

**Management of Commercial Banking**  
**Professor Jitendra Mahakud**  
**Department of Humanities and Social Sciences**  
**Indian Institute of Technology, Kharagpur**  
**Lecture 21**  
**Overview of Asset Liability Management**

So, after the discussion on the different type of risk what the commercial bank face and as well as the different quantifiable measures which are used to measure the risk in general. We can start the discussion on the management of that different type of risk. Mostly every organization goes for the asset liability management and in the banking perspective, the asset liability managements are mostly focuses on the management of the interest rate risk or the particular financial data which are affected due to the change in the interest rate fluctuations. And how those fluctuations basically can be forecasted or how it can be managed?

So, due to the interest rate fluctuations that is which is nothing in the hand of the commercial bank, but still due to the change in the interest rates, once the balance rate and all these things data gets affected, the commercial banks should add just to make the management in such a way in terms of the assets and liabilities, that the maximum loss what they are going to incur due to the fluctuations of the interest rate that will be less. So, that is the basic objective of the asset liability management.

(Refer Slide Time: 1:39)

So, in today's class or today's session, we will be discussing about the concept of asset liability management, what it exactly means and how the interest at risk is defined, what are the different components of the interest rate risk? And how the interest rate risk is measured? And it can be managed, we can start the discussion on the management of the interest rate risk using the gap analysis. So, these are the three concepts what we can introduce today's class.

(Refer Slide Time: 2:11)

And whenever we want to talk about the asset liability management, what this asset liability management exactly means? You see, whenever we are talking about the banking, what these particular bankers basically do? The bankers provide the loans, bankers take deposits, bankers make investments; banker also buy the securities from the different agencies. So, there are

many kinds of functions the bankers do. So, whenever the bankers do this kind of operations in the bank and some of the things are considered as the instruments or the items for the liability side and some of the particular items are considered as the asset.

So, what basically always we observe? The value of those assets and liabilities is always subject to change. And what are those factors basically affect that? That is basically deduction of interest rate, how the interest rate is going to move that is number one. Number two, what is the composition of assets and liabilities? How the assets and liabilities are basically constituted in that particular bank and what is the degree of risk?

So, these are the different type of factors which are basically drive the decisions of the bankers whenever they take these kind of decisions in the market, mostly for the benefits of the commercial bank. And already again and again we are telling that the basic objective of the commercial bank is to maximize the profit and as well as to maintain the liquidity So, whenever we talk about this, all kind of activities what the commercial banks always have and the bankers always try to manage that activities in an efficient manner.

So, mostly they manage their assets and liabilities or the compositions of assets and liabilities also managed by them. So, the process of making such decisions about the composition of assets and liabilities and the risk assessment is known as the asset liability management. So, whenever the decisions in terms of lending activities, in terms of deposit activities, in terms of investment activities are done. Every time the assets positions and liability positions get changed.

So, the bankers have to make the position in such a way by that the exposure towards the risk will be relatively less or if there is any kind of fluctuations in the market factors, then they will particularly may be less exposed to this kind of fluctuations or they can hedge their risk in a better way or they will be well prepared to manage the risk in the better way. So, that process is basically called the asset liability management. And mostly every bank has an Asset Liability Management Committee, which is popularly known as ALCO.

And this Asset Liability Management Committee takes the decisions regarding the compositions of the assets and liabilities what the banks would maintain to minimize this interest rate risk in the market or any other risk in the market. Mostly if you observe, the, although the other things or other type of risk also we use the asset liability management, this is one of the strategy. But mostly the asset liability management is trying to manage this interest

rate risk in the system. So, the basic objective of Asset Liability Management is to manage the interest rate risk in the banking sector.

(Refer Slide Time: 6:11)

So, how that particular thing works? If you see that interest rate risk is what? The interest rate risk case, if there is a change in the interest rate in the future, then what is the potential or expected loss the bank can have or bank can gain in terms of their profitability and the market value of the equity? If there is a change in the interest rate, then it will affect the price of those assets in terms of both assets, side and liability side.

If the price of the assets or the return what the banks always get in terms of assets, they are getting affected, and whatever costs the bank incurs in terms of the different liabilities like deposits and all for that also, the bank gets affected. So, in this particular context, we are trying to find out if how these particular losses specifically are incurred or what is the expected loss the bank can incur due to change in the interest rate?

That is basically measured through interest rate risk, that means what? If the bank's assets and liabilities do not reprice at the same time, then there is a huge impact on the net interest income. Maybe the interest rate changes in the short period has some impact on some type of assets, but it has no impact on the liability or it may be impact on the liability not on the asset, then what happens that it will have a larger impact on a total net interest income of the commercial banks.

