variance for credit of HBL:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | **10.72** | -0.23 | 0.05 | **13245** | -7140.42 | 50985597.78 | 1642.30 |
| 2006 | **10.72** | -0.23 | 0.05 | **15515.7** | -4869.72 | 23714172.88 | 1120.04 |
| 2007 | **9.36** | -1.59 | 2.53 | **17672** | -2713.42 | 7362648.10 | 4314.34 |
| 2008 | **9.28** | -1.67 | 2.79 | **19985.2** | -400.22 | 160176.05 | 668.37 |
| 2009 | **10.17** | -0.78 | 0.61 | **25292.1** | 4906.68 | 24075508.62 | -3827.21 |
| 2010 | **15.44** | 4.49 | 20.16 | **30602.5** | 10217.08 | 104388723.73 | 45874.69 |
| | 65.69 | | **26.19** | 122312.50 | | **210686827.15** | **49792.52** |

Simple Correlation Coefficient (r) = $$\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$$

$$= \frac{49792.52}{\sqrt{26.19}\sqrt{210686827.15}}$$

$$= 0.67$$

**Calculation of Standard Deviation of Credit rate of HBL:**

$$S.D(\delta) = \sqrt{\frac{1}{n}\sum\left(X-\overline{X}\right)^2} = \sqrt{\frac{26.19}{6}} = 2.089$$

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$$

For HBL t-calculation for lending rate and lending amount is

$$t = \frac{0.67}{\sqrt{1-(0.67)^2}} \times \sqrt{6-2}$$

$$= 1.805$$

## 10. Calculation of Average Interest Rate on Credit of NBB

| Sector | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 |
|---|---|---|---|---|---|---|
| Overdraft | - | - | - | - | - | - |
| Export Credit | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 |
| Import LC | - | - | - | - | - | - |
| HMG Bond | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| BG/CG | 8 | 8 | 8 | 8 | 8 | 8 |
| Industrial Loan | 10.5 | 10.5 | 10.5 | 12 | 12 | 12 |
| Term Loan | - | - | - | - | - | - |
| Priority Sector Loan | 10 | 10 | 10 | 10 | 10 | 10 |
| Working Capital | 9 | 9 | 9 | - | - | - |
| Hire Purchase | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 |
| Others | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| **Average Int. Rate(1)** | **9.31** | **9.31** | **9.31** | **9.57** | **9.57** | **9.57** |
| **Lending Amount(2)** | **9348.80** | **8507.90** | **8420.00** | **8302.00** | **9010.70** | **8739.80** |
| Correlation ( $r_{12}$) | -0.104 | | | | | |
| Coefficient of determination ($r_{12}^2$) | 0.01089 | | | | | |
| **t-statistics** | t-cal = 0.209 | | | | | |

**Calculation of Variance for credit of NBB:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | **9.57** | 0.13 | 0.02 | **8739.8** | 18.27 | 333.79 | 2.38 |
| 2006 | **9.57** | 0.13 | 0.02 | **9010.7** | 289.17 | 83619.29 | 37.59 |
| 2007 | **9.57** | 0.13 | 0.02 | **8302** | -419.53 | 176005.42 | -54.54 |
| 2008 | **9.31** | -0.13 | 0.02 | **8420** | -301.53 | 90920.34 | 39.20 |
| 2009 | **9.31** | -0.13 | 0.02 | **8507.9** | -213.63 | 45637.78 | 27.77 |
| 2010 | **9.31** | -0.13 | 0.02 | **9348.8** | 627.27 | 393467.65 | -81.55 |
| | 56.64 | | **0.10** | 52329.20 | | **789984.27** | **-29.15** |

Simple Correlation Coefficient (r) = $$\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$$

$$= \frac{-29.15}{\sqrt{0.10}\sqrt{789984.27}}$$

= -0.104

**Calculation of Standard Deviation of Credit rate of NBB:**

$$S.D(\delta) = \sqrt{\frac{1}{n}\sum\left(X-\overline{X}\right)^2} = \sqrt{\frac{0.10}{6}} = 0.129$$

