DETERMINANTS OF INTEREST RATE IN NEPALESE COMMERCIAL BANKS

By

Nani Maiya Lamichhane

Shanker Dev Campus

Campus Roll No. : 453/061

T.U. Reg. No.: 14293-95

2nd Year Exam Synbol No.: 4246

A Thesis Submitted to :

Office of the Dean

Faculty of Management

Tribhuvan University

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF BUSINESS STUDIES (MBS)

Kathmandu, Nepal

January, 2011

RECOMMENDATION

This is to certify that the thesis

Submitted by:

Nani Maiya Lamichhane

Entitled:

"DETERMINANTS OF INTEREST RATE IN NEPALESE COMMERCIAL BANKS"

has been prepared as approved by this Department in the prescribed format of

the Faculty of Management. This thesis is forwarded for examination.

… … ……	.. ……..……	……..……
Mrs. Rita Maskey	**Prof. Bisheshwor Man Shrestha**	**Prof. Dr. Kamal Deep Dhakal**
(Thesis Supervisor)	**(Head of Research Department)**	**(Campus Chief)**

……..

Mrs. Meera Gautam
(Thesis Supervisor)

VIVA-VOCE SHEET

We have conducted the viva voce examination of the thesis presented

by

Nani Maiya Lamichhane

Entitled:

"DETERMINANTS OF INTEREST RATE IN NEPALESE COMMERCIAL BANKS"

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

Master of Business Studies (MBS)

Viva-Voce Committee

Member (Research Department Head) .....

Member (Thesis Supervisor) .....

Member (Thesis Supervisor) .....

Member (External Expert) .....

Declaration

I hereby declare that the work reported in the thesis entitled "**DETERMINANTS OF INTEREST RATE IN NEPALESE COMMERCIAL BANKS"** Submitted to office of Dean, Faculty of Management, Tribhuvan University, is my original work done in the form of partial fulfillment of the requirements for the degree of Master of Business Studies (MBS) under the Supervision of **Mrs. Rita Maskey** and **Mrs. Meera Gautam,** of Shanker Dev Campus, Tribhuvan University.

……..

Nani Maiya Lamichhane

Shanker Dev Campus

Campus Roll No.: 453/061

T.U. Regd. No. 14293-95

2nd Year Exam Symbol No.:4246

ACKNOWLEDGEMENT

The thesis work "DETERMINANTS OF INTEREST RATE IN NEPALESE COMMERCIAL BANKS"

has been prepared for fulfilling partial requirement of the Master's Degree in Business Studies (MBS) under the supervision of **Mrs. Meera Gautam and Mrs. Rita Maskey, S**hanker Dev Campus.

I am grateful to Shanker Dev Campus, Putalisadak, Kathmandu affiliated to Tribhuvan University for providing me an opportunity to conduct research work on the perspective of "DETERMINANTS OF INTEREST RATE IN NEPALESE COMMERCIAL BANKS". This thesis owns its existence to **Mrs. Meera Gautam and Mrs. Rita Maskey** who not only supervised my thesis but also gave me constant encouragement. Special thanks go to Dr. Kamal Deep Dhakal who gave me the guidelines for this research.

I would like to express my sincere gratitude for providing timely co-operation by library and all the other staffs of SDC and central library of T.U.

I would also like to thank all the staff of Nabil Bank Limited, Standard Chartered Bank Nepal Limited, Bank of Kathmandu, Nepal SBI Bank and Himalayan Bank, especially the staff of Auditing Department for their valuable help for providing Data of Various Years without hesitation.

Finally, I would like to express deep gratitude to my family members and Mr. Ganga Koirala for continuous help and support while preparing this thesis.

Nani Maiya Lamichhane
Researcher

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

$	:	American Dollar
AMT	:	Amount
ATM	:	Any Time Money
BOK	:	Bank of Kathmandu
D.F	:	Degree of Freedom
DEP	:	Deposit
FY	:	Fiscal Year
GDP	:	Gross Domestic Product
HBL	:	Himalayan Bank Ltd
Int	:	Interest
LTD	:	Limited
NABIL	:	Nepal Arab Bank Ltd
NB	:	Nepal Bank Ltd
NIBL	:	Nepal Investment Bank Ltd
NRB	:	Nepal Rastra Bank
Rf	:	Risk Free
Rs	:	Nepalese Rupees
SCBL	:	Standard Chartered Bank Ltd.
SDC	:	Shanker Dev Campus
TU	:	Tribhuvan University

CHAPTER - I

INTRODUCTION

1.1 Background of the Study

Nepal, lying on the laps of Himalayas, is a small, naturally beautiful, democratic and jurisprudence country in the world. It is developing country and is on the path of development. Full phase of development is needed well education, health, social development, industries, employment, infrastructure, utilization of resources etc. The main development sectors are industries and rural development. There is needed economic support.

In the nation, Economy plays the vital role for development. Economy is needed for Manufacturing, Agriculture, Forestry, Tourism, Investment, Taxation etc. Nepal has lot of raw, natural and cultural resources but they are not utilized due to the technical and financial problem. The economic sources of Nepal are agricultural, import export, tourism and remittance generation. The main occupation of Nepalese people is agriculture but this contribution of the sectors to gross domestic product is only 40%. Another Sector of GDP is Export, Import, Service and Remittance collection. Nepalese per capita income is average US Dollar 240 per person per annum, which is very low in comparison to other countries. More than 32% Nepalese are under poverty line and more people are living in hand to mouth problem. Only few of the people are highly richest amount hundred of thousands.

Now, Nepal is depending on foreign aid and loan. Near about 50% budget is dependable upon foreign aide & loan. The reason behind this is sufficient fund to develop in current phase. Financial position is a most important factor for a nation. A financial feedback plays the vital role to utilize the resources, develop the

technological improvement and produce goods & services in competitive situation. So, capital is based upon organization. It helps financial markets to generate the required funds on productive and business sector.

Banks and other financial sector play an important role while collecting funds from unproductive sector with the objective of investment in productive sector. Nepal Rastra Bank is a central bank of Nepal. It is controlling and monitoring its subordinates while developing economic sector. Developing banks, commercial banks, agricultural development banks and other financial companies are co-operating with each other on support of financial growth of the Nepal's economy.

1.1.1 Commercial Bank

Every commercial bank are performing its all kind of banking transactions by accepting deposits, advancing loans, credit creation and agency function. They provide short-term loan, medium term loan and long-term loan for trade and industrial promotion. They are also operating off balance sheet function such as issuing guarantee, bonds letter of credit etc.

As per commercial bank Act 2031B.S, "A commercial bank means the bank which deals in exchanging currency accepting deposit, giving loans and doing commercial transaction."

Keeping above act in mind, we can say that commercial banks play an important on growth of Nepalese economy. Nepal Bank Ltd. is the first commercial bank of Nepal, which was established in 1937A.D. in private sector participation. The government owned Rastriya Banijya Bank is also established in 1966 A.D. and this bank is spread over most of the rural and urban areas of Nepal.

In 1980's, government introduced financial sector reforms, which facilitated the establishment of joint venture banks. Government of Nepal has initiated the

establishment of joint venture banks, especially foreign banks were implemented to bring the modern technological management as well as foreign capital in banking industry. The first joint venture banks are Nepal Arab Bank Ltd. and other famous banks are Standard Chartered Bank, Himalayan Bank and Everest Bank NB Bank etc.

1.1.2 Brief Introduction of Sample Commercial Banks

1. Nepal SBI Bank Limited

Nepal SBI Bank Ltd. (NSBL) is the first Nepal - Indo joint venture bank in the country. It is sponsored by three institutional promoters, namely, State Bank of India, Karmachari Sanchaya Kosh (Employees provident fund) and Agricultural Development Bank of Nepal. Nepal SBI Bank Limited became operational on the 8th July 1993.

The Bank was registered on 2050/01/16 (28.04.1993) in the department of Industry, HMG/N under the company Act 2021 and commercial Bank Act 2031. The equity composition of the bank is state bank of India 50%, employ provident fond 15%, ADB 5%, General public 30%.

It has been providing services through its 10 Branches and 3 Extension counters. The services provided by Nepal SBI Bank Limited Include deposits, remittances, various type of loan facilities, letter of credit, bank guarantees, retail financing (house loans, vehicle loans and education loans) etc. it has recently launched 365 days banking and ATM facility from its new road branch.

2. Bank of Kathmandu Ltd. (BOK)

It was established in 1993 in collaboration with SIAM Commercial bank, Thailand under the company act, the major objective of the bank is to operate commercial banking activities throughout the country with the approval of NRB. The SIAM

commercial bank diluted its holdings to the Nepalese citizens in 1998. Hence, Nepalese public hold 97.72% of the equity shares of BOK and remaining share are held by financial insertions (0.9%) and organized institutions (1.38%). BOK is one of the modern banks in Nepal. This bank accepts the deposit and provides the loan in various sectors. The current interest rate of bank in deposit 4.41% in average and lending rate is 11.18% in average.

3. Nabil Bank Limited (Nepal Arab Bank Limited)

NABIL Bank Limited (Nepal Arab Bank Limited was incorporated in the year 1984 A.D. (2041 BS). It commenced its operation on 112 July 1984 as the first joint venture bank in exchange in the year 1986 A.D. (081/09/042 B.S.).Emirate Bank International Ltd., Dubai was the first Joint venture partner of NABIL. Warranty, NB (international) Ltd., Ireland is the foreign partner. NABIL Bank Limited had the official name Nepal Arab Bank Ltd. till 31st December 2001. The equity composition of Nepal Arab Bank Limited is NB (International) Ltd. Ireland 50%, Nepal Industrial Development Corporation (NIDC 10%, Rastriya Beema Sansthan 9.67%, Nepal Stock Exchange Limited 0.33%, General Public 30%.

NABIL Bank is the Pioneer in introducing many innovative banking services and marketing concept in banking sector of Nepal. It operates its activities through 15 branches and 2 counters. It is the only bank having presence in the Tribhuvan International Airport. Some of the services provided by NABIL Bank Limited are accepting deposits, documentary credit, guarantees, collections, credit cards, tele banking safe deposit lockers, fund transfer etc.

4. Standard Chartered Bank Nepal Limited.

Standard Chartered Bank Nepal Limited, formerly known as Nepal Grindlays Bank Limited was in corporate in the year 1985 and has been in operation since 1987. On 31st July 2000, Standard Chartered Bank concluded the acquisition of

ANZ Grindlays Bank from the Australia and New Zealand Banking Group Limited with this acquisition, 50% shares of Nepal Grindlays Bank Ltd.(NGBL) previously owned by ANZ Grindlays are now owned by Standard Chartered Grindlays Bank Ltd. leading to the name change of the Bank to Standard Chartered Bank Nepal Limited with effective from July 16, 2001. The equity composition of Standard Chartered Bank Nepal Ltd. is Standard Chartered Grindlays Bank 50%, Nepal Bank Limited 33%, General Public 17%.

The Bank focuses mainly on corporate, consumer and commercial banking, providing services for international firms, as well as Embassies, aid agencies, airlines, hotels and government corporations

5. Himalayan Bank Limited (HBL)

Himalayan Bank Limited was established in 1992 by the distinguished business personalities of Nepal in partnership with Habib Limited, on of the largest commercial bank of Pakistan. Bank operations were commenced from January 1993. It is the first commercial bank of Nepal with maximum shareholding by Nepalese private sector. Besides commercial activities, the bank also offers industrial and merchant banking facilities. The bank at present has the five branches in Kathmandu valley and seven branches outside the valley. The bank is also operating a counter in the premise of the Royal palace. The bank has a very aggressive plan of establishing more branches in different parts of the kingdom in near future. The bank's policy is to extend quality and personalized services to its customers as promptly as possible. The bank, as far as possible, offers tailor made facilities to its clients, based on the unique needs and requirements to extend more efficient services to its customers. Himalayan Bank has been adopting a new technology. HBL has listed on Nepal stock exchange in July 5, 1993. The share participation of the bank is public and 20% Habib Bank of Pakistan.

6. Nepal Investment Bank Ltd

Nepal Investment Bank Ltd. (Nepal Indosuez Bank Ltd.) was established in 21st January, 1986 as a third joint venture bank under the Company Act 1964.

Initially the bank is managed by 'Barque Indosuez' Paris in accordance with joint venture and technical services. Fifty percent of the share of Nepal Indosuez Bank Ltd. held by credit Agricole Indosuez was sold to the Nepalese promoters on April 25, 2002 as per the transaction record of NEPSE. After this divestment of share by Nepalese owners, the name of the company was changed to Nepal Investment Bank Ltd by its 15 AGM held on May 31, 2002. Out of total equity shares of Nepal Investment Bank Ltd., 50% shares are held by a group of companies, 15% by commercial banks, another 15% by financial Institutions and remaining 20% by general public. Authorized capital of NIBL is Rs. 270 million and issued and paid up capital are Rs.169.9845 respectively.

1.2 Statement of the Problem

The interest rate plays important role for the banking development. The favorable investment climate makes appropriate interest rate. We have seen, the commercial banks have to shoulder more risk and uncertainty on investment. The bank gain some profit now as well as they has lot of risk on bad debts. They are facing the problems on refund of investment like government owned bank more but in another parts Joint venture and private bank were making good profit in competition each other. They are generating the new ideas and providing the various facilities to accuracy the bank customer.

The Interest is a price of money. The interest rate is different in depositor and lender. That differences margin is the gain of bank. The interest rate charged and offered of financial institution and commercial banks was regulated by central

bank until before few years, But now these institution are free to fix their interest rate.

Interest rate is most important factor in economy and organization. Most of the organizations are not calculate the true or effective interest rate. They are motivated in gain profit. It is different on as per banks. They have own policy on determination. So this researcher has influenced to analyze that what factors affect interest rate and what are the methods used in interest calculation. So this issue is important to study to solve some notify problems.

1. Is the market interest rate is affected by inflation rate and other factors?
2. Which method used in commercial bank to calculation interest rate?
3. What are the major qualitative factors to determine in interest rate in Nepalese Commercial Banks?
4. What are the differences between interest rate theory and practice?
5. So many issues are the finding parts of the statement of problems.

1.3 Focus of the Study

Interest rate and its determination is my focus study part. I am going on analyze the factors and environments of subject. The subject is very important in banking sector .In the Nepalese contest most of the banks are profitable and they are motivated in earning profit. Some joint-venture private banks are very modern they are gain public popularity. But some government owned banks are going on risk side in the reason of bad loan distribution. But in case of interest rate all are the difference in their own strategy. We know that Nepal is geographically country has differences in economically mobilization in rural and town. There is large farness in peoples in deposit use of banking system business areas.

1.4. Objective of the Study

We know that interest rate is important in financial market in collecting the funds and lending the loans, so determination of interest rate is also important function of financial market. This study try to identify the determinants factors of interest rate, appropriate rate methods to determine of interest rate in banking sectors and environmental factors related to interest rate.

- To identify the trend of deposit rate, lending rate, inflation and risk free rate.
- To identify the relationship of interest rate with deposit, lending, interest rate,
- inflation and risk free rate
- To identify the determinant factors and calculation methods of interest rate.
- To analyze the environmental factors regarding interest rate.
- To provide suggestion and recommendation to banks about interest rate.

1.5 Significance of the Study

Development of banking system is a vital issue for the growth of the economy. The economic development of any country depends up on the effective mobilization of the accumulated and mobilization of funds colleting and lending strategy is effected by interest rate. Interest rate is the main factor of the commercial banks. It is also important in depositor and lenders.

Present study is important in the point of view national economy. It is determining price of money, which is called interest rate, whose effects shows on financial system, economic growth in business sector and public sector.

Nepal is sufferings a high inflation rate and it is important factor in economy .It plays role in determination of interest rate. The interest rate is difference in commercial banks. They have own strategy to determine in rate. The rate of interest is one clue for competition in financial market. The reason of fluctuation

in interest, these factors are affecting in rate default risk, political crisis, uncertainty, demand and supply, computation of financial market etc. these various factors are responsible in determination of interest rate.

The subject is important in national and international financial markets, person, parties, business holder's depositors etc. it is a one key of business sector. It is also important to measure the running positions of economy so there are many reasons and objectives which are significant in study.

1.6 Limitation of the Study

- This study is conducted for a partial fulfillment of Master degree on student sector.
- There is lack of sufficient financial recourses to deep and large-scale study.
- The topic is used in various financial sectors but is limited in commercial banks.
- Most of the analysis is descriptive in present study.
- The study is based on some fiscal years 2001/2 to 2008/9 data of commercial banks and concerted in secondary data.

This topic area is very large and affecting factors are more but not all the factors are attempted so only determining factors interest rate are considered. This study will be based on data collected from some sample bank, magazine, books and published reports.

1.7 Organization of the Study

The study has been organized in to five different chapters. They are as follows:

Chapter- I Introduction

This introduction chapter contains the introduction part of the study, objectives of the study, statement of the problem, significance of the study, limitation of the study etc.

Chapter-II Review of Literature

The second chapter contains the review of literature about the interest rate of different commercial banks.

Chapter-III Research Methodology

The third chapter is research methodology consisting of research methodology, research design, nature of data, procedures of data collection.

Chapter-IV Presentation and Analysis of Data

Under this chapter the analysis and interpretation of data has been presented.

Chapter-V Summary, Conclusion and Recommendation

This is the final chapter which summarizes the main conclusion of the previous chapter and offers suggestions for the improvement.

CHAPTER - II

REVIEW OF LITERATURE

2.1 Introduction

The purpose of reviewing the literature is to develop some expertise in one's area, to see what new contributions can be made, and to receive some ideas for developing research design.

The review of literature helps to the study to fulfill issues. The review of literature includes the reviews of previous writing and studies relevant to the problem being explored and with the framework of theory structure.

The review of literature is the one the process locating, reading and evaluating the research literature in area of the students interest (Wolff & Pant, 2005:39).