So, if the net interest income gets affected adversely, then obviously, the bank will be exposed towards more risk in the system. So, in this context, what we see? The change in the value of the assets and change in the value of liabilities will also suffer, then if changing the value of assets and general value of the liabilities will suffer, then obviously, the value of the stockholders equity gets affected. So, if the stockholders equity get affected means the market value of the equity gets affected, then automatically it will have also a larger impact on the total financial performance of the commercial bank.

So, whenever we talk about interest rate risk, it is a very peculiar thing, the interest rate risk has two components. Already we have the idea about that, that interest rate risk has two component in the sense one is we call it the spread risk or the reinvestment risk. One is called

the reinvestment risk and another one is the price risk. If you remember, whenever we talk about this, how basically we do this? For example, the bank has a bond and the bond is a coupon bearing bond.

So, here if the bank is holding the bond then what is happening that every periodical basis the bank is receiving the coupon, let the par value of the bond is thousand, coupon is 10 percent and the maturity period is 5 years or 10 years. And the market interest rate is let 8 percent, then what happens that periodically we are getting the coupon, every year we are getting and coupon is paid yearly, every year we are getting 100 rupees coupon. Then your market price of the bond is nothing but 100 divided by 1.08 plus 100 divided by 1.08 to the power 2 and so on, and nth you will be getting last year 1080 divided by 1.08 to the power 10.

$$\frac{100}{1.08} + \frac{100}{1.08^2} + \dots + \frac{1080}{1.08^{10}}$$

But here if you see that for example, the interest rate has increased, if the interest rate will increase, then your price of the bond will decline. If the price of the bond will decline, then we are exposed to more price risk. The market price has declined because of that we are exposed to more price risk. But now, if you see that, in that particular point of time, if the interest rate has increased, whatever coupons I am getting periodically, if I am reinvested in the market, then I will get some more return.

So, the price level will increase, increase in the interest rate will have a negative impact on the price that is. And it will have a positive impact on the reinvestment return. So, I am exposed to both the components, in reinvestment risk and as well as the price risk. The same thing you can also consider whenever the interest rate will decline, if the interest rate will decline, the price will increase but the investment risk will increase, because the return from the investment of the coupons will be declining.

So, that is why the interest rate risk has two components. One is your spread or the investment risk. Another one is the price risk, to change in interest rate will change the bank's cost of the funds as well as the return on the investment funds. And they may change by the different amounts. Like that the changes in interest rate may change the market value of the bank's assets and liabilities by the different amounts that already, I have given you a small example, you can also consider it in the aggregate way or an aggregate commercial banking point of view.

(Refer Slide Time: 12:13)

So, then if you see that considering this, if you take example, that how basically it affects? I will give a simple example of the Asset Liability Management without any complexity like a bank has this, this is the very simple balance sheet of a commercial bank. This is your asset side and this is your liability side. Let bank has a single asset that is a fixed rate loan, fixed rate loan means the loan has been given as a fixed rate of interest. And loan period is 5 years, 100 million loan has been given, that is the only asset what the bank has.

For simpler way we are trying to explain this. Then they have a single liability and the two liabilities, one is your 30 day deposits. The deposit period or the maturity period of the deposit what the bank has that is only 30 days and that value is 90 million and the interest rate is 4 percent. And they have equity base of 10 million total 100 million, and here we have loan these 100 million and interest rate is 8 percent and total is 100 million are certain liabilities are matched.

So, now if you calculate the net interest income for this, then what are the income they are getting?  $100 \times 8$  percent that is the 8 million minus here  $90 \times 4$  percent that will give you 3.6 then you will be getting 4.4 million. Your net interest income is nothing but your interest income that is  $100 \times 0.08$  and here it is  $90 \times 0.04$ . So, 8 million - 3.6 million, we got 4.4 million. Now, the net interest margin has become your total asset is 100, your net interest income become 4.4 and your net interest income divided by earnings asset that has become 4.4 percent.

(Refer Slide Time: 14:29)

Now, hypothetically if you assume interest rate has changed. Let the market interest rate increases. If the market interest rate increases, then the cost of certain borrowings will increase, but the interest earned from the long term fixed loan will remain unchanged. Because this is a fixed rate loan that is not exposed to any kind of market fluctuations or market interest rate fluctuations in that particular point of time.

So, the interest rate you assume that will increase by 2 percent. Then your expenses will increase by 5.4 because your total deposit was a 90, 90 multiplied by now your interest rate has become six percent then it is 5.4. Then your net interest income has come down to 2.6 million and net interest margin has become 2.6 percent. But, if the bank had made the loan as a floating

rate, let the loan which was given by the bank that is not in a fixed rate basis that is floating rate basis, then what basically would have happened?