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$$

For NBB t-calculation for lending rate and lending amount is

$$t = \frac{-0.104}{\sqrt{1-(0.104)^2}} \times \sqrt{6-2}$$

= -0.209

## 11. Calculation of Correlation between inflation and deposit rate RBB

| Fiscal Year | CPI (1) | Inflation (2) % | Deposit Rate(3) | Lending Rate (4) |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 2.3 | 9.72 |
| 2006 | 179.6 | 9.1 | 2.35 | 9.56 |
| 2007 | 187.6 | 4.5 | 2.35 | 9.17 |
| 2008 | 208.3 | 11.0 | 2.35 | 8.95 |
| 2009 | 234.0 | 12.3 | 2.5 | 9.56 |
| 2010 | 256.4 | 9.6 | 5.25 | 11.95 |

| | | | |
|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **0.175** | Coefficient of Determination | **0.0306** |
| Correlation coefficient. $r_{24}$ | **0.116** | Coefficient of Determination | **0.0134** |
| **t-statistics** | **t-cal (Deposit) =0.355** | **t-tab = 2.776** | **Insignificant** |
| | **t-cal (Lending) =0.234** | **t-tab = 2.776** | **Insignificant** |

**Calculation of Variance for inflation and deposit rate of RBB:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 2.3 | -0.55 | 0.3025 | 1.42 |
| 2006 | 9.1 | 0.32 | 0.1024 | 2.35 | -0.5 | 0.25 | -0.16 |
| 2007 | 4.5 | -4.28 | 18.3184 | 2.35 | -0.5 | 0.25 | 2.14 |
| 2008 | 11 | 2.22 | 4.9284 | 2.35 | -0.5 | 0.25 | -1.11 |
| 2009 | 12.3 | 3.52 | 12.3904 | 2.5 | -0.35 | 0.1225 | -1.23 |
| 2010 | 9.6 | 0.82 | 0.6724 | 5.25 | 2.4 | 5.76 | 1.97 |
| | 52.7 | | **43.0684** | 17.1 | | **6.935** | **3.025** |

Simple Correlation Coefficient (r) = $$\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$$

$$= \frac{3.025}{\sqrt{43.068}\sqrt{6.935}}$$

$$= 0.175$$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^2}} \times \sqrt{n-2}$$

For RBB t-calculation for lending rate and lending amount is

$$t = \frac{0.175}{\sqrt{1-(0.175)^2}} \times \sqrt{6-2}$$

$$= 0.355$$

**Calculation of Variance for inflation and lending rate of RBB:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 9.72 | -0.1 | 0.01 | 0.26 |
| 2006 | 9.1 | 0.32 | 0.1024 | 9.56 | -0.26 | 0.0676 | -0.08 |
| 2007 | 4.5 | -4.28 | 18.3184 | 9.17 | -0.65 | 0.4225 | 2.78 |
| 2008 | 11 | 2.22 | 4.9284 | 8.95 | -0.87 | 0.7569 | -1.93 |
| 2009 | 12.3 | 3.52 | 12.3904 | 9.56 | -0.26 | 0.0676 | -0.92 |
| 2010 | 9.6 | 0.82 | 0.6724 | 11.95 | 2.13 | 4.5369 | 1.75 |
| | 52.7 | | **43.0684** | 58.91 | | **5.8615** | **1.857** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$= \frac{1.857}{\sqrt{43.0684}\sqrt{5.8615}}$

$= 0.116$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$

For RBB t-calculation for lending rate and lending amount is

$t = \frac{0.116}{\sqrt{1-(0.116)^2}} \times \sqrt{6-2}$

$= 0.234$

## 12. Calculation of Correlation between inflation and deposit rate NBL

| Fiscal Year | CPI (1) | Inflation (2) % | Deposit Rate(3) | Lending Rate (4) |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 2.9 | 9.13 |
| 2006 | 179.6 | 9.1 | 2.9 | 9.13 |
| 2007 | 187.6 | 4.5 | 2.4 | 9.13 |
| 2008 | 208.3 | 11.0 | 2.35 | 9.17 |
| 2009 | 234.0 | 12.3 | 2.35 | 9.17 |
| 2010 | 256.4 | 9.6 | 3.25 | 9.85 |

| | | | | |
|---|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **-0.131** | Coefficient of Determination | | **0.017** |
| Correlation coefficient. $r_{24}$ | **0.193** | Coefficient of Determination | | **0.037** |
| **t-statistics** | **t-cal (Deposit) =-0.264** | **t-tab = 2.776** | | **Insignificant** |
| | **t-cal (Lending) =0.393** | **t-tab = 2.776** | | **Insignificant** |

