

CHAPTER I

INTRODUCTION

1.1 Background of the study

It has been well known that trade; commerce and industry are the signs of healthy economic development of every country. The current pace of the economic growth and the level economic development attained over the years indicate the potentiality to compete in the international market. But the pace of economic development of Nepal is still in its infant stage. With the implicit objective of the economic development of the country, Nepal has adopted mixed and liberal economic policy. Especially after the restoration of the democracy, the concept of the liberalization policies has been incorporated as directive principal and state policies. As a result of the liberal economic policy thrust adopted in the eighties, various multinational companies, finance companies and joint venture banks came into existence.

According to US law-" Any institution offering deposits to withdrawal on demands and making loans of a commercial or business nature is bank."

According to Kent-" A bank is an organization whose principal operations are concerned with the accumulation of the temporarily idle money of the general public for the purpose of advancing to other for expenditure."

There is no unanimity among the economists about the origin of the word 'Banking'. The term bank derived from Latin word 'Bancus', which refers to the bench on which the banker would keep its money and his records. Some persons take its origin to the French word 'Banque' and Italian word 'Banco' which means a bench for keeping, lending and exchanging of money or coins in the market place by money lenders and money exchangers.

In simple words any institution engaged in monetary transaction is known as bank. It receives deposits of money from those having savings and lends to those who need money for some purpose paying and charging interest at some fixed rate percent. Beside this, a bank also involved in a number of agency services, e.g. - remitting and collecting cash on behalf of its clients, opening bank draft and LC facilities, Automated Teller Machine Facility (ATM), Debit card, credit card facilities, underwriting shares of newly established

companies etc. In short, a bank helps people in every sector of economy e.g. –trade, industry, commerce, agriculture, etc. Bank is a financial service institution. The transactions in the financial market heavily depend upon the banking system of the country. Without bank it would be quite impossible for the industrialists and entrepreneurs to go directly to general public for getting their savings for investments. So bank is very important for all aspects. Bank can be regarded as the backbone for the resources mobilization.

1.2 History of Banking Development in Nepal

Modern banks can be considered as evolved from ancient gold -smiths. Before 1848 B.S. the gold smiths used to store people's gold and other valuable goods and charge nominal charge against the deposit. That time people deposited their gold and valuable goods for the sake of security rather than earning interest. The history of banking in Nepal is believed to be started from the time of Prime Minister Ranoddip Singh in 1877 A.D. He introduced many financial and economic reforms. The Tejaratha Adda was established at that time and its basic purpose was to provide credit facilities to the general public at a very concessional interest rate. The Tejarath Adda disbursed credit to the people on the basis of collateral of gold and silver. All employees of government were also eligible for this type of loan, which was settled by deducting from their salary. Tejaratha Adda extended credit only; it did not accept deposits from the public.

But the real banking started with the establishment of Nepal Bank Limited in 1994 B.S which was founded by Judda Samsher. It was the first bank of Nepal. Its main function was to provide loans and accept deposits. Till the establishment of Nepal Rastra Bank the major functions of NBL was the function as a central bank also. So it was serving two purposes that are of central and of commercial banks. Having felt the need of development of banking sector and to help the government formulate monetary policies, Nepal Rastra Bank was set up in 2013 B.S. as the central bank of Nepal. It was established to provide monetary and banking services to the government and Nepalese citizens. This bank is totally owned, manages and controlled by the government. Though Nepal Rastra Bank, at present, adopted a deregulatory approach, it requires continuous modification in the view of fast changing

world. Integrated and speedy development of the country is possible only when competitive banking services reaches nooks and corners of the country.

To meet the deficiency the government set up Rastriya Banijya Bank in 2022 B.S. as a fully government owned commercial bank. With the coming up of Rastriya Banijya Bank, banking services spread to both the rural and urban areas. Despite being an agricultural country, our farming system is the traditional one to consume more cost and yield less. To get rid of this problem, scientific agriculture is imperative, which requires adequate finance and specialist of the field. To meet these ends, Agricultural Development Bank was established in 2024 B.s. Moreover, Nepal Industrial Development Corporation had already been set up in 2016 B.S. to transform the agro –based economy to the industrial one and Security Exchange Center to enhance capital market activities. From 2024 B.S. onwards, the Government of Nepal established five rural development banks namely: Eastern, Central, Western, Mid-Western, Far-Western Rural Development Bank respectively.

In order to operate all commercial banks incorporated in Nepal, uniformity of laws of banking acts are essential. So a commercial Bank act 2031 B.S. was enacted and has been amended many times in accordance with the needs. With the promulgation of the act, Nepal witnessed growth in the number of banks from private sector and the number continues to grow even today. Now the act has been replaced by an umbrella act called bank and financial institutions Act, 2063. This act governs not only the commercial banks but also all the financial institution, operating within the country. It classifies commercial banks as category 'A' financial institution, development bank as 'B', finance companies as 'C' and micro finance as 'D' respectively.

1.3 Meaning of Commercial Banks

Commercial bank is regarded as the eldest financial institution in the history of banking. The bank, which is established to promote the trade and industry in the country, is called commercial bank. Commercial banks are more popular nowadays. Modern commercial banks accept deposits under various accounts and grant short term, medium term and long term loans for various proposes. Commercial banks carry out agency functions for the promotion of trade and industry and deal with foreign currency exchange. The major

objective of commercial bank is to earn profit. The difference between the rate of interest allowed on deposits and charged on loans granted is the main source of earning of commercial banks.

According to Commercial Bank Act,2031- “Commercial banks are those banks which are established under this act to perform commercial functions except those which are established for specific purpose like development banks, co-operative etc.”

Nepal Bank Limited is the first commercial bank of Nepal which was established in 1994 B.S. In 2022 B.S. Rastriya Banijya Bank was established. After the restoration of democracy in Nepal, government has taken liberal economic policy as a result many other commercial banks have been established. During the last two and half decades the number of financial institutions has grown significantly. At the beginning of the 1980s there were only two commercial bank and development banks in the country. Induction of economic liberalization policy, particularly the financial sector liberalization provided impetus in the establishment of new bank and non bank financial institutions. By the end of Mid July 2011 there are 32 “A” class commercial banks, 87 “B” class Development Banks, 79 “C” class finance companies, 21 “D” class micro credit development banks, more than 5000 saving and credit cooperatives, and 38 NGOs. (Source: www.nrb.org.np)

(Note: The list of commercial banks established till Mid July 2011 is shown in Appendix I)

1.4 The Interest Rate strategies of NRB

The Central Bank is the apex bank in a country, which controls the monetary system and banking structure. It is regarded as the leading monetary authority of all banking and financial institutions established in the country. It operates in the interest of the country and assists to the government for implementation of economic policy. NRB is the central bank of Nepal. The NRB was established in Baishakh 14, 2013 B.S. under the Nepal Rastra Bank Act, 2012. Its major aims were to regulate the issue of paper money, secure countrywide circulation of Nepalese currency and achieve stability in its exchange rates, mobilize capital for economic development and for trade and industry growth, develop the banking system in the country, thereby ensuring the existence of banking facilities; and maintain the economic

interests of the general public. NRB also was to oversee foreign exchange rates and foreign exchange reserves.

Nepal Rastra Bank is an autonomous and corporate body having perpetual succession. It started its operations with a total number of 23 employees including the Governor and the Chief Accountant. In the initial years of its operation, bank had to focus its attention on abolishing the dual currency system, regulating the circulation of Nepalese currency throughout the kingdom and maintaining stability of exchange rates of the Nepalese currency. For this purpose, the bank opened its offices and currency exchange counters in various parts of the country. Currently, NRB has 7 main offices all over Nepal. NRB is authorized to determine the interest rate charged and offered by the commercial banks and financial institutions. There was full discretion to NRB in determining interest rate structure of banks and financial institutions in the period of 1960 to 1975. The financial system reforms started after the liberalization of interest rates in 1984 when commercial banks were given autonomy to fix interest rates over and above the central banks rates by 1.5 percentage points on saving and 1 percentage point on term deposits. The financial institutions got freedom in fixing their interest rates in their deposit and loans in 1986. However, there was limitation imposed on certain sectors of lending such as the rates of maximum of 15 percent on the priority sectors loan and for the other kinds of loans financial institutions were given freedom to maintain the interest rate structure. On December 1993, Banks and finance companies were not allowed to have more than 6 percentage interest rate spread between deposit and lending rates. Commercial banks were obliged to publish their interest rates and variations were permitted only to the extent of 1 percent on deposit and 2 percent in the lending rates between borrowers for the same purpose.

Nepal opted interest rate liberalisation policy since eighties with partial deregulations of both deposit and lending rates in 1984 followed by a full liberalisation since August 1989. The measure was adopted at a time when real interest rate on deposit was negative and the interest rate spread between the lending and deposit rate was relatively higher due to high operating cost of public banks. By that time, market interest rate was considered to be suboptimal, may be due to the conflict of interest of the authority in determining policy rates and market interest rates together. NRB granted autonomy to commercial banks to fix the rates of interest over and above the NRB rates by 1.5 and 1.0 percentage points respectively

on saving and term deposit. NRB directed commercial banks to reduce the interest rates by 2 percent points than the normal credit for agricultural and cottage industries in 18 remote districts. Interest rates policy in Nepal was characterized by an elaborate system of mandatory deposit and lending rates for commercial banks and other financial institutions before the deregulatory moves of May 1996. The interest rates were further liberalized in May 29, 1986 when commercial banks were allowed to fix rates higher than the minimum deposit rates fixed by the NRB. Commercial banks were also set free to fix lending rates except certain item in the priority sector. The minimum interest rates were 8.5 percent on saving deposit and 12.5 percent for one year fixed deposit. The interest rates on fixed deposit with a maturity period or less than one year were left to the discretion of the banks themselves. Regarding lending rates, the interest rate was at 15 percent maximum. On August 22, 1992, NRB issued some directives to commercial banks and other financial institutions to clearly spell out the interest rate on deposits. NRB also suggested to commercial banks and other financial institutions to limit the spread of interest rate at 6 percent within Mid-December 1993. A further instruction to banks and financial institution was issued in 2002 and now the interest rate spread required to be maintained by commercial banks and financial institutions has also been removed.

1.5 Profile of the sample commercial banks under study

NABIL Bank Ltd.

NABIL Bank Limited, the first foreign joint venture bank of Nepal, started operations in July 1984. NABIL was incorporated with the objective of extending international standard modern banking services to various sectors of the society. Pursuing its objective, NABIL provides a full range of commercial banking services through its 47 points of representation across the kingdom and over 170 reputed correspondent banks across the globe. It was earlier known as Nepal Arab Bank Ltd. It has its head office at Kamaladi, Kathmandu. It has the largest no. of staffs among private commercial banks of Nepal. NABIL, as a pioneer in introducing many innovative products and marketing concepts in the domestic banking sector, represents a milestone in the banking history of Nepal as it started an era of modern banking with customer satisfaction measured as a focal objective while doing business.

NABIL Bank Ltd is the pioneer in introducing much innovative banking service in banking sector of Nepal with almost 50 branches and counters in all major cities. NABIL bank received as “Bank of the Year: 2004”. The share subscription of the NABIL is divided in 5 parts. NB International Ltd. has taken 50%, Nepalese Public has taken 30%, Nepal Industrial Development Corporation has taken 6.15%, Rastiya Beema Samasthan has taken 9.67% and the remaining 0.33% of share is taken by Nepal stock Exchange.

Nepal Investment Bank Ltd.

Nepal Investment Bank Ltd. (NIBL), previously Nepal Indosuez Bank Ltd., was established in 1986 as a joint venture between Nepalese and French partners. The French partner (holding 50% of the capital of NIBL) was Credit Agricole Indosuez, a subsidiary of one the largest banking group in the world. With the decision of Credit Agricole Indosuez to divest, a group of companies comprising of bankers, professionals, industrialists and businessmen, had acquired on April 2002 the 50% shareholding of Credit Agricole Indosuez in Nepal Indosuez Bank Ltd. The name of the bank has been changed to Nepal Investment Bank Ltd. upon approval of bank’s Annual General Meeting, Nepal Rastra Bank and Company Registrar’s office with the following shareholding structure. The 41 Branches of NIBL dedicated to Customer Service .NIBL operates 67 ATMs all over Nepal, largest for any commercial bank in Nepal. NIBL has become the prominent name in Nepalese Banking sector and one of the popular domestic banks. Besides general banking, the Bank is providing almost all modern banking services like e-banking, Mobile banking, credit card (Visa & Master) services, and Merchant services with latest banking technology at a reasonable cost. The bank has been awarded as Banker of the year of 2003, 2005, 2008 and 2010 respectively. A group of companies holding 50% of the capital, Rashtriya Banijya Bank holding 15% of the Capital, Rashtriya Beema Sansthan holding the same percentage and the remaining 20% being held by the General Public (which means that NIBL is a Company listed on the Nepal Stock Exchange).

Bank of Kathmandu (BOK)

BOK was established in 1993 in collaboration with the Siam Commercial Bank, Thailand under the Company Act and the major objective is to operate commercial banking activities throughout the country with the approval of NRB. The SIAM commercial Bank diluted its holding to the Nepalese citizens in 1998. Its ownership capital structure is General public 91.68%, Organized Institution and Nepalese promoters hold 8.32%. Since its major shares are owned by general public, it is regarded as the Bank of Nepalese promoters. BOK has become a prominent name in the Nepalese banking sector. This bank has today become a land mark in the Nepalese banking sector by being among the few commercial banks. Which is entirely managed by Nepalese professionals and owned by the general public. BOK started its operation in March 1995 with the objective to stimulate the Nepalese economy and take it to newer heights. BOK also aims to facilitate the nation's economy and to become more competitive globally. With the aim of providing banking services at the customer's fingertips, BOK has started Internet Banking and Alert Service. In Internet Banking, BOK provides Customer e-banking (Core, Retail and Bill payment) as well as corporate e-banking facilities (Trading financing and web based Cash Management). This bank has 44 branches and 52 ATMs and its head office is located at Kamalpokhari, Kathmandu. BOK has awarded as Banker of the Year for the year of 2011 from the Banker Financial Times, London.

1.6 Statement of the Problem

Capital formulation and its proper utilization are highly essential for economic development of the country. As the banks and financial institutions have a significant role to play in the economic development of a country, more emphasis should be placed in enhancing deposits from savers and lending to those potential investors/borrowers which require financing from the banks by providing interest to the depositors and charging interest to the borrowers. Generally, when interest provided in deposits is very less, people keep their surplus fund idle. In the same way when interest charge on lending is very high the possible investors will also be unable to borrow funds for investment. Majority of people are in need of money to invest in productive sector and more capital is needed even to use modern technology which can be possible only through the banks. The village money lenders are providing credit on

excessively high interest rate and even collecting deposits in low interest rate. If financial intermediaries like bank and financial institution do not play important role in channeling saving to productive sectors in such situation it will not be possible for capital formulation and to compete in the international market. The general policy and practices followed by Nepal with respect to interest rate changed and offered by banks and financial institutions is a subject of great debate, especially in recent years. When credit becomes more costly and less available, total spending for goods and services falls, businesses cut back production and reduce their income and on the other hand, lending rate of interest must be attractive to the investors so that they will be able to enjoy the benefit by utilizing borrowed funds. This can be possible only when the fund seeking people will be able to earn more than what they pay as interest on borrowing funds. But whether the financial system of Nepal is able to attain such situations or not is a matter of concern for us.

1.7 Objectives of the Study

The primary objective of this study is to identify the structure of the interest rate of commercial banks and its impact on deposit and lending. In order to achieve primary objective, other objectives are highlighted as below:

- To study the interest rate structure on deposits and lending of Nepalese commercial banks (NABIL Bank, Nepal Investment Bank and Bank of Kathmandu).
- To study and analyze the relationship of interest rate on the volume of deposits of commercial banks.
- To study and analyze the relationship of interest rate structure on the volume of lending of commercial banks.
- To study and analyze the relationship of deposit and lending rate of commercial banks.
- To provide suggestions on the basis of findings of the study.

1.8 Research Questions

The problems of this study are specified in the form of following research questions:

- 1) What is the impact on deposit and loan of organization due to interest rate charged and offered by NABIL Bank, Nepal Investment Bank and Bank of Kathmandu?
- 2) What are the various methods that commercial banks in Nepal use to calculate the interest rate they charged to borrowers and paid to depositor?
- 3) What are the other major qualitative factors that shape the interest rate in commercial banking sectors?

1.9 Research Hypothesis

A hypothesis is a conjectural statement of the relation between two or more variables. It consists of decision rules required for drawing probabilistic inferences about the population parameters. By testing the hypothesis, we can find out whether it deserves the acceptance or rejection of the hypothesis. Generally, two hypotheses are set up at one time. If one of the hypotheses is accepted then other is rejected and vice versa. The following hypotheses are used to analyze the data:

- 1) Is there any significant correlation between interest rate and deposits of commercial banks?

Null hypothesis, H_0 : $\rho=0$ i.e. interest rate provided on deposits of commercial banks are not correlated

Alternative Hypothesis, H_1 : $\rho \neq 0$ i.e. interest rate provided on deposit and deposit amount of commercial banks are correlated

- 2) Is there any significant correlation between interest rate and lending of commercial banks?

Null hypothesis, H_0 : $\rho=0$ i.e. interest rate charged on lending and lending amount of commercial banks are not correlated.

Alternative hypothesis, H_1 : $\rho \neq 0$ i.e. interest rate charged on lending and lending amount of commercial banks are correlated

3) Is there any significant correlation between interest rate of deposit and lending of commercial banks?

Null hypothesis, h_0 : $p=0$ i.e. interest rate provided on deposit and charged on lending of commercial banks are not correlated.

Alternative hypothesis, h_1 : $p \neq 0$ i.e. interest rate provided on deposit and charged on lending of commercial banks is correlated.

1.10 significance of the study

This study is mainly conducted to know about the interest rate structure of commercial banks of Nepal and to know its impact on deposit and loan. So it helps to analyze the interest rate structure of commercial banks in Nepal and try to develop some ideas to know whether it influences deposits and lending. Capital formulation and its proper utilization are highly essential for economic development of the country. As the banks and financial institutions have a significant role to play in the economic development of a country, more emphasis should be placed in enhancing deposits from savers and lending to those potential investors/borrowers which require financing from the banks by providing interest to the depositors and charging interest to the borrowers. Very few number of research work has been found in this topic. Hence, it is hoped that the finding of the study to some extent will help the policy makers to make strong policy regarding interest rate charged on deposits and lending in Nepalese context. Similarly, it can be fruitful resource for teachers, students, researchers and academicians in abstracting some useful information about interest rate, deposits and lending.

1.11 Limitations of the study

The study is limited by the following steps:

1. Reliability of study depends upon the secondary data.
2. As the samples have been drawn at random for convenience there may exist some sampling errors and the sample size may not be sufficient to generalize the finding.
3. Result is drawn considering five years' data.

4. The samples are taken only from commercial banks; other financial intermediaries are not included in the study.

5. The deposit amount and lending amount of the commercial banks are influenced by several factors. However, this study mainly focuses on the interest rate.

1.12 Organization (Plan) of the study

This study is divided into 5 chapters. prior to the body of the thesis several pages of preliminary materials such as title page , approval sheet, viva sheet , acknowledgments, table of contents, list of figure, list of table, abbreviation used etc have been presented.

Chapter I: Introduction

The first chapter consists of introduction of the study, background of the study, history of banking development in Nepal, meaning of commercial bank, the interest rate strategies of NRB, statement of the problem, objectives of the study, research hypothesis, significance of the study, and limitations of the study.

Chapter II: Review of Literature

This chapter includes review of the literature, which was obtained during the review of books, articles, journals, reports and other relevant materials.

Chapter III: Research Methodology

This chapter deals on research design, population and sample size, source of data, data collection and processing techniques and analysis of tools.

Chapter IV: Data Presentation and Analysis

This chapter attempts to analyze and evaluate data with the help of analytical tools and interpret all the results and findings.

Chapter V: summary, Conclusion and Recommendations

This chapter deals with all the results and the conclusions and recommends some suggestion on the basis of the data analyzed.

CHAPTER II

REVIEW OF LITERATURE

2.1 Introduction

Review of literature means reviewing research studies or other relevant propositions in the related area of the study so that all the past studies, their conclusions and deficiencies may be known and further research can be conducted. It is an integral and mandatory process in research works. Generally speaking, literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. In this chapter, attempts have been made to review the literature related to interest rate structure and its impact on deposit and loan of commercial banks in Nepal. Both the theoretical aspect as well as finding of the previous studies has been included here so as to identify the broad aspects of interest rates structure and its impact on deposit and loan. This chapter is going to show the problems posed by different researchers and writers and the solutions and strategies they exerted.

2.2 Concept and Meaning of Interest Rates

A rate which is charged or paid for the use of money is known as interest rate. An interest rate is often expressed as an annual percentage of the principal. It is calculated by dividing the amount of interest by the amount of principal. For example, if a lender (such as bank) charges a customer Rs. 90 in a year on a loan of Rs.1000, then the interest rate would be $90/1000*100\%=9\%$. Conceptually, interest is both a payment and receipt for the use of money. Therefore it can be considered from the above two points. If the interest is paid, it is considered as “cost” whereas, if the interest is received, it is considered as “return”. Since, money can return over a period of time, interest rates are often considered as an expression of the time value of money.

Interest is compensation to the lender, for a) risk of principal loss, called credit risk; and b) forgoing other investments that could have been made with the loaned asset. These forgone investments are known as the opportunity cost. Instead of the lender using the assets directly, they are advanced to the borrower. The borrower then enjoys the benefit of using the assets

ahead of the effort required to pay for them, while the lender enjoys the benefit of the fee paid by the borrower for the privilege. In economics, interest is considered the price of credit.

2.3 Functions of the interest rate in the Economy

The interest rate performs various important functions in the economy. Some of them are as follows:-

- It helps to flow the current saving to investment to boost up the economy.
- It helps to bring the balance between the supply and the demand for money.
- The government can use interest as an important tool to adopt policy through the volume of saving and investment.

2.4 Theories of determining interest rate

There are different theories of interest rate defined by different economist and they are as follows:

2.4.1 Classical theory of interest rates

Irving fisher analyzed the determination of the level of the interest rate in an economy by inquiring why people save (that is, why they do not consume all their resources) and why others borrow. That economy contains only individuals who consume and save with their current income, firms that borrow unconsumed income in loans and invest, a market where savers make loans of resources to borrowers, and projects in which firms invest. The interest rate on loans embodies no premium for default risk because borrowing firms are assumed to meet all obligations.

Decisions on saving and borrowing

Saving is the choice between current and future consumption of goods and services. Individuals save some of their current income in order to be able to consume more in the future. A major influence on the saving decision is the individual's marginal rate of time preference, which is the willingness to make some consumption now for more future

consumption. Individuals differ in their time preference. Some people may have a rate of time preference that leads them to forgo current consumption for an increase of 10 %, in their future consumption, while others might save only if their future consumption possibilities rise by 20%.

Another influence on the saving decision is income. Generally, higher current income means the person will save more, although people with the same income may have different time preferences. The third variable affecting savings is the reward for saving, or the rate of interest on loans that savers make with their unconsumed income. Interest is what borrowers pay for the loans, and it makes greater future consumption possible. As the interest rate rises, each person becomes willing to save more, given that person's rate of time preference.

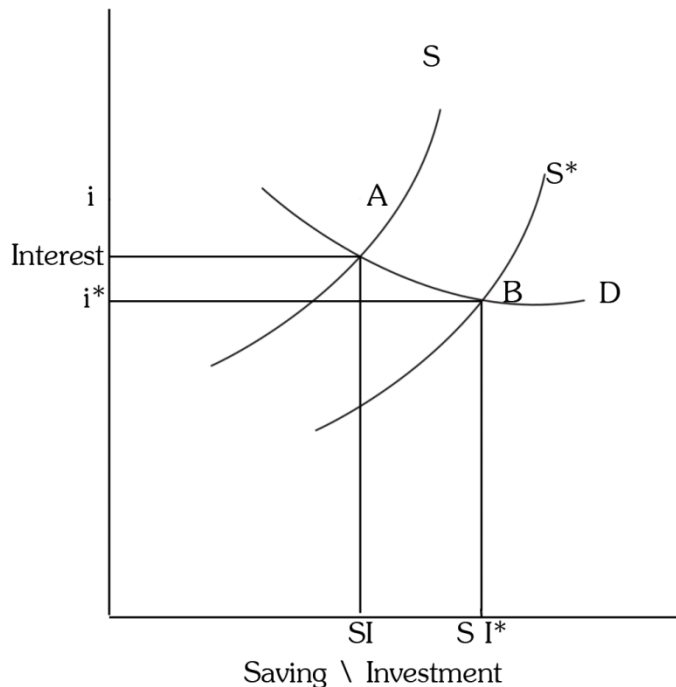


Fig: 2.1 The results of a shift in the supply of Saving

Here in this figure interest is measure in Y-axis and the saving and investment amount in X-axis. The relationship between total savings and the interest rate is graphed as the upward sloping supply function S . It shows that equilibrium rate of interest, labeled I , occurs at the intersection of the demand and supply curves, D and S . The equilibrium level of savings (which is the same as the equilibrium level of borrowing and investment) is given as SI .

Clearly, Fisher's theory emphasizes that the long-run level of the interest rate and the amount of investment depend on a society's propensity to save and on technological development. Now consider circumstances where individuals suddenly grow more willing to save, which amounts to a fall in the marginal rate of time preference remaining all other factors the same. Then the supply function would shift downward from S to S^* and savings would be higher at every level of the interest rate. The equilibrium interest rate would also fall, from i to i^* . Total investment would rise, from SI to SI^* , as firms would get more funds and more projects would be profitable, at any interest rate.

