



Asset Liability Management in Banks

A presentation by Kiran Sharma
Member of Faculty
CAB, RBI, PUNE

Slide 1

k1

kiransharma, 26/02/2010



What is ALM Process ?

- Assessing various Banking Risks
- Actively altering A-L portfolio
- Strategically taking & managing risk
With the objective of Profit Maximisation



Three pillars of ALM process

ALM Inform System	ALM Organisation	ALM Process
MIS	Structure and responsibilities	Risk parameters Risk identification Risk measurement Risk management
Information Availability, Accuracy, Adequacy, Expediency	Level of Top Management involvement	Risk policies and tolerance



Scope of ALM Process

- Liquidity Risk Management
- Management of Market Risk
- Trading Risk Management
- Funding and Capital Planning
- Profit Planning and Growth projection



Multiple Risks faced by Banks

Credit Risk	Market Risk	Operational Risk
Transaction risk or default risk or Counterparty risk Portfolio risk or Concentration risk Settlement Risk	Commodity Risk Interest Rate Risk Forex Rate risk Equity Prices risk Liquidity Risk	Process risk Infrastructure risk Model risk Human risk



Main Focus of ALM

- Liquidity Risk Management
- Currency Risk Management
- Interest Rate Risk Management



What is Liquidity Risk

- Liquidity Risk arises from **funding of long term assets by short term liabilities**, thereby making the liabilities subject to *rollover or refinancing risk*.



Dimensions of Liquidity Risk

- **Funding risk:** unanticipated withdrawals / non renewal of deposits (wholesale/retail)
- **Time risk:** need to compensate for non receipt of expected inflow performing assets turning into NPAs
- **Call Risk:** Due to crystallisation of contingent liabilities and unable to undertake profitable business opportunities when desirable.s



Causes of Liquidity Risk

- Embedded options in Assets and Liabilities



What leads to Liquidity Risk ?

- Lack of Coordination between Credit Administration Department and Treasury i.e. Over extension of credit
- Central bank's action (CRR/ SLR)
- Central / State Government Borrowings (preemption)
- High level of NPAs and Poor asset quality
- Mismanagement
- Hot Money
- Non recognition of embedded option risk
- Reliance on few wholesale depositors
- Large undrawn loan commitments
- Lack of appropriate liquidity policy and contingent plan



Liquidity Risk - Symptoms

- Offering higher rate of interest on deposits
- Delayed payment of matured proceeds
- Delayed disbursement to borrowers against committed lines of credit
- Deteriorating asset quality
- Large contingent liabilities
- Net deposit drain



Liquidity Risk (Contd.)

- Regulatory Requirements
 - CRR / SLR
 - Call Money Borrowings prescriptions / limits
 - ALM Guidelines
 - Host country prescriptions
 - Overseas Offices of Indian Banks



Factors Reducing Liquidity Risk

- Availability of Refinance
- LAF Facility
- Open Market Operations
- CBLO



Liquidity Risk - Measurement

- Two methods are employed:
 - Stock approach - Employing ratios
 - Flow approach - Time bucket analysis



Liquidity Measurement Approaches

- Stock approach and Cash Flow approach
- Key Ratios are:
 - Loan to Asset Ratio
 - Loan to Core Deposits
 - Large liabilities less Temporary investments to Earning assets less Temporary investments
- Purchased Funds to Total Assets
- Loan losses/net loans



Liquidity Risk - Measurement

- Liquidity Ratios
 - Volatile Liability Dependence Ratio
 - Volatile Liabilities minus Temporary Investments to Earning Assets net of Temporary Investments
 - Shows the extent to which bank's reliance on volatile funds to support Long Term assets
 - where volatile liabilities represent wholesale deposits which are market sensitive and temporary investments are those maturing within one year and those investments which are held in the trading book and are readily sold in the market
 - Growth in Core Deposits to growth in assets
 - Higher the ratio the better



Liquidity Risk Management

- Liquidity Management Policy
- Funding strategy
- Liquidity planning under alternative scenarios
- Prudential limits
- Liquidity reporting
- Review



Tools for Measuring and Managing funding requirements

- Use of maturity ladder
- Calculation of cumulative surplus or deficit of funds at selective maturity dates
- Cash flows to be placed in different time buckets based on the behaviour of assets, liabilities and off balance sheet items
- Variance analysis at least half yearly
- Impact of prepayment of loans, premature closure of deposits and exercise of put and call options after specified time.
- Difference of cash inflows and outflows in each time band



How to avoid liquidity crisis

- Cap on interbank borrowing / call borrowing
- Purchased funds vis a vis liquid assets
- Core deposits vis a vis Core assets i.e. CRR, SLR and Loans
- Duration of liabilities and investment portfolio
- Maximum Cumulative Outflows
- Tracking Commitment Ratio to corporates/banks to limit the off balance sheet exposure
- Swapped Fund ratio i.e. extent of Indian ruppees raised out of foreign currency sources.
- Tracking high value deposits (Rs. One crore above)



Liquidity Risk – Measurement (Contd.)