2.2 Meaning of Interest

In common parlance interest is payment made by a borrower to the lender for the money borrowed and it is expressed a rate percent per year .But in economics widely different views have been put forth from the time to Aristotle to the present day. Aristotle recognized only annual husbandry and stock rising as two legitimate industries whose product could be lent and interest earned on them (Jhingan, 1986: 621).

According to Carver “Interest is the income which goes to the owner of capital.” According to Mill's "Interest is the remuneration for more abstinence." Interest is the amount paid to the creditor in return to a debt borrowed by a debtor for a fixed period of time .As the Reward of their factors of production this market is also a reward of other factor of production this interest is also a reward paid to the

capitalist for the use of capital (Joshi, 2058: 384). Prof Meyer- "Interest is the price paid for the use of lovable funds". Prof Seliqman – "Interest is the Return for the fund of capital". Prof. Lord J.M Keynes –"Interest is the reward for parting with liquidity '' In this way there is different definition of interest .Even then the some conclusion may be drawn from all these definition and the conclusion is that the interest is the amount of return paid for the use of capital.

Interest is the amount paid to the creditor in return to a debt borrowed by a debtor for a fixed period of time. As the reward of other factors of production this interest is also a reward paid to the capitalist for the use of capital. The system of borrowing loan and of paying the interest is very old. The economics of different times had hated the system of interest. Even then the poor people were compelled to take loans and pay interests due to various reasons. Those days the loans were taken mostly for consumption purpose. But in the modern days, there are differences in the nature of loans.

2.3 Interest Rate Levels

Funds are allocated among borrowers by interest rate: firms with the most profitable investment opportunities are willing and able to pay the most for capital, so they trend to attract it away from less efficient firms or from those whose products are not in demand. Of course, our economy is not completely free in the sense of being influenced only by market forces, thus, the federal government has agencies that help designated individuals or groups obtain credit favorable terms among those eligible for this kind of assistance are small businesses, certain minorities, and firms willing to build plants in areas with high unemployment. Still, most capital in the use economy is allocated through the price system.

2.4 The Determinants of Market Interest Rates

In general, the quoted (or nominal) interest rate on a debt security, is composed of a real risk-free rate of interest, k*, plus several premiums that reflect inflation. The riskiness of the security and the security's marketability. This relationship can be expressed as follows. (Weston & Brigham, 1986 :45)

Quoted interest rate = K =K*+IP + DRP+ LP +MRP

K= The quoted, nominal, rate of interest on a given security. There are many different securities; hence many different quoted interest rates.

K*= The real risk free rate of interest

The rate of interest that would exist on default-free U.S Treasury Securities if no inflation were expected.

IP = Inflation Premium

A premium for expected inflation that investors add to the real risk-free rate of return.

DRP= Default Risk Premium

The difference between the interest rate on a U.S treasury bond and a corporate bond of equal maturity and marketability.

LP=Liquidity or marketability premium

A premium added to the rate on a security if the security cannot be converted to cash on short notice and at close to the original cost.

MRP=Maturity Risk Premium.

A premium that reflects interest rate risk; bonds with longer maturities have greater interest rate risk.

2.5 Theory of Interest Rate

2.5.1 Gross Interest and Pure Interest

In ordinary terms, the amount, to which we call interest, is the total interest in economics. The pure interest is also included in this total interest.

- Pure or Net interest: - The net interest is the net return paid only for use of capital.
- Insurance against Risk:- Interest also includes reward for risk taking. While investing capital; a capitalist has to be some risks. He includes some amount in the net interest for this risk the amount for insurance against risk. The additional amount is called the amount for insurance against risk. The capitalist bearing two ways of risk.
  a. Personnel risk
  b. Trade risk
- Reward for inconvenience
- While investing capital, a capitalist has to face two kinds of inconvenience. The first inconvenience is that after an investment is done, he can not be able to use capital in his need. The second inconvenience is that when he receives back the amount he has invested, the golden opportunity to invest the capital else where has already been of low cost. The amount over the net interest due to the possibilities of these inconveniences is the reward for inconvenience.
- Payment for management expenditure

  While investing capital, the capitalist should also keep the account. In order to keep the account he has to spend a separate amount. It may also be possible that the creditors should knock the debtor's door many times to receive back his amount. In this way, the creditor should spend some amount for keeping accounts, for hiring employees, for visiting the debtors repeatedly etc. For all these difficulties the creditors charge some amount over the net interest against

the borrowers and these expenses are called the payments for management expenditure (Joshi, 2058:385).

Forces Determining Interest Rate

The problem with interest rates is that although interest rates are critical to every bank, bankers simply cannot control either the level of or the trend in market rate of interest. The rate of interest on any particular loan or security is ultimately determined by the financial market place where supplies of loanable funds (credit) interact with demands of loanable funds (credit) trends to settle at the point where the quantities of loanable funds (credit) demanded and supplied are equal (Petter, 1983:120).

- Interest Rate Risk is one of the Bankers greatest ALM challenges
- The Interest rate is one of the sources of revenue
- When interest rate charge in the financial Marketplace, Bankers find that the change affects.
- Changing interest rate also change the market value of a banks assets and liabilities.
- Interest rate impacts both a bank's balance sheet and its statement of income and expenses.

2.5.2 Loanable Funds Theory of Interest

The Loanable Funds Theory of Interest was propounded simply to remove the drawbacks of the classical Theory of Interest. First of all, this theory was propounded by the famous Swedish economist Johan Gustav Knut Wicksell. Later on, the other Swedish economists, like Bertil Ohlin, Erich Lyndahl, Gunnar Myradah, etc. and the British economist Sir Dennis Robertson, improved and developed the theory very much. These economists are of the neo-classical age. So this theory is also called the Neo-classical theory of Interest. This theory shows that the rate of interest is determined by the interaction of the demand for and the supply of the loanable funds. In the demand for loanable funds, the investment for

the production of the capital goods and the loans for consumption purpose are also included. And in the supply of loanable funds, the disposable income, the bank money or credit, etc. are included. In this way, in context to the determination of the rate of interest, both the monetary and real factors are involved. On the other hand, this theory is also called the Periodic Analysis funds on the period of time. According to this theory, the demand for and the supply of the loanable funds are influenced by different factors (Joshi 205; 386).

2.5.2.1 Demand for Loanable Funds

The classical theory of interest has mentioned that the capital is demanded only for the investment to produce the capital goods. But the demand for the loanable funds (capital) depends on the following factors:

I) Demand for Investment

Generally the business firms demand for capital to purchase the capital goods like buildings, machines, tools, etc. and to conduct the production activities. The amount to be paid to receive such loans is called the interest. The demand for such loans depends on the marginal revenue productivity of capital or on the expected net rate of return of capital. Therefore, the loanable fund is demanded only up to the point where the marginal revenue productivity of capital and the rate of interest to be paid are equal to each other. If the rate of interest is low, the demand for capital or the loanable funds is high and if the rate of interest is high, the demand for loanable funds is low. Thus, the demand for loanable funds is interest-elastic and its curve slopes downwards from left to right.

II) Demand for Consumption

The loanable fund is also demanded for the consumption purposes. Generally, the loanable funds for consumption purposes are demanded for purchasing durable goods like houses, radios, T.V. sets, motor cars, refrigerators, etc. The people

demand for the loanable funds especially at the time when their current incomes and idle cash resources are insufficient to buy the durable goods they desire. Such demand for loanable funds is called the Disserving. If the rate of interest is low, the demand for loanable funds for the consumption of such durable goods will be high and if the rate of interest is high, the demand for loanable funds for such purposes will be low. Therefore, the demand for loanable funds for consumption purposes is also interest-elastic and its curve also slopes downwards from left to right.

III) Demand for Hoarding

People are naturally liquidity-prefers. Therefore, they desire to keep some portions of their incomes in liquid-money or cash-money or idle-money. They do this by spending some percentages of their disposable income. The amount saved in this way is called the Hoarded-money or Hoarding. This hoarding may be used to buy shares, securities the capital goods and to provide loans to somebody else. Or this hoarding may be kept with one self in cash form or in the form of idle money. This act of hoarding is done for two objectives: a) the hoarded or cash money may be invested immediately when the rate of interest goes up in the market and the higher profits may be secured, b) the hoarded money may be invested to purchase shared and securities when their prices are low and aim at selling them at higher prices in the future. Thus, people desire to hoard too much cash money at low rates of interest and desire to hoard less cash money at higher rates of interest. Therefore, the demand for loanable funds to hoard cash money also makes a supply of loanable funds.

2.5.2.2 Supply of Loanable Funds

The classical theory of interest tells us that the saving is formed out of current income and the capital is supplied from this saving. But according to the loanable funds theory, the sources of supply of capital depend on the following factors.

I) Savings

The supply of loanable funds is made out of savings of individual persons, families, business concerns, etc. According to Prof. Robertson, the amount of difference between the past income and the present consumption expenses is the amount of savings of a person of a family. This amount of savings depends upon the level of income of a person. But if we assume the level of income as constant, the amount of savings changes with a change in the rate of interest. The business firms also save some amount out of their incomes. These firms save aiming at not borrowing from the loan markets. Therefore, if the rate of interest is high in the market, they save more and if the rate of interest is low, they save less. In fact, such business firms do not enter into the loan markets even the amount of their savings substitute for the loanable funds of the loan market. Therefore, the amount of this savings influences the rate of interest. Thus, the savings of all kinds are interest elastic. Or if the rate of interest is high, the volume of savings is greater and if the rate of interest is low, the volume of savings is also low. Therefore, the savings curve slopes upwards form left to right.

II) Dishoarding

People hoard some portions of their past income in the form of liquid or idle money. When such hoarded idle money is invested, then it is called Dishoarding. This is another important source of supply of the loanable funds. People invest a greater volume of such hoarded money when the rate of interest is high and when the price of shares and securities is low in the market. Likewise, the investment of such hoarded money decreases when the rate of interest is low and when the price of shares and securities is high in the market. Thus, such dishoarding is also interest-elastic and its curve also slopes upwards from left to right.

III) Disinvestment

It there is an economic havoc in the economy or if the current market rate of interest of capital is higher than the marginal revenue productivity of capital to be received or the expected net rate of return of capital, then the business firms start to disinvest their capital. The amount of such disinvestment may be found from both the fixed and the working capitals. The business firms keep some amounts in form of capital consumption allowances or the depreciation charges for their fixed capital. Now, when they think not to continue or not to run the business, they make the amount of disinvestment received from the capital consumption allowances available in the market in the form of loanable funds. In the same way, the amount received from the sales of the firm's output may also be made slowly available in the market in the form of loanable funds. The volume of the amount of such disinvestment is greater at higher interest rates and smaller at lower interest rates. Therefore, the disinvestment is also interest-elastic and its curve also slopes upwards from left to right.

IV) Bank Money

The commercial banks create credit which is called bank money. The banks provide loans to the businessmen and the industrialists by means of credit or bank money created in this way. The commercial banks can also contract credit when necessary. These also buy and sell securities. Thus, the commercial banks play an important role to supply the loanable funds. But Prof. Knut Wicksell was of the opinion that the bank money is interest inelastic. According to him, the bank money is influenced by the liquidity position of the bank not by the rate of interest. Therefore Prof. Wicksell opined that the curve of bank money is a vertical straight line or is parallel to OY axis. But the economists after Prof. Wicksell improved a lot on their ideas and argued that the bank money is not perfectly interest-inelastic but it is interest-elastic to some extent. These economists argue that the less the interest rate is, the less credits the bank creates and the higher the interest rate

becomes, the more credits the bank creates. Therefore the curve of bank money also slopes upwards from left to right. We explained the different states of the demand for and the supply of the loanable funds. If we collect all the demand curves at one side and all the supply curves at the other side we get separately the total demand curve and the total supply curve.

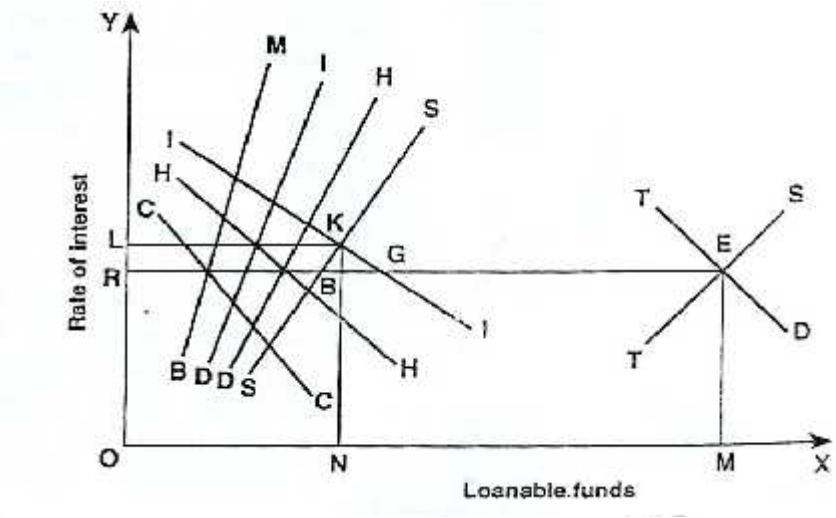
Determination of the Rate of Interest

The rate of interest is determined by the interaction of the demand for and the supply of the loanable funds. The determination of the rate of interest is presented in figure 2.1.

In the figure, CC, HH and II are consumption, hoarding and investment demand curves respectively. In the same way, BM, DI, DH and SS are bank money, disinvestment, dishoarding and savings supply curves respectively. TD is the total demand curve for loanable funds and this curve is sloping downwards from left to right while TS is the total supply curve of loanable funds and this curve is sloping upwards form left to right. E is the interaction point of these two curves. Therefore, the rate of interest is determined at point E or when the demand for and the supply of capital are OM, the rate of interest is OR. Although the total demand for and the total supply of the loanable fund are equal at point E, the amounts of investment and of saving are not equal at this point. Here the amount of investment is RG and the amount of saving is RB or the amount of investment exceeds the amount of saving. Therefore, this is only the short-run state of equilibrium. For the volume of investment is greater than the volume of savings, the income of the people increases in the long-run and as a result, the savings also increases and finally the long-run rate of interest is determined at a point where both savings and investment are equal to each other.

Figure 2.1

Investment Demand Curve



In the context of the determination of the rate of interest, Prof. Wicksell has also mentioned the natural and the market rates of interest. Here, we once turn back to the classical theory of interest. According to this theory, the rate of interest is determined at a point where the demand for (investment) and the supply of (savings) are equal to each other. Therefore, while the investment and savings are equal to point to KN (OL). But Prof. Wicksell argues that this KN (OL) is the natural rate of interest and OR is the market rate of interest. Because, according to him, the natural rate of interest is determined by the interaction of the savings and the investment and the market rate of interest is determined by the interaction of the demand for and the supply of the loanable funds.

The process of the determination of the rate of interest of the Loanable Funds Theory may be simplified by the use of pure savings (savings-dissavings), pure hoarding (hoarding-dishoarding) and pure investment (investment-disinvestment).

Criticisms

The Loanable Funds Theory of Interest has included both the monetary and the real factors of the economy in the context of the determination of the rate of interest. Therefore, this theory is considered very much superior to the classical theory. Even then, this theory has been criticized on various grounds.

- First of all, the loanable funds theory also has assumed the state of full employment. But the economists argue that the state of full employment may not be found in the real world. According to Prof. Keynes, the state of equilibrium in an economy may be achieved only below the level of full employment.
- This theory has attempted to curb the difficulties of the determination of the rate of Interest seen in the classical theory by mixing the real and the monetary factors. But the critics of the theory opine that real factors like savings and investment indicate the flows of money while the monetary factors like bank credit and liquidity indicate the changes in the stock of money and therefore the real and the monetary factors cannot be mixed in one place.
- The theory states that the rate of interest is determined by the loanable funds. But the loanable funds depend upon the disposable income, the disposable income depends upon the investment and the investment depends upon the rate of interest. Thus, according to Prof. Hansen, this theory involves us in such a circular reasoning that we can not come out of it. Therefore, Prof. Hansen and other economists call this theory an indeterminate theory.
- This theory has assumed the level of income constant and states that a change in investment does no bring any change in the level of income. But this statement is not considered correct. Because when the rate of interest falls the amount of investment increases and an increase in the amount of investment rises up the level of income.
- This theory has laid special emphasis on the fact that an increase in the rate of interest increases the amount of savings. But in fact, it is an exaggeration.

Sometimes, a change in the rate of interest may not have any influence on the amount of savings. Specially the saving of a very low income group of people is interest-elastic. In the same way, the people who care more for future may save more than before although the rate of interest has not been increased. Therefore, the statement that a change in the rate of interest highly influences the amount of savings may not always and in all uses be proved true.

- Prof. Keynes has expressed his doubt on the concept of hoarding as used in the Loanable funds theory. Because, according to Keynes, the amount of hoarding may not change unless there is a change in the quantity of money. If the total quantity of money remains the same, the total amount of hoarding in the beginning and at the end of a period remains the same too. The smaller hoarding of money by a person is compensated by a greater hoarding of money by another person. But Keyne's doubt on the concept of hoarding (passive money) does not only depend on the total quantity of money but also depends on the velocity of the circulation of money. And this velocity of the circulation of money itself also depends upon the amount of hoarding of money. Thus, it influences the total supply of money.
- The critics have also criticized the theory on the ground that the Loanable Funds Theory is only a synthesis between the classical Theory of Interest and the Keynesian Liquidity Preference Theory of Interest. Because of this theory only incorporates the savings and investment demand of the classical theory and the liquidity preference of the Keynesian theory into one.

Thus, many critics have criticized the Loanable Funds Theory on various grounds. Even then, it is regarded superior to the classical theory because it has attempted to explain the determination of the rate of interest by amalgamating the real factors such as savings and investment and the monetary factors such as bank money,

liquidity preferences; etc Prof. H.G. Johnson has called this theory as dynamic and the Keynesian theory as static.