This now the income, interest income would have because it has, it was previous rate person they loaned it, it has become ten percent, then your income will be your  $100 \times 0.1$  that will be giving you 10 and it will be 5.4, then it will 4.6 or 4.6 percent. Then what basically we have observed? That if the one particular asset is not interest rate sensitive but the liability is then because of that if there is an increase in the interest rate, then my NIM has gone down. But whenever both the assets and liabilities are interest rate sensitive, I can say that my total net interest margin has gone up.

So, here in general what we have observed? The net interest income depends upon the interest, what basically you have earned on the assets and whatever interest you have paid and how much money you have raised and invested in the market. So, that is the way the net interest income basically depends upon. Now, you understood that in the composition wise assets and liability type or characteristics wise, how the net interest income or interest margin gets affected.

(Refer Slide Time: 17:06)

Now, if you see that how that particular if this kind of scenario arises, then how we can manage that. So, for management of that particular thing, we generally go for many kinds of analysis, we have a gap analysis, we have an earning sensitivity analysis. So, here in the gap analysis it is basically we call a static measure of the risk that is commonly associated with the net interest income targeting and we have earning sensitivity analysis which is extension of the gap. Here we focus on the change in banks earnings due to changes in the interest rate and the balance sheet competition. Little bit or more both are linked, but here it is more or less static, but in the earnings sensitivity analysis, relatively dynamic.

(Refer Slide Time: 18:01)

So, how basically it works? Whenever we talk about the gap analysis, we basically do certain things, there are different steps we have to follow whenever the gap analysis is carried out by a commercial bank. How we basically do that? First of all, you check what are those liabilities and assets you have? And now, out of those liabilities and assets how will you classify them?

Which are those assets and liabilities, which are interest rate sensitive and which are basically non interest rate sensitive?

That means, due to the general interest rate, whose value is going to be changed and due to the change in interest rate whose value is not going to be changed. So, first you classify that. Then, whenever we talk about this, once it is classified, after that we call the particular assets which are rate sensitive, we call them rate sensitive asset, RSA and the liabilities which are rate sensitive, we call them RSL, rate sensitive liabilities.

So, now the particular assets whose interest income or cost do not vary with the interest rate over the time horizon, they can be called as the non-rate sensitive, NRS. They are not basically sensitive towards the fluctuations in the interest rates in the market. So, we have interest sensitive assets, we have interest sensitive liabilities, then we have non-rate sensitive assets and liabilities.

We are not much concerned about the non-rate part, because that is not anyway going to affect or going to be affected by any changes in the interest rates in the market. So, we are not concerned about that. What we are concerned about? We are basically concerned about the due to the change in the interest rate what are those value of the assets and liabilities that are going to be changed, so that is basically our concept.

(Refer Slide Time: 20:10)

In this case, what basically we can do? We basically try to think of how this particular pricing of those assets and liabilities are done. That means we have to consider the maturity buckets of that particular assets and liabilities. The rate sensitivity basically depends upon the frequency of the repricing. So the short term assets and liabilities are more sensitive than assets and liabilities having longer term maturities.

So, whenever the interest rate is changing and maybe the interest rate is changing in a very short period of time, then the assets which are going to be matured in the short term basis they are more affected, but the long term assets and liabilities are not affected. So, that is why the short term assets and liabilities are more rate sensitive than the assets and liabilities having a longer term maturities. And assets and liabilities with longer term maturities, but with variable rate of interest are also at interest rate sensitive.

Just now, we have seen, that if your particular interest rate is there, a particular asset is there, which is longer term in nature, but it depends upon the floating rate loans. Let you take the example of a loan, it is a floating rate loan, then they are also even if the interest rate is changing in the short term basis, that payment also gets affected or the value of that particular asset also gets affected. So, because of that, you see the example, the selection of time period over which the measures are made is very important, very crucial for both an asset and liabilities.

For example, an asset and liabilities which is rate sensitive in 60 days may not be rate sensitive in 30 days or anything or 90 days. So, depending upon that, we have to think that what kind of maturity period we are considering. The consideration of the maturity period, consideration of the different maturity buckets are quite important whenever we are classifying those assets and rate sensitive assets and rate sensitive liabilities and non-rate sensitive assets and liabilities, that actually we have to keep in the mind.

(Refer Slide Time: 22:34)

Then, once it is done, the time periods are called as the maturity buckets or the planning horizon, the first line is repeated. So, over a long time period almost all assets and liabilities are interest rate sensitive that you keep in the mind. And as the time period becomes shorter, the ratio of rate sensitive to non-rate sensitive assets and liabilities falls.