- Purchased Funds to Total Assets
 - where purchased funds include the entire inter-bank and other money market borrowings, including Certificate of Deposits and institutional deposits
- Loan Losses to Net Loans
- Loans to core deposits



Cash Flow Approach

- (a) 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.
- (b) 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.



RBI Guidelines on Liquidity Risk

- Methodology prescribed in ALM System- Structural Liquidity Statement & Dynamic Liquidity Ladder are simple
- Need to make assumptions and trend analysis- Behavioural maturity analysis
- Variance Analysis at least once in six months and assumptions fine-tuned
- Track the impact of exercise of options & potential liquidity needs
- Cap on inter-bank borrowings & Call money



Liquidity profile of banks to be analysed **on static and dynamic basis**

On Static Basis	On Dynamic Basis
Assets, Liabilities, off balance sheet exposure to be pegged on a particular day.	Due importance to be given to seasonal pattern of deposits /loans. Potential liquidity for new loans, unavailed credit limits, loan policy, potential deposit losses, investment obligations, statutory obligations etc.



Liquidity profile of banks

Factor affecting Liquidity profile of banks

- Normal situation
- Bank specific situation
- Market crisis scenario



Reasons for various situations

Normal Situation	<ul style="list-style-type: none">-Establish benchmark- cash flowprofile of on /off balance sheet items-Managing netfunding requirement
Bank specific crisis	<p>Worst case benchmark</p> <ul style="list-style-type: none">No roll over of purchased fundsSubstantive assets turned NPAsRating downgrades leading to high cost of liquidity
Market crisis scenario	<ul style="list-style-type: none">-Severe market disruptions,-failure of major market players- financial crisis and Contagion-- flight of volatile deposits- selling investments with huge discount entailing capital loss



Contingency Plan for Liquidity Management

- Blue print for asset sales, market access, capacity to restructure the maturity and composition of assets and liabilities
- Alternative options of funding
- Backup liquidity support in the form of committed lines of credit reciprocal arrangements, liquidity support from other external sources, liquidity of assets



Interest Rate Risk



Measuring Interest Rate Risk

- Four important analytical techniques to measure and manage IRR
- Maturity gap analysis : (to measure the interest rate sensitivity of earnings)
- Duration : (to measure the interest rate sensitivity of capital)
- Simulation
- Value at Risk:



Gap Analysis

- It is a basic technique also known as:
 - Interest Rate Sensitivity Report
 - Maturity Gap Report
 - Interest Rate Gap Report
- Used in USA & Canada Financial Institutions disclose Gap report in Annual Report



Preparation of Gap Report

- It is a static report
- Balance Sheet and Off Balance Sheet position as on that day
- Determine the number of time buckets
- Determine the length of each bucket

▪



Gap Report contd...

- Slot every Asset, Liability & Off Balance Sheet item into corresponding time bucket
 - Based on Repricing and Contractual Maturity

e.g.

- one year loan that reprices quarterly should be slotted in 3 month bucket



Gap analysis – Prudential limits

- Compute the Gap i.e. Liquidity and IR including
 - i) all Assets and Liabilities
 - ii) RSA and RSL
- Compute the Cumulative Gap (C.G.)
 - C.G. as % of Total Assets
 - C.G. as % of Earning Assets
 - C.G. as % of Equity



Gap analysis – Prudential limits

- A & L to be grouped into time buckets
- $GAP = RSA - RSL$
- $GAP \text{ Ratio} = RSA / RSL$
- $GAP > 0$, $G.R. > 1$, +ve Gap
- $GAP < 0$, $G.R. < 1$, -ve Gap
- $GAP = 0$, $G.R. = 1$, Matched Position



Gap analysis – Prudential limits

- $NIM = NII / \text{Earning Assets}$
- If Gap is +ve, increase/ decrease in interest rates causes increase / decrease in NII and NIM.
- If Gap is -ve, increase/ decrease in interest rates causes decrease / increase in NII and NIM



Gap analysis – Prudential limits

- Passive Management of IRR
 - Attempt to Hedge the GAP
- Active Management of IRR
 - Speculatively alter GAP to raise NII
e.g. If IR rise is expected, make GAP +ve or more +ve
 - Transfer Price Mechanism to enhance the management of Margins
i.e. credit spread, funding or liability spread and mismatch spread.
 - Rational pricing of assets and liabilities
 - *Problems* in forecasting rates