2.5.3 Liquidity Preference Theory of Interest

Prof. Lord John Maynard Keynes had propounded the Liquidity Preference Theory of Interest. Therefore, this theory is also called the Keynesian Theory of Interest. Prof. Keynes has propounded this theory by criticizing the classical and the Loanable Funds Theories of interest. According to Keynes, the rate of interest is calculated by means of money and the interest is a purely monetary phenomenon. Therefore, the Keynesian Theory of Interest is also called the Monetary Theory of Interest. According to this theory, the rate of interest is determined by the demand for money; Keynes has indicated the liquidity preference of the people. On the other hand, the supply of money indicates the total quantity of money available in a fixed period of time. This total quantity of money is changed by the Central Bank of a Country (Joshi 2058:394).

People spend a fixed percentage of their income on consumption on the basis of their propensity to consume. The remaining portion of income after having been spent on consumption may be kept by the people in idle or liquid form or may also be invested to get an additional or extra income. The fact that how much of the income should be invested depends upon the liquidity preference of a person. If the liquidity preference is greater, people will prefer a greater portion of income to keep in the form liquid money with them and if the liquidity preference is smaller, people will prefer a smaller portion of their income to keep in the form of liquid money with them and they will invest the remaining portion of their income to a place from where an extra income may be secured. But, by nature, people prefer to hold cash money with them. So they expect to receive some returns as remunerations for money they have invested. Or people desire to get remuneration for parting with their income even for a specified period. To the amount of

remuneration received in this way, Prof. Keynes has called 'Interest'. According to Prof. Keynes, "Interest is the reward for parting with liquidity for specified period". Thus the liquidity preference of the people may be bought by paying them the amount in the form of interest.

It is necessary to explain both, the demand and supply sides of money, separately on the basis of the Keynesian liquidity preference theory of interest.

Demand Side

People prefer to keep a fixed portion of their income in the form of cash or liquid money for the fulfillment of their different objectives. This preference (desire) of cash or liquid money has a great influence on the determination of the rate of interest. If the liquidity preference is greater, the rate of interest is also higher and if the liquidity preference is smaller, the rate of interest is also lower. In the same way, if the current rate of interest is higher is the market, people prefer less cash money to hold, and if the current rate of interest is lower, people prefer too much cash money to hold with them. Prof. Keynes has divided the objectives or the preferences of the people to hold cash with them into three parts.

I) Transactions Motive

People hold a certain portion of their income in the form of cash for their daily transactions. Prof. Keynes has again divided this transactions motive into two parts.

a) Income Motive

There is a certain period for the people to receive income. The period may be once a month (monthly), twice a month (bi-monthly), once a year (annually), etc. But each person should spend a certain amount of money for their daily consumption. Due to these necessities, people hold a certain portion of their income in the form

of cash or liquid money. The preference to hold cash money depends on the level of income, duration of receiving income, methods of payment, etc.

b) Business Motive

As the individuals desire to hold a certain percentage of their income in the form of cash, the businessmen and the industrialists also do the same. Because these businessmen and the industrialists need a certain fund to pay salaries to their employees, to pay wages to the laborers, to pay for transportation charges, to pay for raw materials, etc. In the same way, the banks create a certain cash reserve fund to fulfill the daily demands for cash of their customers. How much percentage of their incomes does these businessmen, industrialists, banks, etc. hold in the form of cash depends upon the amount of their daily transactions.

II) Precautionary Motive

The future is uncertain of dark. Nobody can certainly predict the future incidents or the future problems. Therefore, people prefer to hold a certain percentage of their future. To fall ill (sick), to come into accidents, to be unemployed, etc. may be such incidents (events). Keeping objectives to be free from all these sudden uncertainties people hold some cash balances with them. This objective is called the precautionary motive. The demand for cash balances for this precautionary motive depends upon the level of income of the people, standards of living, habit, nature, circumstances, etc.

III) Speculative Motive

The idea of speculative motive is an original idea of Prof. Keynes. The objective of holding cash to earn more income in future on the basis of a change in the prices of bonds and the rate of interest is called the speculative motive. The security papers as well as such other papers which provide a fixed rate of interest in a fixed period of time are called the bond papers. As the cash money held for

precautionary motive, the cash money held also for speculative motive acts as a store of value. The cash money held for the precautionary motive makes people away from the speculative motive helps people earn more profits in the future. In the speculative motive the sales and purchases of bonds and the rate of interest are included. There is an inverse relationship between the prices of bonds and the rate of interest. Or if the price of bonds raises the rate of interest falls and if the rate of interest raises the price of bonds falls. People hold cash money with them to earn more profits in future through the changes in the prices of bonds and the rate of interest. If there is a possibility of rising prices of bonds or falling the rate of interest, people prefer to hold less cash with them and they want to invest a higher percentage of their income in bonds. The businessmen purchase bonds at low prices now and sell them at higher prices in the future. The difference between the prices of sales and buys of the bonds becomes the profit of the businessman. Contrary to it, if the prices of bonds are expected to fall and the rate of interest is expected to rise, the businessmen start selling the bonds they possess and they hold much cash balances to earn more profits in the future when the rate of interest is expected still to rise. Thus, there is an inverse but direct relationship between the rate of interest and the cash balances, can earn more profits.

We have explained above the demand for liquidity preferences for transactions motive. According to Prof. Keynes, the rate of interest does not have any influence on the demand for cash balances kept for both these objectives. Therefore, he argues that the demand for such cash balances is interest-inelastic. Both these cash balances remain constant and they can be changed only on the basis of the level of income. Therefore, the demand curve of cash balances for both these objectives slopes upwards being parallel to OY axis.

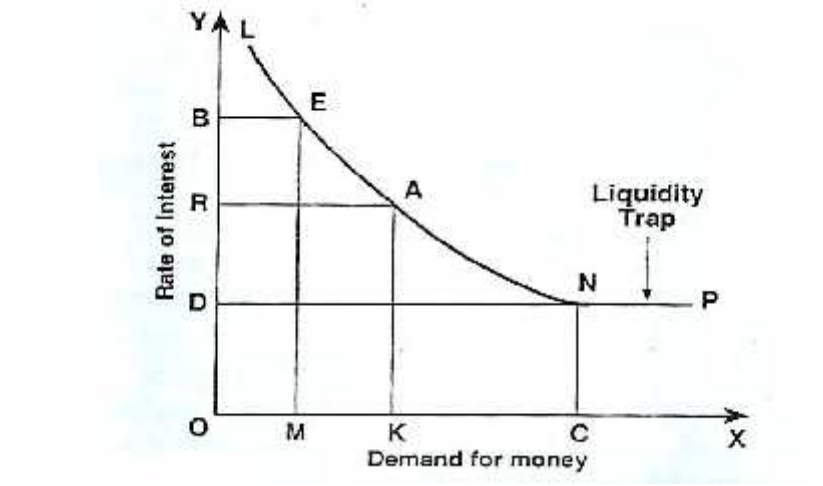
The other side is the portion of income held in the form of cash balances for speculative motive. Due to the reason, the desire for cash balances increases when

the rate of interest falls and the desire for cash balances decreases when the rate of interest rises, this cash balance becomes interest-elastic. Finally, when the rate of interest is minimum, the desire to hold cash balances becomes perfectly elastic and the demand curve of the cash balances of this situation (only) becomes horizontal being parallel to OX axis. Before this situation is reached, the cash balances demand curve for speculative motive slopes downwards from left to right. The cash balances demand curve of this situation is presented in figure 2.2

In the figure, OX axis measures the speculative demand for money and OY axis measures the rate of interest. LP is a liquidity preference curve. According to Prof. Keynes, of the cash balances held for three different motives, the cash balances for transactions and for precautionary motives are more active and the cash balance for the speculative motives is passive and this cash balance for speculative motive plays an important role in determining the rate of interest. In this figure, the liquidity preference demand curve (LP) slopes downwards from left to right, from L to N. It is clear from this that the demand for liquid money is less when the rate of interest is high and the demand for liquid money is more when the rate of interest is low.

Figure 2.2

Liquidity Preference Curve



For example, when the rate of interest is OB, the demand for liquid money is OM and when the rate of interest is OR the demand for liquid money is OK and in this way, when the rate of interest is OD the demand for liquid money is OC. Till the rate of interest reaches OD the demand for liquid money is already perfectly elastic. So, after the point N, the curve becomes horizontal and proceeds up. The economists have called the Liquidity trap to the portion of the curve after the point N. The people's demand for liquid money is influenced much more by the future expectations of the rate of interest than by the current rate of interest.

Supply Side

The total supply of money is composed of the total coins, total notes (paper money) and the total bank money available in a country. In fact there is a special difference between the supply of goods and the supply of money. The supply of goods refers to a production and a continuous consumption of it. Therefore, the supply of goods is a flow. But the Central Bank makes the supply of money under the laws and regulations of the government of a country. This supply of money is a

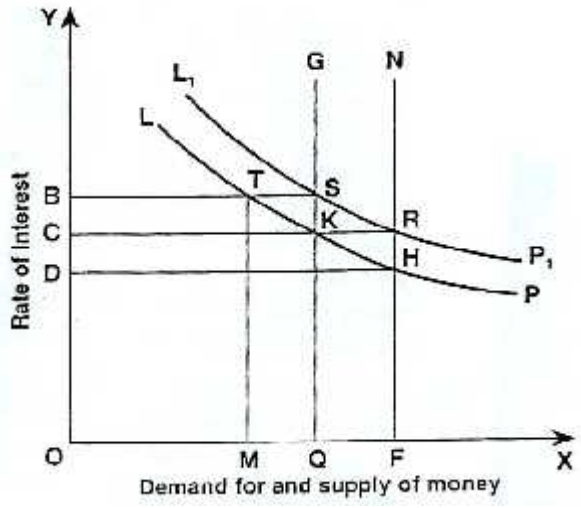
stock. Therefore, Prof. Keynes has considered the supply of money as constant and the supply curve of money is a vertical straight line. A change in the rate of interest does not have any influences the rate of interest and it also directly influences the liquidity preference of the people through changes in the rate of interest. The more the supply of money is, the lower the rate of interest becomes and the less the supply of money is, the higher the rate of interest becomes. But if both the supply of and the demand for money have been increased simultaneously, there will be no increase in the rate of interest. For the supply of money, if the monetary authority of the Central Bank increased the supply of money any time the supply curve of money shifts to the right than the previous one.

Determination of the Rate of Interest

According to Prof. Keynes the rate of interest is determined by the interaction of the total demand for liquid money and the total supply of money. The total demand for liquid money includes the demand for liquid money for transactions, precautionary and speculative motives. Prof. Keynes has given the name M_1 to the demand for cash balances for the first and the second motives and M_2 to the demand for cash balances for the third motive. M_1 completely depends upon the level of income and M_2 completely depends upon the rate of interest. The total of M_1 and M_2 to the total demand for money of a country and Keynes has named as M. This total demand for money (M) is interest-elastic or a change in the rate of interest influences it. On the other hand, the total supply of money depends upon the rules and regulations of the government of the Central Bank of the country. The total supply of money is interest inelastic or a change in the rate of interest does not influence it any more. The rate of interest is determined at a point where the liquid money demand curve (Liquidity preference curve) and the money supply curve meet each other. The process of the determination of the rate of interest is presented in figure 2.3.

Figure 2.3

Liquidity Preference Curve



In the figure, LP curve represents the total demand for cash balances. This LP curve slopes downwards from left to right fort the demand for the cash balances is interest-elastic. QG curve represents the total supply of money and this curve goes upwards straight being parallel to OY axis because the total supply of money is controlled by the government or the Central Bank. OX axis measures the total demand for and the total supply of money and OY axis measures the rate of interest. At the outset, OC rate of interest is determined because here the demand for money and the supply of money are equal at point K or OC is the equilibrium rate of interest. In this situation both the demand for and the supply of money are equal to OQ. Now, let us suppose that by any reason the Central Bank increased the supply of money and the supply curve shifts to the right from QG to FN, but the demand curve of cash balances (LP) is the same. In this situation, the equilibrium rate of interest becomes OD because the constant cash balance demand curve LP and the new supply curve FN meet at the point H. increased, the rate of interest falls. On the other hand when the demand for money is constant and the supply of money decreases to OM, then the demand for and supply of

money become equal at point T and the equilibrium rate of interest is determined equal to OB, On the contrary, even when the supply of money is constant and the demand for cash balances changes, the rate of interest also changes. It happens when the level of income changes or there is an expectation of a change in the rate of interest in the future. If the demand for cash balances increases, the LP curve shifts upwards to the right and if the demand for cash balances decreases, the LP curve shifts downwards to the left and on this ground the equilibrium rate of interest is determined. For example, if the demand fro cash balances increases and its curve shifts from LP toL_1P_1, the new equilibrium rate of interest reaches from OC to OB. Thus, on the one hand, the demand fro cash balances influences the rate of interest, on the other hand, also the rate of interest influences the demand for cash balances. Prof. Keynes has assumed M_1 (the demand for cash balances for the transactions and the precautionary motives) constant and M_2 (the demand for cash balances for speculative motive) variable. Therefore, when we talk about the changes in the demand for cash balances, it indicates only M_2.

Whatever might have been told above, if the Central Bank changes the supply of money in the same proportion as there is a change in the demand fro cash balances of the people or if there is a change in the demand for cash balances of the people in the same proportion as there is a change in the supply of money, the rate of interest remains constant.

According to Prof. Keynes, the supply of money refers to the total of money people hold or desire with them. The rate of interest is determined by the interaction of this supply of money and the demand for cash balances. Therefore, according to Keynes, the rate of interest is not the result of savings, thrift, abstinence, etc. rather it is the result of parting with liquid money. The rate of interest may be equal to the marginal revenue productivity of capital but the marginal revenue productivity of capital cannot determine the rate of interest. In

the same way, according to Keynes, it is not the rate of interest but a change in the level of income which brings equality between the saving and the investment. Thus, Prof. Keynes has explained the determination of the rate of interest on the basis of the purely monetary activities (pure demand for and supply of money). Therefore, this theory is also called the monetary theory of interest.

Criticisms

Prof. Keynes propounded his theory of interest criticizing the classical and the neo-classical theories of interest. He has presented his new concept to interest in his famous book "The General Theory of Employment, Interest and Money." In fact, the Keynesian theory of interest is an original theory and it becomes successful to provide a new contribution to the economic world. By leaving aside both the purely real phenomenon of the classical theory Prof. Keynes has attempted to explain the determination of the rate of interest only on the ground of purely monetary phenomenon. Thus, although the Keynesian theory of interest is an original theory, different economists have criticized this theory on various grounds.

Prof. Keynes has expressed in his theory that money is demanded due to the preferences of liquidity for speculative purpose. In the same way, he has also expressed that money is supplied by the Central Bank or other monetary units of a country. He opines that the supply of money is independent of the rate of interest and the government, the Central Bank and the monetary authorities have control over it. Therefore, the supply of money is considered as constant and the supply curve of money is a vertical straight line being parallel to OY axis. Prof. J.R. Hicks has severely criticized this statement. According to Prof. Hicks also, the supply of money is influenced by the rate of interest or the supply of money may not remain independent of a change in the rate of interest. But because Prof. Keynes has assumed the supply of money as fixed and has laid a great emphasis

only on the demand for liquid money, the Keynesian theory to the determination of the rate of interest is considered as one sided theory.

According to the classical theory of interest, the rate of interest is completely determined by the real factors like savings, investment, etc. Prof. Keynes criticized the classical theory on this very ground and propounded a theory which tells us that the rate of interest is determined by the purely monetary factors like the demand for and the supply of money. But because the demand for cash balances depends upon the productivity of capital, investment, the propensities to save and consume, etc, in reality, the determination of the rate of interest may not be separated from the real factors. In this context, the words of the Swedish economist Prof. Knut Whicksell are worth mentioning. He says that any theory which does not include the monetary and the real factors in relation to the determination of the rate of interest may not be considered as a complete theory. Therefore, the Keynesian theory while being a purely monetary theory cannot explain the determination of the rate of interest.

All the economic theories of Prof. Keynes are based on the short-run explanations. Therefore, also this theory of Keynes explains only how the rate of interest is determined in the short-run. This theory is unable to mention how the rate of interest is determined in the long-run.

The Keynesian theory is not considered successful even in explaining the determination of the rate of interest on the short-run because, according to this theory, the rate of interest should be higher due to the higher liquidity preferences at times of depression. But in reality, the rate of interest is very low at times of depression. In the same way, the liquidity preference of the people is very low at times of boom. Therefore, according to Keynes, the rate of interest should be low at such times. But the reality is just reverse to it. Due to, at times of boom although

the liquidity preference is low, the rate of interest is rising due to industrial progresses. Therefore, the Keynesian theory of the determination of the rate of interest is considered completely wrong in the context of depression and boom.

According to Prof. Keynes, interest is reward for parting with liquidity, not the return for saving and waiting (abstinence). But Keynes could not remember that savings and waiting (abstinence) are the compulsory factors for getting loanable funds. According to Prof. Jacob Viner, there is no possibility of parting with liquidity without savings and the rate of interest is the reward for savings without the parting with liquidity.

Prof. Keynes has stressed that the people demand for cash balances due to changes in the price of bonds and the rate of interest. But people get both the interest and the cash balances by depositing their funds in the savings and current accounts in the banks and by investing their funds in the short-run treasury bills. In such situations, the Keynesian concept of holding cash balances for speculative motives may disappear and it makes the Keynesian theory controversial.

Prof. Keynes has criticized the classical and the neo-classical theories as indeterminate. According to Keynes, the rate of interest is determined by the demand for cash balances and the supply of money. But the Keynesian theory itself is indeterminate because the demand for cash balances depends up-on the level of income and the level of income upon the rate of interest. Because, unless we know the rate of interest, we may not know the level of income and unless we know the level of income we may not know the amount of demand for cash balances. Therefore, also the Keynesian theory of interest is uncertain and indeterminate as the classical and the neo-classical theories are.