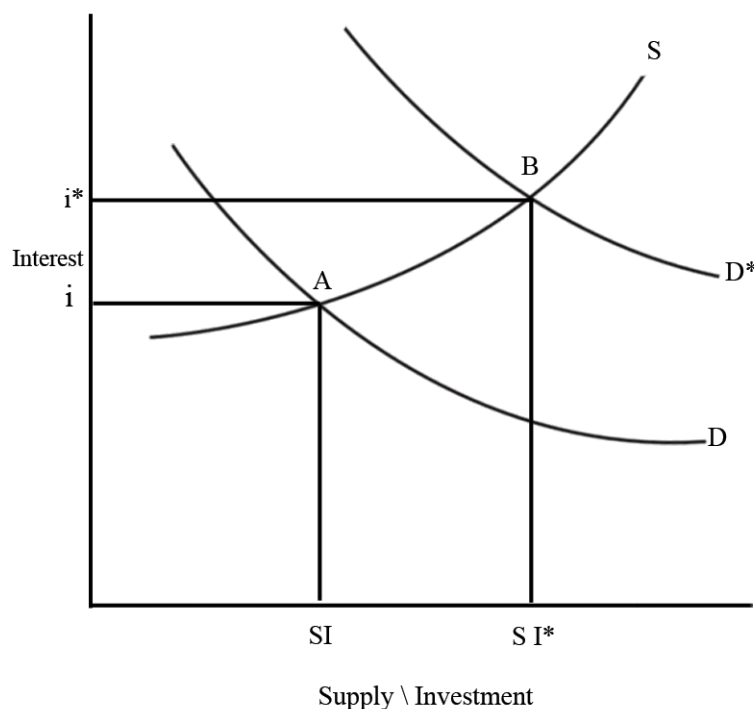


Fig: 2.2 The result of a shift in the demand for Saving

Let us now consider the effects of a sudden increase in technological capability, which make the production cheaper. With no change in any other relevant variable, lower production costs mean more gain on investments and a higher marginal productivity of capital. This results in the upward shift of demand function 'D' to 'D*' due to the increase in firms' desired investment and borrowing through loans, at any level of the interest rate. That shift (from D to D*) prompts a rise in the equilibrium interest rate from i to i^* , and an increase in equilibrium borrowing and investment from SI to SI^* .

2.4.2 The Loanable funds theory of interest

The Swedish economist Knut wicksell (1851-1926), in an effort to explain the effect of the interest rate on commodity prices, made a distinction between the neutral interest rate and the market interest rate. According to Wicksell, the neutral interest would be the rate of interest where the economy would be in equilibrium interest rate.

There is a certain rate of interest on loans which is neutral in respect to commodity prices, and tend neither to raise nor to lower them. This is necessarily the same as the rate of interest which would be determined by supply and demand if no use were made of money and all lending were effected in the form of real capital goods. It comes to much the same thing to describe it as the current value of the natural rate of interest on capital.

In Wicksell's theory, the market interest is the rate of interest in the loan market, as determined by the supply of and demand for money. By increasing (restricting) their loan supply, banks would be in a position to lower (raise) the market interest rate. If, for instance, the market rate falls below the natural rate (due to banks increasing their supply of loans), the economy would expand and, if output exceeds its potential level, prices would rise. If, however, the market rate of interest exceeds the economy's neutral interest rate, output would contract and prices would decline.

While the interest rate in financial markets is determined by demand for and supply of money, the neutral interest rate is set by real factors and money as such has nothing to do with it. Wicksell wrote:" Now if money is loaned at this same rate of interest (That is , the neutral interest rate), it serves as nothing more than a cloak to cover a procedure which , from the purely formal point of view, could have been carried on equally well without it. The conditions of economic equilibrium are fulfilled in precisely the same manner.

"Against the background of wicksell's distinction between the neutral interest rate and the market interest rate, the theory of loanable funds was established. It explains why the market interest rate can deviate from the neutral interest rate which is the case when banks increase the stock of money.

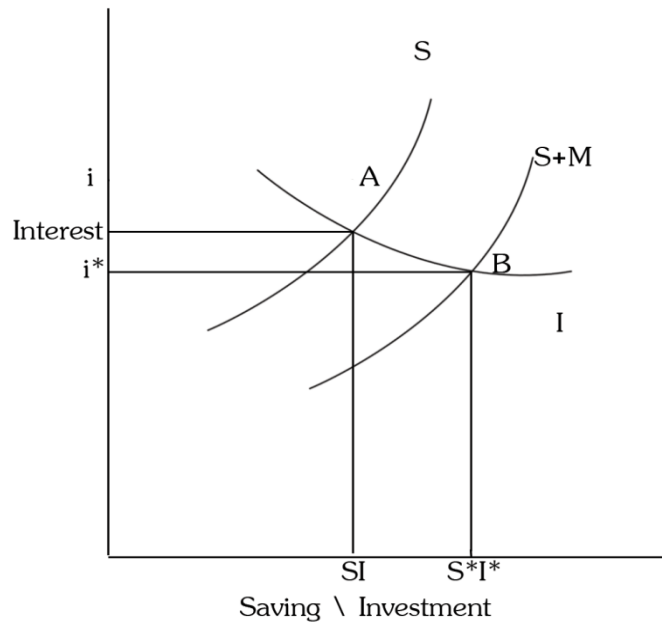


Fig: 2.3 Increasing the supply of money

Here in this figure interest is measure in Y-axis and the saving and Investment in X-axis. Let the supply of savings(S) equals the demand for investment (I), which is represented in point A. The neutral market rate and market interest rates are represented by i , and savings and investment amount to S and I respectively. Now banks increase the stock of money By M (through lending money). As a result, the total supply of loanable funds that is $S+M$ moves S to the right, lowering the market interest rate to i^* . In the new market equilibrium, which is reached in point B, savings amount to S^* and investment to I^* .

Alternatively, the demand for present goods may rise as people prefer to hold more real balances (H). Starting from the equilibrium point A, the demand schedule for present goods would move to the right By H. The shift reflects and increases in peoples' time preference, as less present goods are now offered for future goods. As a result, the market interest rate and the neutral interest rate rise from i to i^* , with savings and investment rising to S^* and I^* . Compared with and increase in the stock of money (created via credit expansion), point B represents a long - run equilibrium.

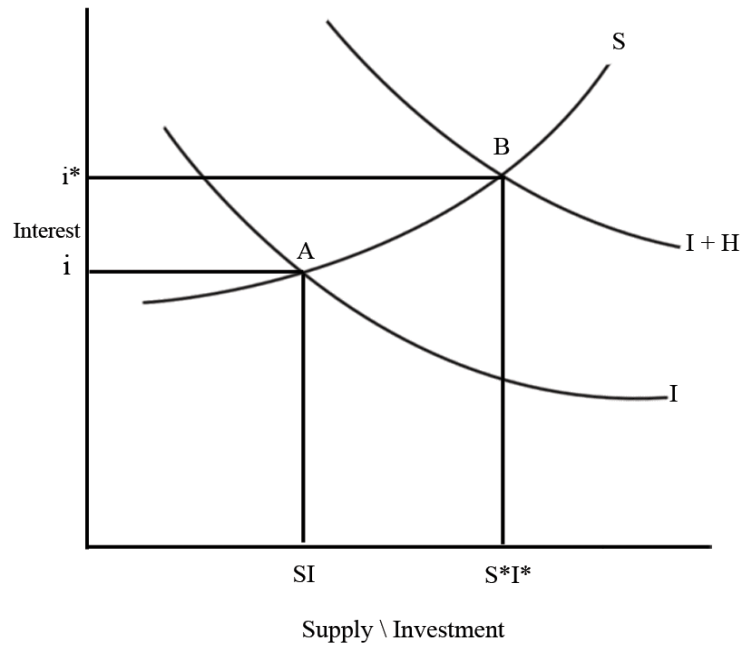


Fig: 2.4 Increasing the demand for money

2.4.3 The liquidity preference theory of Interest rate

The liquidity preference theory, originally developed by John Maynard Keynes, analyzes the equilibrium level of the interest rate through the interaction of the supply of money and the public's aggregate demand for holding money. Keynes assumed that most people hold wealth in only two forms; "money" and "bonds." For Keynes, money is equivalent to currency and demand deposits, which pay little or no interest but are liquid and may be used for immediate transactions. Bonds represent a broad Keynesian category and include long-term, interest-paying financial assets that are not liquid and that pose some risk because their prices vary inversely with the interest rate level. Bonds may be liabilities of governments or firms.

Demand, supply

The public holds money for several reasons. Although money pays no interest; the demand for money is a negative function of the interest rate. At a low rate, people hold a lot of money because they don't lose much interest by doing so and because the risk of a rise in rates may be large.

With a high interest rate, people desire to hold bonds rather than money, because the cost of liquidity is substantial in terms of lost interest payments and because a decline in the interest rate would lead to gains in the bonds' values. In this figure the negative linkage between the interest rate and the demand for money appears as curve D, which relates the interest rate to the amount of money in the economy, given the level of income and expected price inflation. The money supply is not affected by the level of the interest rate so the supply of money appears in the vertical line; MS and the line above the MS indicate a quantity not varying with the interest rate. The equilibrium occurs when the total demand for money equals to total supply of money and the interest rate of i is determined.

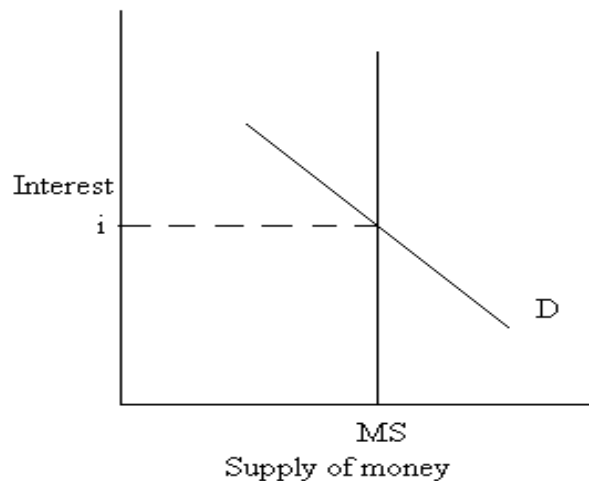


Fig: 2.5 Equilibrium Condition

Liquidity effect

This effect represents the initial reaction of the interest rate to a change in the money supply. With an increase in the money supply, the initial reaction should be a fall in the rate. The reason for the fall is that a rise in the money supply represents a shift in the supply curve. With demand unchanging, the increase in the money supply amounts shift the supply curve MS to the right i.e. MS* and causes a fall in the equilibrium interest rate, from i to i^* .

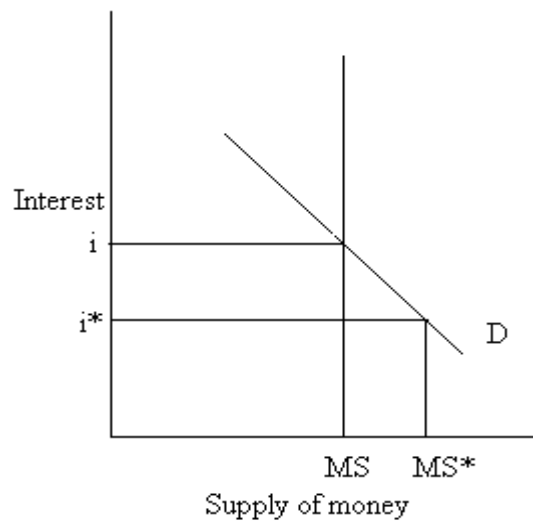


Fig: 2.6 The Liquidity effect of an increase in the money supply

Income effect

It is well known that changes in the money supply affect the economy. A decline in the supply would tend to cause a contraction. An increase in the money supply, generally speaking, is economically expansionary: more loans are available and extended, more people are hired or work longer, and consumers and producers purchase more goods and services. Thus, money supply changes can cause income in the system to vary. Despite the income effect by indication the shift of the demand function to the right i.e. D to D*, brought on by the increase in the money supply causes a rise in the equilibrium interest rate i.e. i to i^* .

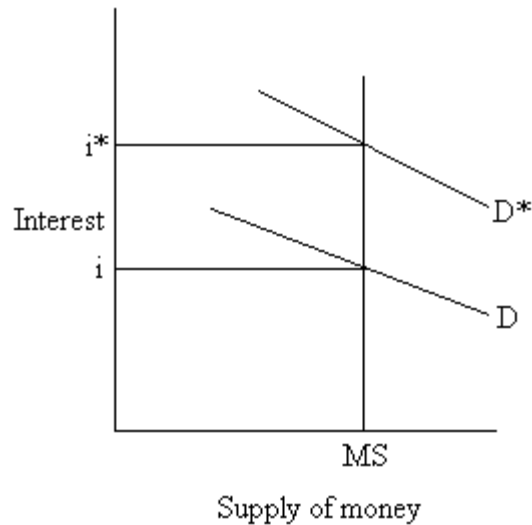


Fig: 2.7 The income effect of a change in the money supply

2.4.4 The rational expectation theory

Expectation theory, also termed expectation, is one of the most common economic theories of term structure. It comes in several variations, the most widely known being the unbiased expectation theory. This theory is new for the financial markets and institutions. It builds on a growing body of research evidence that “the money and capital market are highly effective institution on digesting new information affecting rates and security prices”. This expectation theory assumes that equilibrium interest rate depends upon the change in the expectation of the investors regarding future security prices and return. This decision of the investor towards the borrowing and lending funds come from all available new information. When new information appears about investment, saving or the money supply, investors being immediately to translate the new information into decision to borrow and lend funds. So, rapid is the process of the market digesting new information that security prices and interest rate will be equal to current period interest rate. In other words, the knowledge of past interest rate will not be reliable forecast of future interest rate. In a perfect efficient market, it is impossible to win excess return continuously by trading on publicly available information.

The important assumption and conclusion of the rational expectation theory are (1) the price of securities and interest rates should reflect all available information and the market uses all

this information to establish a probability distribution of expected future prices and interest rates (2) change in rates and security prices are correlated only with unanticipated information (3) the correlation between rates of return in successive time periods is Zero (4) expectation concerning future security prices and interest rates are formed rationally and efficiently.

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

We can illustrate the foregoing points about that rational expectation theory of interest by modifying the loanable funds theory of interest so that its demand and supply schedules reflect not just actual demand and supply but also the expected demand for and supply of loanable funds that will prevail in the next future time period. The supply of loanable funds is assumed to be the same in both time period ($S_o=S_f$).

Now, imagine that during the current period, the government makes an unexpected announcement of its increased need to borrow more money in future period 'F' but as viewed by borrowers and lenders today in time period 'o'. In this case, the equilibrium interest rate in the current period will not be 'I_o', but rather 'I_e', where the expected demand curve 'D_e' intersects the actual supply curve 'S_o'. The equilibrium quantity of loanable funds traded in the current period then will be 'C_e' not 'C_o'. This is because, according to the rational expectation theory, borrowers and lenders will act as rational agents, using all the information they possess (including expected events) to price financial assets today. When the future period arrives, the equilibrium interest rate will rise to rate 'I_f' then quantity of

loanable funds traded will be 'Df'. The equilibrium rate move upward because the demand for loanable fund in period 'f' is more than expected future loanable funds demanded as seen by market participants in period 'o'. Suppose, on the other hand, the actual loanable funds demanded in period 'F' increases upward and beyond 'Do' but by a smaller amount than was anticipated by investors in the market in period 'o'. Demand schedule 'Df' would then fall somewhere between 'Do' and 'De'. The equilibrium interest (with supply curve unchanged) would be lower than i.e. laying somewhere between 'Io' and 'Ie'.

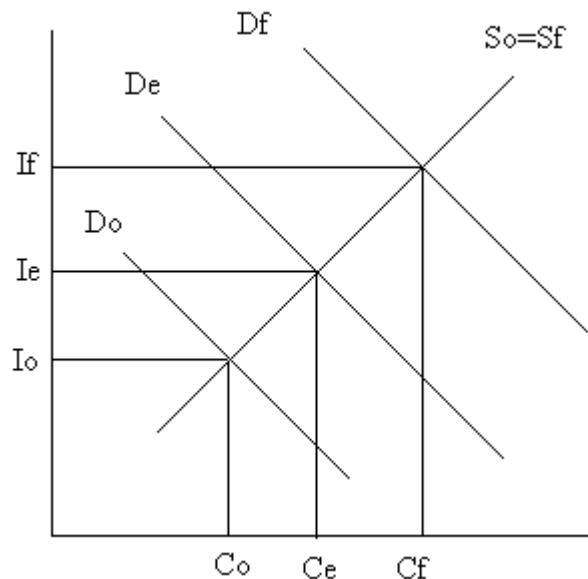


Fig: 2.8 Equilibrium Interest Rates under Rational Expectation Theory

2.5 Factors affecting the difference in interest rates

A rate which is charged or paid for the use of money is known as interest rate. In real world, different financial institutions quote different interest rate. It means that the same type of instrument carries different interest rate at the same time. There are various factors that affect the difference in interest rates. Following are the important;

Credit or default risk- Credit risk refers to the risk that a borrower will default on any type of debt by failing to make payments which it is obligated to do. In other words, the event in which companies or individuals will be unable to make the required payments on their debt

obligations. To mitigate the impact of credit or default risk, lenders often charge rates of return that correspond to the debtor's level of default risk. The higher the risk, the higher the required return, and vice versa.

Liquidity risk - Liquidity is an asset's ability to be sold without causing a significant movement in the price and with minimum loss of value. Liquidity also refers both to a business's ability to meet its payment obligations, in terms of possessing sufficient liquid assets, and to such assets themselves. An asset is liquid if it can be turned into cash quickly without loss. But the risk that the lender might not be able to get cash on short notice is called the liquidity risk. The difference in interest rate due to liquidity risk is called liquidity spread.

Marketability risk- Marketability is the ability of a security to be bought and sold. If there is an active marketplace for a security, it has good marketability. Marketability is similar to liquidity, except that liquidity implies that the value of the security is preserved, whereas marketability simply indicates that the security can be bought and sold easily. Marketability risk deals with the degree of difficulty in being able to convert a financial into cash at its most recent transaction price or very close to it which is the major cause for the difference in interest rate.

Call or prepayment risk- Call and prepayment risk is concerned with the holders having their bonds paid off earlier than the maturity date. This is due to decreasing market rates, which cause the issuer to call the bonds.

Servicing cost – service cost also affects the difference in interest rate. The process of collecting interest and principal payment providing accurate records or monitoring the ongoing credit position of the borrowing involves the operating cost. If the operating cost is higher then the lender charges the higher interest rate and vice-versa. The difference in servicing cost from one institution to another causes difference in interest rate.

Exchange Rate Risk- Exchange risk is a financial risk posed by an exposure to unanticipated changes in the exchange rate between two currencies. It is also known as foreign exchange rate risk or currency risk. Investors and multinational businesses exporting

or importing goods and services or making foreign investments throughout the global economy are faced with an exchange rate risk which can have severe financial consequences if not managed appropriately. The primary risk for the borrower is the devaluation of the domestic currency. This result in an unexpected cost on the international loans, since the loan have to be repaid in the foreign currency that has risen in value relative to the domestic currency.

Taxability- A tax may be defined as a pecuniary burden lay upon individuals or property owners to support the government. Financial claim income is typically subject to taxation. Since the value of the financial claim is based on it's anticipate cash flow. Higher the tax, lower will be the cash flow and higher the interest rate and vice-versa.

2.6 concept of Deposit

An arrangement whereby an individual or organization may place cash for the safekeeping in a bank, discount house or financial institution is known as deposit. It is simply a type of asset. Commercial Bank Act 2031 defines 'deposits' as the amount deposited in a current, saving or fixed accounts of a bank or financial institution. The deposits are subject to withdrawals by means of cheque on a short notice by customers. Bank deposits arise in two ways. When the banker receives cash, it credits the customer's account, it is known as a primary or a simple deposit. People deposit cash in the banking system and thereby convert one form of money, cash into another form, bank money. They prefer to keep their money in deposit account and issue cheques against them to their creditors.

There are various types of deposit available in our country mainly current deposit, saving deposit and fixed deposit. The saving and fixed deposit not only provides safety to the customer money besides, it provides certain interest rate. Whereas, current deposit only provide safety and the customer can withdraw amount at any time they required. The account holders retain rights to their deposit, although restrictions placed on access depend upon there terms and conditions of the account provided by the financial institution. There are several terms and condition regarding the amount of deposit, numbers of withdrawal, interest rate etc.

2.7 Types of Deposit

There are mainly three types of deposit is in practice in banks. They are:-

Current deposit

Current bank account is opened by businessmen who have a number of regular transactions with the bank, both deposits and withdrawals. It is also known as demand deposit. Current account can be opened in co-operative bank and commercial bank. In current account, amount can be deposited and withdrawn at any time without giving any notice. It is also suitable for making payments to creditors by using cheques. Cheques received from customers can be deposited in this account for collection. A current deposit is a running account in the banking heritage offering various flexible payment methods to allow customers to distribute money directly to others. As these deposit are payable on demand, banker is obliged to keep larger cash reserves than are needed in the case of fixed and saving deposits. These types of account are just a facility offered by the bank to its customers so, such deposit doesn't yield an interest return.

Saving deposit

An account used to deposit money at a bank, savings and loan associations, credit union and mutual savings banks and earn interest on the account over time is known as saving account. The customer can add or remove money from the account by visiting the bank. Usually the customer can add or withdraw funds at any time; there is no cost to do so. Banks may require a minimum amount to open or maintain the account. This type of account is often the easiest account for the customer to open. Because of its simplicity, it is the first account for many people and is used by all ages. According to Commercial Bank Act 2031 saving account means "An account of amount deposited in a bank for saving purposes". Saving accounts are maintained by a customer with a depository institution for the purpose of accumulation funds over a period of time. Funds deposited in a savings account may be withdrawn only by the account owner or a duly authorized agent, or on the owner's nontransferable order. The bank fixes the minimum and maximum amount to be withdrawn through a cheque from the deposit. The account may be owned by one or more person. Funds can be deposited or

withdrawn at will, and most savings accounts pay interest from day of deposit to day of withdrawal.

Fixed deposit

The amount deposited for the fixed period of time is called fixed deposit. It is generally opened by such person or institution that doesn't need money frequently or to earn the higher interest. And as the money is kept in bank for certain period of time it is also called time deposit. A fixed deposit is a money deposit at a bank that can't be withdrawn for a certain "term" or period of time. After the maturity time the customer can renew or withdraw the money. It is necessary to have saving or current deposit of a customer before opening a fixed deposit. A deposit of funds in a savings institution under an agreement stipulating that (a) the funds must be kept on deposit for a stated period of time, or (b) the institution may require a minimum period of notification before a withdrawal is made. The fixed deposit has a specific, fixed term often three months, six months, or one to five years. In exchange for keeping the money on deposit for the agreed on term, institutions usually grant higher interest rate than they offer in saving account. Generally speaking, the longer term the better the yield on the money. So, if the term is higher then the interest provided by the saving institute is higher.

2.8 Importance of Deposit

An arrangement whereby an individual or organization may place cash for the safekeeping in a bank, discount house or financial institution is known as deposit. It is simply a type of asset. The deposit plays a very important role in the economy. Various individual opens the deposit account and the financial institution can use that accumulated amount in various productive sectors to gain the profit. Deposit helps in collecting the small quantity of amount from different individual and mobilizes this amount in various investment sectors. Ultimately, it generates employment in various fields that contribute in the increment of the income of the people. Finally, it contribute in improve living standard as well. The GDP of the country increases. Deposit includes the idle money of the public, bank being the mediator to accept this sort of money and help to channelize this in productive sectors. There is a great need of such deposit in the developing countries.

2.9 concept of Lending (Credit)

The word “credit” means “trusting”. Credit is the trust which allows one party to provide resources to another party where that second party does not reimburse the first party immediately, but instead arranges either to repay or return those resources (or other materials of equal value) at a later date. Credit is extended by a creditor, also known as a lender, to a debtor, also known as a borrower. Credit, in commerce and finance, is a term used to denote transactions involving the transfer of money or other property on promise of repayment, usually at a fixed future date. The transferor thereby becomes a creditor, and the transferee, a debtor. Banks loan are classified as a) loan advances b) overdraft c) cash credit d) Discounting of bills and so on. But besides this, the other forms of credit are: Bills of exchange, Cheques, Drafts, Promissory Note, Travelers cheque, Treasury Bills, Letter of Credit, Book credit etc.

There are various types of credit existed and they are;

- Bank credit
- commerce
- consumer credit
- Investment credit
- Public credit
- Real estate
- International

The resources provided may be financial, or they may consist of goods or services (e.g. consumer credit). Credit does not necessarily require money. The credit concept can be applied in barter economies as well, based on the direct exchange of goods and services. However, in modern societies credit is usually denominated by a unit of account (standard monetary unit of measurement of value/cost of goods, services, or assets).

2.10 Factors Affecting the Volume of Credit

There are various factors that affect the volume of credit .Some of the important factors are as follows:-

Rate of Return-If the rate of return is high, people inclined to invest more. So there is positive relationship between rate of return and volume of credit. Higher return refers to higher profit so people become able to afford higher rate of interest along with timely repayment of loan.

Credit Rate- It is one of the major factors that affect the volume of credit. Volume of credit and rate of return has negative relationship i.e. if the rate is higher then the volume of credit is lower and vice-versa.

Investment opportunity- There is positive relationship between the volume of credit and the investment opportunity. If the investment opportunity in the country is high then the people will be inclined to invest more that will increase the volume of credit.

Basic infrastructure- Infrastructure refers to transportation, communication, availability of raw material, marketability etc. If these entire basic infrastructures are abandoned then there will be the high chance of investment that will contribute in the higher volume of the credit facility.

Pace of Financial Development- If the pace of financial development is splendid then automatically the volume of credit will increase. It creates positive impacts on the credit facility of any country. If there are enough banking facilities to provide loans in easy terms, the volume of credit may be high.

Political condition- As it is well known that in stable political situation any work can be carried out easily. In case of credit too, if the political situation is stable then the credit volume will be high, whereas, in instability, the volume of credit is low.

