

Asset-Liability Management in Banks

Asset-Liability Management (ALM)

- Bankers make decisions every day about buying and selling securities, about whether to make particular loans, and about how to fund their investment and lending activities.
- These decisions are partly based on the outlook of interest rates. Further, bankers take into account the composition of their assets and liabilities, as well as the degree of risk they are willing to take.
- The process of making such decisions is known as asset-liability management (ALM). The Asset Liability Management Committee (ALCO) has the overall responsibility for managing the sources and uses of funds on the balance sheet and off-balance sheet activities with respect to interest rate risk and liquidity.
- ALM is generally viewed as short-term in nature, with the aim of achieving near-term financial goals.

Liquidity Risk Management

- The object of any ALM policy is ensuring both profitability and liquidity.
- Usually a bank maintains profitability by borrowing short and lending long.
- However, in order to ensure that a potentially illiquid position is avoided, maturity matching has to be ensured.
- A bank generally aims to eliminate the liquidity risk while it only tries to manage the interest rate risk. This is because elimination of interest rate risk is not profitable.
- In liquidity risk management, the focus is on the liquidity position of the bank. The bank would estimate its cash requirements and the cash inflows and adjust these two to ensure a safe level for its liquidity position.
- All deposits based on their maturity fall under the categories: volatile funds, vulnerable funds and stable funds.
- Volatile funds include those deposits which are sure to be withdrawn during the period for which the liquidity estimate is to be made. These include short-term deposits. Float funds are also treated as volatile deposits.
- Deposits which are likely to be withdrawn during the planning tenure are categorized as vulnerable deposits. For e.g., a bank would know which part of savings deposits are stable and which portion is vulnerable.
- Finally, the residual deposits are stable deposits.
- Having obtained the consolidated / component-wise working funds, the bank will now have to estimate the average cash and bank balances that are to be maintained. This average balance can be maintained as a percentage to the total working funds. This average is based on forecasts, and hence a safety margin should also be ensured.
- Any balance beyond this range will necessitate corrective action either by deploying the surplus funds or by borrowing funds to meet the deficit. This acceptance level is, however, a dynamic figure which will change over time.

ALM Implementation

- RBI has initiated an ALM framework in India based on Gap Analysis.
- Based on the RBI model, banks can segregate their assets and liabilities into various maturity buckets and also identify those assets and liabilities that are interest sensitive.
- While deciding about liquidity requirements, in certain cases the RBI has only provided benchmarks. Liquidity limits for the different time buckets can be set by the particular bank given its past experience of volatile and core portion of savings/ current account deposits.

Maturity Gap Method

- Initially the RBI has considered the traditional Gap analysis as a suitable method. Later the banks should move over to more sophisticated methods including Duration Gap analysis and Simulation Models
- Each bank should set prudential limits on individual Gaps with the approval of the Board / Management Committee. The following time buckets are considered:
 - 1 to 14 days
 - 15 to 28 days
 - 29 days to 3 months
 - Over 3 months to 6 months
 - Over 6 months to 1 year
 - Over 1 year to 3 years
 - Over 3 years to 5 years
 - Over 5 years
 - Non-sensitive

Liquidity Risk Management

- RBI has suggested maturity profiling in terms of outflows and inflows while arriving at liquidity prognosis.
- A Statement of Structural Liquidity may be prepared by placing all cash inflows and outflows in the maturity ladder. A maturing liability will be a cash outflow while a maturing asset will be a cash inflow.
- Contingent liabilities also need to be taken into account.
- According to the latest guidelines, the banks may adopt a more granular approach to measurement of liquidity risk by splitting the first time bucket (1-14 days at present) in the Statement of Structural Liquidity into three time buckets viz. Next day , 2-7 days and 8-14 days.
- The net cumulative negative mismatches during the next day, 2-7 days, 8-14 days and 15-28 days buckets should not exceed 5 % ,10%, 15 % and 20 % of the cumulative cash outflows in the respective time buckets in order to recognise the cumulative impact on liquidity.

- The Statement of Structural Liquidity may be compiled on best available data coverage, in due consideration of non-availability of a fully networked environment. Banks may, however, make concerted and requisite efforts to ensure coverage of 100 per cent data in a timely manner.
- Banks may undertake dynamic liquidity management and should prepare the Statement of Structural Liquidity on daily basis. The Statement of Structural Liquidity, may, however, be reported to RBI, once a month, as on the third Wednesday of every month.
- Within each time bucket there could be mismatches depending upon cash inflows and outflows. While the mismatches up to one year would be relevant, the main focus should be on the short term mismatches, viz. 1-14 days and 15-28 days.