According to some critics, people demand for cash balances due to other different objectives apart form the three motives presented by Keynes. But they argue, the interest is not received for parting with these cash balances (liquidity). They again opine that the interest is received for the productivity of capital.

In this way, different economists have criticized the Keynesian theory of the rate of interest on various grounds. Even then, the importance of liquidity preference presented by Keynes should be considered correct and this is his originality, too. Although the liquidity preference is glimpsed through the explanation of hoarding and dishoarding in the neo-classical theory, too, this neo-classical theory is unsuccessful to explain it in details.

2.5.4 The Modern Theory of Interest

All the theories of the rate of interest appeared till today are uncertain and indeterminate. For example, the classical theory has laid a great emphasis on the role of real factors in determining the rate of interest. The Loanable Funds Theory has included both the real and the monetary factors in this work, but it has not been succeeded in it. In the same way, Prof. Keynes has laid a special emphasis only on the monetary factors. Thus, not any theory has been able to present a satisfactory explanation in relation to the determination of the rate of interest. Therefore, Prof. Hicks and Hansen have propounded a separate theory about it. This theory is called the Modern Theory of Interest. This theory is also called the Determinate Theory of Interest. Profs. Hicks and Hansen have opined that there is only a difference in the concept of savings between the classical and the Loanable Funds Theories and in all other things they are same. Therefore, these economists have attempted to mix from the one side the classical and the neo- classical theories and from the other side the Keynesian theory of interest in their modern theory of interest. Or in this Modern Theory attempts have been made to mix both the real and the monetary factors. In fact, in the determination of wages, both the

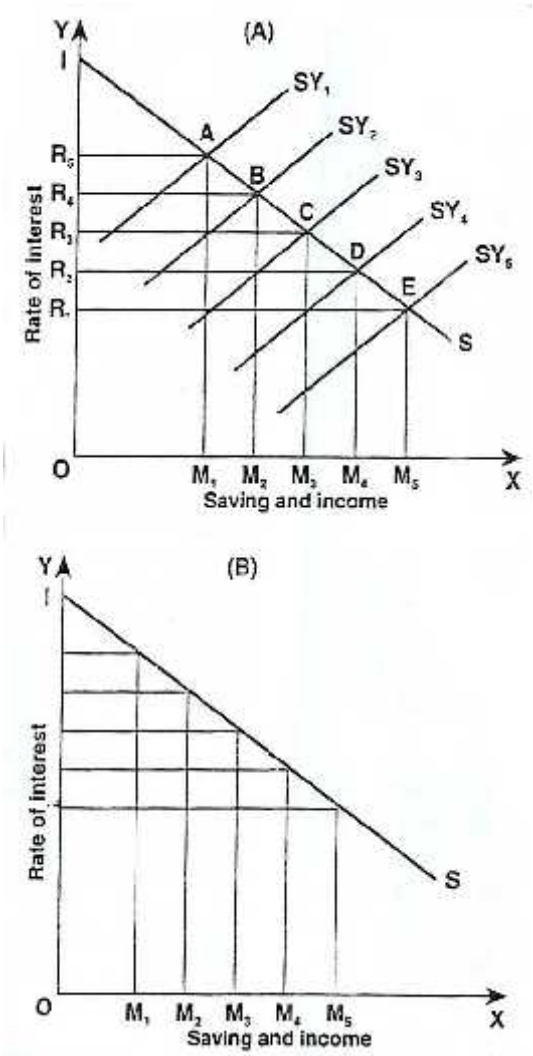
real factors of the classical theory and the monetary factors of the Keynesian theory are logical. Therefore, these modern economists have presented a satisfactory explanation of the determination of the rate of interest by mixing both these factors. According to this modern theory, (i) Saving Function, (ii) Investment Function, (iii) Liquidity Preference Function and (iv) Supply Function are included in the determination of the rate of interest. The theory may be brought into a complete form also by including the level of income in these four factors. To present a combination of these different factors, Prof, Hicks has constructed an IS curve. This IS curve states a situation of an equilibrium established in the real sector. On the other hand, Prof, Hansen ahs constructed an LM curve to present the same combination. This LM curve expresses a situation of an equilibrium established in the monetary sector. According to the modern theory of the rate of interest, the rate of interest is determined at a point where these two curves intersect each other. Now, let us explain the construction of the IS and LM curves in short.

Construction of IS Curve

In a society, there are people of various income levels. The amount of savings is as much higher as the level of income is. The rate of interest is as much lower as amount of savings is high. On this ground, Loanable Funds Theory has presented us a group of loanable funds in different income levels. This group of loanable funds amalgamating with the investment curve makes available to us a new curve which is called a Hicksian IS curve. The construction of an IS curve is presented in figure 2.4(A) (B)**.**

Figure 2.4

(A)(B) IS Curve



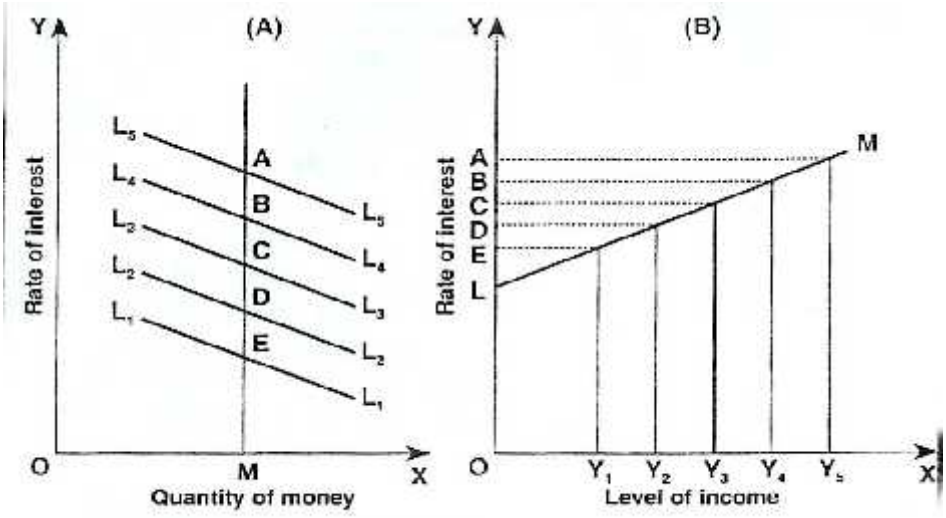
Construction of LM Curve

The liquidity preference of the people is different at the different levels of income. When the level of income increases, the liquidity preference of the people also increases and it causes an increase in the rate of interest. On this ground, the Liquidity preference Theory of Prof. Keynes provides us a group of liquidity preference curves. This group of the liquidity preference curves, along with the

supply curve of money, provides us a new curve to which Prof. Hansen has named as LM curve. The supply curve of money is supposed to be constant because the supply of money is conducted by the Central Bank or the monetary authority of a country. This LM curve maintains a spate of equilibrium between the supplies of money received from various levels of income and the demand for the cash balances of the people and shows the rate of interest determined on this ground.

Figure 2.5

LM Curve



In figure 2.5(A) and 2.5 (B) a construction of LM curve is presented. In the figure, MP is the supply curve of money which is constant at the OM quantity of money. L_1, L2, L3, L4, and L_5 represent the demand for money at various levels of income respectively. A, B, C, D and E are the equilibrium points of the demand of and the supply of money. If we draw straight lines from each point to reach the OY axis, we may clearly see the determination of the rate of interest by equilibrating the demand for and the supply of money at different levels of income. Thus, if we join the points of the rats of interest determined at various levels of income by

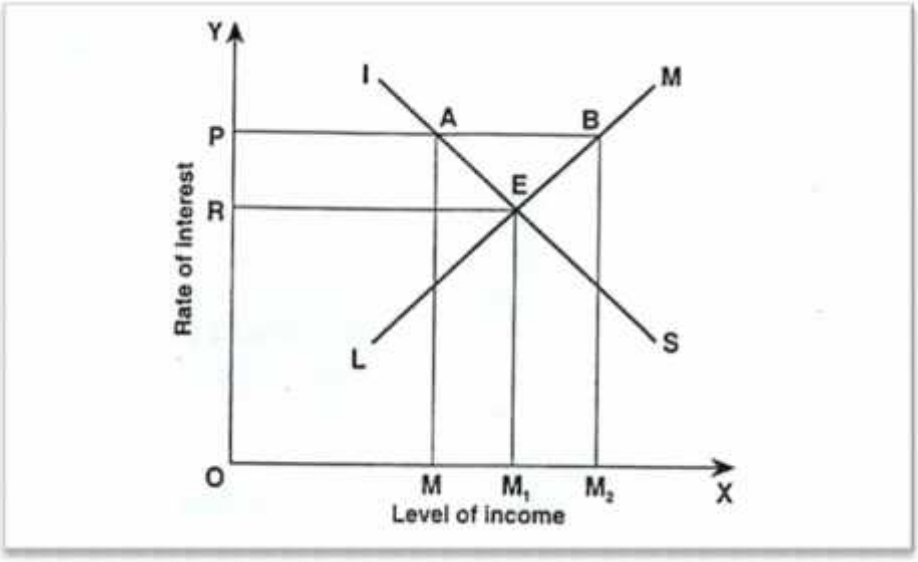
equilibrating the demand for cash balances and the supply of money, a new curve is constructed and this curve is called the Hansen's LM curve.

Determination of the Rate of Interest

We have already presented a process of construction of IS curve. The IS curve is a joint curve of savings and investment. Or at this IS cure the investment and the savings have reached a state of equilibrium. According to the classical economists, the rate of interest is determined at the state of equilibrium of these investments and savings (real factors). On the other hand, we have also presented above the process of construction of LM curve. This LM curve is a joint curve of the demand for cash balances and the supply of money. Or at this LM curve, the demand for cash balances and the supply of money have reached a state of equilibrium. According to Prof. Keynes, the rate of interest is determined at the state of equilibrium of this demand for cash balances and the supply of money (monetary factors). But both these processes of the determination of the rate of interest are one sided and according to Profs. Hicks and Hansen, the rate of interest is determined only by the interaction of these two processes.

Figure 2.6

IS &LM Joint Curve



In this figure 2.6, OX axis measures the level of income and OY axis the rate of interest. IS curve is sloping downwards from left to right. LM curve is sloping upwards from left to right. These two curves meet at point E. So OR (EM_1) rate of interest is determined. Apart from this, the point of equilibrium also shows that the level of income is determined at OM. Thus, the modern theory of the determination of the rate of interest explains the determination of the rate of interest together with the determination of the level of income.

Thus, the modern theory has included all the factors like the desire to save (propensity to save), supply of money, investment, liquidity preference, etc. in the process of the interest rate determination and it also explains how a change in any factor among them affects the rate of interest and the level of income. Besides, the theory also explains how the government of a country influences the supply of money (LM curve) by changing her monetary policy and how the government influences the savings and the investment (IS curve) by changing the public expenditures.

Criticisms

The economists like Hicks and Hansen have provided a new contribution to the economic world by propounding the modern theory of the rate of interest. This theory is also successful in coordinating fiscal and monetary policies or the income determination and the monetary theories by integrating the classical and the Keynesian theories of interest. Even then, there are some weaknesses of this theory.

- First of all, the theory of the determination of the rate of interest of Hicks and Hansen is based on the assumption that the rate of interest is perfectly variable. But the rate of interest is not always perfectly variable in practice. The Central Bank of a country can adopt a policy to control the rate of

interest. This theory may not be applied if the rate of interest is not completely variable.

- This theory is based on the assumption that the investment is interest-elastic. But it may not be said that the investment is always interest, elastic. This theory does not apply if the investment is interest inelastic any time.
- According to Prof. Don Patinkin and Prof. Milton Friedman, this theory is very much artificial and very much simples as well. According to them, to divide the economy into real and monetary sectors is itself an artificial and unreal. In fact, both these sectors are tied up together and they act and react to each other.
- According to Prof. Don Patinkin, the factors like supply of money, savings, propensities to consume, investment, liquidity preference, etc. do not only influence the rate of interest and the level of income but they also influence the prices of the goods and services. The theory of 'determination of rate of interest' of Profs. Hicks and Hansen has not mentioned anything about it.

2.6. Review of Related Studies

2.6.1 Review from International Articles

Determinants of the term structure of interest rates – approaches to combining arbitrage free models and monetary macroeconomics (2006).

The Deutsche Bundes Bank presents article monthly report, April 15, 2006 about determinants of interest rate. The term structure of interest rates represents the relationship between the maturities and the yields of bonds. While short-term interest rates are influenced crucially by monetary policy, longer-term interest rates mainly reflect market players' expectations of future macroeconomic developments. Interest rates of different maturities do not move independently of each other, however. Rather, they are linked by the condition of absence of arbitrage, which means that the term structure must not allow any trading strategy

which permits risk-free investment profits from investment in bonds of differing maturities. Modern term structure models link this key concept from the finance literature to explanatory approaches from macroeconomics. This article presents the basic idea of such combined modeling using the German term structure as an illustration. It identifies How the term structure reacts to inflationary and business cycle movements and calculates the level of the risk premiums contained in bond yields. Basic concepts and shape of the term structure over time the nominal term structure reflects the relationship between the maturity of a bond.

The Corresponding Rate of Interest

The Deutsche Bundes Bank published the Monthly Report 16April, 2006 about the corresponding rate of interest as follows:

The securities issued by the Federal Government have maturities at issue ranging from six months to over 30 years. The term structure of Federal bonds is calculated and published by the Bundes bank on a daily basis.

At the beginning of April this year, the German term structure, as calculated by the Bundes bank, was somewhat flatter than its long-term average. The spread between the yields for ten-year and one-year bonds was somewhat more than 0.9 percentage point; on a 30-year long-term average, the spread between the long and short ends of the bond market amounted to 1.26 percentage points.

Accordingly, the mean term structure, i.e. the average of the yield curves over a period of several years, slopes upward. Besides this “normal” shape, which implies an annual yield that increases with the time to maturity of the bonds, the curve may occasionally be inverted. This means that a lower annual yield prevails for longer maturities than for shorter ones; the spread between one-year and ten-year bonds becomes negative. For example, the monetary policy tightening that

began in1979 resulted in short-term interest rates rising to record levels, while the longer-term yields in the capital market did not entirely keep pace: the market players assumed that the increase in short term rates would be temporary, with rates going back down in the longer term. In line with this, an inverted yield curve could be observed beginning in September 1979. With the decline in interest rates that began in autumn 1981, the interest rate differential gradually returned to “normal" again; from August 1982, the slope of the Yield curve was positive. There were similar periods of high short-term interest rates from May 1989 to March 1990, and from November- Current as at 7 April 2006 % Time to maturity in years0 1 2 3 4 5 6 7 8 9 10 Term structure of German bond market interest rates ***** For maturities of one, three and six months: money market rates reported by Frankfurt banks. For maturities of one to ten years: interest rates for (hypothetical) zero-coupon bonds (Svensson Method), based on listed Federal securities. Deutsche Bundes Bank 4.0 3.8 3.6 3.4 3.2 3.0 2.8 2.6. In this context, the term structure typically represents the yields of zero-coupon bonds. Such bonds are characterized by the fact that, while no payments are incurred until their maturity, their purchase price is lower than the fixed amount to be paid back. The yield associated with such a bond corresponds to its return, ie. the constant annual rate of growth by which the invested capital finally increases up to the amount to be paid out. Unlike zero-coupon bonds, most traded bonds are characterized by the fact that payments (coupons) are paid to the creditor during the life of the bond at pre-determined dates. Nevertheless, in principle, any coupon bond may be expressed as a portfolio of zero-coupon bonds. This means that the price of every coupon bond can be calculated from the term structure of zero-coupon bonds.2 Using a numerical procedure, the yields on “artificial" zero-coupon bonds are calculated for fixed times to maturity from the bonds traded on the market. A detailed account of the estimation technique and the data used may be found in Deutsche Bundes bank, estimating the term structure of interest rates, Monthly Report, October1997, pp 61-66.3 The average was calculated from the month-end

levels From January 1976 to March 2006 term structure based on Federal Government issues Shape of the term structure over time.

Approaches to explaining the shape and dynamics of the Term Structure of Interest Rate

The Deutsche Bundes Bank Presented the Monthly Report April 17, 2006 about approaches to explaining the safe and dynamics of the term structure of interest rate. The determinants of interest rates of differing maturities and their behavior over time are of great interest to financial markets and central banks. For monetary policy, the term structure is of importance in two respects. First, it contains information not only on market expectations of future interest rate movements but also of future developments in inflation and the business cycle. Second, the relationship between short-term and long-term interest rates is relevant to the monetary policy transmission mechanism; although monetary policy has a crucial impact on the short end of the term structure, it is mainly longer-term interest rates which influence decisions on investment, the acquisition of consumer durables or, say, Purchasing owner-occupied housing. The expectations hypothesis is one of the oldest and most prominent approaches to explaining the relationship between interest rates of differing maturities. In its pure form, his hypothesis states that, in equilibrium, investment in a long-term bond is equivalent to the expected return on successive short-term investments. The review of literature presented in this thesis. Book study, thesis, articles, and journals help to analysis of the subject matte

2.6.2 Review from Thesis

Khatri Chettri (1980**)** study on a Thesis, "*Interest Rate Structure and its Relation with Deposit, Inflation and Credits in Nepal-1980".* The main objectives of this thesis as follows:

- To present a concrete picture of the interest Rate and other economic variable like deposit, inflation and credit flow in Nepal.

- To Analyze the impact and implementation 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, Chhettri 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.

Similarly, he found that rate of interest is directly affected by the rate of inflation. For loan rate of interest and loan amount, loan rate of interest also affects the credit flows.

Finally, he found that the institutional interest rate is the important explanatory variable to influence the volume of deposit in Nepal.