2.11 Term Structure of Interest Rate

The term structure of interest rates is the relationship between the yield to maturity and the time to maturity for pure discount bonds. For example, the yield on a one-year bond might be 4% while the yield on a 30-bond is 6%. The yields differ for several reasons, including differences in risk for short-term and long-term investments and differences in expectations about future interest rates. The term structure of interest rates is of fundamental importance in macroeconomics because monetary policy affects short-term interest rates, but investment depends on long-term interest rates. Theories about the term structure of interest rates thus become theories about the connection between monetary policy and investment.

2.11.1 Pure Expectation Theory

The simplest of interest rate theories is the pure expectations theory which assumes that the term structure of an interest contract only depends on the shorter term segments for determining the pricing and interest rate of longer maturities. The pure expectations theory is the simplest of interest rate theories. It assumes that yields at higher maturities (such as that of 5, 10, or 30 year bonds), correspond exactly to future realized rates, and are compounded from the yields on shorter maturities. In other words, buying a ten year bond is equal to buying two five year bonds in succession; you're as safe in a ten-year as in a five-year bond. At a cursory consideration, this should indeed be the case.

Limitations in the pure expectations theory

It is not hard to see that the pure expectations theory is similar to a pure intellectual exercise. It is rare to achieve the perfect results of this theory where today's predicted rates over different maturities exactly match future realized spot rates. In addition, although the theory explains the simultaneous movement of rates, and also the relationship between the long and short terms well, it does not say anything about why the yield curve has an upward slope most of the time, that is, why longer term maturities command a higher interest rate in comparison to the short term. Since we noted that all maturities are equivalent in function, the slope is equally likely to be upwards as downwards (in tune with the boom-bust cycle, and rising and falling future rate expectations.), but this is not the case. Clearly, investors

attach a higher risk to longer maturities due to some intrinsic factor not explained or predicted by the pure expectations theory.

2.11.2 Liquidity Preference Theory

This theory introduces the concept of a risk or liquidity premium for predicting future rates. It posits that, while the term structure of interest rate contracts are substitutable for the most part for different maturities (i.e. a ten-year bond is partially a substitute for two consecutive five-year bonds purchased), there is a risk factor that leads to the yield curve to be upward sloping most of the time. Thus, even if the interest rate expectations were the same across the entire spectrum of maturities, the yield curve would still be sloping upwards due to the inherent risk of acquiring a debt instrument at a longer maturity.

The risk premium is the result of lesser liquidity of long maturity interest rate contracts, as well as the higher risk of default the more we delay the date the repayment. In a two-way relationship, the lower marketability of long-term instruments leads to their lower liquidity, and that also contributes to a higher interest rate on a consistent basis.

Liquidity preference theory is essentially an improved version of the pure expectations theory. It maintains the former's postulate that different maturities are substitutable, but adds that they are only partially so. There is a small qualitative difference between long and short term debt instruments, quantified in the risk premium, which leads to the sloping upward curve and the observed phenomenon of higher rates at higher maturities most of the time.

2.11.3 The segmented-Markets or Hedging -pressure Argument

Market segmentation theory introduces a different term premium concept. In this theory, individuals have strong maturity preferences, thus bonds of different maturities trade in separate markets. This means that markets for bonds of different maturities are completely separated and segmented and cannot substitutable. As a result, the demand and supply of bonds of particular maturity are little affected by the bonds of neighboring maturities' prices and generally determined independently. We can say that borrowers have particular periods for which they want to borrow and lenders have particular holding periods in mind. Investors have to decide whether they need short term or long term instruments. In this situation, we

know that investors prefer their portfolio to be liquid. Thus, they will prefer short term instruments to long term instruments. This results so that short term instruments will receive higher demand in the market. This higher demand to the short term instruments will cause higher prices and lower yield.

2.11.4 Preferred Habitat Theory

To combine the market segmentation theory with the better aspects of the liquidity preference theory, the preferred habitat theory was developed. Both the expectations theory and the market segmentation theory fail to explain some observed phenomena in the market satisfactorily. The preferred habitat theory is a combination, a synthesis of those two theories created in order to explain the interest rate- maturity term relationship.

The preferred habitat theory posits that although investors prefer a certain segment of the market in their transactions based on term structure (the yield-maturity plot of the debt instrument showing which yield matches which maturity, another term for the yield curve) and risk, they are often prepared to step out of this desired to segment if they are adequately compensated for the decision. But they will never prefer a long term instrument over a short term contract with the same interest rate. Thus, maturity structure does lead to some fundamental differences in investor behavior, but there is always a price at which all maturities will provide the same attractiveness to a potential investor. In other words, a sufficiently high interest rate will lead market actors to attach greater value to a less-preferred, unusual maturity, leading to the usual upward sloping shape of the yield curve. The market is segmented, but only partially so, interest rates do add up over longer maturities, but once again, only in part.

The major conclusions of the preferred habitat theory are as follows:

1. If the yield curve slopes upward, investors do not expect any major changes in interest rates. Rates may go higher, but they may also remain the same, with the upward slope reflecting the risk premium. In other words, the prevailing conditions are expected to continue (provided that the economy is growing).

2. If the yield curve is sloping downward, short interest rates are expected to fall. Since at higher maturities we'd expect interest rates to be higher, but get them lower in a downward slope, the only possible conclusion is that rates will fall so much that they will be lower than today's rates even with the risk premium added.

3. If the yield curve is flat, the market is expecting future rates to come down slightly. Interest rates must fall in the future, so that the yield curve may remain flat even with the risk premium added on top of future prices.

2.12 Review of Related Studies

Several studies have been conducted by different researchers on the topic. Some of them as are supposed to be relevant for the justification of need and importance of this study is presented below:

Mr.Rajbhandary (1998) conducted a study entitled “**The Interest Rate Structure of Commercial Banks in Nepal**”. The objective of his study was to show the relation of interest rate with saving and fixed deposits; with loans and advances and with interest earning (i.e. interest received on loan minus interest paid on deposit).

His analysis concludes that the time deposits are positively and significantly correlated with the interest rates. There is significant correlation between the saving deposits and the rate of interest. Fixed deposit is more sensitive to the interest rate revision done by NRB. The correlation between the growth of fixed deposits and the interest rate particularly from 1974 and 1977 is most significant but the relation between interest rate and loan and advances is less significant. Among the entire sector, the private sector seems most sensitive to interest rate change. Most of the loans too correlated positively if absolute cumulative figure are taken. But the growth rate of total loans and advances except investment on government securities is negatively correlated more with the weighted average rate of interest since 1973. The growth of loan to private sector is also negatively correlated with interest rate since 1971. Negative correlation between loans and interest rate meant that loan decrease at higher interest rate and vice versa. The net interest earning is depended upon interest coverage. The total interest received and the total interest paid significantly correlated in the case of both of the banks i.e. Nepal Bank Limited and Rastriya Banijya Bank, the sample organizations of

the study. In his view that NRB can well monitor the credit flow and profits of the commercial banks in Nepal by manipulating the rates of interest. It can manipulate the demand for and supply of money.

Mr.Bhatta (2004) conducted a study entitled “**Interest Rate and its effect on Deposit and Lending**”. The main objective of his study is to examine the relationship between interest rate and deposits, the relationship between interest rate and loans and to present and analyze interest rate structure of various commercial banks in different time period. His study also tried to show the relationship between inflation and interest rate on deposit and lending.

The conclusions drawn by Bhatta are as follows:-

- 1) Deposit rates of all the sample banks under study are in decreasing trend; means that every year deposit rates of sample banks under study have decreased.
- 2) Lending rates of all the sample banks under study are also in decreasing trend; means that every year lending rates of sample banks under study have decreased.
- 3) Analysis shows that interest rates on lending are far higher than deposit rates of sample banks. The correlation coefficient between these two variables (deposits rate and lending rate) of sample banks comes highly positive.
- 4) The simple correlation coefficient between deposit rate and deposit amount of sample banks were highly negative. But out of them, correlation coefficient analysis of one sample bank is found to be negative. It means that in that case the theory doesn't match the analysis. So, writer concludes that case the result appears in that study was different than the theory.
- 5) The correlation analysis between lending rate and lending amount of all sample banks under study comes highly negative. This relation between two variables (lending rate and lending amount) of sample banks matches with the theory which says with the increase in lending rate, lending amount decreases and vice-versa. So, he concluded that lending rate is the most important determinant of loan and advances of all commercial banks. This makes clear that borrower's seem more interest conscious.

Another study was made on the topic “**Interest rate and its relation with Deposit, Lending and Inflation in Nepal**” by Mr.Parajuli in 2005. In this study, the disseminator tries to portrait the relation of interest rate with deposit and lending amount (i.e. existence of substitution effect). The findings drawn by Mr.Parajuli from his study were as follows:-

1) The interest rate on both deposit and lending of all the sample banks are found to be in decreasing trend. Theoretically, there is positive relationship between saving amount and saving interest rate but here negative relationship is found. It states that there is no substitution effect in Nepalese financial market.

2) Analysis of fixed deposit amount and fixed interest rate shows negative relationship except RBB and NBL. Theoretically, there is negative relationship between lending interest rate and lending amount. In this study for the 5 sample banks except NBL have negative correlation between these two variables.

3) The relationship between interest rate on deposit and inflation rate is positive. Similarly the correlation between interest rate on lending and inflation rate is found to be moderately positive. He also concluded that the spread between deposit interest rate and lending interest rate is in decreasing trend.

2.13 Research Gap

After reviewing those related literature we gain various knowledge about the required topics which certainly provide guideline to this study.

Interest is a rate which is charged or paid for the use of money is known as interest rate. An interest rate is often expressed as an annual percentage of the principal. It is calculated by dividing the amount of interest by the amount of principal. There are various theories related to it. The term structures of interest rate are pure expectation theory, liquidity premium view of yield curve, segmented-marketed or hedging-pressure argument, and preferred habitat theory.

Deposit is an arrangement whereby an individual or organization may place cash for the safekeeping in a bank, discount house or financial institution is known as deposit. It is simply a type of asset. There are mainly three types of deposits and they are current, saving and fixed deposit.

The word “credit” means “trusting”. Credit is the trust which allows one party to provide resources to another party where that second party does not reimburse the first party immediately, but instead arranges either to repay or return those resources (or other materials of equal value) at a later date.

This study is based on the deposit and loan of 3 commercial banks (NABIL, NIBL and BOK). It study the relationship between interest rate on deposit amount with deposit amount, interest rate on loan with loan amount. This research will definitely provide good guidelines to the future researcher to know about the impact of interest on deposit and loan amount.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology refers to the methods that are used in conduction research or performing research operations. In other words, research methodology are those methods, which are used by the researcher during the coursed of studying his/her research problems. Research methodology is a way to solve the research problem systematically. The research methodology is wider term. The research methodology considers the logic behind the methods used in the context of research study and explains why particular method or technique is used. It also highlights about how the research problem has been defined, what data have been collected, what particular method has been adopted, why the hypothesis has been formulated.

With a view to attain the overall objective of examining the interest rate and its impacts on deposit and loan of commercial banks in Nepal, this study attempts to identify the impact of interest rate on deposit and lending of commercial banks in Nepal. To achieve the stated objectives certain methodology should have to be followed which is discussed in this chapter. It provides a description of methods and procedures for collecting and analyzing the data.

3.2 Research Design

Research design is the plan, structure and strategy of investigation conceived so as to obtain answers to the research questions and to control the variances. It is the arrangement of conditions for collection and analysis of data. A research design is a plan for the collection and analysis of data. It presents a series of guide posts to enable the researcher to progress in the right direction in order to achieve the goal. The research design asks, what approach to the problem should be taken, what methods will be used, what strategies will be effective? etc. A research design is the specification of methods and procedures for acquiring the information needed. It is the overall operational pattern of framework, of the project that stipulates what information is to be collected from which sources by what procedure. If it is

a good design, it will ensure that the information obtained is relevant to the research questions and that it was collected by objective and economical procedures. Research design is essential for the whole study and helps in finding out deficiency in expectation of the starting of work. To achieve the objective of this study, descriptive and analytical research design has been used.

3.3 Source of Data and Collection Procedure

This study has been conducted through two sources of data: primary source and secondary source:

- a) Primary source: As a primary source of data, I have consulted and interviewed the staffs and concerned persons related with my topic.
- b) Secondary data: The study is solely base on secondary data. For the study purpose, annual reports of Sample banks and NRB are used as the major sources of data. In addition to this, published annual report, balance sheet, prospectus, annual general meeting and unpublished office records, journals, magazines, articles, government and university publications, NRB as well as the web site of the banks.

3.4 Population and Sample

A small portion chosen from the population for studying its properties is called a sample and the number of units in the sample is known as the sample size. The method of selection a small portion of the population for the study and to draw conclusion about the characteristics of the population is known as sampling. According to update data there are altogether 32 commercial banks, which is the population concerned with the study and the banks under study constitutes the sample for the study. Thus among 32 commercial banks, 3 banks are taken under the study which are as follows;

1. NABIL Bank Ltd.
2. Nepal Investment Bank Ltd.
3. Bank of Kathmandu

3.5 Justification

These commercial banks are very popular in the market and are performing vital role for the growth and economic development of the country. All the banks under study had won the bank of the year award and alike awards in different periods of time. So, these all banks are competitors. Therefore, I am selecting these banks for study in interest rate structure and its impacts on deposit and loan of commercial banks in Nepal.

3.6 Tools for Data Analysis

The thesis will cover and include the financial and statistical tools to analyze the data in order to reach to the conclusion of the research. The data analysis tools are computed from the relationship of different financial and statistical tools. As per the topic requirement, emphasis is given on statistical tools and they are as follows:

3.6.1 Arithmetic Mean

The arithmetic mean is the most simple and the most commonly used average among the various averages. The arithmetic average or arithmetic mean is also simply called as mean. The arithmetic mean may be defined as the sum of all values divided by the number of values. The arithmetic mean is usually denoted by \bar{X} .

Mathematically,

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

$\sum x$ = sum or total of all values

n= Number of values or observation

3.6.2 Standard Deviation

It is the best measure of dispersion. It is an improvement over the mean deviation and is free from the defects of other measures of dispersion. The standard deviation is defined as the positive square root of the arithmetic mean of the squared deviations from their arithmetic mean of a set of values. It is also known as 'Root Mean-Square Deviation'. It is usually denoted by the Greek letter σ (small sigma).

Mathematically,

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X-\bar{X})^2}{n}}$$

3.6.3 Correlation Of coefficient

Correlation analysis is the statistical tool that we can use to describe the degree to which one variable 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. The relationship between age, height and weight are studied by correlation. Correlation is an analysis of the covariance between two or more variables and correlation analysis of the covariance between two or more variables and correlation analysis deals to determine the degree of relationship between two or more variables. In correlation analysis, only one variable is treated as dependent and one or more variables are treated as independent. The values of correlation coefficient lie between -1 and +1. When the value of $r=1$, there is perfect positive correlation between the two variables. When the value of $r=-1$, there is perfect negative correlation between the two variables. When the value or $r=0$ then the variables are uncorrelated. Nearer the value of r to +1, closer will be the relationship between the variables, nearer the value of r to 0 lesser will be the relationship.

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

$$\text{Coefficient of Correlation/ Karl person's Correlation Coefficient } (r) = \frac{\text{Cov}(X_1, X_2)}{\sigma(X_1)\sigma(X_2)}$$

Where, Cov = Covariance

$$\text{Covariance } (X_1X_2) = 1/n \{(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)\}$$

Or,

$$\begin{aligned}\text{Actual Mean Method} &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}}\end{aligned}$$

n= Total number of observation

X₁ and X₂ = two variables, correlation between them are calculated.

3.6.4 Coefficient of Determination

The square of the simple correlation coefficient is called coefficient of determination and it is very useful in interpreting the value of simple correlation coefficient. The main significance of the coefficient of determination is to represent the portion of total variations due to independent variable. It measures the percentage of total variation in dependent variable explained by independent variable.

$$\text{Coefficient of determination } r_{12}^2 = r_{12}^2$$

3.6.5 t-test for significance for Correlation Coefficient

The sampling distribution of sample means for small samples follows t –distribution. To deal with small samples (sample size is less or equal to 30) for testing of hypothesis concerning population means, difference between two population means and an observed sample correlation coefficient, new techniques and test of significance known as exact sample tests have been developed. A method of dealing with small samples was developed by a British Statistician, W.S. Gosset in 1908. It was first published by Gosset through the adopted the pen name “Student” and later on it has extended by Prof. R.A. Fisher. Thereafter, the t-distribution is commonly called student’s t -distribution or simply student’s distribution.

Mathematically,

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

Where, t follows t-distribution with n-2 degree of freedom (d.f.), ‘n’ being the sample size, ‘r’ being observed sample correlation coefficient

CHAPTER IV

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

In this chapter, the collected data through research are analyzed and presented in actual form i.e. in the form of table and chart. Unless and until the collected data are presented and analyzed in proper way, this study is meaningless. So this part is very much important which gives the proper identification of the study. In this chapter the data collected are analyzed to show the relationship between interest and deposit as well as interest and loan amount. This chapter is categorized into three parts; presentation, analysis, interpretation and findings. The data are presented in tables, graphs and analyzed by using different statistical tools according to its requirement.

This chapter covers the main portion of the study where the actual study of finding is being done. At first the interest rate structure of deposit and loan is shown then the relationship between interest rate on deposit and deposit amount and relationship between interest rate and lending and lending amount is shown and analyzed. Finally relationship between deposit rate and lending rate is calculated and analyzed. The presented data is from fiscal year 2007 to 2011.

4.2 Analysis of Interest rate and Deposit

In this section the detail information of interest rate and deposit of three sample banks from the year 2007 to 2011 is studied. But only the saving and fixed deposit is studied because the current deposit doesn't earn any interest. Theoretically, there is a positive relationship between the interest rate and deposit i.e. if the interest rate is higher then the deposit amount is also high and vice versa. These sample banks have their own magnitude of interest rate and the relationship between its interest and deposits are clearly shown and explain using tables, graphs and statistical tools.

4.2.1 NABIL Bank Ltd

Table No: 4.1

Interest rate structure on deposits of NABIL (Mid-July 2007 to 2011)

| Deposit/Year | 2007 | 2008 | 2009 | 2010 | 2011 |
|---------------------------|-------------|-------------|-------------|-------------|-------------|
| Saving | 2 | 2 | 2 | 3 | 4 |
| Fixed | | | | | |
| 7 Days | | | | | |
| 14 Days | 1.75 | | | | |
| 1 Month | 2 | 3.5 | 3.5 | 6.5 | 5.5 |
| 2 Months | | | | | |
| 3 Months | 2.75 | 4.5 | 4.5 | 7.5 | 6.5 |
| 6 Months | 3 | 5.5 | 5.5 | 8.5 | 8 |
| 1 Year | 3.5 | 7 | 6.5 | 9.75 | 9.75 |
| 2 Years\Above | 4 | 7 | 8 | 11 | 11 |
| Fixed Deposit Mean | 2.833 | 5.5 | 5.6 | 8.65 | 8.15 |
| Whole Mean | 2.714 | 4.92 | 5 | 7.71 | 7.46 |
| S.D.(σ) | 1.85 | | | | |

Source: Statistics, Interest Rate Structure, NRB

Table 4.1 shows the saving and fixed interest rate of NABIL Bank of the last five years 2007 to 2011. Here 2007 is taken as the initial year and 2011 as the end year. In the years 2007 to 2009 the saving interest rate is constant i.e.2 % and after that the interest is in increasing trend i.e. in 2010 its 3% and 2011 its 4%. Bank uses to quote the interest rate of fixed deposit in different short term period like 7 days, 14 days, 1 month,2 months, 3 months, 6 months, 1 year and 2 years \above. The fixed deposit mean rate is also in increasing trend. The fixed deposit mean is 2.833, 5.5, 5.6, 8.65, and 8.15 respectively in the year 2007, 2008,2009,2010,2011. In the year 2008 to 2009 the increment is low then after the increment is higher but in 2011 the interest decreases to 8.15 from 8.65. The average rate of interest is 2.714, 4.92, 5, 7.71, 7.46 respectively in the year 2007,2008,2009,2010 and 2011. The average rate is also in increasing trend. (Calculation of Whole Mean and Standard Deviation is shown in Appendix II)

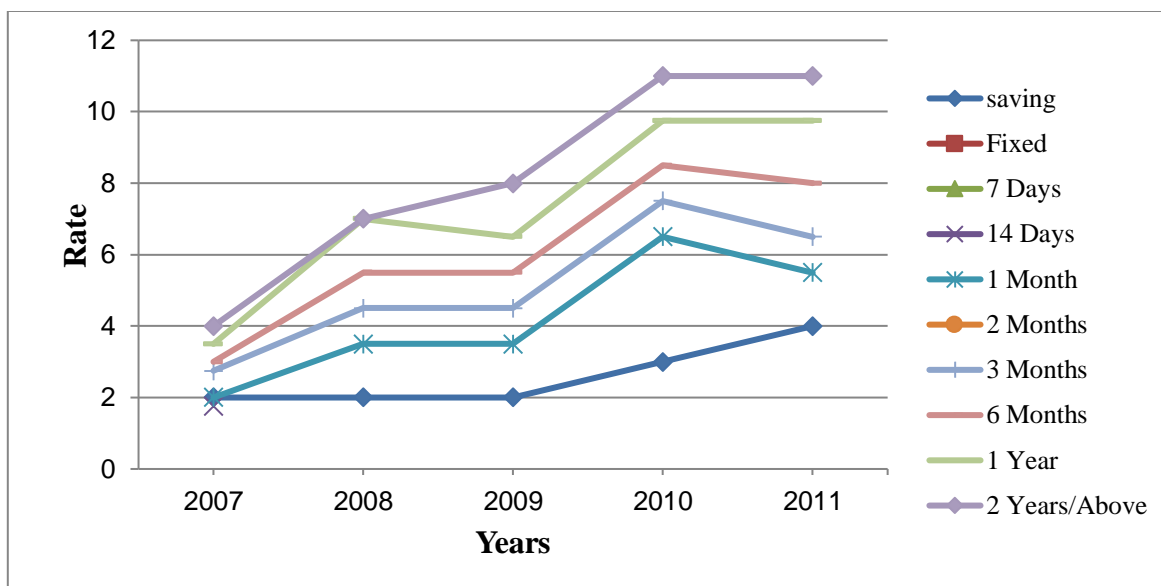


Fig: 4.1 Interest rates on saving and fixed deposit of NABIL from the year 2007 to 2011

The above figure 4.1 shows the rate of interest in saving and fixed deposit from year 2007 to 2011. Both the saving and the fixed rate of interest are in increasing trend. In figure the saving rate is constant in 2007 to 2009 and then it is increasing. The fixed interest rate is also in increasing trend but in the year 2011 the rate is mostly decreasing comparing to the year 2010. Besides of 1 years and 2 years\above is constant with 2010.