Managing Interest Rate Risk

- Before the liberalisation of the financial markets in 1991, most of the interest rates were not subject to regular changes, and hence ALM was not given much importance. However, in recent years, there has been a sea-change in approach.
- Today management of bank portfolios involves managing both assets and liabilities.
- On balance sheet adjustment involves changing the portfolio of assets and liabilities includes steps such as adjusting the maturity, repricing, and payment schedules. In addition, the bank could buy or sell securitised assets.
- Off-Balance Sheet adjustments include changing the interest position of a bank by using off-balance sheet derivatives, such as interest rate swaps and futures.

Concept of Net Interest Income

Liabilities		Assets	
Equity	10 mio	5- yr fixed rate loans @8%	100 mio
30-day deposits@4%	90 mio		
Total	100 mio	Total	100 mio

- The net interest income (NII) = Interest Income – Interest Expense = Rs. (8 – 3.6) mio = Rs. 4.4 mio
- Net Interest Margin (NIM) = NII/ Earning Assets = 4.4/100 = 4.4%.
- If market rates of interest increase, the cost of short-term borrowings will increase, and NII will decrease as loans are at long –term fixed rates. On the other hand, if market rates of interest decrease, then NII will increase.
- The mix of all the assets and liabilities will decide the net effect on NII.

Maturity Gap Method

- The maturity gap method of ALM technique aims to tackle the interest rate risk by highlighting the gap that exists between the Risk Sensitive Assets (RSAs) and Risk Sensitive Liabilities (RSLs), the maturity periods of the same and the gap period. The objective of this method is to stabilize/ improve the net interest income in the short run over discrete periods of time called the gap periods.
- The first step is to collect the gap periods, say anywhere between one month to one year. Having chosen the gap periods, all the RSAs and RSLs are grouped into 'maturity buckets' based on the maturity and the time until the first possible repricing due to change in interest rates.
- Rate Sensitive Gap (RSG) = RSAs – RSLs
- Also Gap Ratio or Interest Rate Sensitivity Ratio
= RSAs/ RSLs
- The gap so analysed can be used by the treasury department to tackle the rising/ falling interest rate structures.
- For example, when RSG is positive, the consequence of a rate fluctuation is an increase in the net interest income when the interest rates rise and a decrease in the same when the rates fall. The opposite is true when RSG is negative: the consequence of a rate fluctuation is a decrease in the net interest income when the interest rates rise and an increase in the same when rates fall.
- The process of maturity gap approach assesses the impact of a percentage change in interest rates on Net Interest Income (NII). The objective of an ALM policy will be to maintain the NIM (net interest margin) within certain limits by managing the risks.
- The following steps are therefore involved for a bank:
 - Assess the percentage change in NIM that is acceptable to the bank
 - Make a forecast for the quantum and direction of the interest rate change
 - Based on the above determine the gap level (positive/ negative)

GAP and Net Interest Margin Example

(Rs. In Crores)	Bank A	Bank B
Total Assets	1000	1000
RSAs	40	400
RSLs	20	200
GAP (RSAs – RSLs)	20	200
GAP ratio (RSAs/RSLs)	2	2
NII (assumed)	200	200
Decrease in interest rate	2%	2%
Change in NII (GAP x Δr)	-0.4	-4

Note: In the above example, even though the asset size and the GAP ratio are identical for both banks, it is evident that Bank B assumes greater risk since its interest income will be more volatile when interest rates change.

Limitations of Maturity Gap Approach

- Depends upon accuracy of interest rate forecasts – may not be correct
- While gap measurement is a comparatively easy task, gap management is not.
- It assumes that change in interest rates immediately affects the RSAs and RSLs by the same quantum which is not always the case in reality.
- Ignores the time value of money for the cash flows while determining the gap

ALM Strategies

- The size of the net interest income can be controlled through defensive or aggressive ALM.
- The goal of defensive ALM is to insulate the NII from changes in interest rates; that is, to prevent interest rate changes from decreasing or increasing NII. In contrast, aggressive ALM focuses on increasing NII through altering the portfolio of the institution.
- The success of aggressive ALM depends on the ability to forecast future interest rate changes. However, if interest rate changes do not move the way predicted, this strategy can lead to losses, and hence risky.
- The focus of the defensive strategy is to insulate the portfolio from interest rate changes, whether the direction of the interest rate movement is upward or downward, predictable or unpredictable.