Bhatta (2005) study on a Thesis, *"Interest Rate and its effect on Deposit and Lending"*. The major finding of this thesis as follows:

- Deposit Rate 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 decrease trend, means that every year lending rates of sample banks under study have decreased.
- Analysis shows that interest rates on lending are for higher than deposit rates of sample banks.
- Bhatt is going to find out the deposit rate and lending rate.

Pokhrel (2006) study on a Thesis, "*Determinants of Interest Rate in Nepalese Financial Market".* The main objectives of this thesis as follows:

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

Pokharel is going to find out determination of interest rate in Nepalese Financial Markets, banks, finance etc. he is going to find out the objectives by qualitative method and quantitative method. He found that the correlation confection between interest rate on deposit and amount of deposit highly negative.

- Lending rate and lending amount co-relation coefficient to be found negative.
- Interest rate on deposit and inflation rat e is little positive.
- The relationship of interest rate on lending with risk free rate is both positive and negative.

Shrestha (2008) on the "*The Interest Rate Structure and Its Influence on Deposit and Lending of Joint Venture Banks in Nepal"* concludes:

- The interest rate on both deposit and lending of all sample banks are in decreasing trend.
- The saving deposit amount and saving interest rate have negative relationship.
- Fixed deposit amount and fixed interest rate shows negative relationship.
- One of variables that affect the demand of fund (lending activity) is lending interest rate.

- Interest rate on deposit does not attract the depositors; as every year deposit rate of sample, banks are seen deceasing. So it nay also be concluded that commercial banks are not conceived in collecting deposit as interest rate on deposit is too less.
- Lending rate of sample banks can be concluded that interest rate on lending attract borrowers investors as lending rate of sample banks have decreased every year to provide better opportunities for the borrowers investors.

Pathak (2010) study on a Thesis, "*The Interest Rate Structure and Its Influence on Deposit and Lending of Commercial Banks in Nepal"*. The objectives of this thesis are as follows:

- To analyze the interest rate structure of commercial banks.
- To study the influence (i.e. relationship) of interest rate to deposit amount in Nepalese commercial banks.
- To explore the sensitivity of interest rate to the lending amount.
- To examine the position of interest rate spread and loan and advance ratio of commercial banks.

The major findings of this thesis are as follows:

- According to the substitution theory there should be strong relationship between the deposit amounts and deposit interest rate.
- According to theory, lending interest rate and lending amount should have inverse relationship.
- According to interest rates spread, loan and advance ratios, generally interest rate spread shows how greater rate charged by bank for lending than deposit rate and greater loan and advance to total deposit ratio implies the better utilization of total deposit.

CHAPTER - III

RESEARCH METHODOLOGY

A research methodology helps to solve the research problem in a systemic way. This chapter has been designed and developed as a guideline or a plan for the achievement of objectives set and developed for the purpose of this study in the first chapter. Reliability and validity of research work is to facilitate by research methodology and the basic objective of this chapter is to guide chapter four for data presentation, descriptive and empirical analysis of interest rate and its effect on deposits and lending. So, suitable research methodology as demanded by the study has been followed. It is intended to use simple and lucid research methodology.

3.1 Research Design

Research design is a plan, structure and strategy of investigation. It is a blue print for the collection, measurement and analysis of data. Research design is the arrangement of conditions and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. This is an ex-post fact or historical research design. Research design is more analytical and less descriptive. The relevant and needed data has been collected from various publications of various commercial banks and publication of Nepal Rastra Bank (Wolf and Pant, 2005:92).

3.2 Population and Sample

The "population" or universe for research means all the members of research study in which the research is based. Here the population or universe of the study comprises of all 18 commercial banks of Nepal. And the study of only 6 banks is

taken as sample. From population, here the simplest method of sampling that is simple random sampling method is used. The sample banks are

1. Standard Chartered Bank
2. NABIL Bank Limited
3. Nepal Investment Bank
4. Bank of Katmandu Limited
5. Himalayan Bank Limited
6. SBI Bank Limited.

3.3 Data/Information Collection Procedure

Basically this study is based on published sources of information. Thus, this study is based on secondary source of data to fulfill above-mentioned objectives. The secondary data are collected from various publications of commercial banks. Nepal Rastra bank, and even from websites of various banks. The primary data has been used in this study as the primary information regarding this study through the SPSS data processing.

3.4 Data Processing and Analysis Techniques

Data obtained from various sources cannot be directly used in their original form. When data will not be presented in understandable and easier way there would be no use of conducting data research study or analysis of data. Analysis part would be difficult without processing data, even difficult to understand to the readers. So, to make the study understandable at the first sight data should be processed.

Presentation of data means to keep raw data into understandable form by editing, rechecking and using various tools such as tables, charts, figures and trend lines. In this study also data are presented using all the above-mentioned tools so as to make understand the analysis part in proper and easier way. Homogeneous data have been sorted in one table and similarly various tables have been prepared to

keep required data. Using financial and statistical tools, the data have been analyzed and interpreted.

3.5 Tools for Data Analysis

As this study required more statistical tools rather than financial tools to attain the objectives set above various statistical tools have been used which as follows:

Arithmetic Mean

Arithmetic mean of a given set of observations is their sum divided by the number of observations. In such a case all the items are equally important. Simple arithmetic mean is used in this study as per the necessity for analysis.

$$\text{Mean } (\bar{X}) = \frac{\sum X}{N}$$

Where,

$\sum X$= sum of all values of the variable "X"

N= number of observations

X= variables involved

Standard Deviation

The standard deviation usually denoted by the letter sigma (ō). Karl Pearson suffused it as a widely used measure of desperation and is defined as the positive square root of the arithmetic mean of the squares of the deviation of the give observations from their arithmetic mean of a set of value. It is also known as root mean square deviation. Standard deviation, in this study, has been used to measure the degree of fluctuation of interest rate and that of other variables as per the necessity of the analysis.

$$\text{Standard Deviation } (\pm) = \frac{\sum f(X - \bar{X})^2}{N}$$

The greater the standard deviation the greater will be the magnitude of the deviation of the values from mean vice versa.

Coefficient of Correlation

Correlation is a statistical tool, which studies the relationship between two variables, and correlation analysis involves methods techniques used for studying and measuring the extent of the relationship between the two variables. Two or more variables are said to be correlated if change in the value of one variable appears to be related or linked with the change in the other variables. When the relationship is of a quantitative nature, the appropriate statistical tool for discovering and the relationship and expressing it in a brief formula is correlation analysis (Gupta, 2002: 49).

Correlation coefficient (r) = $$\frac{n\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - (\sum X)^2}\sqrt{n\sum Y^2 - (\sum Y)^2}}$$

Correlation may be positive or negative and ranges from -1 to +1. When r = +1, there is 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. Simple correlation between interest rate and deposit, between interest rate, inflation rate and deposit rate and lending is examined in this study.

Coefficient of Determination (r^2)

The square of simple correlation co-efficient is called co-efficient of determination. It measures the percentage of total variation in dependent variable explained by independent variable.

Similarly multiple correlation coefficients between above mentioned variables also have been determined once assuming interest rate on deposit as dependent variable and other two variables (deposit amount and lending rate) as independent and then assuming interest rate on lending as dependent variable and other two variables (lending amount and deposit rate) as independent.

Where,
X and Y = two variables, correlation between which is calculated
n = total number of observations

The multiple correlation is used for the measure of degree of association between one variable and 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.

Multiple Correlation Coefficient; variable one as dependent and variables two and three is independent.

$$(R_{1.23}) = \frac{r_{12}^2 \Gamma r_{13}^2 Z 2 r_{12} r_{13} r_{23}}{1 Z r_{23}^2}$$

Where,

r_{12} = correlation coefficient between variable one and two

r_{13} = correlation coefficient between variable one and three

r_{23} = correlation coefficient between variable two and three

Coefficient of Multiple Determinations

The Square of multiple correlation coefficients is called coefficient of multiple determination and it is very useful in interpreting the value of multiple correlation coefficient. The main significance of the multiple determinations is to represent the proportion of total variations in the dependent variable, which is explained, by

the variations in the two independent variables. Co-efficient of multiple determination measures the percentage of total variation in dependent variable. The significance of it is to represent the proportion of total variations in the dependent variable which is explained by the independent variables.

Coefficient of Multiple Determination = $R_{1.23}^2$

T-test for Significance of Correlation Coefficient

T-distribution is commonly called student's t-distribution and is used when the sample size is less than 30, given a random sample from a bi variate normal population. When hypothesis is tested that the correlation coefficient of the population is zero, i.e. the variables in population are uncorrelated, the following t-test is applied; which is applied in this study.

$$t = \frac{r}{\sqrt{1 - r^2}} \left| \sqrt{n\ Z2} \right| t_{nZ2}$$

Here, 't' follows t-distribution with (n-2) degree of freedom (d.f.), 'n' being the number of sample.

If the calculated value of 't' exceeds $t_{0.05}$ for (n-2) d.f.; we say that the values of 'r' is significant at 5% level. If 't' $< t_{0.05}$ the data are consistent with the hypothesis of an uncorrelated population.

3.6 Variables

Variables are the characteristics of persons, things, groups', programme etc. A variable is thus a symbol to which numerals or values are assigned. Deposit rate, lending rate, deposit amount, lending amount, inflation etc are variables of this study.

CHAPTER – IV

PRESENTATION AND ANALYSIS OF DATA

In this section we analyze about presented data. This chapter includes details of interpretation of data relating to data.

Presentation and analysis of data is the major part of this research study. Using the various financial variables and statistical tools discussed in 'Research Methodology', we analyze the data to achieve our objective of the study.

Presentation and Analysis of Secondary Data

All the secondary data are published in books, journals and reports. These data are presented for analysis to fulfillment of objective.

4.1 Analysis of Trend and Relationship of Deposit, Lending and Various Rates

Trend Analysis

In this thesis there is presentation of the data of different sample banks about interest rates. The trend analyzes interest rate on deposit, interest rate in lending, inflation rate and risk free rate. The figure shows the results combination of various rates.

Correlation Analysis

Correlations analysis represents the statistical technique for identifying the degree of relationship between two variables. It is the tool generally used to analyze the nature and degree to which one variable is related to another. Karl Pearson's coefficient of correlation is a widely accepted method for the correlation analysis that finds the coefficient of correlation.

4.1.1 Standard Chartered Bank Nepal Limited

The following table 4.1 presents the different information of standard chartered bank related to yearly deposit amount, loan amount, interest rate on deposit and lending, inflation rate and risk free rate.

Table 4.1

Position of Deposit Amount Rate, Lending Amount Rate, Inflation and Risk Free Rate of SCBNL

(Rs in Million)

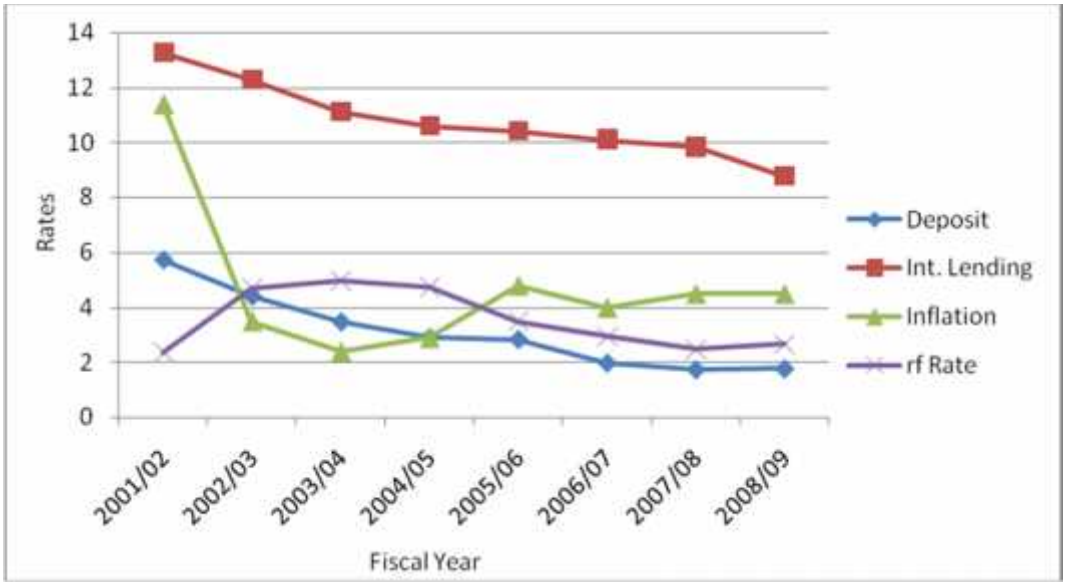
Fiscal Year	Deposit (a)	Int. Dep. (b)	Loan Amt. (c)	Int. Lending (d)	Inflation (e)	rf Rate (F)
2001/02	11160.8	5.71	4693.10	13.28	11.40	2.33
2002/03	12566.4	4.39	4957.50	12.30	3.50	4.66
2003/04	15430.1	3.46	5924.10	11.12	2.40	4.96
2004/05	15835.7	2.89	5787.90	10.61	2.90	4.71
2005/06	18755.5	2.82	6080.70	10.41	4.80	3.48
2006/07	21161.4	1.96	6729.60	10.11	4.00	2.93
2007/08	19344	1.72	8214.00	9.84	4.50	2.46
2008/09	23050.5	1.75	8905.00	8.78	4.50	2.64

Source: Banking and financial statistics 2001-2008

Table 4.1 presents the details for calculation various information. It helps to identify the trend of deposit, lending interest rate and other factors .the main objectives of this table is also to identify the relationship between different rate through the calculation of correlation.

Figure 4.1

Trend of Interest Rate Deposit and Lending, Inflation Rate and Risk Free Rate of SCBNL



Source: Table 4.1

The figure 4.1 shows the relationship between rates of Standard Chartered Bank deposit rate, lending rate, inflation rate and risk-free rate. The figure show the trend of rates every year interest on deposit and lending rate decrease continuously and inflation rate and risk free rate shows up and down in different years.

Table 4.2

Correlation between Different Components of SCBNL

Variables	Coefficient of Correlation	Coefficient of Determination	t-statistics	Table value	Remarks
Rab	-0.934	0.8723	6.4028	2.44	Significant
Rbd	0.968	0.9370	9.45	2.44	Significant
Rcd	-0.904	0.8172	5.1795	2.44	Significant
Rbe	0.609	0.3708	1.88	2.44	Not significant
Rbf	0.183	0.033	0.5091	2.44	Not significant
Rde	0.552	0.304	1.620	2.44	Not significant
Rdf	0.202	0.040	0.5050	2.44	Not significant

Source: Appendix-1

Standard Charted Bank is one of the Joint Venture Commercial Bank in Nepal. We are analyzing about the bank correlation about the activities of deposit and lending rate.

The correlation coefficient between deposits and interest rate on deposit (rab) is -0.934. The coefficient of determination between the interest rate on deposit and two variables r^2 ab 0.8723 .t-statistics for testing significance of correlation is 6.40. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than calculated value. Correlation coefficient is significant.

The correlation coefficient between deposit rate and lending Rate is rbd= 0.962 which is positive. The determination of coefficient between deposit rate and lending rate is r^2bd =0.9370 which is positive t- value for the testing, significance of correlation is 9.45. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than the calculated value correlation coefficient is significant.

The correlation coefficient between loan amount and lending rate is rcd =-0.904 which is negative correlation. The coefficient of determinations between two variable r^2cd =0.8172. t-statistics for testing the significance of correlation is 5.17. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than calculated value correlation coefficient is significant.

The correlation coefficient between deposit rate and inflation rate is rbc = 0.609 is positive correlation. The coefficient of determination between two variables r^2bc is 0.3708, which is positive correlation is 1.88. Since the tabulated rate at 5% level of significance 5 degree of freedom 2.44 is quarter than calculated value correlation coefficient is not sufficient.

The correlation coefficient between deposit rate and risk free rbf = 0.183 is positive. The coefficient is determination (r^2bf) 0.033 positive t-statistics for testing significance of correlation is 0.5091. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is not significance.

The correlation coefficient between lending rate and inflation rate is rdc is 0.552 is positive and determination of correlation coefficient is r^2dc = 0.304 is positive correlation, t- Statistics for testing significance correlation is 1.620. Since the tabulated t-value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is significant.

The correlation between the lending rate and risk free rate rdc 0.202 positive. The determination of correlation coefficient is r^2df = 0.040 t-statistics for testing significance of correlation is 0.5050. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is not significance.

Table 4.3

Multiple Correlation Coefficients and Multiple Determinations

Rb.ad	0.9680	R2b.ad	0.930
Rd.bc	0.9556	R2d.bc	0.9131
Rb.ef	0.9098	R2b.ef	0.827
Rd.ef	0.9165	R2d.ef	0.839

Source: Appendix-1

Table 4.3 explains the combined effect of independent variables at once on dependent variables which has been analyzed through multiple correlations. The coefficient of multiple determinations assuming one factor is dependent and other two are independent. The method use to calculation and measure the variance of variables in percentage.

4.1.2 SBI Bank Ltd.

The following table 4.4 presents the different information of SBI bank related to yearly deposit amount, loan amount interest rate on deposit and lending, inflation rate and risk free rate.