Calculation of Correlation Coefficient, Coefficient of Determination and t –statistics

Table No: 4.2

**Relationship between Interest Rate on Deposit and Deposit amount of NABIL Bank
(Rs. in million)**

| Year (1) | Saving Deposit Interest Rate(2) | Saving Deposit Amount (3) | Fixed Deposit Interest Rate(4) | Fixed Deposit Amount (5) |
|----------|---------------------------------|---------------------------|--------------------------------|--------------------------|
| 2007 | 2 | 10187.4 | 2.833 | 5435.2 |
| 2008 | 2 | 12160 | 5.5 | 8464.1 |
| 2009 | 2 | 14620.4 | 5.6 | 8310.7 |
| 2010 | 3 | 13783.6 | 8.65 | 14711.1 |

| | | | | |
|-------------------------------------|-------------------------------|---------------|-------------------------------|-------------|
| 2011 | 4 | 14288.5 | 8.15 | 16840.8 |
| Correlation | $r_{23} = 0.51$ | | $r_{45} = 0.95$ | |
| Coefficient of Determination | $r_{23}^2 = 0.2601$ | | $r_{45}^2 = 0.9025$ | |
| t-statistics | t-cal = 1.03 t-tab = 3.182 | Insignificant | t-cal = 5.27 t-tab = 3.182 | Significant |

Source: Statistics, Interest Rate Structure, Banking & Financial Statistics, NRB

Table No: 4.2 shows the total amount of saving and fixed deposit and the interest rate during last five years starting from 2007 to 2011. In every year the saving deposit is increasing except in 2010. In 2010 the saving decreases from Rs. 14620.4 to Rs.13783.6. The fixed deposit amount is also in increasing trend except the fiscal year 2009. In 2009 the amount decreases from Rs. 8464.1 to Rs. 8310.7. This table shows that the saving amount is increasing even the interest rate is constant from fiscal year 2007 to 2009 which indicate the negative relationship between interest rate and the saving amount. Whereas, the fixed deposit amount is increasing in every increasing interest rate that indicate the positive relationship between the interest rate and fixed deposit amount. The relationship between the interest rate and saving amount and fixed amount is shown in the figure 4.2 and 4.3 below:

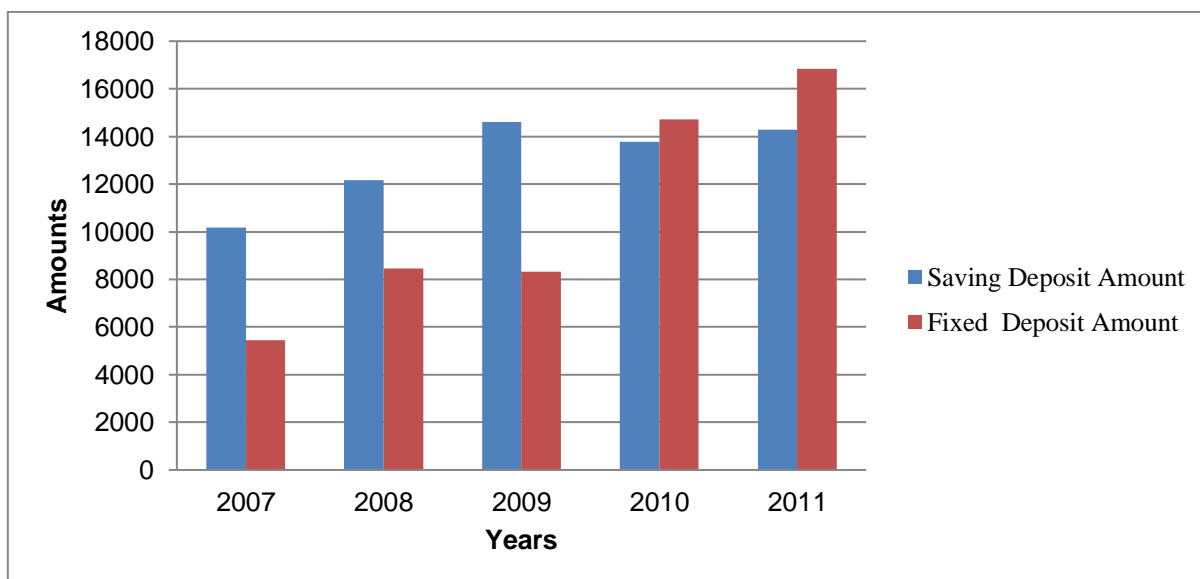


Fig: 4.2 Deposit Amount of NABIL Bank from the year 2007 to 2011

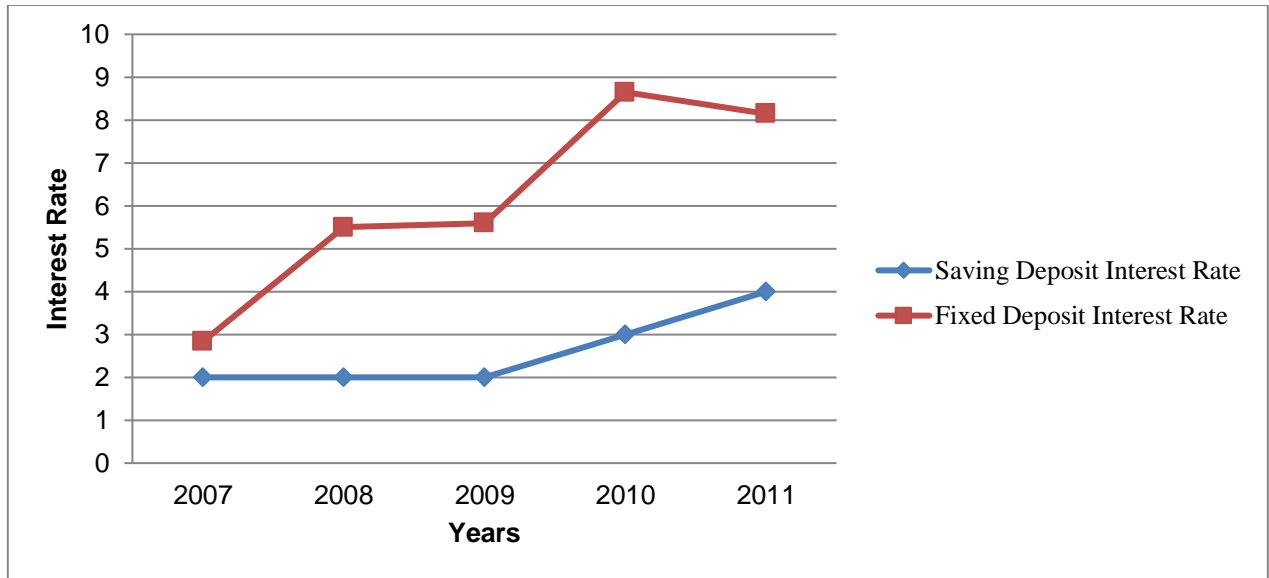


Fig: 4.3 Deposit Rate of NABIL Bank from the year 2007 to 2011

In the table 4.2 the correlation coefficient between saving deposits interest and saving deposit amount is $r_{23} = 0.51$ i.e. there is positive correlation coefficient between saving deposit interest and saving deposit amount. It indicates that if the interest rate on saving increases then the saving deposit also increases and vice versa. The coefficient of determination between these two variables is $r_{23}^2 = 0.2601$ i.e. 26.01% which indicate that 26.01% is the effect of interest rate on saving amount and remaining 73.99% is the effect of other factors. The t-calculated is 1.03 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is less than t-tabulated so the correlation coefficient is insignificant i.e. null hypothesis (H_0) is accepted. It means that there is no relationship between interest rate on deposit and saving deposit amount of NABIL Bank.

In the same manner, the correlation coefficient between fixed deposits interest and fixed deposit amount is $r_{45} = 0.95$ i.e. there is positive correlation coefficient between fixed deposit interest and fixed deposit amount. It indicates that if the interest rate on fixed increases then the fixed deposit also increases and vice versa. The coefficient of determination between these two variables is $r_{45}^2 = 0.9025$ i.e. 90.25% which indicate that 90.25% is the effect of interest rate on saving amount and remaining 9.75% is the effect of other factors. The t-calculated is 5.27 whereas the tabulated t-value at 5% level of

significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is greater than t-tabulated so the correlation coefficient is significant i.e. alternative hypothesis (H_1) is accepted. It means that there is relationship between interest rate on deposit and fixed deposit amount of NABIL Bank. (Calculation is shown in Appendix II)

4.2.2 Nepal Investment Bank Ltd (NIBL)

Table No: 4.3
Interest rate structure on deposits of NIBL (Mid-July 2007 to 2011)

| Deposit/Year | 2007 | 2008 | 2009 | 2010 | 2011 |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|
| Saving | 2.5 | 2.5 | 2.5 | 2.5 | 4.75 |
| Fixed | | | | | |
| 7 Days | | | | | |
| 14 Days | 1.25 | 1.25 | 1.25 | 1.25 | |
| 1 Month | 1.75 | 1.75 | 1.75 | 1.75 | 5.75 |
| 2 Months | | | | | |
| 3 Months | 2.625 | 2.625 | 2.625 | 2.625 | 6.25 |
| 6 Months | 2.875 | 2.875 | 2.875 | 2.875 | 6.75 |
| 1 Year | 4.375 | 5.25 | 5.25 | 5.25 | 7.25 |
| 2 Years\Above | 4.75 | 5.75 | 5.75 | 5.75 | 8.25 |
| Fixed Deposit Mean | 2.94 | 3.25 | 3.25 | 3.25 | 6.85 |
| Whole Mean | 2.88 | 3.14 | 3.14 | 3.14 | 6.5 |
| S.D.(σ) | 1.374 | | | | |

Source: Statistics, Interest Rate Structure, NRB

Table No: 4.3 shows the saving and fixed interest rate of NIBL of the last five years 2007 to 2011. Here 2007 is taken as the initial year and 2011 as the end year. In the years 2007 to 2010 the saving interest rate is constant i.e.2.5 % and after that the interest is in increasing trend i.e. in 2011 it is 4.75%. Bank uses to quote the interest rate of fixed deposit in different short term period like 7 days, 14 days, 1 month,2 months, 3 months, 6 months, 1 year and 2 years \above. The fixed deposit mean is 2.94, 3.25, 3.25, 3.25 and 6.85 respectively in the year 2007, 2008,2009,2010,2011. The fixed deposit mean rate is also in increasing trend

from 2007 to 2008 and 2010 to 2011. In the year 2008 to 2010 the fixed interest mean is constant to 3.25%. The average rate of interest is 2.88, 3.14, 3.14, 3.14, and 6.5 respectively in the year 2007,2008,2009,2010 and 2011. The average rate highly increases in 2011 being 6.5% from 3.14% in 2010 and in the fiscal year 2008 to 2010 it is constant to 3.14%. (Calculation of Whole Mean and Standard Deviation is shown in Appendix II)

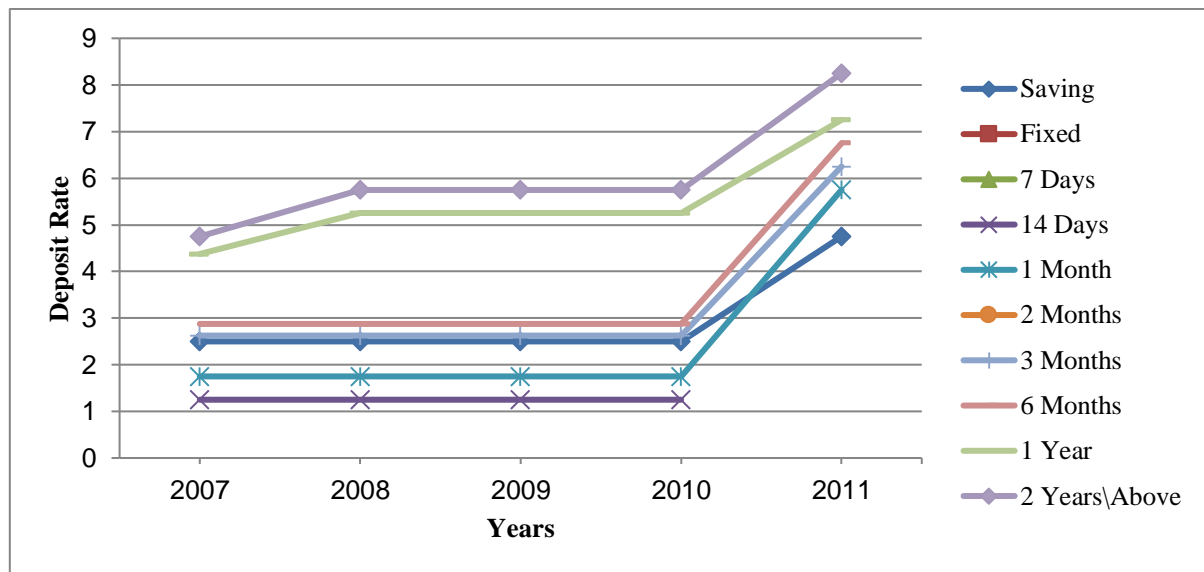


Fig: 4.4 Interest rates on saving and fixed deposit of NIBL from the year 2007 to 2011

The above figure 4.4 shows the rate of interest in saving and fixed deposit from fiscal year 2007 to 2011. Both the saving and the fixed rate of interest are in increasing trend. In figure the saving rate is constant in 2007 to 2010 and then it is increasing. The fixed interest rates are in increasing trend in 2007 to 2008 but constant in 2008 to 2010 and then it is increasing.

Calculation of Correlation Coefficient, Coefficient of Determination and t –statistics

Table No: 4.4

Relationship between Interest Rate on Deposit and Deposit amount of NIBL

(Rs. in million)

| Year (1) | Saving Deposit Interest Rate(2) | Saving Deposit Amount (3) | Fixed Deposit Interest Rate(4) | Fixed Deposit Amount (5) |
|----------|---------------------------------|---------------------------|--------------------------------|--------------------------|
| 2007 | 2.5 | 10742.2 | 2.94 | 7516.8 |

| | | | | |
|-------------------------------------|--------------------------------|---------------|-------------------------------|-------------|
| 2008 | 2.5 | 13688.8 | 3.25 | 7944.2 |
| 2009 | 2.5 | 10542.2 | 3.25 | 6516.9 |
| 2010 | 2.5 | 13783.64 | 3.25 | 14711.07 |
| 2011 | 4.75 | 13554.8 | 6.85 | 18378.3 |
| Correlation | $r_{23} = 0.367$ | | $r_{45} = 0.798$ | |
| Coefficient of Determination | $r_{23}^2 = 0.1347$ | | $r_{45}^2 = 0.637$ | |
| t-statistics | t-cal = 0.683 t-tab = 3.182 | Insignificant | t-cal = 3.80 t-tab = 3.182 | Significant |

Source: Statistics, Interest Rate Structure, Banking & Financial Statistics, NRB

Table No: 4.4 shows the total amount of saving and fixed deposit and the interest rate during last five fiscal years starting from 2007 to 2011. In every fiscal year the saving deposit is increasing except in 2009 and 2011. In 2009 the saving decreases from Rs. 13688.8 to Rs. 10542.2 and 2011 the saving decrease from Rs. 13783.64 to Rs. 13554.8. In every year the fixed deposit amount is increasing expect in 2009. In 2009 the fixed amounts decreases from Rs. 7944.2 to Rs. 6516.9. This table shows that the saving interest rate is constant from year 2007 to 2010 i.e. 2.5% and the saving amount fluctuate even the rate is constant. The fixed interest rate is also constant in 2008 to 2010 and fixed amount fluctuate even it is constant. (Calculation is shown in Appendix II)

The relationship between the interest rate and saving amount and fixed amount is shown in the figure 4.5 and 4.6 below:

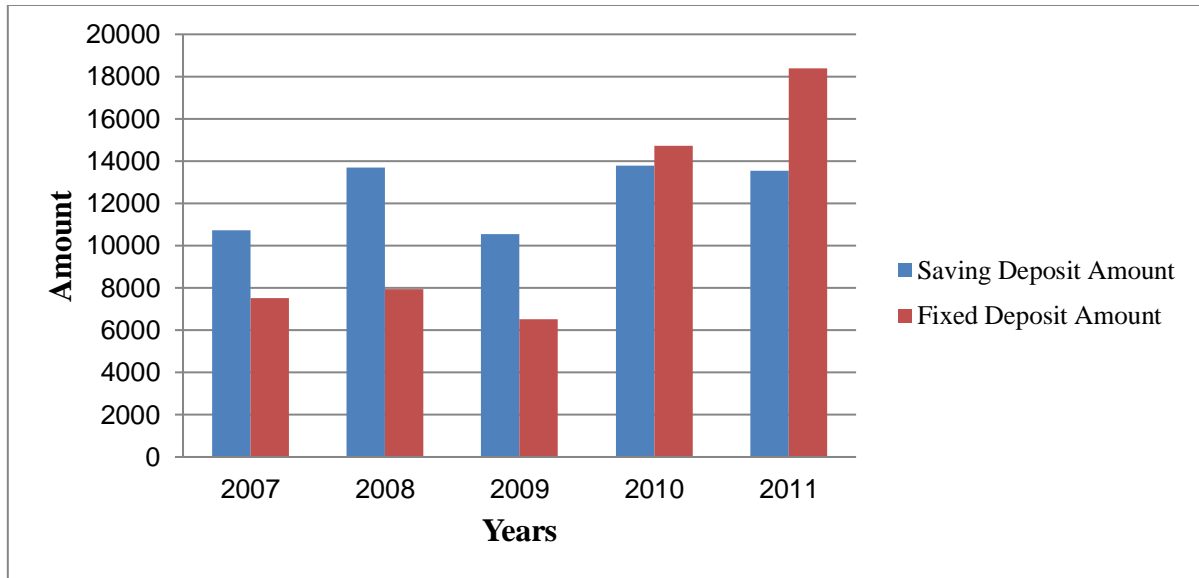


Fig: 4.5 Deposit Amount of NIBL from the year 2007 to 2011

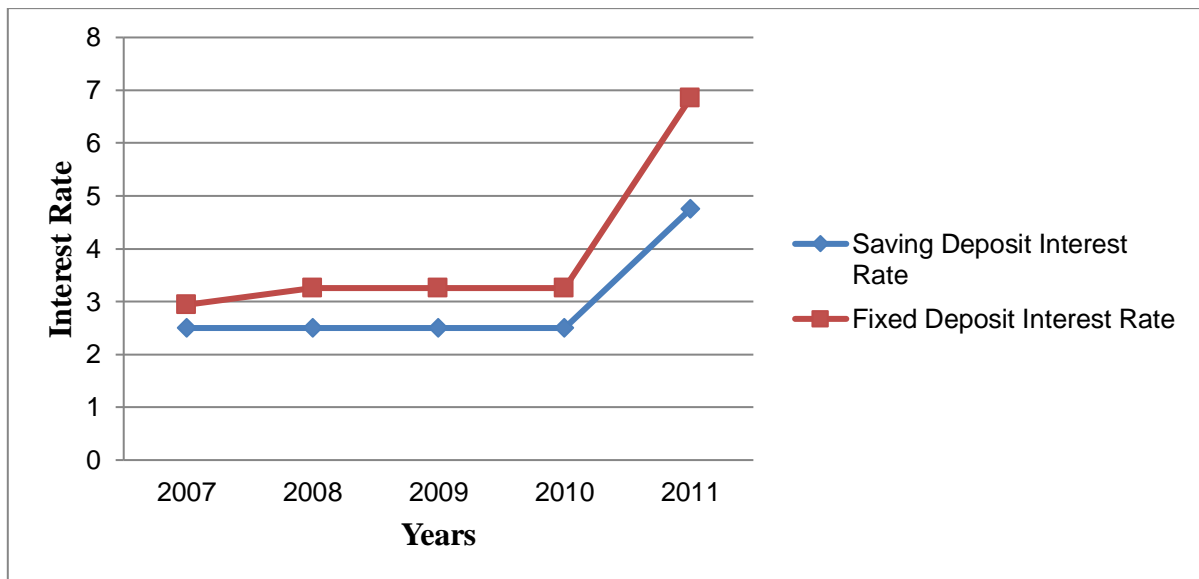


Fig: 4.6 Deposit Rate of NIBL from the year 2007 to 2011

In the table 4.4 the correlation coefficient between saving deposits interest and saving deposit amount is $r_{23} = 0.367$ i.e. there is positive correlation coefficient between saving deposit interest and saving deposit amount. It indicates that if the interest rate on saving increases then the saving deposit also increases and vice versa. The coefficient of

determination between these two variables is $r_{23}^2 = 0.1347$ i.e. 13.47% which indicate that 13.47% is the effect of interest rate on saving amount and remaining 86.53% is the effect of other factors. The t-calculated is 0.683 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is less than t-tabulated so the correlation coefficient is insignificant i.e. null hypothesis (H_0) is accepted. It means that there is no relationship between interest rate on deposit and saving deposit amount of NIBL Bank.

In the same manner, the correlation coefficient between fixed deposits interest and fixed deposit amount is $r_{45} = 0.798$ i.e. there is positive correlation coefficient between fixed deposit interest and fixed deposit amount. It indicates that if the interest rate on fixed increases then the fixed deposit also increases and vice versa. The coefficient of determination between these two variables is $r_{45}^2 = 0.637$ i.e. 63.7% which indicate that 63.7% is the effect of interest rate on saving amount and remaining 36.3% is the effect of other factors. The t-calculated is 3.80 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is greater than t-tabulated so the correlation coefficient is significant i.e. alternative hypothesis (H_1) is accepted. It means that there is relationship between interest rate on deposit and fixed deposit amount of NIBL Bank. (Calculation is shown in Appendix II)

4.2.3 Bank of Kathmandu (BOK)

Table No: 4.5
Interest rate structure on deposits of BOK (Mid-July 2007 to 2011)

| Deposit/Year | 2007 | 2008 | 2009 | 2010 | 2011 |
|---------------------|-------------|-------------|-------------|-------------|-------------|
| Saving | 2.25 | 2.25 | 2.25 | 2.25 | 3.5 |
| Fixed | | | | | |
| 7 Days | 1.5 | 2 | 3 | 3 | |
| 14 Days | 2 | 2.5 | 3.5 | 3.5 | |
| 1 Month | 2.5 | 3 | 4 | 4 | 6 |
| 2 Months | | | | | |
| 3 Months | 3 | 3.5 | 4.5 | 4.5 | 7 |

| | | | | | |
|----------------------------------|-------|------|-------|-------|------|
| 6 Months | 3.25 | 4 | 5 | 6 | 8 |
| 1 Year | 3.625 | 5 | 6.25 | 8.5 | 8.5 |
| 2 Years\Above | 3.625 | 5.5 | 7.875 | 8.825 | 9.75 |
| Fixed Deposit Mean | 2.79 | 3.64 | 4.88 | 5.48 | 7.85 |
| Whole Mean | 2.72 | 3.47 | 4.55 | 5.07 | 7.13 |
| S.D.(σ) | 2.29 | | | | |

Source: Statistics, Interest Rate Structure, NRB

Table No: 4.5 shows the saving and fixed interest rate of BOK of the last five years 2007 to 2011. Here 2007 is taken as the initial year and 2011 as the end year. In the years 2007 to 2010 the saving interest rate is constant i.e.2.25 % and after that the interest increased i.e. in 2011 it is 3.5%.Bank uses to quote the interest rate of fixed deposit in different short term period like 7 days, 14 days, 1 month,2 months, 3 months, 6 months, 1 year and 2 years \above. The fixed deposit mean is 2.79, 3.64, 4.88, 5.48 and 7.85 respectively in the year 2007, 2008, 2009, 2010, 2011.The fixed deposit mean rate is in increasing trend in every fiscal year. The average rate of interest is 2.72, 3.47, 4.55, 5.07 and 7.13 respectively in the year 2007,2008,2009,2010 and 2011.The average rate of interest rate of BOK is in increasing trend. (Calculation of Whole Mean and Standard Deviation is shown in Appendix II)

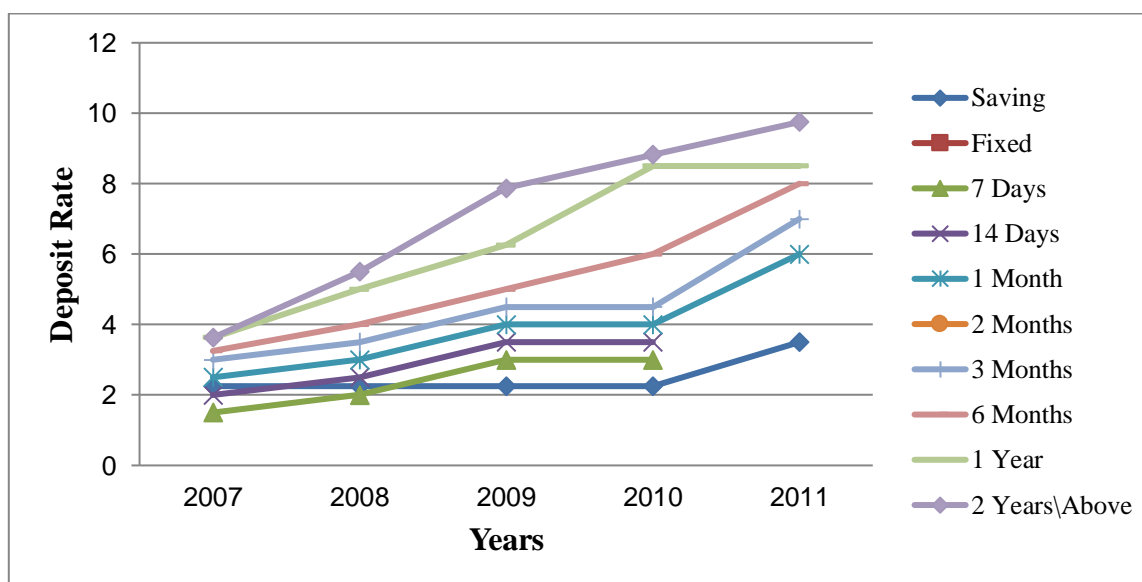


Fig: 4.7 Interest rates on saving and fixed deposit of BOK from the year 2007 to 2011

The above fig: 4.7 shows the rate of interest in saving and fixed deposit from fiscal year 2007 to 2011. Both the saving and the fixed rate of interest are in increasing trend. In figure the saving rate is constant in 2007 to 2010 and then it is increasing. The fixed interest rates are in increasing trend in every year.