**Calculation of Variance for inflation and deposit rate of NBL:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 2.9 | 0.21 | 0.0441 | -0.54 |
| 2006 | 9.1 | 0.32 | 0.1024 | 2.9 | 0.21 | 0.0441 | 0.07 |
| 2007 | 4.5 | -4.28 | 18.3184 | 2.4 | -0.29 | 0.0841 | 1.24 |
| 2008 | 11 | 2.22 | 4.9284 | 2.35 | -0.34 | 0.1156 | -0.75 |
| 2009 | 12.3 | 3.52 | 12.3904 | 2.35 | -0.34 | 0.1156 | -1.2 |
| 2010 | 9.6 | 0.82 | 0.6724 | 3.25 | 0.56 | 0.3136 | 0.46 |
| | 52.7 | | **43.0684** | 16.15 | | **0.7171** | **-0.73** |

Simple Correlation Coefficient (r) = $$\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$$

$$= \frac{-0.73}{\sqrt{43.0684}\sqrt{0.7171}}$$

= -0.131

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$$

For NBL t-calculation for lending rate and lending amount is

$$t = \frac{-0.131}{\sqrt{1-(0.131)^2}} \times \sqrt{6-2}$$

= -0.264

**Calculation of Variance for inflation and lending rate of NBL:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 9.13 | -0.13 | 0.0169 | 0.34 |
| 2006 | 9.1 | 0.32 | 0.1024 | 9.13 | -0.13 | 0.0169 | -0.04 |
| 2007 | 4.5 | -4.28 | 18.3184 | 9.13 | -0.13 | 0.0169 | 0.56 |
| 2008 | 11 | 2.22 | 4.9284 | 9.17 | -0.09 | 0.0081 | -0.2 |
| 2009 | 12.3 | 3.52 | 12.3904 | 9.17 | -0.09 | 0.0081 | -0.32 |
| 2010 | 9.6 | 0.82 | 0.6724 | 9.85 | 0.59 | 0.3481 | 0.48 |
| | 52.7 | | **43.0684** | 55.58 | | **0.415** | **0.817** |

Simple Correlation Coefficient (r) = $$\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$$

$$= \frac{0.817}{\sqrt{43.068}\sqrt{0.415}}$$

= 0.193

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$$

For NBL t-calculation for lending rate and lending amount is

$$t = \frac{0.193}{\sqrt{1-(0.193)^2}} \times \sqrt{6-2}$$

$= 0.393$

## 13. Calculation of Correlation between inflation and deposit rate ADB

| Fiscal Year | CPI (1) | Inflation (2) % | Deposit Rate(3) | Lending Rate (4) |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 3.15 | 14.5 |
| 2006 | 179.6 | 9.1 | 3.4 | 10.5 |
| 2007 | 187.6 | 4.5 | 3.35 | 10.4 |
| 2008 | 208.3 | 11.0 | 2.85 | 9.94 |
| 2009 | 234.0 | 12.3 | 4.35 | 10.44 |
| 2010 | 256.4 | 9.6 | 5.45 | 11.33 |

| | | | |
|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **0.327** | Coefficient of Determination | **0.107** |
| Correlation coefficient. $r_{24}$ | **0.432** | Coefficient of Determination | **0.187** |

| | | | |
|---|---|---|---|
| **t-statistics** | **t-cal (Deposit) =0.692** | **t-tab = 2.776** | **Insignificant** |
| | **t-cal (Lending) =0.958** | **t-tab = 2.776** | **Insignificant** |

**Calculation of Variance for inflation and deposit rate of ADB:**

| Year | X | $(X-\bar{X})$ | $(X-\bar{X})^2$ | Y | $(Y-\bar{Y})$ | $(Y-\bar{Y})^2$ | $(X-\bar{X})(Y-\bar{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 3.15 | -0.61 | 0.3721 | 1.57 |
| 2006 | 9.1 | 0.32 | 0.1024 | 3.4 | -0.36 | 0.1296 | -0.12 |
| 2007 | 4.5 | -4.28 | 18.3184 | 3.35 | -0.41 | 0.1681 | 1.75 |
| 2008 | 11 | 2.22 | 4.9284 | 2.85 | -0.91 | 0.8281 | -2.02 |
| 2009 | 12.3 | 3.52 | 12.3904 | 4.35 | 0.59 | 0.3481 | 2.08 |
| 2010 | 9.6 | 0.82 | 0.6724 | 5.45 | 1.69 | 2.8561 | 1.39 |
| | 52.7 | | **43.0684** | 22.55 | | **4.7021** | **4.656** |