Table 4.4

Position of Deposit Amount Rate, Lending Amount Rate, Inflation and Risk Free Rate of SBI Bank Limited

(Rs in Million)

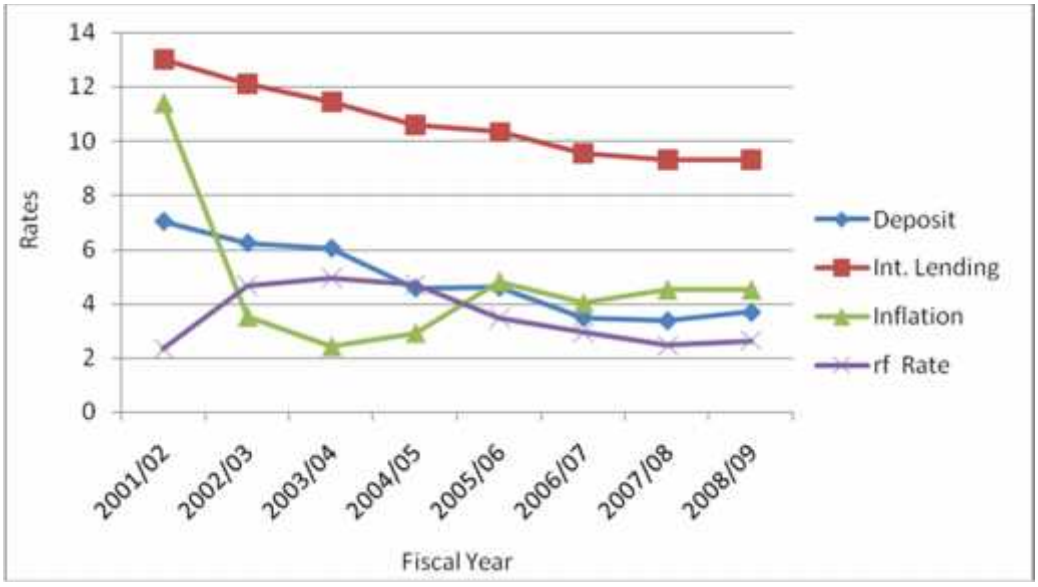
Fiscal Year	Year	Deposit (a)	Int. Dep. (b)	Loan Amt (c)	Int. Lending (d)	Inflation (e)	rf Rate (F)
2001/02	2001	4362.2	7.05	2930.4	13	11.4	2.33
2002/03	2002	4543.2	6.25	3560.1	12.1	3.5	4.66
2003/04	2003	6618.4	6.05	4176.3	11.44	2.4	4.96
2004/05	2004	5572.2	4.571	4593.9	10.6	2.9	4.71
2005/06	2005	6522.8	4.6	4766.1	10.34	4.8	3.48
2006/07	2006	7232.1	3.464	5552.5	9.56	4	2.93
2007/08	2007	8645.8	3.355	6619	9.315	4.5	2.46
2008/09	2008	10852.7	3.67	8060	9.33	4.5	2.64

Source: Banking and financial statistics 2001-2008

Table 4.4 presents the details for calculation various information. It helps to identify the trend of deposit, lending interest rate and other factors. The main objectives of this table is also to identify the relationship between different rate through the calculation of correlation.

Figure 4.2

Trend of Interest Rate on Deposit and Lending, Inflation Rate and Risk Free Rate of SBI Bank Limited



Source: Table 4.4

This figure 4.2 shows the relationship between rates of SBI bank deposit rate, lending rate, inflation rate and risk-free rate. The figure show the trend of rates every year interest on deposit and lending rate decrease continuously and inflation rate and risk free rate shows up and down in different years.

Table 4.5

Correlation between Different Components of SBI Bank

Variables	Coefficient of correlation	Coefficient of determination	t-statistics	Table value	Remarks
Rab	-0.772	0.5959	2.975	2.44	Significant
Rbd	0.987	0.9741	15.022	2.44	Significant
Rcd	-0.898	0.8064	4.9928	2.44	Significant
Rbe	0.442	0.1953	1.2054	2.44	Not significant
Rbf	0.353	0.124	0.9230	2.44	Not significant
Rde	0.503	0.2530	1.4239	2.44	Not significant
Rdf	0.302	0.0912	0.7750	2.44	Not significant

Source: Appendix 1

SBI Bank is the one of commercial bank in Nepal. This Bank permanence is going up good now a day.

The correlation between the deposit amount and interest on deposit (rab) it-0.772Which is negative correlation .The determination of two variables r2 abs o.5959 I positive, t-statistics for testing the significance of correlation is 2.975 since the tabulated t-value at 5% level of significance for degree of freedom 2.44 is less than calculated value correlation is significant.

The correlation between interest on deposit and interest in lending is (rbd) =0.987 which is positive correlation. The determination of correlation on coefficient r^2bd = 0.9741 which is positive t-statistics for testing the significance of significance for 5 degree of freedom 2.44 is less than the calculated value correlation is significant.

The correlation coefficient between the loan amount and interest rate on lending rcd = - 0.898 which is negative correlation on. The coefficient of determination between two variables r^2cd=0.8069 which is positive correlation t-statistics for testing the significance of correlation is 4.99. Since the tabulated value at 5% level of significance for 5 degree of freedom 2.44is less than calculated value correlation coefficient is significant.

The correlation coefficient between to interest rate on deposit and inflation rate is r e= 0.442 which is positive correlation .the confiscate of declination between two variables r^2be=0.1953 which is positive. t-static for testing the significance of correlation is 1.2054. Since the tabulated value of freedom 2.44 is grater than calculated value correlation coefficient is not significant.

The correlation coefficient deposit and risk free rate is r bf =0.353 which is positive correlation the coefficient of determination of two variables r^2 bf=0.124 which is positive correlation t-statistics for testing the significance of correlation is 0.9230. Since the tabulated value at 5%level of significance for 5degree of freedom 2.44is greater than calculated value. Correlation coefficient is not significant.

The correlation coefficient between the interest rate on lending and inflation rate r d e = 0.503 which is positive. The coefficient of determination two variables r^2 d e = 0.2530.which is positive. t- Statistics for testing. The significance of correlation is 1.1239 since the tabulated t-value at 5%level of significance for 5 degree of freedom 2.44 is less than calculated value correlation coefficient is not significant.

The correlation coefficient between .lending rate and risk free rate rdf=0.302 which is positive. The determination of two variables is 0.0912 which is positive t-statics for testing the significance of correlation is 0.7750.since the tabulated value at 5%level of significance for 5 degree of freedom 2.44 is grater that the calculated value . Correlation is significance.

Table 4.6

Multiple Correlation Coefficients and Multiple Determinations of SBI Bank Limited

Rb.ad	0.9917	R2b.ad	0.9834
Rd.bc	0.9917	R2d.bc	0.9834
Rb.ef	0.9474	R2b.ef	0.8974
Rd.ef	0.9299	R2d.ef	0.8648

Source: Appendix 1

Combined effect of independent variables at once on dependent variables has been analyzed through multiple correlations. The coefficient of multiple determinations assuming one factor is dependent and other two are independent. The method use to calculation and measure the variance of variables in percentage.

4.1.3 Nepal Investment Bank

The following table 4.7 presents the different information of NIBL bank related to yearly deposit amount, loan amount interest rate on deposit and lending, inflation rate and risk free rate.

Table 4.7

Position of Deposit Amount Rate, Lending Amount Rate, Inflation and Risk Free Rate of NIBL

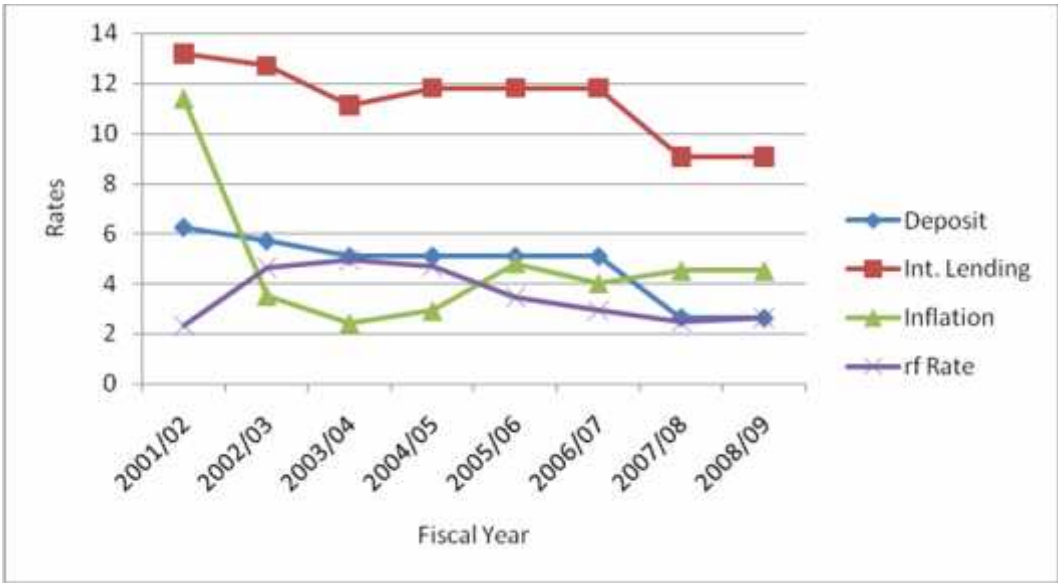
(Rs In Million)

Fiscal Year	Year	Deposit (a)	Int. Dep. (b)	Loan Amt (c)	Int. Lending (d)	Inflation (e)	rf Rate (F)
2001/02	2001	2438.9	6.25	1421.60	13.18	11.40	2.33
2002/03	2002	2982.4	5.71	2071.30	12.69	3.50	4.66
2003/04	2003	4256.2	5.10	2431.30	11.12	2.40	4.96
2004/05	2004	4174.8	5.11	2715.70	11.80	2.90	4.71
2005/06	2005	7922.8	5.11	5949.20	11.80	4.80	3.48
2006/07	2006	11706.3	5.10	7290.20	11.80	4.00	2.93
2007/08	2007	14254.8	2.66	10295.00	9.05	4.50	2.46
2008/09	2008	18927.3	2.64	13007.00	9.05	4.50	2.64

Source: Banking and financial statistics 2001-2008

Above table 4.7 presents the details for calculation of various information. It helps to identify the trend of deposit, lending interest rate and other factors. The main objective of this table is also to identify the relationship between different rate through the calculation of correlation.

Figure 4.3
Trend of Interest Rate Deposit and Lending, Inflation Rate and Risk Free Rate of NIBL



Source: Table - 4.7

This figure 4.3 shows the relationship between rates of NIBL bank deposit rate, lending rate, inflation rate and risk-free rate. The figure show the trend of rates every year interest on deposit and lending rate decrease continuously and inflation rate and risk free rate shows up and down in different years

Table 4.8

Correlation between Different Components of NIBL

Variables	Coefficient of correlation	Coefficient of determination	t-statistics	Table value	Remarks
Rab	-0.895	0.8010	4.9152	2.44	Significant
Rbd	0.985	0.970	13.94	2.44	Significant
Rcd	-0.870	0.7569	4.322	2.44	Significant
Rbe	0.308	0.0948	07929	2.44	Not significant
Rbf	0.398	0.1584	1.062	2.44	Not significant
Rde	0.366	0.1339	0.9633	2.44	Not significant
Rdf	0.317	0.100	0.3170	2.44	Not significant

Source: Appendix 1

The correlation coefficient is between the deposit amount and deposit rate rab = -0.895 which is negative correlation. The determination two variables r^2ab =0.8010 which is positive-statistics for testing the significance of correlation is 4.9152.Since the tabulated value at 5% level of significance for 5 degree of freedom 2.44 is than the calculated value correlation is significant.

The correlation coefficient is between the deposit rate and lending rate rbd is0.985 which is positive. The determination of two variables r^2bd= 0.970 which is positive. t-statistics for testing the significance of correlation is 13.94. Since the tabulated positive value at 5% level of freedom 2.44 is less than the calculated value correlation is significant.

The correlation between loan Amount and lending rate rcd = -0.870 which is negative. The determination between two variables r^2cd= 0.7569 which is positive correlation-statistics for testing the significance of correlation is 4.322.Since the tabulated value at 5%levelof significance for 5 degree of freedom 2.44 is less than calculated value correlation is significance.

The correlation coefficient between interest on deposit and inflation rate rbc=0.308.the determination of correlation coefficient is 0.984. This is positive. The t-statistics for testing the significance of correlation is 0.7929.Since the tabulated t-value at 5% level of significance for 5 degree of level of freedom 2.44 is greater than the calculated value correlation is significant.

The correlation coefficient between interest on deposit and risk free (rbf) =0.398 which is positive. The determination between two variables r^2bf =0.1589 which is positive. The t- statistics for testing the significance of correlation is 1.062. Since the tabulated value at 5% lending significance for 5 degree of level freedom 2.44 is greater than the tabulated value correlation is significant.

The correlation coefficient between interest on lending and inflation rate rdc=0.366 which is positive. The determination of two variable r^2dc=0.1339. t-statistics for testing the significance of correlation is 0.9633.Since the tabulated value at 5% level of significance for 5 degree freedom 2.44 is greater than calculated value correlation is significant.

The correlation coefficient between lending rate and risk free rate (rdf) =0.317 which is positive The determination of coefficient between two variables r2bf= 0.100. t-statistics for testing the significance of correlation is 0.3170. Since the tabulated value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation is significant

Table 4.9

Multiple Correlation Coefficient and Multiple Determinations

Rb.ad	0.9893	R2b.ad	0.9783
Rd.bc	0.9868	R2d.bc	0.9737
Rb.ef	0.8415	R2b.ef	0.7081
Rd.ef	0.8126	R2d.ef	0.6603

Source: Appendix 1

Combined effect of independent variables at once on dependent variables has been analyzed through multiple correlations. The coefficient of multiple determinations assuming one factor is dependent and other two are independent. The method use to calculation and measure the variance of variables in percentage

4.1.4 Nabil Bank

The following table 4.10 presents the different information of NABL bank related to yearly deposit amount, loan amount interest rate on deposit and lending, inflation rate and risk free rate.

Table 4.10

Position of Deposit Amount Rate, Lending Amount Rate, Inflation and Risk Free Rate of NABIL

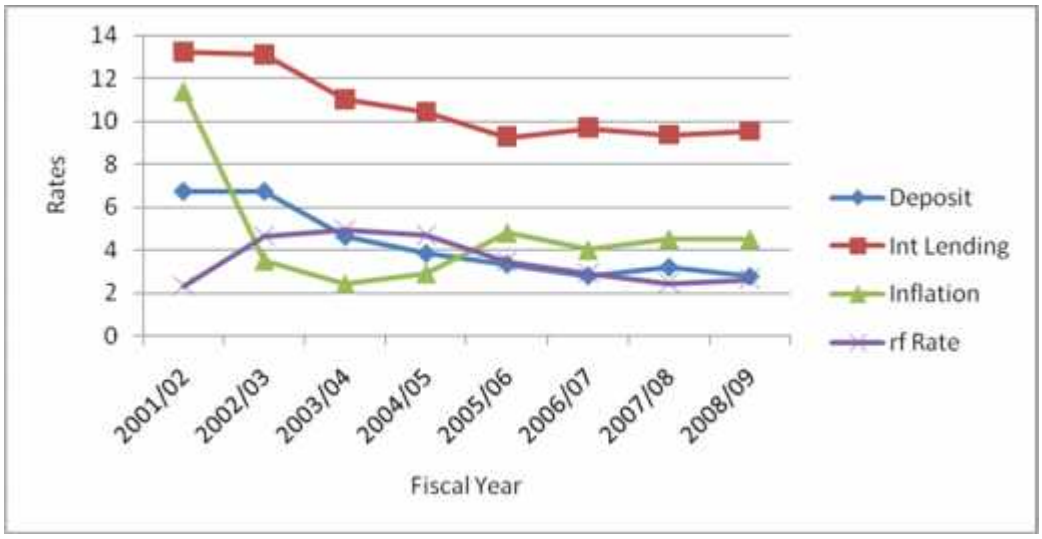
(Rs in Million)

Fiscal Year	Year	Deposit (a)	Int. Dep. (b)	Loan Amt. (c)	Int Lending (d)	Inflation (e)	rf Rate (f)
2001/02	2001	9464.4	6.75	5811.7	13.23	11.4	2.33
2002/03	2002	12780.1	6.75	7323.6	13.09	3.5	4.66
2003/04	2003	15838.9	4.64	8437.6	11.01	2.4	4.96
2004/05	2004	15370.6	3.842	7328.2	10.4425	2.9	4.71
2005/06	2005	13437.7	3.34	8267.8	9.25	4.8	3.48
2006/07	2006	14098	2.8	8769.7	9.67	4	2.93
2007/08	2007	14586	3.2	11078	9.354	4.5	2.46
2008/09	2008	19348.4	2.77	13021	9.54	4.5	2.64

Source: Banking and Financial Statistics 2001-2008

Table 4.10 presents the details for calculation of various information. It helps to identify the trend of deposit, lending interest rate and other factors. The main objective of this table is also to identify the relationship between different rate through the calculation of correlation.

Figure 4.4
Trend of Interest Rate Deposit and Lending, Inflation Rate and Risk Free Rate of NABIL



Source: Table 4.10

Figure 4.4 shows the relationship between rates of NABIL bank deposit rate, lending rate, inflation rate and risk-free rate. The figure show the trend of rates every year interest on deposit and lending rate decrease continuously and inflation rate and risk free rate shows up and down in different years.

Table 4.11

Correlation between Different Components of NABIL

Variables	Coefficient of correlation	Coefficient of determination	t-statistics	Table value	Remarks
Rab	-0.934	0.8723	6.4028	2.44	Significant
Rbd	0.982	0.9643	12.73	2.44	Significant
Rcd	-0.689	0.474	2.3269	2.44	Significant
Rbe	0.462	0.213	1.2756	2.44	Not significant
Rbf	0.257	0.066	0.6513	2.44	Not significant
Rde	0.464	0.2152	3.1426	2.44	Not significant
Rdf	0.237	0.0561	0.8762	2.44	Not significant

Source: Banking and financial statistics 2001-2008

The correlation coefficient between deposits and interest rate on deposit (rab) is -0.934.the coefficient of determination between the interest rate on deposit and two variables. r^2 ab=0.8723 t-statistics for testing significance of correlation is 6.4028 Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is les than calculated value. Correlation coefficient is significant.

The correlation coefficient between deposit rate and lending Rate is rbd= 0.982 which is positive. The determination of coefficient between deposit rate and lending rate is r^2bd =0.9643 which is positive. t- Value for the testing, significance of correlation is 12.73. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than the calculated value correlation coefficient is significant.