Calculation of Correlation Coefficient, Coefficient of Determination and t –statistics

Table No: 4.6

Relationship between Interest Rate on Deposit and Deposit amount of BOK

(Rs. in million)

| Year (1) | Saving Deposit Interest Rate(2) | Saving Deposit Amount (3) | Fixed Deposit Interest Rate(4) | Fixed Deposit Amount (5) |
|-------------------------------------|--|----------------------------------|---------------------------------------|---------------------------------|
| 2007 | 2.25 | 5526.8 | 2.79 | 3037.2 |
| 2008 | 2.25 | 6595.2 | 3.64 | 3703.1 |
| 2009 | 2.25 | 7260.3 | 4.88 | 4474.6 |
| 2010 | 2.25 | 6723.2 | 5.48 | 6383.6 |
| 2011 | 3.5 | 6607.6 | 7.85 | 7850.3 |
| Correlation | $r_{23} = 0.058$ | | $r_{45} = 0.971$ | |
| Coefficient of Determination | $r_{23}^2 = 0.0033$ | | $r_{45}^2 = 0.943$ | |
| t-statistics | t-cal = 0.101 t-tab = 3.182 | Insignificant | t-cal = 7.04 t-tab = 3.182 | Significant |

Source: Statistics, Interest Rate Structure, Banking & Financial Statistics, NRB

Table No: 4.6 shows the total amount of saving and fixed deposit and the interest rate during last five years starting from 2007 to 2011. In every year the saving deposit is increasing except in 2010 and 2011. In 2010 the saving decreases from Rs. 7260.3 to Rs. 6723.2 and 2011 the saving decrease from Rs. 6723.2 to Rs. 6607.6. In every fiscal year the fixed deposit amount is increasing. This table shows that the saving interest rate is constant from 2007 to 2010 i.e. 2.5% and the saving amount fluctuate even the rate is constant. It shows the positive relationship between fixed interest rate and fixed deposit amount because in every increase in interest rate the fixed deposit amount is also increasing. The relationship between

the interest rate and saving amount and fixed amount is shown in the figure 4.5 and 4.6 below:

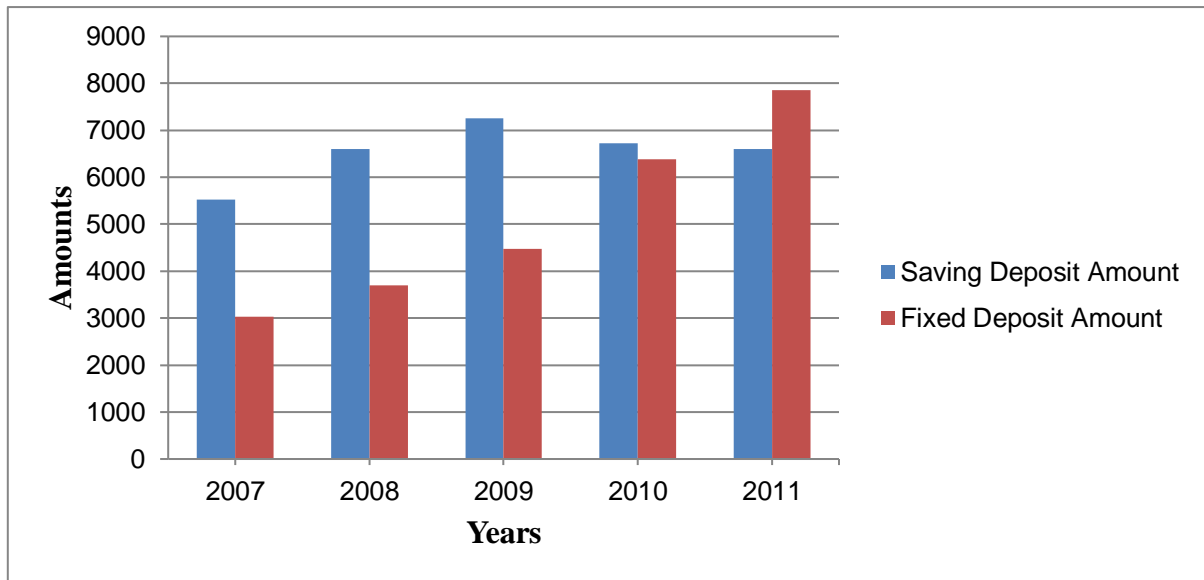


Fig: 4.8 Deposit Amount of BOK from the year 2007 to 2011

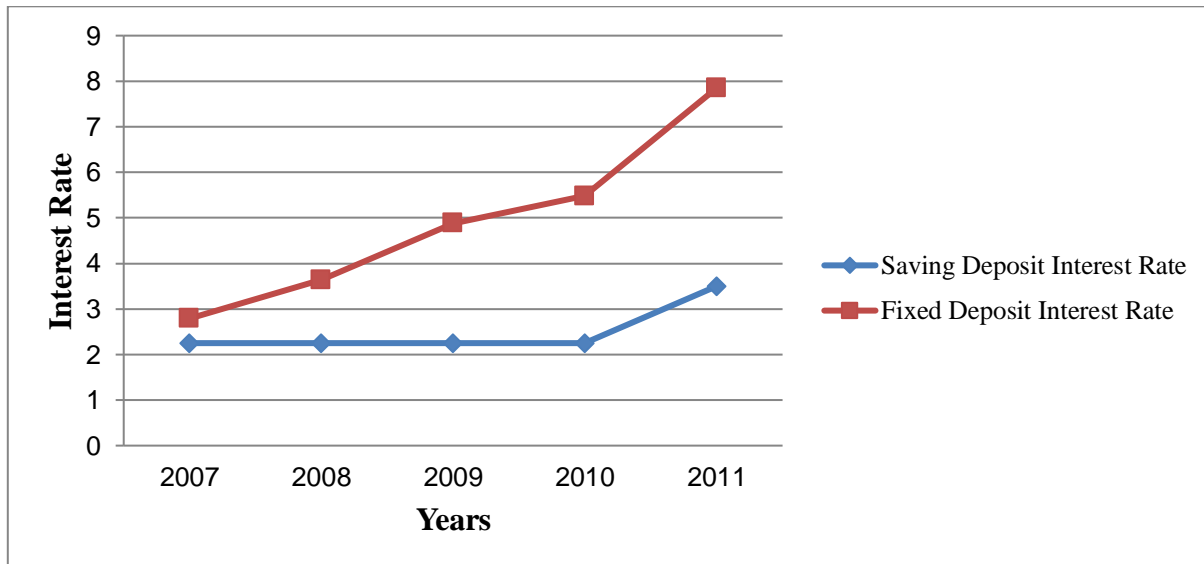


Fig: 4.9 Deposit Rate of BOK from the year 2007 to 2011

In the table 4.6 the correlation coefficient between saving deposits interest and saving deposit amount is $r_{23} = 0.058$ i.e. there is positive correlation coefficient between saving

deposit interest and saving deposit amount. It indicates that if the interest rate on saving increases then the saving deposit also increases and vice versa. The coefficient of determination between these two variables is $r_{23}^2 = 0.0033$ i.e. 0.33% which indicate that 0.33% is the effect of interest rate on saving amount and remaining 99.67% is the effect of other factors. The t-calculated is 0.101 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is less than t-tabulated so the correlation coefficient is insignificant i.e. null hypothesis (H_0) is accepted. It means that there is no relationship between interest rate on deposit and saving deposit amount of BOK.

In the same manner, the correlation coefficient between fixed deposits interest and fixed deposit amount is $r_{45} = 0.971$ i.e. there is positive correlation coefficient between fixed deposit interest and fixed deposit amount. It indicates that if the interest rate on fixed increases then the fixed deposit also increases and vice versa. The coefficient of determination between these two variables is $r_{45}^2 = 0.943$ i.e. 94.3% which indicate that 94.3% is the effect of interest rate on saving amount and remaining 5.7% is the effect of other factors. The t-calculated is 7.04 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is greater than t-tabulated so the correlation coefficient is significant i.e. alternative hypothesis (H_1) is accepted. It means that there is relationship between interest rate on deposit and fixed deposit amount of BOK. (Calculation is shown in Appendix II)

4.3 Analysis of Interest rate and Lending

In this section the detail information of interest rate and lending of three sample banks from the year 2007 to 2011 is studied. Theoretically, there is inverse relationship between the interest rate and the loan amount i.e. if the interest rate is high the lending amount is less and vice versa. Higher amount of borrowing indicates higher investment in the country. This is necessary for the economic growth of any country. There are various sectors in which any bank can provide loan according to their capacity. Here in this analysis too different sectors in which the sample banks can provide the loan are clearly mentioned. These sample banks

have their own magnitude of interest rate and the relationship between its interest and lending are clearly shown and explain using tables, graphs and statistical tools.

4.3.1 NABIL Bank Ltd.

Table No: 4.7
Lending Rate of NABIL Bank on different sectors (2007 to 2011)
(Rs. in million)

| Sectors\Year | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|--------------------|---------|---------|---------|---------|
| Overdraft | | | | | |
| Export Credit | 4.25 | 9.625 | 10.75 | 12.75 | 13.5 |
| Import L\C | 4.25 | 10 | 10.75 | 12.75 | 13.5 |
| Against FDR | 7 | 9.125 | | | 12 |
| Against Govt. Bond | 7.25 | 9 | | | 13 |
| Against BG\CG | 7.5 | 9.5 | 10 | 15 | 14 |
| Against other Guarantee | 8.5 | 10 | 11 | | 16.5 |
| Industrial Loan | | | | | |
| Commercial Loan | | 10.25 | | | |
| Priority Sector | 10.25 | | | | |
| Deprived Sector | 6.75 | 8 | 8 | 10 | 12 |
| Term Loan | 10.5 | 11 | 11.75 | 15 | 15.5 |
| Working Capital | 9.75 | 10.5 | 11.25 | 13.75 | 14.75 |
| Hire Purchase | 9.25 | | | | |
| Consortium | | | | | |
| Others | 9.25 | 11 | 11.5 | 15.5 | 17 |
| Average Lending Rate(1) | 7.875 | 9.82 | 10.63 | 13.54 | 14.18 |
| Loan Amount (2) | 15657.1 | 21514.6 | 27816.6 | 32902.8 | 38765.6 |
| Correlation Coefficient(r_{12}) | $r_{12} = 0.978$ | | | | |
| Coefficient of Determination (r_{12}^2) | $r_{12}^2 = 0.956$ | | | | |
| t-statistic | t-cal = 8.07 | | | | |

| | |
|----------------|--------------|
| | t-tab =3.182 |
| S.D.(σ) | 2.35 |

Source: Statistics, Interest Rate Structure, Banking & Financial Statistics, NRB

Table No: 4.7 shows the interest rate in various sectors of NABIL Bank in the years 2007 to 2011. In this table year 2007 is taken as initial period and year 2011 as the end. The interest rate is in increasing trend in every fiscal year in every sector. Only in deprived sector the interest rate is constant i.e. 8% in 2009 to 2010. The loan on commercial, industrial sectors, consortium and hire purchase are not given. Only in 2008 the commercial loan is provided with a rate of 10.25%. In 2007 the maximum interest rate is 10.5% in term loan and minimum is 4.25% in export credit and import L.C. In 2011 the maximum interest rate is 17% in other loan and minimum in 12 in deprived sectors and against FDR. The average lending rate is 7.875, 9.82, 10.63, 13.54 and 14.18 respectively in years 2007, 2008, 2009, 2010 and 2011. The lending amount is Rs.15657.1, Rs.21514.6, Rs.27816.6, Rs.32902.8 and Rs. 38765.6 respectively in years 2007, 2008, 2009, 2010 and 2011. Both the interest rate and lending amount is increasing in every year. The fluctuation in lending interest rate and lending amount is shown in figures 4.10 and 4.11 below:

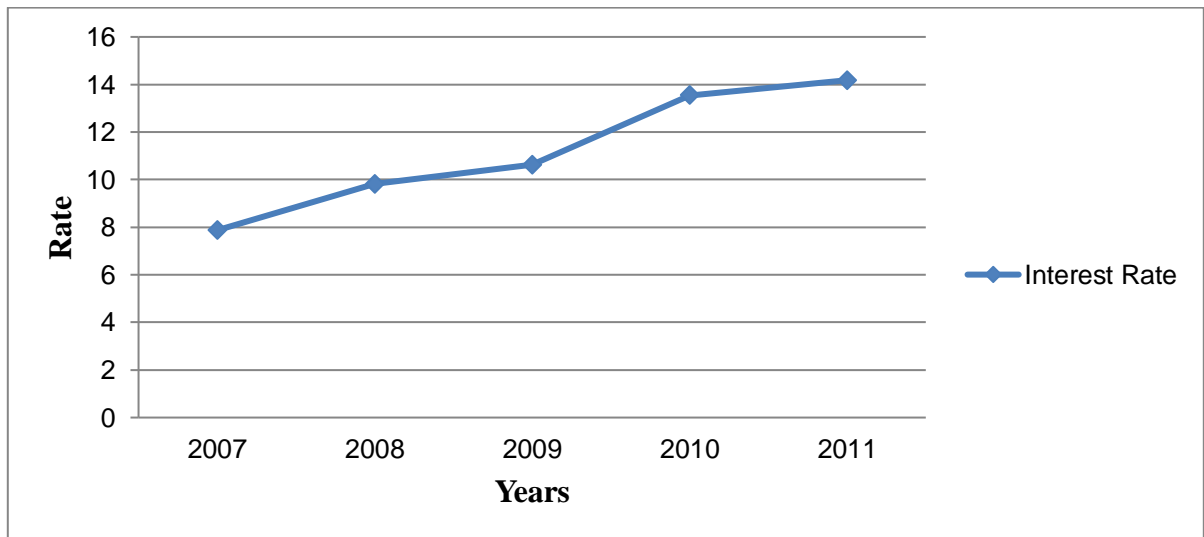


Fig: 4.10 Average Lending Rate of NABIL from the year 2007 to 2011

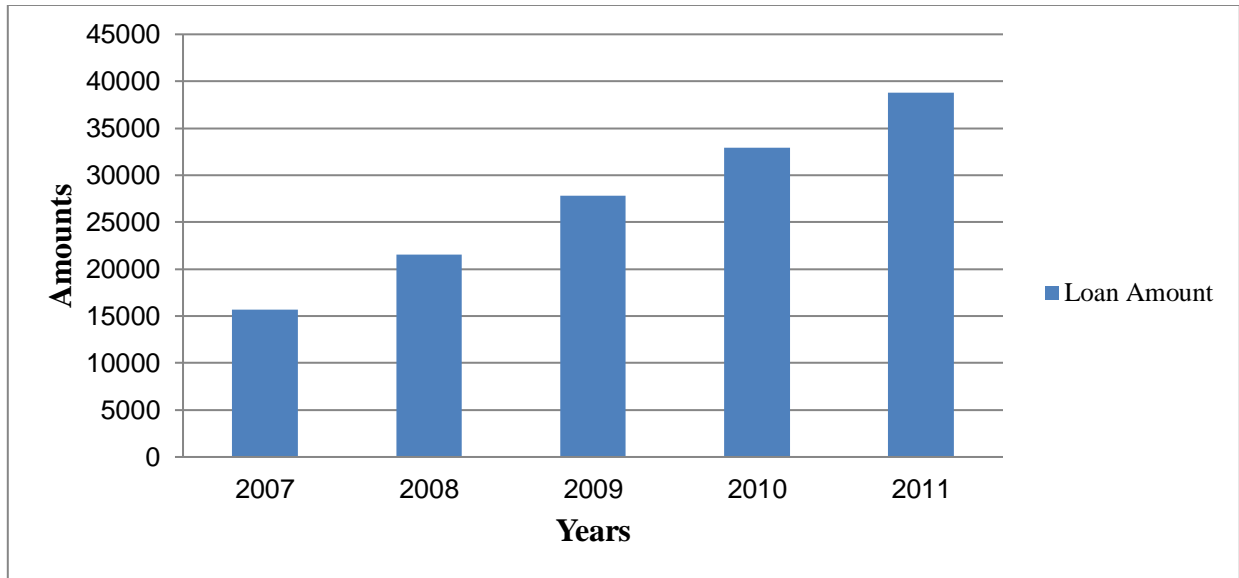


Fig: 4.11 Lending Amount of NABIL from the 2007 to 2011

In the table 4.7 the correlation coefficient between lending rate and lending amount is $r_{12} = 0.978$ i.e. there is positive correlation coefficient between lending rate and lending amount. It indicates that if the interest rate on loan increases then the lending amount also increases and vice versa. The coefficient of determination between these two variables is $r_{12}^2 = 0.956$ i.e. 95.6% which indicate that 95.6% is the effect of lending rate on lending amount and remaining 4.4% is the effect of other factors. The t-calculated is 8.07 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is higher than t-tabulated so the correlation coefficient is significant i.e. alternative hypothesis (H_1) is accepted. It means that there is relationship between lending rate and lending amount of NABIL Bank. (Calculation is shown in Appendix III)

4.3.2 Nepal Investment Bank Limited (NIBL)

Table No: 4.8

Lending Rate of NIBL on different sectors (2007 to 2011)

(Rs. in million)

| Sectors\Year | 2007 | 2008 | 2009 | 2010 | 2011 |
|--------------|--------|--------|--------|--------|------|
| Overdraft | 10.875 | 10.875 | 10.875 | 10.875 | 15 |

| | | | | | |
|---|-------------------------------|---------|----------|---------|---------|
| Export Credit | 9.375 | 9.375 | 9.375 | 9.375 | 13 |
| Import L\C | | | | | |
| Against FDR | 7.5 | 7.5 | 7.5 | 7.5 | 11 |
| Against Govt. Bond | 7 | 7 | 7 | 7 | 14 |
| Against BG\CG | 8 | 8 | 8 | 8 | 14 |
| Against other Guarantee | | | | | |
| Industrial Loan | | | | | |
| Commercial Loan | | | | | |
| Priority Sector | 8 | | | | |
| Deprived Sector | 6.5 | 6.5 | 6.5 | 6.5 | 11.5 |
| Term Loan | 11.5 | 11.5 | 11.5 | 11.5 | 16 |
| Working Capital | 10.875 | 10.875 | 10.875 | 10.875 | 15 |
| Hire Purchase | 10 | 10 | 10 | 10 | 15.5 |
| Consortium | | | | | |
| Others | 9.75 | 9.5 | 9.5 | 9.5 | 18 |
| Average Lending Rate(1) | 9.03 | 9.11 | 9.11 | 9.11 | 14.3 |
| Loan Amount (2) | 17482 | 27145.5 | 28911.60 | 32902.8 | 41665.2 |
| Correlation Coefficient(r_{12}) | $r_{12} = 0.774$ | | | | |
| Coefficient of Determination (r_{12}^2) | $r_{12}^2 = 0.599$ | | | | |
| t-statistic | t-cal = 2.12 t-tab = 3.182 | | | | |
| S.D.(σ) | 4.344 | | | | |

Source: Statistics, Interest Rate Structure, Banking & Financial Statistics, NRB

Table No: 4.8 shows the interest rate in various sectors of NIBL Bank in the F.Y. 2007 to 2011. In this table year 2007 is taken as initial period and 2011 as the end. The interest rate is constant in 2007 to 2010 in every sector except other loan. The other loan is constant in 2008 to 2010. In 2011 the interest rate increased in every sector and the increase is comparatively higher. The loan on commercial, industrial sectors, consortium, against other

guarantee and priority sectors are not provided. Only in 2007 the priority sector loan is provided with a rate of 8%. In 2007 the maximum interest rate is 11.5% in term loan and minimum is 6.5% in deprived sector. In 2011 the maximum interest rate is 18 % in other loan and minimum is 11% in against FDR. The average lending rate is 9.03, 9.11, 9.11, 9.11 and 14.3 respectively in years 2007, 2008, 2009, 2010 and 2011. The lending amount is Rs.17482, Rs.27145.5, Rs. 28911.60, Rs.32902.8 and Rs.41665.2 respectively in years 2007, 2008, 2009, 2010 and 2011. The interest rate is constant in year 2008 to 2010 and increases to 14.3 in 2011. Even the interest rate is constant the loan amount keeps on increasing which shows the positive relationship between the rate and the loan amount. The fluctuation in lending interest rate and lending amount is shown in figures 4.10 and 4.11 below:

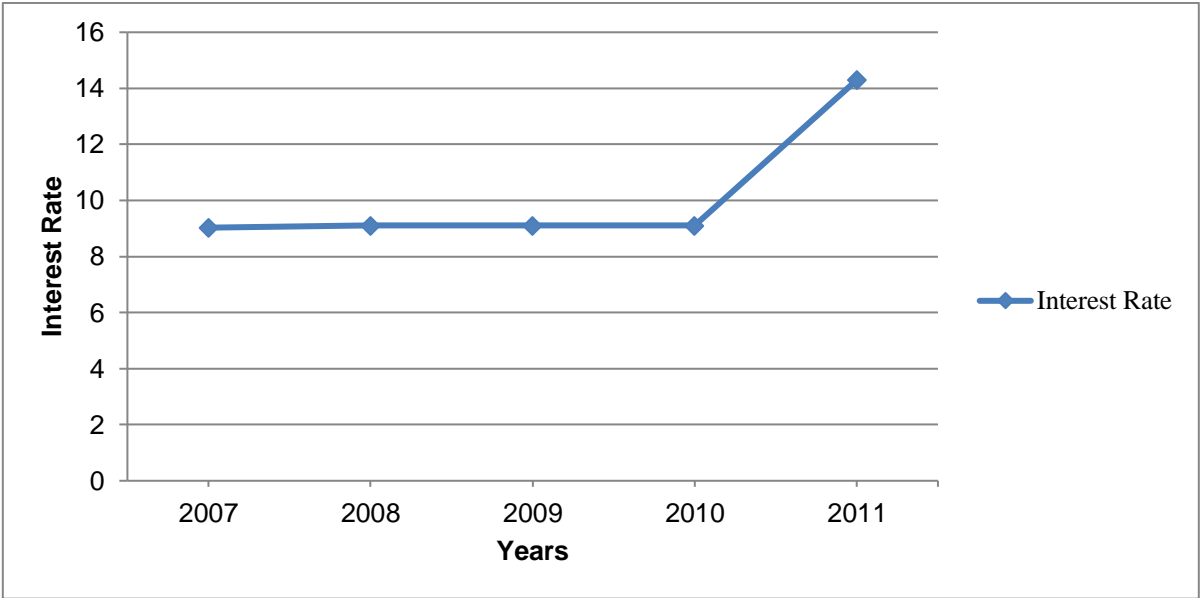


Fig: 4.12 Average Lending Rate of NIBL from the year 2007 to 2011

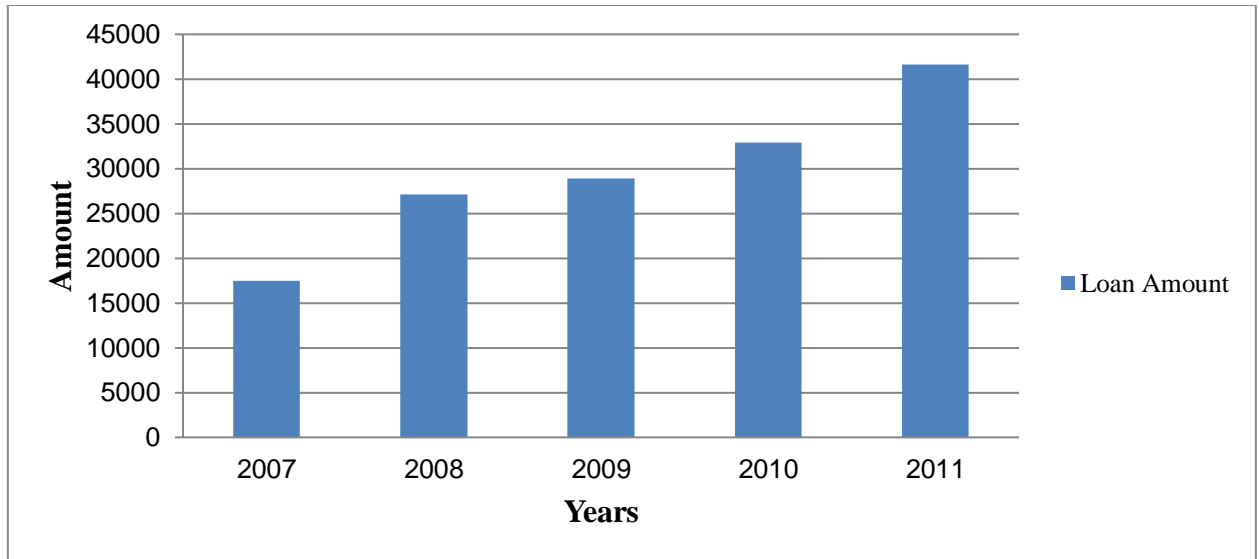


Fig: 4.13 Lending Amount of NIBL from the year 2007 to 2011

In the table 4.8 the correlation coefficient between lending rate and lending amount is $r_{12} = 0.774$ i.e. there is positive correlation coefficient between lending rate and lending amount. It indicates that if the interest rate on loan increases then the lending amount also increases and vice versa. The coefficient of determination between these two variables is $r_{12}^2 = 0.599$ i.e. 59.9% which indicate that 59.9% is the effect of lending rate on lending amount and remaining 40.1% is the effect of other factors. The t-calculated is 2.12 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is less than t-tabulated so the correlation coefficient is insignificant i.e. null hypothesis (H_0) is accepted. It means that there is no relationship between lending rate and lending amount of NIBL. (Calculation is shown in Appendix III)

4.3.3 Bank Of Kathmandu (BOK)

Table No: 4.9
Lending Rate of BOK on different sectors (2007 to 2011)

(Rs. in million)

| Sectors\Year | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|-------------------------------|---------|---------|---------|---------|
| Overdraft | 11.75 | 11.75 | 11.75 | 14.5 | 15 |
| Export Credit | 7.75 | 7.75 | 10 | 13 | 11.25 |
| Import L\C | 10.25 | 10.25 | 10.75 | 12.5 | 13.75 |
| Against FDR | 7.5 | 7.5 | 9.25 | 13.5 | 13.5 |
| Against Govt. Bond | 7.25 | 7.25 | | 12.5 | 12.5 |
| Against BG\CG | 9.25 | 9.25 | 9.75 | 12.5 | 12.5 |
| Against other Guarantee | 7.5 | 7.5 | | | 12.5 |
| Industrial Loan | 11.75 | 11.75 | | | |
| Commercial Loan | 12.25 | 12.25 | | | |
| Priority Sector | | | | | |
| Deprived Sector | 8.75 | 8.75 | 9 | 13 | 13.5 |
| Term Loan | 11.75 | 11.75 | 12 | 14 | 15.5 |
| Working Capital | 11.75 | 11.75 | 11.75 | 14 | 14.5 |
| Hire Purchase | 9.25 | 9.25 | 11 | 13.25 | 15 |
| Consortium | | | | | |
| Others | 9.25 | 9.25 | 11.25 | 11 | 15 |
| Average Lending Rate(1) | 9.71 | 9.56 | 10.65 | 13.07 | 13.71 |
| Loan Amount (2) | 9663.6 | 12692.9 | 14894.7 | 16847.1 | 17247.8 |
| Correlation Coefficient(r_{12}) | $r_{12} = 0.881$ | | | | |
| Coefficient of Determination (r_{12}^2) | $r_{12}^2 = 0.7755$ | | | | |
| t-statistic | t-cal = 3.22 t-tab = 3.182 | | | | |
| S.D.(σ) | 1.73 | | | | |

Source: Statistics, Interest Rate Structure, Banking & Financial Statistics, NRB

Table No: 4.9 shows the interest rate in various sectors of BOK from the year 2007 to 2011. In this table 2007 is taken as initial period and 2011 as the end. The interest rate fluctuates in various sectors and in some sector it is constant. The loan on industrial sectors, commercial, consortium and priority sectors are not provided. Only in 2007, 2008 the industrial loan and commercial loan are provided with a rate of 11.75% and 12.25% respectively .In 2007 the maximum interest rate is 12.25% in commercial loan and minimum is 7.5% in against other guarantee and against FDR. In 2011 the maximum interest rate is 15.5 % in term loan and minimum in 11.25% in export credit. The average lending rate is 9.71, 9.56, and 10.65, 13.07and13.71 respectively in years 2007, 2008, 2009, 2010 and 2011. The lending amount is Rs.9663.6, Rs.12692.9, Rs.14894.7, Rs. 16847.1 and Rs. 17247.8 respectively in years 2007, 2008, 2009, 2010 and 2011. Both the interest rate and lending amount is increasing in every fiscal year but only in 2008 the interest rate decreases from 9.71% to 9.56%. The fluctuation in lending interest rate and lending amount is shown in figures 4.10 and 4.11 below:

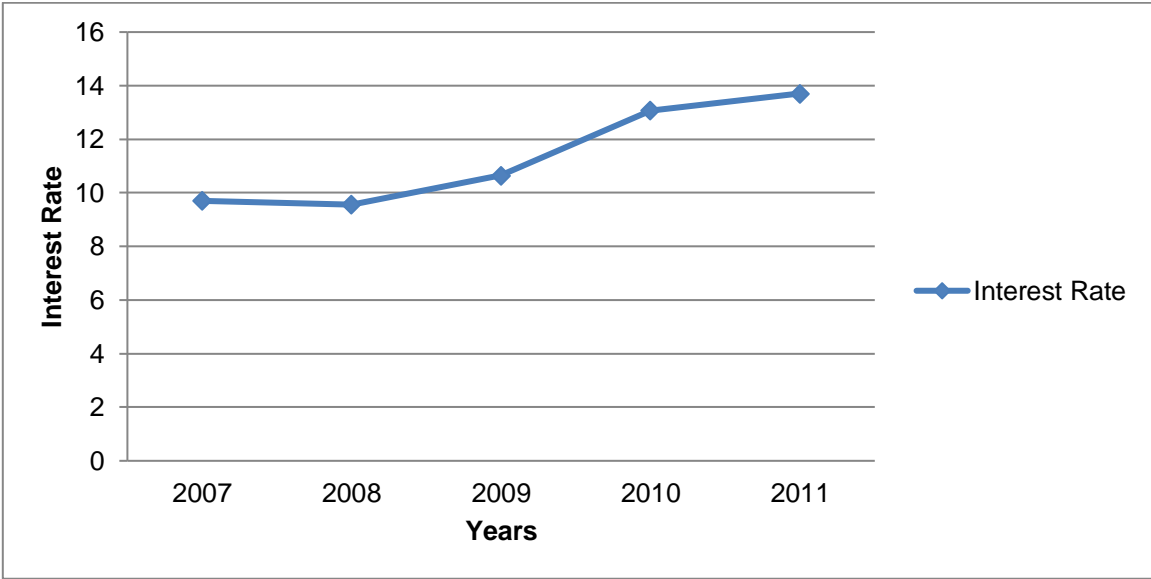


Fig: 4.14 Average Lending Rate of BOK from the year 2007 to 2011

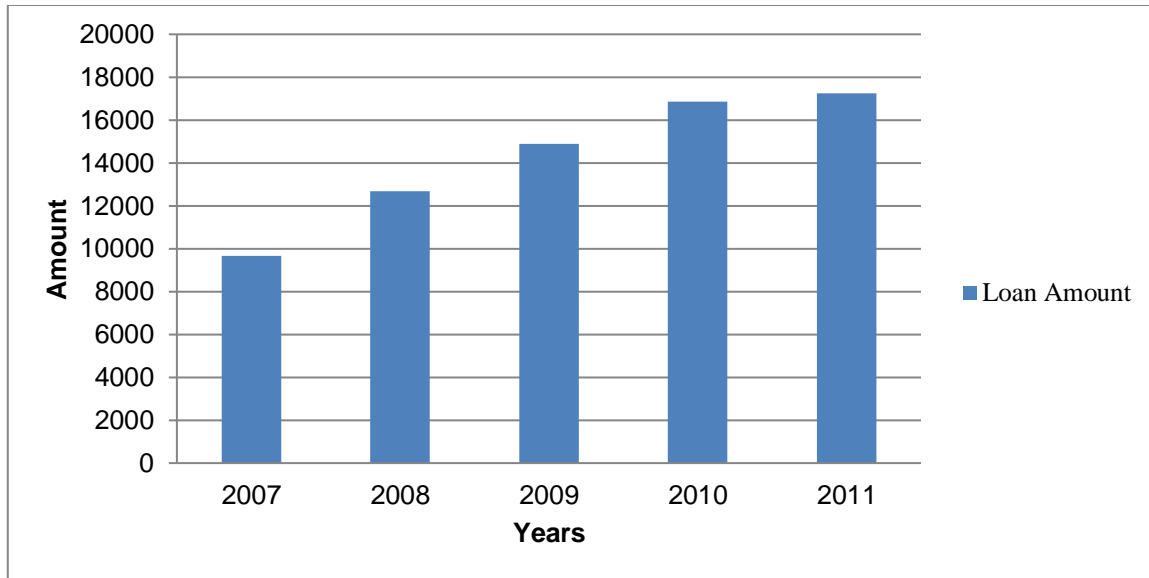


Fig: 4.15 Lending Amount of BOK from the year 2007 to 2011

In the table no: 4.9 the correlation coefficient between lending rate and lending amount is $r_{23} = 0.881$ i.e. there is positive correlation coefficient between lending rate and lending amount. It indicates that if the interest rate on loan increases then the lending amount also increases and vice versa. The coefficient of determination between these two variables is $r_{23}^2 = 0.7755$ i.e. 77.55% which indicate that 77.55% is the effect of lending rate on lending amount and remaining 22.45% is the effect of other factors. The t-calculated is 3.22 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is less than t-tabulated so the correlation coefficient is insignificant i.e. null hypothesis (H_0) is accepted. It means that there is no relationship between lending rate and lending amount of BOK. (Calculation is shown in Appendix III)

4.4 Analysis of relation between Deposit Rate and Lending Rate

The interest provided in deposit is the expenses of the bank whereas, the interest rate charged in loan are the income of the bank. Generally there is a positive relationship between deposit rate and the lending rate. It means if the deposit rate increases the lending rate also increases and vice versa. To measure the actual relationship between interest rate on deposit and lending, the prevailing situation of each bank is analyzed.

4.4.1 NABIL Bank Ltd.

Table No: 4.10

Relationship between Interest rate on Deposit and lending of NABIL Bank

| Years(1) | Deposit Rate(2) | Lending Rate(3) |
|---|-------------------------------|-----------------|
| 2007 | 2.714 | 7.875 |
| 2008 | 4.92 | 9.82 |
| 2009 | 5 | 10.63 |
| 2010 | 7.71 | 13.54 |
| 2011 | 7.46 | 14.18 |
| Correlation Coefficient(r_{23}) | $r_{23} = 0.984$ | |
| Coefficient of Determination (r_{23}^2) | $r_{23}^2 = 0.968$ | |
| t-statistic | t-cal = 9.52 t-tab = 3.182 | Significant |

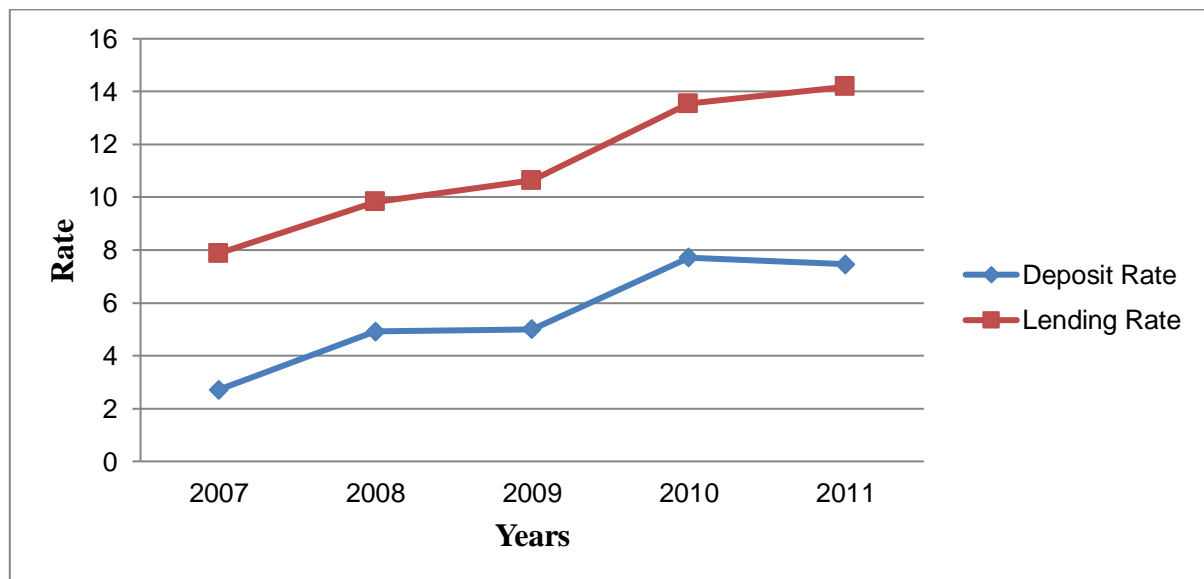


Fig: 4.16 Relationships between Deposit Rate and Lending Rate of NABIL

Table No: 4.10 and fig: 4.16 show the deposit rate and lending rate of NABIL Bank during the year 2007 to 2011. Both the deposit rate and lending rate are in increasing tendency. But in the year 2011 the deposit rate decrease from 7.71% to 7.46%.

In the table 4.9 the correlation coefficient between deposit rate and lending rate is $r_{23} = 0.984$ i.e. there is positive correlation coefficient between lending rate and lending amount. It indicates that if the interest rate on loan increases then the lending amount also increases and vice versa. The coefficient of determination between these two variables is $r_{23}^2 = 0.968$ i.e. 96.8% which indicate that 96.8% is the effect of lending rate on lending amount and remaining 3.2% is the effect of other factors. The t-calculated is 9.52 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is greater than t-tabulated so the correlation coefficient is significant i.e. alternative hypothesis (H_1) is accepted. It means that there is relationship between deposit rate and lending rate of NABIL. (Calculation is shown in Appendix IV)

4.4.2 Nepal Investment Bank Ltd.

Table No: 4.11

Relationship between Interest rate on Deposit and lending of NIBL Bank

| Years(1) | Deposit Rate(2) | Lending Rate(3) |
|---|--------------------------------|------------------------|
| 2007 | 2.88 | 9.03 |
| 2008 | 3.14 | 9.11 |
| 2009 | 3.14 | 9.11 |
| 2010 | 3.14 | 9.11 |
| 2011 | 6.5 | 14.3 |
| Correlation Coefficient(r_{23}) | $r_{23} = 0.998$ | |
| Coefficient of Determination (r_{23}^2) | $r_{23}^2 = 0.996$ | |
| t-statistic | t-cal = 27.35 t-tab = 3.182 | Significant |

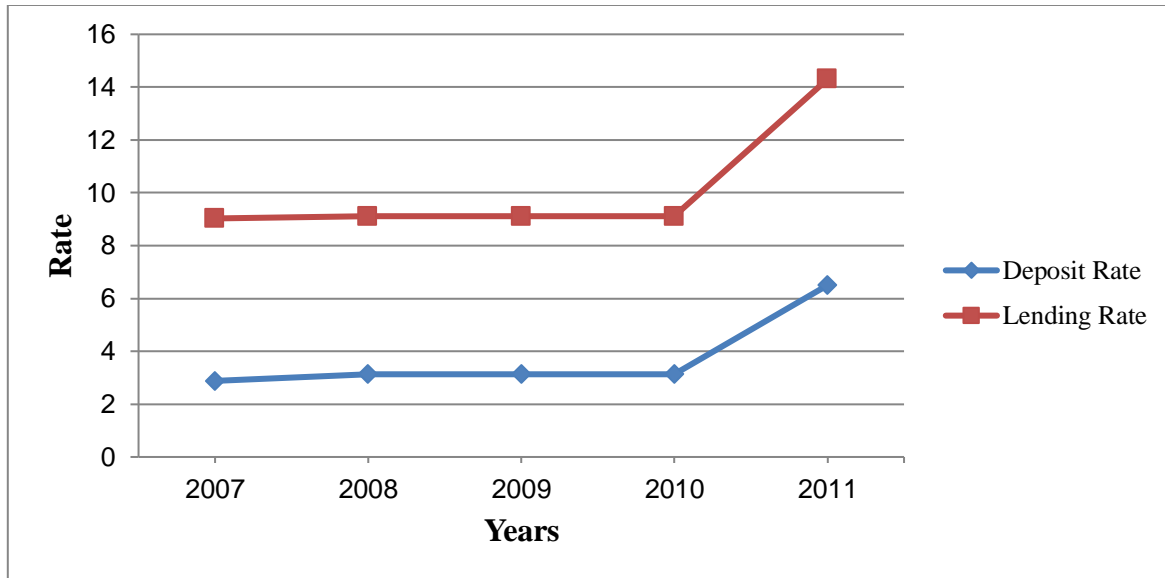


Fig: 4.17 Relationships between Deposit Rate and Lending Rate of NIBL

Table No: 4.11 and fig 4.17 shows the deposit rate and lending rate of NIBL during the year 2007 to 2011. Both the deposit rate and lending rate increase from 2007 to 2008, constant in 2008 to 2010 then both increase in 2011.

In the table 4.10 the correlation coefficient between deposit rate and lending rate is $r_{23} = 0.998$ i.e. there is positive correlation coefficient between lending rate and lending amount. It indicates that if the interest rate on loan increases then the lending amount also increases and vice versa. The coefficient of determination between these two variables is $r_{23}^2 = 0.996$ i.e. 99.6% which indicates that 99.6% is the effect of lending rate on lending amount and remaining 0.4% is the effect of other factors. The t-calculated is 27.35 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is greater than t-tabulated so the correlation coefficient is significant i.e. alternative hypothesis (H_1) is accepted. It means that there is relationship between deposit rate and lending rate of NIBL. (Calculation is shown in Appendix IV)

4.4.3 Bank of Kathmandu

Table No: 4.12

Relationship between Interest rate on Deposit and lending of BOK

| Years(1) | Deposit Rate(2) | Lending Rate(3) |
|---|-------------------------------|-----------------|
| 2007 | 2.72 | 9.71 |
| 2008 | 3.47 | 9.56 |
| 2009 | 4.55 | 10.65 |
| 2010 | 5.07 | 13.07 |
| 2011 | 7.13 | 13.71 |
| Correlation Coefficient(r_{23}) | $r_{23} = 0.913$ | |
| Coefficient of Determination (r_{23}^2) | $r_{23}^2 = 0.833$ | |
| t-statistic | t-cal = 3.87 t-tab = 3.182 | Significant |

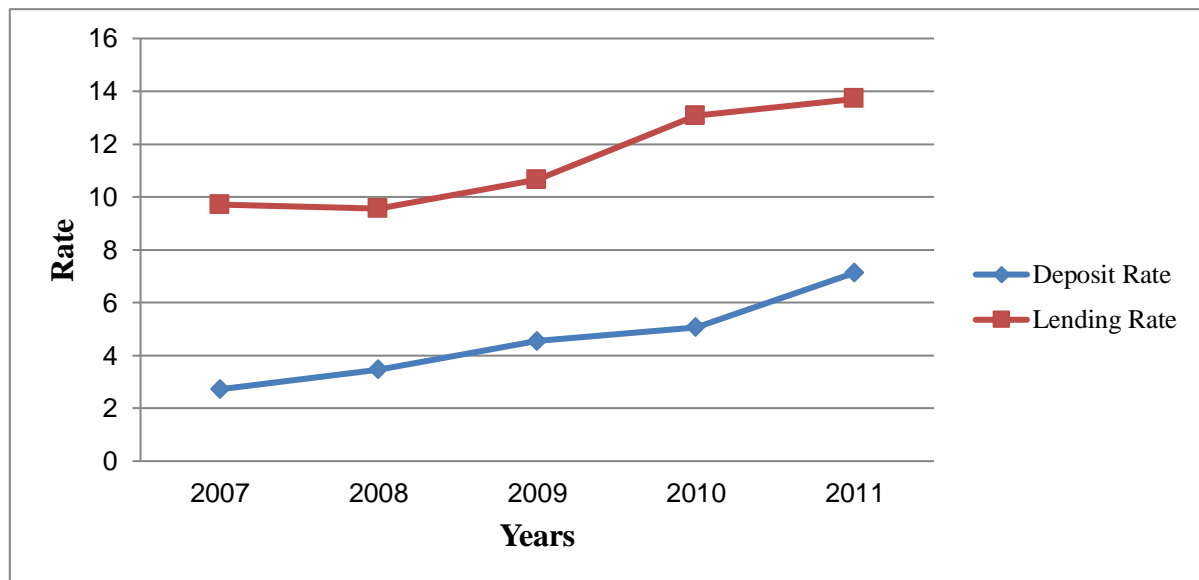


Fig: 4.18 Relationships between Deposit Rate and Lending Rate of BOK

Table No: 4.12 and fig 4.18 shows the deposit rate and lending rate of BOK during the F.Y. 2007 to 2011. Both the deposit rate and lending rate are in increasing tendency except in case of lending rate in 2008 decreases from 9.71% to 9.56%.

In the table 4.12 the correlation coefficient between deposit rate and lending rate is $r_{23} = 0.913$ i.e. there is positive correlation coefficient between lending rate and lending amount. It indicates that if the interest rate on loan increases then the lending amount also increases and vice versa. The coefficient of determination between these two variables is $r_{23}^2 = 0.833$ i.e. 83.3% which indicate that 83.3% is the effect of lending rate on lending amount and remaining 16.7% is the effect of other factors. The t-calculated is 3.87 whereas the tabulated t-value at 5% level of significance for two tails at (5-2) degree of freedom is 3.182. Since the t-calculated is greater than t-tabulated so the correlation coefficient is significant i.e. alternative hypothesis (H_1) is accepted. It means that there is relationship between deposit rate and lending rate of BOK. (Calculation is shown in Appendix IV)

4.5 Major Findings

After presenting and analyzing the interest rate, deposit amount and loan amount of the samples banks by using various analytical tools, the major finding are as follows:

i) Findings after Analysis of Interest rate and Deposit amount

- The saving deposit rate of each sample bank is constant for mostly 4 years and then it increases. Whereas, the fixed deposit rate is constant for the years 2008 to 2009 for NABIL, 2007 to 2010 for NIBL. For BOK, the fixed rate is fluctuated.
- The fixed deposit rate is higher with the increase in the term of fixed deposit.
- The fixed deposit amount increases in every year except in case of NABIL in 2008 to 2009 and 2009 to 2010 or NIBL the amount is decreasing.
- The calculated correlated coefficient of NABIL, NIBL, BOKs' interest rate and saving amount is 0.51, 0.367, 0.058 respectively which shows the positive relationship between the interest rate and saving deposit amount .If the interest rate increases the saving deposit amount increases and vice-versa.

- The calculated correlated coefficient of NABIL, NIBL, BOKs' interest rate and fixed amount is 0.95, 0.798, 0.971 respectively which shows the positive correlation between the interest rate and fixed deposit amount .If the interest rate increases the fixed deposit amount increases and vice-versa.
- The t-calculated of NABIL, NIBL and BOKs' interest rate and saving amount is less than the t-table so the banks saving amounts are insignificant with the change in interest rate. The t-calculated of NABIL, NIBL and BOKs' interest rate and fixed amount is greater than the t-table so the banks fixed amounts are significant with the change in interest rate. If the interest rate is high then the fixed amount also increases and vice versa.

ii) Findings after Analysis of Interest rate and Lending amount

- The sample banks provided loan in various sectors but the industrial, commercial, priority sector is neglected.
- The average lending rate of NABIL and BOK is in increasing tendency in last 5 years whereas it is constant for 2008 to 2010 (i.e. 9.11%) for NIBL then it increased in 2011.
- In all three sample banks the lending amount increases in every year. Even the rate is constant in NIBL but the lending amount goes increasing in that period too.
- The calculated correlated coefficient of NABIL, NIBL, BOK's lending rate and lending amount is 0.978, 0.774, 0.881 respectively which shows the positive correlation between the interest rate and lending amount .If the interest rate increases the lending amount increases and vice-versa.
- The t-calculated of NABIL and NIBL interest rate and lending amount is greater than the t-table so the both banks lending amounts are significant with the change in interest rate i.e. if the interest rate increase then the loan also increases and vice versa. But BOK is insignificant with the change in interest rate i.e. there is no impact of interest in its loan.

iii) Findings after Analysis the relationship between deposit rate and lending rate

- The deposit rate of NABIL bank is fluctuating whereas the lending rate is increasing in past 5 years. The deposit rate of NIBL is constant during the year 2008 to 2010 (i.e.

3.14%) then it increases in 2011 and same situation in lending rate too (i.e. 2008 to 2010 it was 9.11). Whereas the deposit rate of BOK is in increasing tendency during past 5 years and the lending rate is fluctuating during these periods.

- The calculated correlated coefficient of NABIL, NIBL, BOK's lending rate and lending amount is 0.984, 0.998, 0.913 respectively which shows the positive correlation between deposit rate and lending rate. If the interest rate increases the lending amount increases and vice-versa.
- The t-calculated of all three sample banks deposit rate and lending rate is greater than the t-table so the banks' deposit rate and lending rate are significant with each other i.e. there is relationship between deposit rate and lending rate.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter is the brief accumulation of the whole study. This chapter contains the three parts and they are summary, conclusion and recommendation. The summary and conclusion parts are made related with the introduction, presentation and analysis of the necessary data. The recommendation is made according to the findings and shortcoming of the sample commercial banks.

5.1 Summary

It has been well know that trade; commerce and industry are the signs of healthy economic development of every country. With the implicit objective of the economic development of the country, Nepal has adopted mixed and liberal economic policy. Especially after the restoration of the democracy, the concept of the liberalization policies has been incorporated as directive principal and state policies. As a result of the liberal economic policy thrust adopted in the eighties, various multinational companies, finance companies and joint venture banks came into existence. Commercial banks play a vital role in economic development of any country so up to Mid July 2011 there are 31 commercial banks.

This study mainly focuses on the impact of interest rate on deposit and lending amount. There are various factors that affect the deposit amount and lending amount, among them interest rate is one of the important factors. The savers i.e. depositors are highly influence by the interest rate provided to them as well as the investor or lender is also affected by the interest rate charged. If the interest rate is less then the surplus amount of saver will be idle whereas, if it is costly to borrow the amount then the investor/lender will be unable to borrow the amount which ultimately affects the economic development of the country. So the financial institution should pay attention towards the interest rate that is fixed because it affects the loan and deposit. In this chapter the brief introduction about Nepalese economy, interest rate, sample organizations, statement of problem and significance of the study, objectives of the study, research hypothesis and limitation of study are done.

In second chapter attempts have been made to review the literature related to interest rate structure and its impact on lending and deposit of commercial banks in Nepal. This chapter is going to show the problems posed by different researchers and writers and the solutions and strategies they exerted. The main motto of this chapter is to show how far and how much our present study is associated with different past researches. So, different journals, articles, books and research works were reviewed. The concept, role of interest rate in the economy and factors affecting interest rate are reviewed and identified. Various theories related with the interest rate namely: Classical theory, Loanable funds theory, Liquidity preference theory and Rational expectation theory are reviewed. Meaning, types, importance of deposit are discussed. Meaning and factors affection the volume of credit are discussed. The term structure of interest rate and it theory namely: Pure expectation theory, Liquidity premium theory, Segmented-markets or Hedging-pressure argument, Preferred habitat theory are reviewed. Various unpublished thesis done on same matter are also studied and mentioned in this chapter.

In third chapter it is related with the sources of data collection and procedure of a sample banks. It is concern with the tools for data analysis to get the knowledge about the real impact of interest on deposit and loan. This chapter deals about the financial and statistical tools that are to be used in analyzing the data.

The last chapter contains the major parts i.e. presenting, calculating and analyzing the data that are collected by using various statistical tools and financial tools like mean, standard deviation, correlation coefficient, coefficient of determination, t-statistic. It also consists of major finding on the basis of analyzing the data.

5.2 Conclusion

The sample banks are very reputed bank in the context of Nepal. NABIL bank received as “Bank of the Year: 2004”. The NIBL bank has been awarded as Banker of the year of 2003, 2005, 2008 and 2010 respectively. BOK has awarded as Banker of the Year for the year of 2011 from the Banker Financial Times, London. The study of five years data show the growing deposit and loan as well as some fluctuation too. On the basis of presentation and analysis of data the major conclusion can be draw which is as follows:

- 1) According to the theory, there is positive relationship between deposits rate and deposit amount but it is not applicable in all the sample banks. Even though the rate is constant or decreases from previous year the deposit amount increases. It may be just because of unavailability of other reliable place of investment, political instability and feeling of insecurity among people. In the last five years people accumulated most of their funds on saving and fixed accounts though they don't get appropriate interest on it. As well as banks are providing high interest on fixed deposit due to the crises of liquidity from last 4 years in banks.
- 2) All the sample banks have positive correlation with the interest rate and the saving and fixed deposit amount. So it proves that there exists a positive relationship between the deposit rate and the deposit amount. But while t-testing the deposit rate of saving and saving amount it shows insignificant relationship whereas, for fixed there is significant relationship. It may be happen because the depositor want security of their property as well they lack the place to invest.
- 3) According to the theory, there is negative relationship between lending rate and lending amount. Even though the lending rate is constant or it increase there too exist an increasing tendency to borrow the amount. In every last five years the lending amount is increasing. This may be happen due to the increase in real states business and other investment opportunities.
- 4) All the sample banks have positive correlation with the lending rate and lending amount. The NABIL bank has highest correlation then BOK and NIBL. It shows there is positive relationship between lending rate and lending amount which means other factors are responsible for the negative relationship between lending rate and lending amount. The t-statistic of NABIL 's and NIBL's shows significant relationship between lending rate and lending amount but BOK's shows insignificant relationship.
- 5) The deposit rate is the expenses of the bank and the lending rate is the income of the bank. So there should be positive relationship between these rates. The analysis of these sample banks shows the positive relationship between these rates. The NIBL bank has highest correlation then NABIL and BOK. It means if the deposit rate increase then the lending rate increases and vice versa. The t-statistics of all sample banks show the significant relationship between these rates.