How much interest rate risk is acceptable?

- One of the most difficult decisions that bank managers face is determining the appropriate degree of interest rate risk to assume.
- At one extreme, referred to as defensive interest rate risk management, the bank would attempt to structure its assets and liabilities in order to eliminate interest rate risk. However, the profitability of a bank that does not take some interest risk would be inadequate.
- No one has perfect foresight with respect to interest rates. However, high-risk strategies combined with imperfect forecasts of interest rate movements can result in disaster.

Bond Value with Annual Interest

Please see Slide numbers 21 and 22

Duration Gap Analysis

- The deficiencies of traditional gap analysis, especially the focus on accounting income rather than on equity, have encouraged a search for alternative approaches to measuring and managing the interest rate exposure of a financial institution. One such approach is duration gap analysis.

- “Duration” may be defined as the weighted average time (measured in years) to receive all cash flows from a financial instrument.

Semi-active Management Strategy: Immunization

- Interest risk comprises two risks: price risk and coupon reinvestment risk.
- Note that price risk and coupon reinvestment risk derived from a change in interest rates have an opposite effect on the investor’s ending wealth position.
- Specifically, a rise in market interest rates, will cause an ending price that is below expectations, but the reinvestment of interim cash flow will be at a rate above expectations, so this flow will be above expectations.
- It is clearly important for say a bond investor with a known holding period to attempt to eliminate these two risks derived from changing interest rates.
- Eliminating these risks from a bond portfolio is referred to as immunization.
- A portfolio of investments in bonds is immunized for a holding period if its value at the end of the holding period, regardless of the course of interest rates during the holding period, is as large as it would have been had the interest rate function been constant throughout the holding period.

Duration

- Most bonds provide coupon (interest) payments in addition to a final (par) payment at maturity. A measure of the average time prior to receipt of payment is duration.
- *Duration (D)* is the weighted average measure of a bond’s life, where the various time periods in which the bond generates cash flows are weighted according to the relative sizes of the present values of those flows.
- *We could also say that a bond portfolio is immunized from the interest rate risk if the duration of the portfolio is equal to the desired holding period.*
- Finally, the duration of a portfolio will keep changing with time. Hence, rebalancing of the portfolio on an annual or as needed basis will have to be carried out.

Please see slide numbers 28 and 29.

Modified Duration

- Now that we know how to calculate a bond’s duration, we need to know how much its price will change as its yield changes without need to resort to trial-and-error methods. Algebraically, an approximate direct relationship between the duration of a bond and its price volatility for a change in market interest rates is:
- % change in price = - MD (Δ BP/100), where
- MD = modified duration, Δ BP = change in basis points (plus or minus).
- Further, MD = D / (1 + r/ p), where
- D = duration (years)
- r = market yield (decimal)
- p = interest payments per year (usually two)

- Suppose a bond has a calculated duration of 4.87 years with an interest rate of 7.76 per cent and interest payable semi-annually.
- The modified duration on these bonds is thus:
- $MD = (4.87) / (1 + 0.0776/2) = 4.87 / 1.0388 = 4.69$
- So, suppose these bonds are yielding 7.76 per cent to maturity, and rates fall by 50 basis points to 7.26 per cent. The price of the bond should rise by 2.345 per cent as follows:
- Per cent change in price = $- 4.69 (- 50/ 100) = + 2.345$
- If say initially the bond sells for 1093.75 to yield 7.76 per cent, it will rise to 1,119.40 to yield 7.26 per cent (a 2.345 percent price rise).

Simulation and ALM

- Banks in advanced countries have started using simulation models that allow them to examine alternative interest rate scenarios, and to stress-test their portfolios.
- Many of the larger banks depend primarily on simulations, and they set limits for their interest rate exposure. For example, a bank may limit its interest rate exposure to a 5 per cent change in net interest income. Given this limit, it models the balance sheet that will constrain it to that limit when interest rate changes by, say 200 basis points.
- Stress testing reveals the effects on income and capital of larger changes in interest rates. Stress testing can be thought of as testing the implications of a worst-case scenario.

ALM by Banks

- AD Category - I banks may use the following instruments to hedge their asset-liability portfolio:
- Interest Rate Swaps, Currency Swaps, and Forward Rate Agreements.
- AD Category - I banks may also purchase call or put options to hedge their cross currency proprietary trading positions.

Based on Presentation by Prof Abhijit Roy to RBI officers during September – October 2012.