The correlation coefficient between loan amount and lending rate is rcd =-0.689 which is negative correlation. The coefficient of determinations between two variable r^2cd =0.474. t-statistics for testing the significance of correlation is 2.3269. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than calculated value correlation coefficient is significant.

The correlation coefficient between deposit rate and inflation rate is rbc = 0.462 is positive correlation. The coefficient of determination between two variables r^2bc is 0.213, which is positive correlation. t-statics for testing the significance of correlation is 1.2756. Since the tabulated rate at 5% level of significance 5 degree of freedom 2.44 is grater than calculated value correlation coefficient is not sufficient.

The correlation coefficient between deposit rate and risk free rbf= 0.257 is positive. The coefficient id determination (r^2bf) 0.066 positive t-statistics for testing significance of correlation is 0.6513. Since the tabulated t- value at 5%

level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is not significance.

The correlation coefficient between lending rate and inflation rate is rde is 0.464 is positive and determination of correlation coefficient is r^2de = 0.2152 is positive correlation. t- Statistics for testing significance correlation is 3.1426. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than calculated value correlation coefficient is significant.

The correlation between the lending rate and risk free rate rdf = 0.237 positive. The determination of correlation coefficient is r^2df =0.0561. t-statistics for testing significance of correlation is 0.8762. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is not significance.

Table 4.12

Multiple Correlation Coefficients and Multiple Determinations

Rb.ad	0.9847	R2b.ad	0.9697
Rd.bc	0.981	R2d.bc	0.9632
Rb.ef	0.8636	R2b.ef	0.7442
Rd.ef	0.8434	R2d.ef	0.7113

Source: Appendix 1

Combined effect of independent variables at once on dependent variables has been analyzed through multiple correlations. The coefficient of multiple determinations assuming one factor is dependent and other two are independent. The method use to calculation and measure the variance of variables in percentage

4.1.5 Himalayan Bank

The following table 4.13 presents the different information of Himalayan bank related to yearly deposit amount, loan amount interest rate on deposit and lending, inflation rate and risk free rate.

Table 4.13

Position of Deposit Amount Rate, Lending Amount Rate, Inflation and Risk Free Rate of HBL

(Rs in Million)

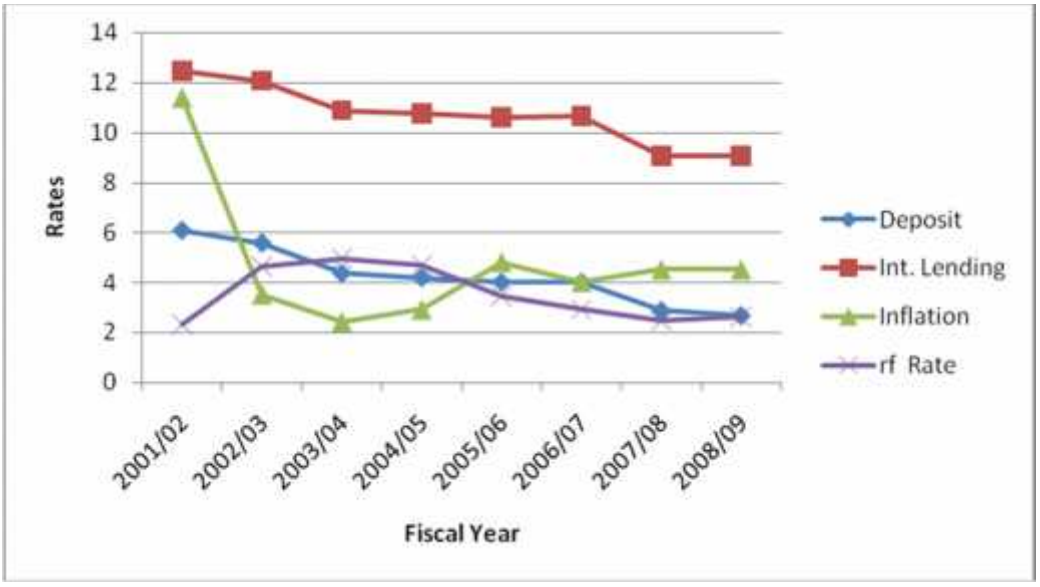
Fiscal Year	Year	Deposit (a)	Int. Dep. (b)	Loan Amt (c)	Int. Lending (d)	Inflation (e)	rf Rate (F)
2001/02	2001	9780.4	6.07	5372	12.46	11.4	2.33
2002/03	2002	14082.5	5.57	7423.2	12.06	3.5	4.66
2003/04	2003	17613.6	4.357	9176.9	10.88	2.4	4.96
2004/05	2004	18595.2	4.192	7673.5	10.75	2.9	4.71
2005/06	2005	21002.8	4.01	11079.2	10.61	4.8	3.48
2006/07	2006	22760.9	4.01	13081.7	10.64	4	2.93
2007/08	2007	24831.1	2.875	13245	9.047	4.5	2.46
2008/09	2008	26456.2	2.68	15516	9.05	4.5	2.64

Source: Banking and financial statistics 2001-2008

Table 4.13 presents the details for calculation various information. It helps to identify the trend of deposit, lending interest rate and other factors .the main objectives of this table is also to identify the relationship between different rate through the calculation of correlation.

Figure 4.5

Trend of Interest Rate Deposit and Lending, Inflation Rate and Risk Free Rate of HBL



Source: Table 4.13

Figure 4.5 shows the relationship between rates of Himalayan Bank deposit rate, lending rate, inflation rate and risk-free rate. The figure show the trend of rates every year interest on deposit and lending rate decrease continuously and inflation rate and risk free rate shows up and down in different years

Table 4.14

Correlation between Different Components of HBL

Variables	Coefficient of Correlation	Coefficient of Determination	t-statistics	Table Value	Remarks
Rab	-0.975	0.95062	10.75	2.44	Significant
Rbd	0.993	0.9860	20.55	2.44	Significant
Rcd	-0.894	0.2381	4.88	2.44	Significant
Rbe	0.488	0.2381	1.36	2.44	Not significant
Rbf	0.269	0.072	0.6839	2.44	Not significant
Rde	0.43	0.1849	1.1666	2.44	Not significant
Rdf	0.321	0.1030	0.83011	2.44	Not significant

Source: Banking and financial statistics 2001-2008

The correlation coefficient between interest rate on deposits and interest rate on deposit (rab) is -0.975. The coefficient of determination between the interest rate on deposit and two variables. r^2ab = 0.95062T-statistics for testing significance of correlation is 10.75. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is les than calculated value. Correlation coefficient is significant.

The correlation coefficient between deposit rate and lending rate is rbd= 0.993 which is positive. The determination of coefficient between deposit rate and lending rate is r^2bd =0.9860 which is positive t- value for the testing, significance of correlation is 20.55. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than the calculated value correlation coefficient is significant.

The correlation coefficient between loan amount and lending rate is rcd =-0.894 which is negative correlation. The coefficient of determinations between two

variable r^2cd =0.2381 t-statistics for testing the significance of correlation is 4.88. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than calculated value correlation coefficient is significant.

The correlation coefficient between deposit rate and inflation rate is rbe = 0.488 is positive correlation. The coefficient of determination between two variables r^2be is 0.2381,t-stastics for testing the significance of correlation is 1.36. Since the tabulated rate at 5% level of significance 5 degree of freedom 2.44 is quarter than calculated value correlation coefficient is not sufficient.

The correlation coefficient between deposit rate and risk free rbf= 0.269 is positive. The coefficient id determination (r^2bf) 0.072 positive t-statistics for testing significance of correlation is 0.6839. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is not significance.

The correlation coefficient between lending rate and inflation rate is rde is 0.43 is positive and determination of correlation coefficient is r^2de = 0.1849 is positive correlation. t- Statistics for testing significance correlation is 1.1666. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is significant.

The correlation between the lending rate and risk free rate rdf 0.321 which is positive. The determination of correlation coefficient is r^2df =0.1030. t-statistics for testing significance of correlation is 0.8311. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is not significance.

Table 4.15

Multiple Correlation Coefficient and Multiple Determinations

Rb.ad	0.9948	R2b.ad	0.986
Rd.bc	0.3450	R2d.bc	0.119
Rb.ef	0.0.6107	R2b.ef	0.372
Rd.ef	0.8023	R2d.ef	0.634

Source: Banking and financial statistics 2001-2008

Combined effect of independent variables at once on dependent variables has been analyzed through multiple correlations, the coefficient of multiple determinations.

4.1.6 Bank of Kathmandu

The following table 4.16 presents the different information of BOK related to yearly deposit amount, loan amount interest rate on deposit and lending, inflation rate and risk free rate.

Table 4.16

Position of Deposit Amount Rate, Lending Amount Rate, Inflation and Risk Free Rate of BOK

(Rs in Million)

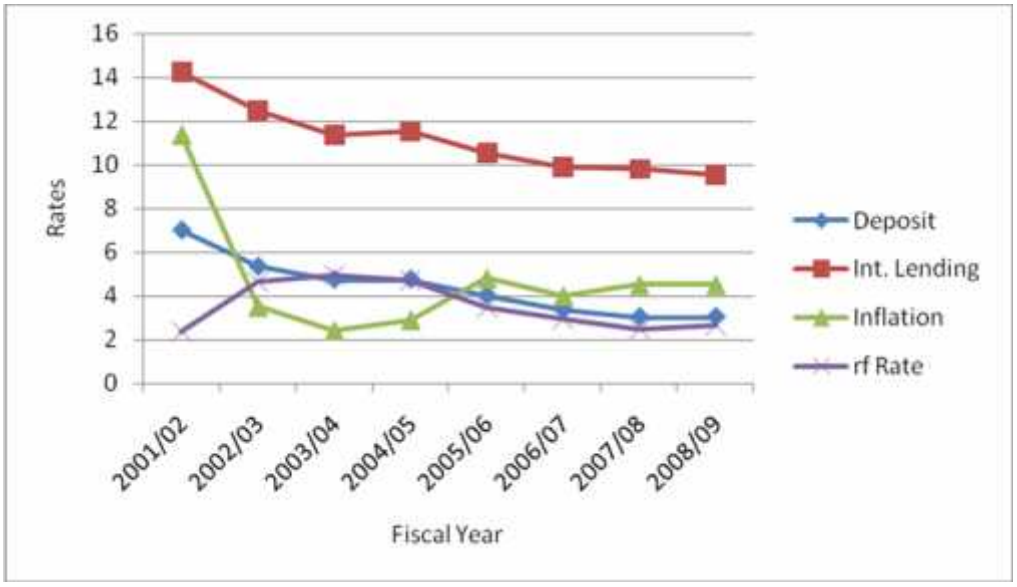
Fiscal Year	Year	Deposit (a)	Int. Dep (b)	Loan Amt (c)	Int. Lending (d)	Inflation (e)	rf Rate (F)
2001/02	2001	2396.50	7.00	1811.50	14.24	11.40	2.33
2002/03	2002	3983.00	5.34	2995.30	12.48	3.50	4.66
2003/04	2003	5724.10	4.75	4327.10	11.36	2.40	4.96
2004/05	2004	5735.90	4.75	4977.60	11.52	2.90	4.71
2005/06	2005	6169.60	4.02	4956.20	10.54	4.80	3.48
2006/07	2006	7741.60	3.38	6104.90	9.92	4.00	2.93
2007/08	2007	8942.80	3.03	6167.00	9.83	4.50	2.46
2008/09	2008	10429.30	3.04	7525.00	9.55	4.50	2.64

Source: Banking and financial statistics 2001-2008

Table 4.16 presents the details for calculation on various information. It helps to identify the trend of deposit, lending interest rate and other factors .the main objectives of this table is also to identify the relationship between different rate through the calculation of correlation.

Figure 4.6

Trend of Interest Rate on Deposit and Lending, Inflation Rate and Risk Free Rate of BOK



Source: Table - 4.16

This figure 4.6 shows the relationship between rates of BOK deposit rate, lending rate, inflation rate and risk-free rate. The figure show the trend of rates every year interest on deposit and lending rate decrease continuously and inflation rate and risk free rate shows up and down in different years

Table 4.17

Correlation between Different Components of BOK

Variables	Coefficient of correlation	Coefficient of determination	t-statistics	Table value	Remarks
Rab	-0.975	0.9506	10.75	2.44	Significant
Rbd	0.994	0.988	22.23	2.44	Significant
Rcd	-0.960	0.9216	8.397	2.44	Significant
Rbe	0.604	0.3648	1.856	2.44	Not significant
Rbf	0.208	0.0432	0.5208	2.44	Not significant
Rde	0.618	0.3819	1.9255	2.44	Not significant
Rdf	0.175	0.03062	0.4353	2.44	Not significant

Source: Banking and financial statistics 2001-2008

The correlation coefficient between interest rate on deposits and interest rate on deposit (rab) is -0.975.the coefficient of determination between the interest rate on deposit and two variables. r^2ab=0.9506 t-statistics for testing significance of correlation is 10.75. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than calculated value. Correlation coefficient is significant.

The correlation coefficient between deposit rate and lending Rate is rbd= 0.994 which is positive. The determination of coefficient between deposit rate and lending rate is r^2bd =0.988 which is positive t- value for the testing, significance of correlation is 22.23. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than the calculated value correlation coefficient is significant.

The correlation coefficient between loan amount and lending rate is rcd =-0.960 which is negative correlation. The coefficient of determinations between two variable r^2cd =0.9216 t-statistics for testing the significance of correlation is 8.397.

Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is less than calculated value correlation coefficient is significant.

The correlation coefficient between deposit rate and inflation rate is rbe = 0.604 is positive correlation. The coefficient of determination between two variables r^2bc is 0.3648, which is positive .t-statistics for testing the significance of correlation is 1.856. Since the tabulated rate at 5% level of significance 5 degree of freedom 2.44 is quarter than calculated value correlation coefficient is not sufficient.

The correlation coefficient between deposit rate and risk free rbf= 0.208 is positive. The coefficient id determination (r^2bf) 0.0432 is positive; t-statistics for testing significance of correlation is 0.5208. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is not significance.

The correlation coefficient between lending rate and inflation rate is rde is 0.618 is positive and determination of correlation coefficient is r^2dc = 0.3819 is positive correlation; t- Statistics for testing significance correlation is 1.9255. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is significant.

The correlation between the lending rate and risk free rate rdf 0.175 is positive. The determination of correlation coefficient is r^2df =0.03062 t-statistics for testing significance of correlation is 0.4353. Since the tabulated t- value at 5% level of significance for 5 degree of freedom 2.44 is greater than calculated value correlation coefficient is not significance.

Table 4.18

Multiple Correlation Coefficients and Multiple Determinations

Rb.ad	0.990	R2b.ad	0.981
Rd.bc	0.9948	R2d.bc	0.989
Rb.ef	2.5912	R2b.ef	6.714
Rd.ef	0.9747	R2d.ef	0.794

Source: Banking and financial statistics 2001-2008

Combined effect of independent variables at once on dependent variables has been analyzed through multiple correlations. The coefficient of multiple determinations assuming one factor is dependent and other two are independent. The method use to calculation and measure the variance of variables in percentage

4.2. Major Findings of the Study

Determinants of interest in Nepalese commercial bank, the subject matter is important in financial market. There are some objectives presented for analysis. To identify the appropriate method and model of interest rate, calculation of trend and relationship in various factor. Environmental factors are analysis through the primary research. The recommendation and suggestion attempts the major suggestion in this issue. There are some findings as follows:

- The trend of rates presents in figure, this figure shows the relationship between deposit rate, lending rate, inflation rate and risk-free rate. The figure show the trend of rates every year interest on deposit and lending rate decrease continuously and inflation rate and risk free rate shows up and down in different years. The correlation analysis between the deposit rate and deposit amount, lending amount and lending rate show the result negative correlation and others factors show the positive relation. Another presentation t-statistics show the result between deposit rate and deposit amount and lending rate, lending amount and lending rate, deposit rate and lending rate t- Value at 5% level of significance for 5 degree of freedom 2.44 is less than calculated value. Correlation coefficient is significant.

- There is identifying some factors of interest rate they are risk inflation maturity period demand and supply of funds etc. Most of the commercial banks used simple regular method. The main factors are risk, return, inflation and risk free rate.
- The environmental factor analysis through the questioner method. The results presented through the SPSS program basis. Interest rate is affected by maturity period. Market competition is important factor in interest rate. Political instability and violence is bad for economic sector. It is affected the interest rate. Depositor and lender activity plays the vital role in determination in interest rate.
- The basic determinants factors are inflation rate, risk and return and others. As then other factors also affected to determinants of interest rate. Investment climate, tax rules and regulation re affected factors for determinants. The valuable opinions viewers are agree in factors.
- Interest rate is important factor for commercial bank. It plays the vital role in banking business environment. It plays prime role for banking competition. It is needed to regularly decline for extend the business. Most of the opinions are supported in this question.
- The relation of interest rate related in various sector. Interest rate affects customer service cost, profit, stock price, price of goods etc.
- NRB is one of the center banks of Nepal. NRB has major responsibility for control national economy. It plays the vital role and responsibility for commercial banks. All the commercial banks are controlled and monitored through the NRB bank.
- Commercial banks apply the different rate for lending in different sector. It helps to develop in various sectors. The respondent also agreed in segregate interest rate.

CHAPTER - V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Nepal is a beautiful country; Nepalese people are depended in agricultural sector. National GDP is most part depended in agriculture. Nepal has a lot of natural resources and need to utilize. Finance is one of the important tools in nation. Nepal is depending on foreign aid and loan in the condition Nepalese financial markets help to generate the required fund and mobilized. Nepal Bank Ltd is the one of first bank in Nepal which is established in 1994 BS as a joint venture between government and private sector. Now in Nepal 18 commercial banks established, 29 development banks, 70 finance companies, 11micro credit development bank,19 saving and credit cooperation, 47 NGOS (performing limited banking activities) Commercial banks are important in Nepal. They are performing its all kind of banking transactions by accepting deposits, advancing loans credit creation and agency function.