Simple Correlation Coefficient (r) = $$\frac{\Sigma(X-\bar{X})(Y-\bar{Y})}{\sqrt{\Sigma(X-\bar{X})^2}\sqrt{\Sigma(Y-\bar{Y})^2}}$$

$$= \frac{4.656}{\sqrt{43.0684}\sqrt{4.7021}}$$

$= 0.327$

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$$

For ADB t-calculation for lending rate and lending amount is

$$t = \frac{0.327}{\sqrt{1-(0.327)^2}} \times \sqrt{6-2}$$

$= 0.692$

**Calculation of Variance for inflation and lending rate of ADB:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 14.5 | 3.31 | 10.9561 | -8.54 |
| 2006 | 9.1 | 0.32 | 0.1024 | 10.5 | -0.69 | 0.4761 | -0.22 |
| 2007 | 4.5 | -4.28 | 18.3184 | 10.4 | -0.79 | 0.6241 | 3.38 |
| 2008 | 11 | 2.22 | 4.9284 | 9.94 | -1.25 | 1.5625 | -2.78 |
| 2009 | 12.3 | 3.52 | 12.3904 | 10.44 | -0.75 | 0.5625 | -2.64 |
| 2010 | 9.6 | 0.82 | 0.6724 | 11.33 | 0.14 | 0.0196 | 0.11 |
| | 52.7 | | **43.0684** | 67.11 | | **14.2009** | **-10.7** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$= \frac{-10.7}{\sqrt{43.0684}\sqrt{14.2}}$

$= 0.432$

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^2}} \times \sqrt{n-2}$$

For ADB t-calculation for lending rate and lending amount is

$$t = \frac{0.432}{\sqrt{1-(0.432)^2}} \times \sqrt{6-2}$$

$= 0.958$

## 14. Calculation of Correlation between inflation and deposit rate HBL

| Fiscal Year | CPI (1) | Inflation (2) % | Deposit Rate(3) | Lending Rate (4) |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 2.9 | 10.72 |
| 2006 | 179.6 | 9.1 | 2.9 | 10.72 |
| 2007 | 187.6 | 4.5 | 2.9 | 9.36 |
| 2008 | 208.3 | 11.0 | 3.8 | 9.28 |
| 2009 | 234.0 | 12.3 | 4.8 | 10.17 |
| 2010 | 256.4 | 9.6 | 7.7 | 15.44 |

| | | | | |
|---|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **0.455** | Coefficient of Determination | | **0.207** |
| Correlation coefficient. $r_{24}$ | **0.135** | Coefficient of Determination | | **0.018** |
| **t-statistics** | **t-cal (Deposit) =1.022** | **t-tab = 2.776** | **Insignificant** | |
| | **t-cal (Lending) =0.272** | **t-tab = 2.776** | **Insignificant** | |

**Calculation of Variance for inflation and deposit rate of HBL:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 2.9 | -1.27 | 1.6129 | 3.28 |
| 2006 | 9.1 | 0.32 | 0.1024 | 2.9 | -1.27 | 1.6129 | -0.41 |
| 2007 | 4.5 | -4.28 | 18.3184 | 2.9 | -1.27 | 1.6129 | 5.44 |
| 2008 | 11 | 2.22 | 4.9284 | 3.8 | -0.37 | 0.1369 | -0.82 |
| 2009 | 12.3 | 3.52 | 12.3904 | 4.8 | 0.63 | 0.3969 | 2.22 |
| 2010 | 9.6 | 0.82 | 0.6724 | 7.7 | 3.53 | 12.4609 | 2.89 |
| | 52.7 | | **43.0684** | 25 | | **17.8334** | **12.6** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$= \frac{12.6}{\sqrt{43.068}\sqrt{17.83}}$

= 0.455

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

t = $\frac{r}{\sqrt{1-r_{12}^{\ 2}}}\times\sqrt{n-2}$

For HBL t-calculation for lending rate and lending amount is

t = $\frac{0.455}{\sqrt{1-(0.455)^2}}\times\sqrt{6-2}$

= 1.022

**Calculation of Variance for inflation and lending rate of HBL:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 10.72 | -0.23 | 0.0529 | 0.59 |
| 2006 | 9.1 | 0.32 | 0.1024 | 10.72 | -0.23 | 0.0529 | -0.07 |
| 2007 | 4.5 | -4.28 | 18.3184 | 9.36 | -1.59 | 2.5281 | 6.81 |
| 2008 | 11 | 2.22 | 4.9284 | 9.28 | -1.67 | 2.7889 | -3.71 |
| 2009 | 12.3 | 3.52 | 12.3904 | 10.17 | -0.78 | 0.6084 | -2.75 |
| 2010 | 9.6 | 0.82 | 0.6724 | 15.44 | 4.49 | 20.1601 | 3.68 |
| | 52.7 | | **43.0684** | 65.69 | | **26.1913** | **4.554** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$= \frac{4.554}{\sqrt{43.068}\sqrt{26.19}}$