5.3 Recommendation

Although these sample banks are performing its internal activities well and competitive in the market, the following recommendations are suggested on the basis of observation and analysis of data:

- 1) In case to increase its deposit the banks should increase their deposit rate so more people will be influence to save in banks so the accumulated money can be utilized in proper sectors. It helps to generate more capital from depositors and can investing in productive sector that ultimately improve the economic sectors of the country.
- 2) In case to increase the lending the banks should reduce the lending rate as possible so the investor will be attracted to borrow the amount. As we know the interest on loan is income of any bank so, if the banks are capable to provide huge loan to trustworthy investor then both the bank as well as economy of the country grows.
- 3) Merely, providing loan is not sufficient for the growth of the banks but the commercial banks should emphasize on the repayment on loan. It should provide incentive to borrowers to encourage for the payment of loan on time.
- 4) The higher lending rate should be charged in unproductive sectors and lower rate in productive sectors. So the scarce deposit collected from public goes to productive sector which ultimately enhances GDP and productivity of the country.
- 5) The commercial banks should invest in higher yield oriented sectors. For this they have to invest their fund in sector with higher return. It will ultimately increase the profit of the bank.
- 6) The NRB suggested that the financial institution should include the inflation premium as far as possible while fixing the interest rates. If the inflation rate is not considered and real rate come out to be negative then depositors may withdraw their money and utilize it on unproductive sectors.
- 7) The NRB suggested that commercial banks should formulate and implement a client oriented service policy while fixing deposit rates and lending rates. It helps the banks to face the cut –thought competition very boldly.

APPENDIX

APPENDIX-I

The list of commercial banks established till March 2011.

S.N. Commercial Banks

1. Nepal Bank Ltd.
2. Rastriya Banijya Bank Ltd.
3. Nabil Bank Ltd.
4. Nepal Investment Bank Ltd.
5. Standard Chartered Bank Nepal Ltd.
6. Himalayan Bank Ltd.
7. Nepal SBI Bank Ltd.
8. Nepal Bangladesh (NB) Bank Ltd.
9. Everest Bank Ltd.
10. Bank of Kathmandu Ltd.
11. Nepal Industrial and commercial Bank Ltd.
12. Machhapuchhre Bank Ltd.
13. kumari Bank Ltd.
14. Laxmi Bank Ltd.
15. Siddhartha Bank Ltd.
16. Agriculture Development Bank Ltd.
17. Global Bank Ltd.
18. Citizen Bank International Ltd.
19. Prime Commercial Bank Ltd.
20. Sunrise Bank Ltd.
21. Bank of Asia Nepal Ltd.
22. Development Credit Bank Ltd.
23. NMB Bank Ltd.
24. Kist Bank Ltd.
25. Janata Bank Ltd.

26. Mega Bank Ltd.
27. Commerz and Trust Bank Ltd.
28. Civil Bank Ltd.
29. Century Bank Ltd.
30. Sanima Bank (currently got approval from NRB for commercial bank)

(Source: www.nrb.org.np)(Mid-March 2011)

APPENDIX-II

4.1 Calculation of Mean and Standard Deviation of NABIL Bank

| Whole Mean (X) | (X- \bar{X}) | (X - \bar{X}) ² |
|-----------------|-----------------|-------------------------------|
| 2.714 | -2.8468 | 8.1043 |
| 4.92 | -0.6408 | 0.411 |
| 5 | -0.5608 | 0.3145 |
| 7.71 | 2.1492 | 4.6191 |
| 7.46 | 1.8992 | 3.6070 |
| $\sum x=27.804$ | | $\sum(X-\bar{X})^2=17.06$ |

Fixed Deposit Mean = Total fixed deposit \ n

Whole Mean (X) = Total deposit \ n

$$\text{Mean } (\bar{X}) = \frac{\sum x}{n} = \frac{27.804}{5} = 5.5608$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X-\bar{X})^2}{n}} = \sqrt{\frac{17.06}{5}} = 1.85$$

The average and standard deviation of interest rate on deposit of NABIL Bank is 5.5608 and 1.85 respectively.

4.2 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NABIL Bank

For Saving Deposit:

| Years | Rate (x_1) | Deposit (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|-------------------|-------------------------|---------------------|---------------------|---|--------------------------------------|---|
| 2007 | 2 | 10187.4 | -0.6 | -2820.58 | 1692.35 | 0.36 | 7955671.54 |
| 2008 | 2 | 12160 | -0.6 | -847.98 | 508.788 | 0.36 | 719070.08 |
| 2009 | 2 | 14620.4 | -0.6 | 1612.42 | -967.452 | 0.36 | 2599898.3 |
| 2010 | 3 | 13783.6 | 0.4 | 775.6 | 310.24 | 0.16 | 601555.36 |
| 2011 | 4 | 14288.5 | 1.4 | 1280.5 | 1792.7 | 1.96 | 1639680.25 |
| | $\sum X_1 = 13$ | $\sum X_2 =$ 65039.9 | | | $\sum(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 3336.62 | $\sum(X_1 - \bar{X}_1)^2$ $= 3.2$ | $\sum(X_2 - \bar{X}_2)^2$ $= 13515875.5$ |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{13}{5} = 2.6$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{65039.9}{5} = 13007.98 \sim 13008$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{3336.62}{\sqrt{3.2} \sqrt{13515875.5}} = \frac{3336.62}{6576.534} = 0.51 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NABIL Bank is 0.51.

$$\text{Coefficient of determination } (r_{23})^2 = 0.2601$$

$$t\text{-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.51 * \frac{\sqrt{5-2}}{\sqrt{1-0.2601}} = 1.03$$

For Fixed Deposit:

| Years | Rate (x_1) | Deposit (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|------------------------|-------------------------|---------------------|---------------------|---|--|---|
| 2007 | 2.833 | 5435.2 | -3.3136 | -5317.18 | 17619.01 | 10.97994 | 28272403.15 |
| 2008 | 5.5 | 8464.1 | -0.6466 | -2288.28 | 1479.602 | 0.418092 | 5236225.358 |
| 2009 | 5.6 | 8310.7 | -0.5466 | -2441.68 | 1334.622 | 0.298772 | 5961801.222 |
| 2010 | 8.65 | 14711.1 | 2.5034 | 3958.72 | 9910.26 | 6.267012 | 15671464.04 |
| 2011 | 8.15 | 16840.8 | 2.0034 | 6088.42 | 12197.54 | 4.013612 | 37068858.1 |
| | $\sum X_1 =$ 30.733 | $\sum X_2 =$ 53761.9 | | | $\sum (X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 42541.03 | $\sum (X_1 - \bar{X}_1)^2$ = 21.97743 | $\sum (X_2 - \bar{X}_2)^2$ = 92210751.87 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{30.733}{5} = 6.1466$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{53761.9}{5} = 10752.38$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{45}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{42541.03}{\sqrt{21.97743} \sqrt{92210751.87}} = \frac{42541.03}{45017.28} = 0.95 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NABIL Bank is 0.95.

$$\text{Coefficient of determination } (r_{45})^2 = 0.9025$$

$$t\text{-statistics (t)} = r_{45} * \frac{\sqrt{n-2}}{\sqrt{1-r_{45}^2}} = 0.95 * \frac{\sqrt{5-2}}{\sqrt{1-0.9025}} = 5.27$$

4.3 Calculation of Mean and Standard Deviation of NIBL Bank

| Whole Mean (X) | (X- \bar{X}) | (X - \bar{X}) ² |
|----------------|-----------------|-------------------------------|
| 2.88 | -0.88 | 0.7744 |
| 3.14 | -0.62 | 0.3844 |
| 3.14 | -0.62 | 0.3844 |
| 3.14 | -0.62 | 0.3844 |
| 6.5 | 2.74 | 7.5076 |
| $\sum x=18.8$ | | $\sum(X-\bar{X})^2 = 9.4352$ |

Fixed Deposit Mean = Total fixed deposit \ n

Whole Mean (X) = Total deposit \ n

$$\text{Mean } (\bar{X}) = \frac{\sum x}{n} = \frac{18.8}{5} = 3.76$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X-\bar{X})^2}{n}} = \sqrt{\frac{9.4352}{5}} = 1.374$$

The average and standard deviation of interest rate on deposit of NIBL Bank is 3.76 and 1.374 respectively.

4.4 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NIBL Bank

For Saving Deposit:

| Years | Rate (x ₁) | Deposit (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|------------------------|---------------------------|---------------------------------|---------------------------------|--|--|--|
| 2007 | 2.5 | 10742.2 | -0.45 | -1720.13 | 774.0576 | 0.2025 | 2958840 |
| 2008 | 2.5 | 13688.8 | -0.45 | 1226.472 | -551.912 | 0.2025 | 1504234 |
| 2009 | 2.5 | 10542.2 | -0.45 | -1920.13 | 864.0576 | 0.2025 | 3686892 |
| 2010 | 2.5 | 13783.64 | -0.45 | 1321.312 | -594.59 | 0.2025 | 1745865 |
| 2011 | 4.75 | 13554.8 | 1.8 | 1092.472 | 1966.45 | 3.24 | 1193495 |
| | $\sum X_1 =$ 14.75 | $\sum X_2 =$ 62311.64 | | | $\sum (X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 2458.062 | $\sum (X_1 - \bar{X}_1)^2$ = 4.05 | $\sum (X_2 - \bar{X}_2)^2$ = 11089326 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{14.75}{5} = 2.95$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{62311.64}{5} = 12462.328$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient}(r_{23}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{2458.062}{\sqrt{4.05} \sqrt{11089326}} = \frac{2458.062}{6701.621} = 0.367 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NIBL Bank is 0.367.

Coefficient of determination $(r_{23})^2 = 0.1347$

$$t\text{-statistics (t)} = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.367 * \frac{\sqrt{5-2}}{\sqrt{1-0.1347}} = 0.683$$

For Fixed Deposit:

| Years | Rate (x_1) | Deposit (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|-----------------------|--------------------------|---------------------|---------------------|---|--|---|
| 2007 | 2.94 | 7516.8 | -0.968 | -3496.65 | 3384.761 | 0.937024 | 12226589 |
| 2008 | 3.25 | 7944.2 | -0.658 | -3069.25 | 2019.569 | 0.432964 | 9420320.1 |
| 2009 | 3.25 | 6516.9 | -0.658 | -4496.55 | 2958.733 | 0.432964 | 20218998 |
| 2010 | 3.25 | 14711.07 | -0.658 | 3697.616 | -2433.03 | 0.432964 | 13672364 |
| 2011 | 6.85 | 18378.3 | 2.942 | 7364.846 | 21667.38 | 8.655364 | 54240957 |
| | $\sum X_1 =$ 19.54 | $\sum X_2 =$ 55067.27 | | | $\sum (X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 27597.41 | $\sum (X_1 - \bar{X}_1)^2$ = 10.89128 | $\sum (X_2 - \bar{X}_2)^2$ = 109779228 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{19.54}{5} = 3.908$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{55067.27}{5} = 11013.454$$

$$\text{Karl Person's Correlation Coefficient}(r_{45}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}}$$

$$= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{27597.41}{\sqrt{10.89128} \sqrt{109779228}} = \frac{27597.41}{34577.98} = 0.798$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NIBL Bank is 0.798.

Coefficient of determination $(r_{45})^2 = 0.637$

$$t\text{-statistics (t)} = r_{45} * \frac{\sqrt{n-2}}{\sqrt{1-r_{45}^2}} = 0.798 * \frac{\sqrt{5-2}}{\sqrt{1-0.637}} = 3.80$$

4.5 Calculation of Mean and Standard Deviation of BOK Bank

| Whole Mean (X) | $(X-\bar{X})$ | $(X-\bar{X})^2$ |
|------------------|---------------|---------------------------------|
| 2.72 | -1.868 | 3.489424 |
| 3.47 | -1.118 | 1.249924 |
| 4.55 | -0.038 | 0.001444 |
| 5.07 | 0.482 | 0.232324 |
| 7.13 | 2.542 | 6.461764 |
| $\sum x = 22.94$ | | $\sum (X-\bar{X})^2 = 11.43488$ |

Fixed Deposit Mean = Total fixed deposit \ n

Whole Mean (X) = Total deposit \ n

$$\text{Mean } (\bar{X}) = \frac{\sum x}{n} = \frac{22.94}{5} = 4.588$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum (X-\bar{X})^2}{n}} = \sqrt{\frac{11.43488}{5}} = 2.29$$

The average and standard deviation of interest rate on deposit of BOK Bank is 4.588 and 2.29 respectively.

4.6 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of BOK Bank

For Saving Deposit:

| Years | Rate (x ₁) | Deposit (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1)(X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|------------------------|---------------------------|---------------------------------|---------------------------------|--|--|--|
| 2007 | 2.25 | 5526.8 | -0.25 | -1015.9 | 253.975 | 0.0625 | 1032053 |
| 2008 | 2.25 | 6595.2 | -0.25 | 52.5 | -13.125 | 0.0625 | 2756.25 |
| 2009 | 2.25 | 7260.3 | -0.25 | 717.6 | -179.4 | 0.0625 | 514949.8 |
| 2010 | 2.25 | 6723.2 | -0.25 | 180.5 | -45.125 | 0.0625 | 32580.25 |
| 2011 | 3.5 | 6607.6 | 1 | 64.9 | 64.9 | 1 | 4212.01 |
| | $\sum X_1 = 12.5$ | $\sum X_2 = 32713.1$ | | | $\sum (X_1 - \bar{X}_1)(X_2 - \bar{X}_2) = 81.225$ | $\sum (X_1 - \bar{X}_1)^2 = 1.25$ | $\sum (X_2 - \bar{X}_2)^2 = 1586551$ |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{12.5}{5} = 2.5$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{32713.1}{5} = 6542.7$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{81.225}{\sqrt{1.25} \sqrt{1586551}} = \frac{81.225}{1408.21} = 0.058 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of BOK Bank is 0.058.

Coefficient of determination $(r_{23})^2 = 0.0033$

$$t\text{-statistics (t)} = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.058 * \frac{\sqrt{5-2}}{\sqrt{1-0.0033}} = 0.101$$

For Fixed Deposit:

| Years | Rate (x ₁) | Deposit (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|---|--|--|
| 2007 | 2.79 | 3037.2 | -2.138 | -2052.56 | 4388.373 | 4.571044 | 4213002.6 |
| 2008 | 3.64 | 3703.1 | -1.288 | -1386.66 | 1786.018 | 1.658944 | 1922826 |
| 2009 | 4.88 | 4474.6 | -0.048 | -615.16 | 29.52768 | 0.002304 | 378421.83 |
| 2010 | 5.48 | 6383.6 | 0.552 | 1293.84 | 714.1997 | 0.304704 | 1674021.9 |
| 2011 | 7.85 | 7850.3 | 2.922 | 2760.54 | 8066.298 | 8.538084 | 7620581.1 |
| | $\sum X_1 =$ 24.64 | $\sum X_2 =$ 25448.8 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 14984.42 | $\sum(X_1 - \bar{X}_1)^2$ =15.07508 | $\sum(X_2 - \bar{X}_2)^2$ =15808853 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{24.64}{5} = 4.928$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{25448.8}{5} = 5089.76$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{45}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{14984.42}{\sqrt{15.07508} \sqrt{15808853}} = \frac{14984.42}{15437.75} = 0.971 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of BOK Bank is 0.971.

Coefficient of determination $(r_{45})^2 = 0.943$

$$t\text{-statistics (t)} = r_{45} * \frac{\sqrt{n-2}}{\sqrt{1-r_{45}^2}} = 0.971 * \frac{\sqrt{5-2}}{\sqrt{1-0.943}} = 7.04$$

APPENDIX-III

4.7 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NABIL Bank (Lending)

| Years | Rate (x ₁) | Lending (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|---|--|--|
| 2007 | 7.875 | 15657.1 | -3.334 | -11674.2 | 38921.92 | 11.11556 | 136287880 |
| 2008 | 9.82 | 21514.6 | -1.389 | -5816.74 | 8079.452 | 1.929321 | 33834464 |
| 2009 | 10.63 | 27816.6 | -0.579 | 485.26 | -280.966 | 0.335241 | 235477.27 |
| 2010 | 13.54 | 32902.8 | 2.331 | 5571.46 | 12987.07 | 5.433561 | 31041167 |
| 2011 | 14.18 | 38765.6 | 2.971 | 11434.26 | 33971.19 | 8.826841 | 130742302 |
| | $\sum X_1 =$ 56.045 | $\sum X_2 =$ 136656.7 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 93678.66 | $\sum(X_1 - \bar{X}_1)^2$ =27.64052 | $\sum(X_2 - \bar{X}_2)^2$ =332141289 |

Average lending rate = Total lending rate \ n

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{56.045}{5} = 11.209$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{136656.7}{5} = 27331.34$$

$$\text{Karl Person's Correlation Coefficient}(r_{12}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}}$$

$$= \frac{\sum(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum(X_1 - \bar{X}_1)^2} \sqrt{\sum(X_2 - \bar{X}_2)^2}} = \frac{93678.66}{\sqrt{27.64052} \sqrt{332141289}} = \frac{93678.66}{95814.77} = 0.978$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NABIL Bank is 0.978.

Coefficient of determination (r₁₂)² = 0.956

$$t\text{-statistics (t)} = r_{12} * \frac{\sqrt{n-2}}{\sqrt{1-r_{12}^2}} = 0.978 * \frac{\sqrt{5-2}}{\sqrt{1-0.956}} = 8.07$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X_1 - \bar{X}_1)^2}{n}} = \sqrt{\frac{27.64052}{5}} = 2.35$$

4.8 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NIBL Bank (Lending)

| Years | Rate (x ₁) | Lending (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|---|--|--|
| 2007 | 9.03 | 17482 | -1.102 | -12139.4 | 13377.64 | 1.214404 | 147365518 |
| 2008 | 9.11 | 27145.5 | -1.022 | -2475.92 | 2530.39 | 1.044484 | 6130179.8 |
| 2009 | 9.11 | 28911.60 | -1.022 | -709.82 | 725.436 | 1.044484 | 503844.43 |
| 2010 | 9.11 | 32902.80 | -1.022 | 3281.38 | -3353.57 | 1.044484 | 10767455 |
| 2011 | 14.3 | 41665.2 | 4.168 | 12043.78 | 50198.48 | 17.37222 | 145052637 |
| | $\sum X_1 =$ 50.66 | $\sum X_2 =$ 148107.1 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 63478.37 | $\sum(X_1 - \bar{X}_1)^2$ =21.72008 | $\sum(X_2 - \bar{X}_2)^2$ =309819634 |

Average lending rate = Total lending rate \ n

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{50.66}{5} = 10.132$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{148107.1}{5} = 29621.42$$

$$\text{Karl Person's Correlation Coefficient } (r_{12}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}}$$

$$= \frac{\sum(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum(X_1 - \bar{X}_1)^2} \sqrt{\sum(X_2 - \bar{X}_2)^2}} = \frac{63478.37}{\sqrt{21.72008} \sqrt{309819634}} = \frac{63478.37}{82032.70} = 0.774$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NIBL Bank is 0.774.

Coefficient of determination $(r_{12})^2 = 0.599$

$$t\text{-statistics (t)} = r_{12} * \frac{\sqrt{n-2}}{\sqrt{1-r_{12}^2}} = 0.774 * \frac{\sqrt{5-2}}{\sqrt{1-0.599}} = 2.12$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X_1 - \bar{X}_1)^2}{n}} = \sqrt{\frac{21.72008}{5}} = 4.344$$

4.9 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of BOK Bank (Lending)

| Years | Rate (x_1) | Lending (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|----------------------|-------------------------|---------------------|---------------------|---|--|---|
| 2007 | 9.71 | 9663.6 | -1.63 | -4605.62 | 7507.161 | 2.6569 | 21211736 |
| 2008 | 9.56 | 12692.9 | -1.78 | -1576.32 | 2805.85 | 3.1684 | 2484784.7 |
| 2009 | 10.65 | 14894.7 | -0.69 | 625.48 | -431.581 | 0.4761 | 391225.23 |
| 2010 | 13.07 | 16847.1 | 1.73 | 2577.88 | 4459.732 | 2.9929 | 6645465.3 |
| 2011 | 13.71 | 17247.8 | 2.37 | 2978.58 | 7059.235 | 5.6169 | 8871938.8 |
| | $\sum X_1 =$ 56.7 | $\sum X_2 =$ 71346.1 | | | $\sum(X_1 - \bar{X}_1)(X_2 - \bar{X}_2) =$ 21400.4 | $\sum(X_1 - \bar{X}_1)^2 =$ 14.9112 | $\sum(X_2 - \bar{X}_2)^2 =$ 39605150 |

Average lending rate = Total lending rate \ n

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{56.7}{5} = 11.34$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{71346.1}{5} = 14269.22$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{12}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{21400.4}{\sqrt{14.9112} \sqrt{39605150}} = \frac{21400.4}{24301.43} = 0.881 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of BOK Bank is 0.881.

Coefficient of determination $(r_{12})^2 = 0.7755$

$$\text{t-statistics } (t) = r_{12} * \frac{\sqrt{n-2}}{\sqrt{1-r_{12}^2}} = 0.881 * \frac{\sqrt{5-2}}{\sqrt{1-0.7755}} = 3.22$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum (X - \bar{X})^2}{n}} = \sqrt{\frac{14.9112}{5}} = 1.73$$

APPENDIX-IV

4.10 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NABIL Bank (Deposit Rate and Interest Rate)

| Years | Rate (x ₁) | Lending (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|---|--|--|
| 2007 | 2.714 | 7.875 | -2.8468 | -3.334 | 9.491231 | 8.10427 | 11.115556 |
| 2008 | 4.92 | 9.82 | -0.6408 | -1.389 | 0.890071 | 0.410625 | 1.929321 |
| 2009 | 5 | 10.63 | -0.5608 | -0.579 | 0.324703 | 0.314497 | 0.335241 |
| 2010 | 7.71 | 13.54 | 2.1492 | 2.331 | 5.009785 | 4.619061 | 5.433561 |
| 2011 | 7.46 | 14.18 | 1.8992 | 2.971 | 5.642523 | 3.606961 | 8.826841 |
| | $\sum X_1 =$ 27.804 | $\sum X_2 =$ 56.045 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 21.35831 | $\sum(X_1 - \bar{X}_1)^2$ =17.05541 | $\sum(X_2 - \bar{X}_2)^2$ =27.64052 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{27.804}{5} = 5.5608$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{56.045}{5} = 11.209$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{21.35831}{\sqrt{17.05541} \sqrt{27.64052}} = \frac{21.35831}{21.712} = 0.984 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NABIL Bank is 0.984.

$$\text{Coefficient of determination } (r_{23})^2 = 0.968$$

$$\text{t-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.984 * \frac{\sqrt{5-2}}{\sqrt{1-0.968}} = 9.52$$

4.11 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NIBL Bank (Deposit Rate and Interest Rate)

| Years | Rate (x_1) | Lending (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|----------------------|----------------------|---------------------|---------------------|---|--|--|
| 2007 | 2.88 | 9.03 | -0.88 | -1.102 | 0.96976 | 0.7744 | 1.214404 |
| 2008 | 3.14 | 9.11 | -0.62 | -1.022 | 0.63364 | 0.3844 | 1.044484 |
| 2009 | 3.14 | 9.11 | -0.62 | -1.022 | 0.63364 | 0.3844 | 1.044484 |
| 2010 | 3.14 | 9.11 | -0.62 | -1.022 | 0.63364 | 0.3844 | 1.044484 |
| 2011 | 6.5 | 14.3 | 2.74 | 4.168 | 11.42032 | 7.5076 | 17.372224 |
| | $\sum X_1 =$ 18.8 | $\sum X_2 = 50.66$ | | | $\sum (X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 14.291 | $\sum (X_1 - \bar{X}_1)^2$ $= 9.4352$ | $\sum (X_2 - \bar{X}_2)^2$ $= 21.72008$ |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{18.8}{5} = 3.76$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{50.66}{5} = 10.132$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{14.291}{\sqrt{9.4352} \sqrt{21.72008}} = \frac{14.291}{14.32} = 0.998 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NIBL Bank is 0.998.

$$\text{Coefficient of determination } (r_{23})^2 = 0.996$$

$$\text{t-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.998 * \frac{\sqrt{5-2}}{\sqrt{1-0.996}} = 27.35$$

4.12 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of BOK Bank (Deposit Rate and Interest Rate)

| Years | Rate (x_1) | Lending (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|-----------------------|----------------------|---------------------|---------------------|---|--|---------------------------------------|
| 2007 | 2.72 | 9.71 | -1.868 | -1.63 | 3.04484 | 3.489424 | 2.6569 |
| 2008 | 3.47 | 9.56 | -1.118 | -1.78 | 1.99004 | 1.249924 | 3.1684 |
| 2009 | 4.55 | 10.65 | -0.038 | -0.69 | 0.02622 | 0.001444 | 0.4761 |
| 2010 | 5.07 | 13.07 | 0.482 | 1.73 | 0.83386 | 0.232324 | 2.9929 |
| 2011 | 7.13 | 13.71 | 2.542 | 2.37 | 6.02454 | 6.461764 | 5.6169 |
| | $\sum X_1 =$ 22.94 | $\sum X_2 =$ 56.7 | | | $\sum(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 11.9195 | $\sum(X_1 - \bar{X}_1)^2$ =11.43488 | $\sum(X_2 - \bar{X}_2)^2$ =14.9112 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{22.94}{5} = 4.588$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{56.7}{5} = 11.34$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum(X_1 - \bar{X}_1)^2} \sqrt{\sum(X_2 - \bar{X}_2)^2}} = \frac{11.9195}{\sqrt{11.43488} \sqrt{14.9112}} = \frac{11.9195}{13.06} = 0.913 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of BOK Bank is 0.913.

Coefficient of determination $(r_{23})^2 = 0.833$

$$\text{t-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.913 * \frac{\sqrt{5-2}}{\sqrt{1-0.833}} = 3.87$$

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APPENDIX

APPENDIX-I

The list of commercial banks established till Mid July 2011.