Interest is the cost of money and it is medium of collecting and lending money respectively. Interest rate plays vital role in banking sector. Commercial bank and financial institution could determine the interest rate by own strategy. They are calculating interest rate as per risk, inflation rate, banking cost, environmental factors etc.

There are important issues in this thesis which factors are affected to determine the interest rate in commercial bank. How to calculate the interest rate that is the major parts of qualification factors to determine interest rate all the issue of the research focused to some modern commercial bank. They are gaining public popularity too. The study fulfills the objective of qualitative and quantitative factors of interest rate, banking competition through interest rate.

Review of literature is an essential part of all studies. It is the way to discover what other resources have concern and left in the area a critical review of literature helps to the researcher to develop a thorough understanding an insight into previous research work that relates to the present study. This chapter introduced to meaning of commercial which is accepted different types of deposit and invested in various which is one of the financial intuition, the commercial bank has worked various sector in economical sector. They are accepting the deposit; provide the loan, agency function and general utility function.

Interest is the cost of among which is very important factors. In financial work, it is price paid for use of loanable funds, Returns for the fund of capital in the interest are different theories rate of interest. The classical theories of interest emphasis save and interest demand as interest rate determining forces. The liquidity preference theory points to demand and supply of cash balance.

The interest rate is affected the inflation rate economic greater budget deficit money supply. Specific risk and cost factors affecting interest rate on debt security are marketability, liquidity default risk taxability, servicing cost exchange rate risk and environment risks, political resources.

The secondary data collection from publication and primary data collection from questionnaire collected data are presented in table and graphic and analyzed various statistical tools line mean, correlation coefficient-statistics coefficient of determination the study mainly forecasted to find out the factors of determinate the interest rate in various way.

5.2. Conclusion

The conclusion is the finding of the study. This study focused in find out the presented objectives through the method and techniques; First of all we can define the conclusion come out from the presented data.

Conclusion from Secondary Data Analysis

The secondary data has presented to show the effects of inflation rate and risk and relation in interest rate through the related variables and also study to different rates correlation in the activities of deposit and lending amount and rates.

1. Bank Deposit Rate and Lending Rate

The bank deposit and interest rate find out the negative correlation when supply of the loan able fund (supply of deposit) increases interest rate as such deposit decrease. In general concept, interest rate on deposit should be positively correlation meaning that higher rate attracts more deposit, but we have assured that interest rate is depended factor which is determined by supply of loanable fund. The coefficient of determination express the total variance of interest rate on deposit and has been explained by independent variable ie. amount of deposit collected and remaining is due to the effect of other factors in the economy. T-statistics of for the testing the correlation is significant in all samples. This means significantly correlated and an increase/decrease in the amount of deposit brings a decrement (increment) in interest rate on deposit.

2. Interest Rate on Deposit and Lending Rate

The interest rate on deposit and lending rate are positive correlation. The determination variance effects between the factors. Always the lending rate is high then deposit rate; the t-statistics of correlation is significant.

3. Loan and Advances Amount and Lending Rate

The correlation coefficient between two variables tells that more loan is demanded of lower rate i.e. demanded on interest rate. The determination of variance in interest rate on lending and remaining is the effects of other factors.

4. Interest Rate on Deposit and Inflation Rate

Two variables are positively correlated; an increment in inflation brings increment in interest rate on deposit vice versa. The inflation rate is affected by interest rate. The coefficient of determination explain total variance in dependent and independent variables T- value of for testing the significance of correlation coefficient is less than the tabulated T-value for the 5 degree of freedom at 5% level of significance 2.44. The calculated values are less than table value the correlation coefficient is not significant.

5. Deposit Rate and Risk Free Rate

Deposit rate and risk free rate are positive correlation but coefficient is small. The affecting is risk free rate. The determination explained of total variance in dependent and independent variables and they are affected. The T- value for testing the significance of correlation co efficiency calculated value which is significantly similar value tabulated value for 5 degree of freedom at 5% level of significance 2.44 from this it is relegated that interest rate on deposit is not significantly correlated with the risk free rate doesn't affect interest rate on deposit of samples significantly.

6. Interest Rates on Lending and Inflation Rate

Interest rate on lending and inflation rate is positive correlation coefficient. The determination of two variables explained variance and due to effect each other factors. The t- value for testing the significance of correlation calculated value is sincere than the tabulated T-value for degree of freedom at 5% level of significance 2.44 the variables are not correlated significantly. This means that lending rate of sample banks aren't significantly correlated with the inflation rate.

7. Interest Rate on Lending and Risk Free Rate

The correlation coefficient between interest rate on lending and risk free rate are correlated. The determination coefficient between two variables defines the variance and explains the effect of the other factors the t-value for testing the significance of the coefficient sample are the calculated T-value which is similar than table value at 5% level of significance for the 5% degree of freedom 2.44 the correlation coefficient is not significance, this means that interest rate on lending of sample bank are not significantly affected by the risk free rate.

To examine the multiple correlation coefficients has also completed. The multiple correlation coefficient take in one sample dependent and other two independent, it shows that variables are affected each other factors.

Trend Analysis

The data presentation some sample banks and analysis the figure. The result show the chart deposit rate and lending rate decrease in every year continuously. Inflation rate and risk free rate show up and down. The reason of the decrease rate business environment is not good reason supply of money high and demand of fund is not attractive in current situation in Nepal.

Factors and Method

The major factors identify risk, maturity period, inflation rate, demand and supply of fund etc. and most of the commercial banks are used to the simple regular method used in lending rate.

5.3 Recommendations

The technology and tools and education open the brain of people and they come to concern in the new world. Most of the people are unknown above the lot of things lack of education, communication, techniques and technology. In the sense of

people are make strong and active in latest communicative world to development in various economically, socially etc

- The national economy plays the vital role in development of every sector for that saving and lending is most necessary factor. It helps to mobilize the capital. Interest rate is the fundamental component to mobilize the capital so it must be optimum level .
- There is needed to extend the investment climate which helps to the extend service and market for the investment to the Nepalese commercial banks.
- Autonomy to determine the interest rate is essential to develop the economic growth. This helps to determine the optimal interest rate during the changing environment.
- The interest rate is one of the basic components collecting the fund and lending to business sector. It is needed to minimize to extend the business environment.
- The NRB'S role is needed to strongly monitor to the banking sectors, which helps to maintain and implement the rules and regulation.
- Government should make the strong policy for development of economy and implementation to develop the nation.
- Suitable interest rate motive to depositor and lenders, so suitable interest rate helps to increase the depositor and lenders so interest rate must be flexible on the basis of development reason. This can be success after the establishment of favorable investment clement and ruled by law and order.
- Most of the Nepalese are unable to banking procedure lack of sufficient banks and their reign so it must be needed to extend the branch office in Nepal.
- Political and economic environment must be improved for development of banking sector.
- Strength and stable government is needed for long term vision and implementation of plan and economic program.
- It is needed to publish interest rate in National News paper daily. Its information helps to attract general people to businessman and other concern person.

BIBLIOGRAPHY

Books:

Ahuja, H.L. (1992). *Advanced Economic Theory, Micro Economic Analysis.* New Delhi: S. Chand and Company Ltd.

Cheney, J.M. & Moses, E.A. (1992). *Fundamentals of Investments.* St. Paul: West Publishing Company.

Gupta, S.C. (1992). *Fundamentals of Statistics*. Bombay: Himalayan Publishing House.

Jhingan, M.L. (1986). *Advance Economic Theory*. New Delhi: Konark Publishing Pvt. Ltd.

Joshi, M.M. (2058).*Principle of Economics.* Kathmandu: Sukunda Pustak Bhandar.

Joshi, P.R. (2003). *Research Methodology.* Kathmandu: Buddha Academic Publishers and Distributors Pvt. Ltd.

Joshi, S. (2058). *Micro and Macro Economic Analysis.* Kathmandu: Taleju Prakashan.

K.C., F.B. (2057). B*usiness Finance.* Kathmandu: Sukunda Pustak Bhawan.

Manohar, K., Shrestha, D. & Bhandari, B. (2004). *Financial Markets and Institution.* Kathmandu: Asmita Books Publisher and Distributor.

Rose, P.S. (1983). *Money and Capital Markets" Financial Institutions and Instrument in Global Marketplace*. Chicago: Irwin.

Van Horne, J.C. (2000). *Financial Managements and Policy*. New Delhi: Prentice Hall of India.

Weston, J.F. & Brigham, E.F. (1996). *Essentials of Managerial Finance.* Chicago: The Dryden Press.

Wolf, K.H. & Pant, P.R. (2005). *A Hand Book For Social Science Research And Thesis Writing.* Kathmandu: Buddha Academy.

Article:

Determinants of the Term Structure of Interest Rates – Approaches to Combining Arbitrage Free Models and Monetary Macroeconomics (2006)

Dissertations:

Pathak, S. (2010). *A Study on The Interest Rate Structure and Its Influence on Deposit and Lending of Commercial Banks in Nepal.* Kathmandu: An Unpublished Thesis submitted to T.U.

Bhatta, S. (2005). *Interest Rate and Its Effect on Deposit and Lending*. Kathmandu: An Unpublished Thesis submitted to T.U.

Dongol, N. (2003). T*he Impact of Interest Rate on Financial Performance of Commercial Banks.* Kathmandu: An Unpublished Thesis submitted to T.U.

Kshetry, K. (1980). *Interest Rate Structure and Its Relations with Deposit Inflation and Credit in Nepal.* Kathmandu: An Unpublished Thesis submitted to T.U.

Neupane, G.P. (1977). *A study on Interest Rates and Financial Development in Nepal.* Kathmandu: An Unpublished Thesis submitted to T.U.

Pandey, R. (1979). *A Study on Money Supply, Level of Price and Interest Rate Structure.* Kathmandu: An Unpublished Thesis submitted to T.U.

Pokhrel, J. (2004). *Determinants of Interest Rate in Nepalese Financial Market*. Kathmandu: An Unpublished Thesis submitted to T.U.

Shrestha (2008). *The Interest Rate Structure and Its Influence on Deposit and Lending of Joint Venture Banks in Nepal*. Kathmandu: An Unpublished Thesis submitted to T.U.

Shrestha, S.K. (1979). *Interest Rates and Its Impact upon Resource Mobilization*. Kathmandu: An Unpublished Thesis submitted to T.U.

Websites:

www.nabil.com

www.nrb.org

www.nibl.com

www.himalayanbanks.com

www.standardchartered.com

APPENDICES

Appendix-1

Standard Chartered Bank Ltd.

Correlation analysis

1. Deposit amount and interest rate on deposit (ab)

Correlations

		VAR00001	VAR00002
VAR00001	Pearson Correlation	1	-.934(**)
	Sig. (2-tailed)	.	.001
	N	8	8
VAR00002	Pearson Correlation	-.934(**)	1
	Sig. (2-tailed)	.001	.
	N	8	8

** Correlation is significant at the 0.01 level (2-tailed).

2. Deposit interest rate and lending rate (bd)

Correlations

		VAR00002	VAR00004
VAR00002	Pearson Correlation	1	.968(**)
	Sig. (2-tailed)	.	.000
	N	8	8
VAR00004	Pearson Correlation	.968(**)	1
	Sig. (2-tailed)	.000	.
	N	8	8

** Correlation is significant at the 0.01 level (2-tailed).

3. Lending amount and lending rate (cd)

Correlations

		VAR00004	VAR00003
VAR00004	Pearson Correlation	1	-.904(**)
	Sig. (2-tailed)	.	.002
	N	8	8
VAR00003	Pearson Correlation	-.904(**)	1
	Sig. (2-tailed)	.002	.
	N	8	8

** Correlation is significant at the 0.01 level (2-tailed).

4. Interest rate on deposit and inflation rate (rbe)

Correlations

		VAR00002	VAR00005
VAR00002	Pearson Correlation	1	.609
	Sig. (2-tailed)	.	.109
	N	8	8
VAR00005	Pearson Correlation	.609	1
	Sig. (2-tailed)	.109	.
	N	8	8

5. Interest rate on deposit and risk free rate (rbf)

Correlations

		VAR00002	VAR00006
VAR00002	Pearson Correlation	1	.183
	Sig. (2-tailed)	.	.665
	N	8	8
VAR00006	Pearson Correlation	.183	1
	Sig. (2-tailed)	.665	.
	N	8	8

6. Interest rate in lending and inflation rate (rde)

Correlations

		VAR00004	VAR00005
VAR00004	Pearson Correlation	1	.552
	Sig. (2-tailed)	.	.156
	N	8	8
VAR00005	Pearson Correlation	.552	1
	Sig. (2-tailed)	.156	.
	N	8	8

8. Interest rate in lending and risk free rate (rdf)

Correlations

		VAR00004	VAR00006
VAR00004	Pearson Correlation	1	.202
	Sig. (2-tailed)	.	.631
	N	8	8
VAR00006	Pearson Correlation	.202	1
	Sig. (2-tailed)	.631	.
	N	8	8

Appendix-2

T-statistics for Standard Chartered Bank

1. Deposit amount and deposit rate

$$rab = \frac{rab}{\sqrt{1-rab^2}} \times \sqrt{x-2}$$

$$= \frac{-0.934}{\sqrt{1-0.8723}} \times \sqrt{8-2}$$

$$= \frac{-0.934}{\sqrt{\quad}} \times 2.4494$$

$$= \frac{-0.934}{\quad} \times 2.4494$$

$$= 6.4028$$

2. Deposit rate and lending rate

$$rbd = \frac{rbd}{\sqrt{1-rbd^2}} \times \sqrt{x-2}$$

$$= \frac{\sqrt{0.968}}{\sqrt{1-0.968}} \times \sqrt{8-2}$$

$$= \frac{\sqrt{0.968}}{\sqrt{0.032}} \times 2.4494$$

$$= \frac{0.968}{0.1789} \times 2.4494$$

$$= 9.45$$

3. Lending amount and lending rate

$$rcd = \frac{rcd}{1-rcd^2} \times \sqrt{x-2}$$

$$= \frac{-0.904}{\sqrt{1-0.817}} \times \sqrt{8-2}$$

$$= \frac{-0.904}{\sqrt{0.183}} \times 2.4494$$

$$= 5.1795$$

4. Deposit rate and inflation rate.

$$rbe = \frac{rbe}{\sqrt{}} X \sqrt{x-2}$$

$$= \frac{0.609}{\sqrt{0.6292}} X \quad 2.4494$$

$$= \frac{0.609}{.7932} X \quad 2.4494$$

$$= \frac{1.4916}{0.7932}$$

$$= 1.88$$

5. Deposit rate and risk free rate

$$rbf = \frac{rbf}{\sqrt{1-rbf^2}} \sqrt{x-2}$$

$$= \frac{0.202}{\sqrt{1-0.033}} X \sqrt{8-2}$$

$$= \frac{0.202}{\sqrt{0.9797}} X \quad 2.4494$$

$$= \frac{0.4947}{\sqrt{0.9833}}$$

$$= 0.5039$$

6. Lending rate and inflation rate

$$rde = \frac{rde}{\sqrt{1-rde^2}} \times \sqrt{x-2}$$

$$= \frac{0.552}{\sqrt{1-0.304}} \times \sqrt{8-2}$$

$$= \frac{0.552}{\sqrt{0.8342}} \times 2.4494$$

$$= 1.620$$

7. Lending rate and risk free rate

$$rdf = \frac{rdf}{\sqrt{1-rdf^2}} \times \sqrt{x-2}$$

$$= \frac{0.202}{\sqrt{1-0.040}} \times \sqrt{8-2}$$

$$= \frac{0.202}{\sqrt{0.9797}} \times 2.4494$$

$$= 0.5050$$

Appendix-3

Determination and multiple determination

$$R_b ad = \sqrt{\frac{r^2 ab + rbd^2 - 2\ rab\ rbd\ rad}{1-rad^2}}$$

$$= \sqrt{\frac{0.8723 + 0.9370 - 2x - 0.934 \times 0.968 \times -0.957}{1-0.9158}}$$

$$= \sqrt{\frac{1.8093 - 1.7304}{0.0842}}$$

$$= \sqrt{\frac{0.0789}{0.0842}}$$

$$= 0.9680$$

$$R^2 bad = (Rbad)^2$$

$= (0.9680)^2$

$= 0.930$

$$Rdbc = \sqrt{\frac{Rdb^2 + Rdc^2 - 2rdb\ rdc\ rbc}{1-bc^2}}$$

$$= \sqrt{\frac{0.9370 + 0.8172 - 2x0.968\ x\ -0.904x\ -0.862}{1-0.7430}}$$

$$= \sqrt{\frac{1.7542 - 1.5086}{0.257}}$$

$$= \sqrt{\frac{0.2456}{0.257}}$$

$= 0.9556$

$R^2dbc = (Rdbc)^2$

$= (0.9556)^2$

$= 0.9131$

$$(Rbef) = \sqrt{\frac{rbe^2 + rbf^2 - 2\ rbe\ rbf\ ref}{1 - ref^2}}$$

$$= \sqrt{\frac{0.304 + 0.033 - 2 \times 0.609 \times 0.183 \times -0.647}{1 - 0.4186}}$$

$$= \sqrt{\frac{0.337 + 0.1442}{0.5813}}$$

$$= \sqrt{\frac{0.4812}{0.5813}}$$

$$= \sqrt{0.8278}$$

$= 0.9098$

$R^2bef = (rbef)^2$

$= (0.998)^2$

$= 0.8277$

3. $R.def = \sqrt{\dfrac{rde^2 + rdf^2 - 2rde\ rdf\ ref}{1-ef^2}}$

$= \sqrt{\dfrac{0.304 + 0.040 - 2x0.552x0.202\ x\ -0.647}{1-0.4186}}$

$= \sqrt{\dfrac{0.48828}{0.5813}}$

$= 0.9165$

$R^2\ def = (rdf)^2 = (0.9165)^2 = 0.8399$