To each bank, because there is no such regulations, that how basically the period can be defined or the pricing time can be defined. So, in this case each bank decides on those time period that match it needs. So, it is the bank specific, the bank decides that the maturity period or the maturity buckets for that particular interest calculation or defining the rate sensitive assets and rate sensitive liabilities for that particular commercial bank that actually you can keep in the mind.

(Refer Slide Time: 23:52)

So, this is an example, if you see, there are certain kind of assets which are given as rate sensitive assets, there are certain assets which are rate sensitive liabilities and some of the assets are non-rate sensitive assets and liabilities. For any bank, if you talk about a cash, the cash is non-rate sensitive because anyway interest rate will have no impact on the cash, the cash in



hand or cash in vault, whatever name you can say. So, that basically is not going to be affected by the interest rate.

That is why it is written as non-rate sensitive. Then we have short term securities. These are generally rate sensitive asset, that any change in the interest rate will have the impact on this because it is a highly short term in nature. Let you assume that the particular period we are considering for this particular bank we are considering one year. After one year which maturity period is up to one year, we consider them as short term. And more than one year, we consider them long term.

So in this case, the short term securities are rate sensitive asset. The variable rate loans are the rate sensitive assets even if they are long term. The short term loans, they are also rate sensitive assets. The long term securities, there are long term securities, remember they are non-rate sensitive, because here we are talking about one year period, because their particular yield or interest rate is fixed for a reasonable period of time. So because of that, they are considered as the non-rate sensitive, long term loans non-rate sensitive.

If it is, fixed rate loans, and other assets like fixed assets and all they are basically the non-rate sensitive. You come to the demand deposits. Demand deposits in the sense, may for example, you take the particular deposits which are relatively due to the change in interest rate their interest rate do not change frequently. Short term savings, there is a possibility that interest rate may change, that is why these are rate sensitive liabilities.

Borrowing from the central bank obviously, every day that can change, repo rate can change that is why it is a rate sensitive liabilities. Money market deposits, every day it changes that is why the rate sensitive liabilities. Equity is not going to be affected by the interest rate fluctuations that is why it is a non-rate sensitive. Long term savings are also non-rate sensitive's. Now, if you observe one thing, what is the rate sensitive asset and how much is the rate sensitive liabilities?

If you have seen this side, your rate sensitive assets are 30 plus 50, 80 plus 25 that is 105, total value let you assume that it is in million, that this maybe you can assume that it is measured as rupees million. In this case, let this is 105 million, but if you see the rate sensitive liabilities, these are 50 plus 60 115 plus 30, 145. So, this particular bank is a more inclined towards the rate sensitive liabilities. What does it mean?

It means that if there is any kind of change in the interest rate, which has the impact on the liability and as well as the assets, then if the interest rate go in the reverse way or in the adverse way, then the net profit of that particular bank also adversely affected. For example, the interest rate will go up, the net income, interest income will increase, but the net interest liabilities will increase more because the rate sensitive liabilities for this particular bank is already more than the rate sensitive assets.

So, the rate sensitivity comparison of the assets and liabilities will tell you that whether any change in the interest rate will have a larger impact or maybe positive impact, a negative impact on the commercial bank or not. So, that is why the proper identification of the rate sensitive assets and rate sensitive liabilities are quite important. Then we have to also ensure that the bank is going or bank is dominated towards more rate sensitive assets or they are dominated by more rate sensitive liabilities.

Depending upon that, if we can forecast the interest rate in such that way, then we have to adjust the balance rate to minimize that particular risk or minimize the fluctuations of the net interest income, what this particular bank is going to face, if there is any kind of change in interest rates in the market. So, what basically we have seen?

That the rate sensitivity is quite important, whenever we are talking about the impact of interest rate changes on the net interest income of the commercial bank. This is a small example and we will discuss more on that on this particular issue in the coming sessions. But you can get the idea that how basically, the rate sensitive assets and rate sensitive liabilities are defined in the different maturity buckets, and what is the implications of that?

(Refer Slide Time: 30:26)

Then in the conclusion what basically we discussed here, the process of making commercial banking decisions about the composition of assets and liabilities and risk assessment is known as asset liability management. Interest rate risk is nothing but a potential loss from non-expected changes in interest rate, which can affect profitability and the market value of equity.

And the static measure of risk that is commonly associated with the net interest income or margin targeting. Always gap analysis classifies the assets and liabilities according to their interest rate sensitivity. And interest rate sensitivity will have an implications for the

fluctuations of the net interest income or the direction of just change of the net interest income for the commercial bank. So, in detail the different types of gap analysis what the commercial bank use that we will be discussing in the coming sessions. Thank you.

(Refer Slide Time: 31:29)

These are the different references what you can go through for the detail analysis. And we will be extending this gap analysis in the future session.