S.N. Commercial Banks

31. Nepal Bank Ltd.
32. Rastriya Banijya Bank Ltd.
33. Nabil Bank Ltd.
34. Nepal Investment Bank Ltd.
35. Standard Chartered Bank Nepal Ltd.
36. Himalayan Bank Ltd.
37. Nepal SBI Bank Ltd.
38. Nepal Bangladesh (NB) Bank Ltd.
39. Everest Bank Ltd.
40. Bank of Kathmandu Ltd.
41. Nepal Industrial and commercial Bank Ltd.
42. Machhapuchhre Bank Ltd.
43. kumari Bank Ltd.
44. Laxmi Bank Ltd.
45. Siddhartha Bank Ltd.
46. Agriculture Development Bank Ltd.
47. Global Bank Ltd.
48. Citizen Bank International Ltd.
49. Prime Commercial Bank Ltd.
50. Sunrise Bank Ltd.
51. Bank of Asia Nepal Ltd.
52. Development Credit Bank Ltd.
53. NMB Bank Ltd.
54. Kist Bank Ltd.
55. Janata Bank Ltd.

56. Mega Bank Ltd.
57. Commerz and Trust Bank Ltd.
58. Civil Bank Ltd.
59. Century Bank Ltd.
60. Lumbini Bank Ltd.
61. Sanima Bank
62. Nepal Credit & Commercial Bank Ltd.

(Source: www.nrb.org.np)

APPENDIX-II

4.1 Calculation of Mean and Standard Deviation of NABIL Bank

| Whole Mean (X) | (X- \bar{X}) | (X - \bar{X}) ² |
|-----------------|-----------------|-------------------------------|
| 2.714 | -2.8468 | 8.1043 |
| 4.92 | -0.6408 | 0.411 |
| 5 | -0.5608 | 0.3145 |
| 7.71 | 2.1492 | 4.6191 |
| 7.46 | 1.8992 | 3.6070 |
| $\sum x=27.804$ | | $\sum(X-\bar{X})^2=17.06$ |

Fixed Deposit Mean = Total fixed deposit \ n

Whole Mean (X) = Total deposit \ n

$$\text{Mean } (\bar{X}) = \frac{\sum x}{n} = \frac{27.804}{5} = 5.5608$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X-\bar{X})^2}{n}} = \sqrt{\frac{17.06}{5}} = 1.85$$

The average and standard deviation of interest rate on deposit of NABIL Bank is 5.5608 and 1.85 respectively.

4.2 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NABIL Bank

For Saving Deposit:

| Years | Rate (x_1) | Deposit (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|-------------------|-------------------------|---------------------|---------------------|---|--------------------------------------|---|
| 2007 | 2 | 10187.4 | -0.6 | -2820.58 | 1692.35 | 0.36 | 7955671.54 |
| 2008 | 2 | 12160 | -0.6 | -847.98 | 508.788 | 0.36 | 719070.08 |
| 2009 | 2 | 14620.4 | -0.6 | 1612.42 | -967.452 | 0.36 | 2599898.3 |
| 2010 | 3 | 13783.6 | 0.4 | 775.6 | 310.24 | 0.16 | 601555.36 |
| 2011 | 4 | 14288.5 | 1.4 | 1280.5 | 1792.7 | 1.96 | 1639680.25 |
| | $\sum X_1 = 13$ | $\sum X_2 =$ 65039.9 | | | $\sum(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 3336.62 | $\sum(X_1 - \bar{X}_1)^2$ $= 3.2$ | $\sum(X_2 - \bar{X}_2)^2$ $= 13515875.5$ |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{13}{5} = 2.6$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{65039.9}{5} = 13007.98 \sim 13008$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{3336.62}{\sqrt{3.2} \sqrt{13515875.5}} = \frac{3336.62}{6576.534} = 0.51 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NABIL Bank is 0.51.

$$\text{Coefficient of determination } (r_{23})^2 = 0.2601$$

$$\text{t-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.51 * \frac{\sqrt{5-2}}{\sqrt{1-0.2601}} = 1.03$$

For Fixed Deposit:

| Years | Rate (x ₁) | Deposit (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|---|--|---|
| 2007 | 2.833 | 5435.2 | -3.3136 | -5317.18 | 17619.01 | 10.97994 | 28272403.15 |
| 2008 | 5.5 | 8464.1 | -0.6466 | -2288.28 | 1479.602 | 0.418092 | 5236225.358 |
| 2009 | 5.6 | 8310.7 | -0.5466 | -2441.68 | 1334.622 | 0.298772 | 5961801.222 |
| 2010 | 8.65 | 14711.1 | 2.5034 | 3958.72 | 9910.26 | 6.267012 | 15671464.04 |
| 2011 | 8.15 | 16840.8 | 2.0034 | 6088.42 | 12197.54 | 4.013612 | 37068858.1 |
| | $\sum X_1 =$ 30.733 | $\sum X_2 =$ 53761.9 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 42541.03 | $\sum(X_1 - \bar{X}_1)^2$ =21.97743 | $\sum(X_2 - \bar{X}_2)^2$ = 92210751.87 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{30.733}{5} = 6.1466$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{53761.9}{5} = 10752.38$$

$$\text{Karl Person's Correlation Coefficient}(r_{45}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}}$$

$$= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{42541.03}{\sqrt{21.97743} \sqrt{92210751.87}} = \frac{42541.03}{45017.28} = 0.95$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NABIL Bank is 0.95.

$$\text{Coefficient of determination } (r_{45})^2 = 0.9025$$

$$t\text{-statistics (t)} = r_{45} * \frac{\sqrt{n-2}}{\sqrt{1-r_{45}^2}} = 0.95 * \frac{\sqrt{5-2}}{\sqrt{1-0.9025}} = 5.27$$

4.3 Calculation of Mean and Standard Deviation of NIBL Bank

| Whole Mean (X) | (X- \bar{X}) | (X - \bar{X}) ² |
|----------------|-----------------|-------------------------------|
| 2.88 | -0.88 | 0.7744 |
| 3.14 | -0.62 | 0.3844 |
| 3.14 | -0.62 | 0.3844 |
| 3.14 | -0.62 | 0.3844 |
| 6.5 | 2.74 | 7.5076 |
| $\sum x=18.8$ | | $\sum(X-\bar{X})^2 = 9.4352$ |

Fixed Deposit Mean = Total fixed deposit \ n

Whole Mean (X) = Total deposit \ n

$$\text{Mean } (\bar{X}) = \frac{\sum x}{n} = \frac{18.8}{5} = 3.76$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X-\bar{X})^2}{n}} = \sqrt{\frac{9.4352}{5}} = 1.374$$

The average and standard deviation of interest rate on deposit of NIBL Bank is 3.76 and 1.374 respectively.

4.4 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NIBL Bank

For Saving Deposit:

| Years | Rate (x ₁) | Deposit (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|---------------------------|---------------------------------|---------------------------------|---|--|--|
| 2007 | 2.5 | 10742.2 | -0.45 | -1720.13 | 774.0576 | 0.2025 | 2958840 |
| 2008 | 2.5 | 13688.8 | -0.45 | 1226.472 | -551.912 | 0.2025 | 1504234 |
| 2009 | 2.5 | 10542.2 | -0.45 | -1920.13 | 864.0576 | 0.2025 | 3686892 |
| 2010 | 2.5 | 13783.64 | -0.45 | 1321.312 | -594.59 | 0.2025 | 1745865 |
| 2011 | 4.75 | 13554.8 | 1.8 | 1092.472 | 1966.45 | 3.24 | 1193495 |
| | $\sum X_1 =$ 14.75 | $\sum X_2 =$ 62311.64 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 2458.062 | $\sum(X_1 - \bar{X}_1)^2$ = 4.05 | $\sum(X_2 - \bar{X}_2)^2$ =11089326 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{14.75}{5} = 2.95$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{62311.64}{5} = 12462.328$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient}(r_{23}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{2458.062}{\sqrt{4.05} \sqrt{11089326}} = \frac{2458.062}{6701.621} = 0.367 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NIBL Bank is 0.367.

Coefficient of determination $(r_{23})^2 = 0.1347$

$$t\text{-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.367 * \frac{\sqrt{5-2}}{\sqrt{1-0.1347}} = 0.683$$

For Fixed Deposit:

| Years | Rate (x ₁) | Deposit (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|---|--|--|
| 2007 | 2.94 | 7516.8 | -0.968 | -3496.65 | 3384.761 | 0.937024 | 12226589 |
| 2008 | 3.25 | 7944.2 | -0.658 | -3069.25 | 2019.569 | 0.432964 | 9420320.1 |
| 2009 | 3.25 | 6516.9 | -0.658 | -4496.55 | 2958.733 | 0.432964 | 20218998 |
| 2010 | 3.25 | 14711.07 | -0.658 | 3697.616 | -2433.03 | 0.432964 | 13672364 |
| 2011 | 6.85 | 18378.3 | 2.942 | 7364.846 | 21667.38 | 8.655364 | 54240957 |
| | $\sum X_1 =$ 19.54 | $\sum X_2 =$ 55067.27 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 27597.41 | $\sum(X_1 - \bar{X}_1)^2$ =10.89128 | $\sum(X_2 - \bar{X}_2)^2$ = 109779228 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{19.54}{5} = 3.908$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{55067.27}{5} = 11013.454$$

$$\text{Karl Person's Correlation Coefficient}(r_{45}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}}$$

$$= \frac{\sum(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum(X_1 - \bar{X}_1)^2} \sqrt{\sum(X_2 - \bar{X}_2)^2}} = \frac{27597.41}{\sqrt{10.89128} \sqrt{109779228}} = \frac{27597.41}{34577.98} = 0.798$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NIBL Bank is 0.798.

Coefficient of determination $(r_{45})^2 = 0.637$

$$t\text{-statistics (t)} = r_{45} * \frac{\sqrt{n-2}}{\sqrt{1-r_{45}^2}} = 0.798 * \frac{\sqrt{5-2}}{\sqrt{1-0.637}} = 3.80$$

4.5 Calculation of Mean and Standard Deviation of BOK Bank

| Whole Mean (X) | (X- \bar{X}) | (X - \bar{X}) ² |
|------------------|-----------------|-----------------------------------|
| 2.72 | -1.868 | 3.489424 |
| 3.47 | -1.118 | 1.249924 |
| 4.55 | -0.038 | 0.001444 |
| 5.07 | 0.482 | 0.232324 |
| 7.13 | 2.542 | 6.461764 |
| $\sum x = 22.94$ | | $\sum (X - \bar{X})^2 = 11.43488$ |

Fixed Deposit Mean = Total fixed deposit \ n

Whole Mean (X) = Total deposit \ n

$$\text{Mean } (\bar{X}) = \frac{\sum x}{n} = \frac{22.94}{5} = 4.588$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum (X - \bar{X})^2}{n}} = \sqrt{\frac{11.43488}{5}} = 2.29$$

The average and standard deviation of interest rate on deposit of BOK Bank is 4.588 and 2.29 respectively.

4.6 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of BOK Bank

For Saving Deposit:

| Years | Rate (x_1) | Deposit (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|----------------------|-------------------------|---------------------|---------------------|--|-------------------------------------|--|
| 2007 | 2.25 | 5526.8 | -0.25 | -1015.9 | 253.975 | 0.0625 | 1032053 |
| 2008 | 2.25 | 6595.2 | -0.25 | 52.5 | -13.125 | 0.0625 | 2756.25 |
| 2009 | 2.25 | 7260.3 | -0.25 | 717.6 | -179.4 | 0.0625 | 514949.8 |
| 2010 | 2.25 | 6723.2 | -0.25 | 180.5 | -45.125 | 0.0625 | 32580.25 |
| 2011 | 3.5 | 6607.6 | 1 | 64.9 | 64.9 | 1 | 4212.01 |
| | $\sum X_1 =$ 12.5 | $\sum X_2 =$ 32713.1 | | | $\sum(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 81.225 | $\sum(X_1 - \bar{X}_1)^2$ = 1.25 | $\sum(X_2 - \bar{X}_2)^2$ = 1586551 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{12.5}{5} = 2.5$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{32713.1}{5} = 6542.62$$

$$\text{Karl Pearson's Correlation Coefficient } (r_{23}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1^2} \sqrt{\sum x_2^2}}$$

$$= \frac{\sum (X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{81.225}{\sqrt{1.25} \sqrt{1586551}} = \frac{81.225}{1408.21} = 0.058$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of BOK Bank is 0.058.

Coefficient of determination $(r_{23})^2 = 0.0033$

$$t\text{-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.058 * \frac{\sqrt{5-2}}{\sqrt{1-0.0033}} = 0.101$$

For Fixed Deposit:

| Years | Rate (x ₁) | Deposit (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|---|--|--|
| 2007 | 2.79 | 3037.2 | -2.138 | -2052.56 | 4388.373 | 4.571044 | 4213002.6 |
| 2008 | 3.64 | 3703.1 | -1.288 | -1386.66 | 1786.018 | 1.658944 | 1922826 |
| 2009 | 4.88 | 4474.6 | -0.048 | -615.16 | 29.52768 | 0.002304 | 378421.83 |
| 2010 | 5.48 | 6383.6 | 0.552 | 1293.84 | 714.1997 | 0.304704 | 1674021.9 |
| 2011 | 7.85 | 7850.3 | 2.922 | 2760.54 | 8066.298 | 8.538084 | 7620581.1 |
| | $\sum X_1 =$ 24.64 | $\sum X_2 =$ 25448.8 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 14984.42 | $\sum(X_1 - \bar{X}_1)^2$ =15.07508 | $\sum(X_2 - \bar{X}_2)^2$ =15808853 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{24.64}{5} = 4.928$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{25448.8}{5} = 5089.76$$

$$\text{Karl Person's Correlation Coefficient } (r_{45}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}}$$

$$= \frac{\sum(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum(X_1 - \bar{X}_1)^2} \sqrt{\sum(X_2 - \bar{X}_2)^2}} = \frac{14984.42}{\sqrt{15.07508} \sqrt{15808853}} = \frac{14984.42}{15437.75} = 0.971$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of BOK Bank is 0.971.

Coefficient of determination $(r_{45})^2 = 0.943$

$$t\text{-statistics } (t) = r_{45} * \frac{\sqrt{n-2}}{\sqrt{1-r_{45}^2}} = 0.971 * \frac{\sqrt{5-2}}{\sqrt{1-0.943}} = 7.04$$

APPENDIX-III

4.7 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NABIL Bank (Lending)

| Years | Rate (x_1) | Lending (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|------------------------|--------------------------|---------------------|---------------------|--|--|---|
| 2007 | 7.875 | 15657.1 | -3.334 | -11674.2 | 38921.92 | 11.11556 | 136287880 |
| 2008 | 9.82 | 21514.6 | -1.389 | -5816.74 | 8079.452 | 1.929321 | 33834464 |
| 2009 | 10.63 | 27816.6 | -0.579 | 485.26 | -280.966 | 0.335241 | 235477.27 |
| 2010 | 13.54 | 32902.8 | 2.331 | 5571.46 | 12987.07 | 5.433561 | 31041167 |
| 2011 | 14.18 | 38765.6 | 2.971 | 11434.26 | 33971.19 | 8.826841 | 130742302 |
| | $\sum X_1 =$ 56.045 | $\sum X_2 =$ 136656.7 | | | $\sum(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 93678.66 | $\sum(X_1 - \bar{X}_1)^2$ =27.64052 | $\sum(X_2 - \bar{X}_2)^2$ =332141289 |

Average lending rate = Total lending rate \ n

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{56.045}{5} = 11.209$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{136656.7}{5} = 27331.34$$

$$\text{Karl Person's Correlation Coefficient } (r_{12}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}}$$

$$= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{93678.66}{\sqrt{27.64052} \sqrt{332141289}} = \frac{93678.66}{95814.77} = 0.978$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NABIL Bank is 0.978.

Coefficient of determination $(r_{12})^2 = 0.956$

$$t\text{-statistics (t)} = r_{12} * \frac{\sqrt{n-2}}{\sqrt{1-r_{12}^2}} = 0.978 * \frac{\sqrt{5-2}}{\sqrt{1-0.956}} = 8.07$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X_1 - \bar{X}_1)^2}{n}} = \sqrt{\frac{27.64052}{5}} = 2.35$$

4.8 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NIBL Bank (Lending)

| Years | Rate (x ₁) | Lending (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|---|--|--|
| 2007 | 9.03 | 17482 | -1.102 | -12139.4 | 13377.64 | 1.214404 | 147365518 |
| 2008 | 9.11 | 27145.5 | -1.022 | -2475.92 | 2530.39 | 1.044484 | 6130179.8 |
| 2009 | 9.11 | 28911.60 | -1.022 | -709.82 | 725.436 | 1.044484 | 503844.43 |
| 2010 | 9.11 | 32902.80 | -1.022 | 3281.38 | -3353.57 | 1.044484 | 10767455 |
| 2011 | 14.3 | 41665.2 | 4.168 | 12043.78 | 50198.48 | 17.37222 | 145052637 |
| | $\sum X_1 =$ 50.66 | $\sum X_2 =$ 148107.1 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 63478.37 | $\sum(X_1 - \bar{X}_1)^2$ =21.72008 | $\sum(X_2 - \bar{X}_2)^2$ =309819634 |

Average lending rate = Total lending rate \ n

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{50.66}{5} = 10.132$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{148107.1}{5} = 29621.42$$

$$\text{Karl Person's Correlation Coefficient } (r_{12}) = \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}}$$

$$= \frac{\sum(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum(X_1 - \bar{X}_1)^2} \sqrt{\sum(X_2 - \bar{X}_2)^2}} = \frac{63478.37}{\sqrt{21.72008} \sqrt{309819634}} = \frac{63478.37}{82032.70} = 0.774$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NIBL Bank is 0.774.

Coefficient of determination $(r_{12})^2 = 0.599$

$$t\text{-statistics (t)} = r_{12} * \frac{\sqrt{n-2}}{\sqrt{1-r_{12}^2}} = 0.774 * \frac{\sqrt{5-2}}{\sqrt{1-0.599}} = 2.12$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum(X_1 - \bar{X}_1)^2}{n}} = \sqrt{\frac{21.72008}{5}} = 4.344$$

4.9 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of BOK Bank (Lending)

| Years | Rate (x_1) | Lending (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|----------------------|-------------------------|---------------------|---------------------|---|--|---|
| 2007 | 9.71 | 9663.6 | -1.63 | -4605.62 | 7507.161 | 2.6569 | 21211736 |
| 2008 | 9.56 | 12692.9 | -1.78 | -1576.32 | 2805.85 | 3.1684 | 2484784.7 |
| 2009 | 10.65 | 14894.7 | -0.69 | 625.48 | -431.581 | 0.4761 | 391225.23 |
| 2010 | 13.07 | 16847.1 | 1.73 | 2577.88 | 4459.732 | 2.9929 | 6645465.3 |
| 2011 | 13.71 | 17247.8 | 2.37 | 2978.58 | 7059.235 | 5.6169 | 8871938.8 |
| | $\sum X_1 =$ 56.7 | $\sum X_2 =$ 71346.1 | | | $\sum(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 21400.4 | $\sum(X_1 - \bar{X}_1)^2$ = 14.9112 | $\sum(X_2 - \bar{X}_2)^2$ = 39605150 |

Average lending rate = Total lending rate \ n

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{56.7}{5} = 11.34$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{71346.1}{5} = 14269.22$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{12}) &= \frac{\sum x_1 x_2}{\sqrt{\sum x_1} \sqrt{\sum x_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{21400.4}{\sqrt{14.9112} \sqrt{39605150}} = \frac{21400.4}{24301.43} = 0.881 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of BOK Bank is 0.881.

Coefficient of determination $(r_{12})^2 = 0.7755$

$$t\text{-statistics } (t) = r_{12} * \frac{\sqrt{n-2}}{\sqrt{1-r_{12}^2}} = 0.881 * \frac{\sqrt{5-2}}{\sqrt{1-0.7755}} = 3.22$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum (X - \bar{X})^2}{n}} = \sqrt{\frac{14.9112}{5}} = 1.73$$

APPENDIX-IV

4.10 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NABIL Bank (Deposit Rate and Interest Rate)

| Years | Rate (x ₁) | Lending (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|--|--|--|
| 2007 | 2.714 | 7.875 | -2.8468 | -3.334 | 9.491231 | 8.10427 | 11.115556 |
| 2008 | 4.92 | 9.82 | -0.6408 | -1.389 | 0.890071 | 0.410625 | 1.929321 |
| 2009 | 5 | 10.63 | -0.5608 | -0.579 | 0.324703 | 0.314497 | 0.335241 |
| 2010 | 7.71 | 13.54 | 2.1492 | 2.331 | 5.009785 | 4.619061 | 5.433561 |
| 2011 | 7.46 | 14.18 | 1.8992 | 2.971 | 5.642523 | 3.606961 | 8.826841 |
| | $\sum X_1 =$ 27.804 | $\sum X_2 =$ 56.045 | | | $\sum (X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 21.35831 | $\sum (X_1 - \bar{X}_1)^2$ =17.05541 | $\sum (X_2 - \bar{X}_2)^2$ =27.64052 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{27.804}{5} = 5.5608$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{56.045}{5} = 11.209$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum X_1 X_2}{\sqrt{\sum X_1} \sqrt{\sum X_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{21.35831}{\sqrt{17.05541} \sqrt{27.64052}} = \frac{21.35831}{21.712} = 0.984 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NABIL Bank is 0.984.

Coefficient of determination $(r_{23})^2 = 0.968$

$$\text{t-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.984 * \frac{\sqrt{5-2}}{\sqrt{1-0.968}} = 9.52$$

4.11 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of NIBL Bank (Deposit Rate and Interest Rate)

| Years | Rate (x_1) | Lending (x_2) | $(X_1 - \bar{X}_1)$ | $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2)$ | $(X_1 - \bar{X}_1)^2$ | $(X_2 - \bar{X}_2)^2$ |
|-------|----------------------|----------------------|---------------------|---------------------|--|---|---|
| 2007 | 2.88 | 9.03 | -0.88 | -1.102 | 0.96976 | 0.7744 | 1.214404 |
| 2008 | 3.14 | 9.11 | -0.62 | -1.022 | 0.63364 | 0.3844 | 1.044484 |
| 2009 | 3.14 | 9.11 | -0.62 | -1.022 | 0.63364 | 0.3844 | 1.044484 |
| 2010 | 3.14 | 9.11 | -0.62 | -1.022 | 0.63364 | 0.3844 | 1.044484 |
| 2011 | 6.5 | 14.3 | 2.74 | 4.168 | 11.42032 | 7.5076 | 17.372224 |
| | $\sum X_1 =$ 18.8 | $\sum X_2 =$ 50.66 | | | $\sum(X_1 - \bar{X}_1)$ $(X_2 - \bar{X}_2) =$ 14.291 | $\sum(X_1 - \bar{X}_1)^2$ $=$ 9.4352 | $\sum(X_2 - \bar{X}_2)^2$ $=$ 21.72008 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{18.8}{5} = 3.76$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{50.66}{5} = 10.132$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum X_1 X_2}{\sqrt{\sum X_1} \sqrt{\sum X_2}} \\ &= \frac{\sum(X_1 - \bar{X}_1)(X_2 - \bar{X}_2)}{\sqrt{\sum(X_1 - \bar{X}_1)^2} \sqrt{\sum(X_2 - \bar{X}_2)^2}} = \frac{14.291}{\sqrt{9.4352} \sqrt{21.72008}} = \frac{14.291}{14.32} = 0.998 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of NIBL Bank is 0.998.

$$\text{Coefficient of determination } (r_{23})^2 = 0.996$$

$$\text{t-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.998 * \frac{\sqrt{5-2}}{\sqrt{1-0.996}} = 27.35$$

4.12 Calculation of Correlation Coefficient, Coefficient of Determination and t-statistics of BOK Bank (Deposit Rate and Interest Rate)

| Years | Rate (x ₁) | Lending (x ₂) | (X ₁ - \bar{X}_1) | (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) (X ₂ - \bar{X}_2) | (X ₁ - \bar{X}_1) ² | (X ₂ - \bar{X}_2) ² |
|-------|---------------------------|------------------------------|---------------------------------|---------------------------------|--|--|--|
| 2007 | 2.72 | 9.71 | -1.868 | -1.63 | 3.04484 | 3.489424 | 2.6569 |
| 2008 | 3.47 | 9.56 | -1.118 | -1.78 | 1.99004 | 1.249924 | 3.1684 |
| 2009 | 4.55 | 10.65 | -0.038 | -0.69 | 0.02622 | 0.001444 | 0.4761 |
| 2010 | 5.07 | 13.07 | 0.482 | 1.73 | 0.83386 | 0.232324 | 2.9929 |
| 2011 | 7.13 | 13.71 | 2.542 | 2.37 | 6.02454 | 6.461764 | 5.6169 |
| | $\sum X_1 =$ 22.94 | $\sum X_2 =$ 56.7 | | | $\sum(X_1 - \bar{X}_1)$ (X ₂ - \bar{X}_2)= 11.9195 | $\sum(X_1 - \bar{X}_1)^2$ =11.43488 | $\sum(X_2 - \bar{X}_2)^2$ =14.9112 |

$$\text{Mean } (\bar{X}_1) = \frac{\sum X_1}{n} = \frac{22.94}{5} = 4.588$$

$$\text{Mean } (\bar{X}_2) = \frac{\sum X_2}{n} = \frac{56.7}{5} = 11.34$$

$$\begin{aligned} \text{Karl Person's Correlation Coefficient } (r_{23}) &= \frac{\sum X_1 X_2}{\sqrt{\sum X_1} \sqrt{\sum X_2}} \\ &= \frac{\sum (X_1 - \bar{X}_1) (X_2 - \bar{X}_2)}{\sqrt{\sum (X_1 - \bar{X}_1)^2} \sqrt{\sum (X_2 - \bar{X}_2)^2}} = \frac{11.9195}{\sqrt{11.43488} \sqrt{14.9112}} = \frac{11.9195}{13.06} = 0.913 \end{aligned}$$

Therefore correlation coefficient between saving interest rate and saving deposit amount of BOK Bank is 0.913.

Coefficient of determination $(r_{23})^2 = 0.833$

$$t\text{-statistics } (t) = r_{23} * \frac{\sqrt{n-2}}{\sqrt{1-r_{23}^2}} = 0.913 * \frac{\sqrt{5-2}}{\sqrt{1-0.833}} = 3.87$$