= 0.1356

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$$

For HBL t-calculation for lending rate and lending amount is

$$t = \frac{0.135}{\sqrt{1-(0.135)^2}} \times \sqrt{6-2}$$

= 0.272

## 15. Calculation of Correlation between inflation and deposit rate NBB

| Fiscal Year | CPI (1) | Inflation (2) % | Deposit Rate(3) | Lending Rate (4) |
|---|---|---|---|---|
| 2005 | 164.6 | 6.2 | 4.5 | 9.57 |
| 2006 | 179.6 | 9.1 | 4.5 | 9.57 |
| 2007 | 187.6 | 4.5 | 4.5 | 9.57 |
| 2008 | 208.3 | 11.0 | 4.5 | 9.31 |
| 2009 | 234.0 | 12.3 | 4.5 | 9.31 |
| 2010 | 256.4 | 9.6 | 4.5 | 9.31 |

| | | | |
|---|---|---|---|
| Correlation coefficient. $r_{23}$ | **0** | Coefficient of Determination | **0** |
| Correlation coefficient. $r_{24}$ | **-0.813** | Coefficient of Determination | **0.661** |

| | | | |
|---|---|---|---|
| **t-statistics** | **t-cal (Deposit) =0** | **t-tab = 2.776** | **Insignificant** |
| | **t-cal (Lending) =2.795** | **t-tab = 2.776** | **Significant** |

**Calculation of Variance for inflation and deposit rate of NBB:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 4.5 | 0 | 0 | 0 |
| 2006 | 9.1 | 0.32 | 0.1024 | 4.5 | 0 | 0 | 0 |
| 2007 | 4.5 | -4.28 | 18.3184 | 4.5 | 0 | 0 | 0 |
| 2008 | 11 | 2.22 | 4.9284 | 4.5 | 0 | 0 | 0 |
| 2009 | 12.3 | 3.52 | 12.3904 | 4.5 | 0 | 0 | 0 |
| 2010 | 9.6 | 0.82 | 0.6724 | 4.5 | 0 | 0 | 0 |
| | 52.7 | | **43.0684** | 27 | | **0** | **0** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$= \frac{0}{\sqrt{43.0684}\sqrt{0}}$

= 0

**Student t-statistics for hypothesis test:**

Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$$

For NBB t-calculation for lending rate and lending amount is

$$t = \frac{0}{\sqrt{1-(0)^2}} \times \sqrt{6-2}$$

$= 0$

**Calculation of Variance for inflation and lending rate of NBB:**

| Year | X | $(X-\overline{X})$ | $(X-\overline{X})^2$ | Y | $(Y-\overline{Y})$ | $(Y-\overline{Y})^2$ | $(X-\overline{X})(Y-\overline{Y})$ |
|---|---|---|---|---|---|---|---|
| 2005 | 6.2 | -2.58 | 6.6564 | 9.57 | 0.13 | 0.0169 | -0.34 |
| 2006 | 9.1 | 0.32 | 0.1024 | 9.57 | 0.13 | 0.0169 | 0.04 |
| 2007 | 4.5 | -4.28 | 18.3184 | 9.57 | 0.13 | 0.0169 | -0.56 |
| 2008 | 11 | 2.22 | 4.9284 | 9.31 | -0.13 | 0.0169 | -0.29 |
| 2009 | 12.3 | 3.52 | 12.3904 | 9.31 | -0.13 | 0.0169 | -0.46 |
| 2010 | 9.6 | 0.82 | 0.6724 | 9.31 | -0.13 | 0.0169 | -0.11 |
| | 52.7 | | **43.0684** | 56.64 | | **0.1014** | **-1.7** |

Simple Correlation Coefficient (r) = $\frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{\Sigma(Y-\overline{Y})^2}}$

$= \frac{-1.7}{\sqrt{43.0684}\sqrt{0.1014}}$

$= -0.813$

**Student t-statistics for hypothesis test:**
Formula to compute t-calculation

$$t = \frac{r}{\sqrt{1-r_{12}^{\ 2}}} \times \sqrt{n-2}$$

For NBB t-calculation for lending rate and lending amount is

$$t = \frac{-0.813}{\sqrt{1-(0.813)^2}} \times \sqrt{6-2}$$

$= 2.795$

**Note: In this dissertation calculation are made by using both calculator (formula) and excel worksheet. So, for all case, every calculation are not shown here.**