Gap analysis – Prudential limits

- Appropriate Board and Senior Management oversight
- Adequate Risk Mgmt Policies and procedures
- Appropriate RM monitoring and Control Functions
- Comprehensive Internal Controls and Independent Audits



Altering the GAP

- Asset Restructuring
- Liability Restructuring
- Growth
- Shrink
- Off- Balance Sheet Hedge



Duration Gap Analysis

- Duration is a measure of percentage change in the economic value of a position that will occur given a small change in the level of interest rates
- Difference between duration of assets and liabilities is bank's net duration.
- If $DA > DL$, a decrease in interest rate will increase the MVE of the bank.
- If $DL > DA$, an increase in interest rate will increase the MVE of the bank and a decrease in interest rate will decrease the MVE of the bank.
- Duration Gap Analysis recognises the time value of money.
- It fails to recognise basis risk as it assumes parallel shift in yeild curve.



Simulation

- Simulation technique attempts to overcome the limitation of GAP and Duration approaches by computer modelling the bank's interest rate sensitivity.
- The modelling makes assumptions about future path of interest rates, shape of yield curve,, changes in business activity, pricing and hedging strategies,



Value at Risk

- Var is the maximum potential loss in market value or income
 - over a given time horizon,
 - under normal market conditions,
 - at a given level of certainty.



Value at Risk

- VaR serves as Information Reporting to stakeholders.
- Performance Evaluation i.e. return generated of individuals/ business units for the risks taken and subsequently allow for comparison
- Resource Allocation (capital and personnel) to provide a higher risk adjusted profitability.
- Regulatory (to impart stability to the overall financial system)



Computation of VaR

VaR is measured by Standard Deviation of unexpected outcome (volatility)
- σ (“sigma”)

Normal distribution is characterised by two parameters:

i) Its mean μ (“mu”) and ii) Standard Deviation σ (“sigma”)

Its probability distribution function has a **bell shaped curve**.

Total area under the curve = cumulative probability of occurrence



VaR Computation

Possible range of values of variable X	Probability
$\mu - \sigma$ to $\mu - \sigma$	68.3%
$\mu - 1.65\sigma$ to $\mu + 1.65\sigma$	90.0%
$\mu - 2*\sigma$ to $\mu + 2*\sigma$	95.5%
$\mu - 3*\sigma$ to $\mu + 3*\sigma$	99.7%



VaR Computation

Potential Loss in value of X	Probability
σ	84.2%
1.65σ	95.0%
2σ	97.8%
3σ	99.9%



VaR Computation

- Choice of confidence level reflects risk appetite and the cost of a loss exceeding the VaR e.g.
 - Bankers Trust uses 99% level
 - Chemical and Chase use a 97.5% level
 - Citibank use 95.4% level
 - JP Morgan use 95% level
 - FEDAI indicates 97.5 % confidence level with 3 days holding period
 - Basel defines 99 % confidence level with 10 days holding period



Calculating VaR

- ABC Bank had long overnight position of US \$ 10 mio
- Closing Spot Rate = Rs. 45.65/ USD
- Calculate its VaR ?



Calculating Volatility

- Assume volatility of INR/USD exchange rate is 10%
- Annual Volatility = daily Volatility * $\sqrt{\text{no of trading days}}$
- Suppose trading days are 250
 - Calculate volatility ?
- $10\% = \sigma * \sqrt{250}$
- $\sigma = 0.6325\%$



□ Calculate volatility ?

- $10\% = \sigma * \text{sqrt}(250)$

Ans.

- $\sigma = 0.6325\%$



Calculate volatility

- Exercise

Possible range of values of
variable X : Probability

$\mu - \sigma$ to $\mu + \sigma$: 68.3%



Calculating Volatility

- Solution
- Possible range of values of variable X: Probability
- $\mu - \sigma$ to $\mu + \sigma$: 68.3%
- Next day fluctuation in INR/USD will be between
- $45.65 * (1 + 0.006325)$ and $45.65 * (1 - 0.006325)$

- Ans:

- 45.93874 and 45.36126



VaR application

- VaR to be used in combination with Stress Testing to take care of Event Risk.(scenario)
- VaR methodology can be extended to all treasury activities of a bank i.e.
- Forex, Money Market Trading, Investments, Equity Trading
- For Indian banks : risk adjusted profitability measurement is the way forward.



- Management of Forex Risk



Management of Forex Risk

- Set appropriate limits- open position and gaps
- Clear cut and well defined division of responsibility between front, middle and back office
- Var approach to risk associated with exposures
- Maturity and Position (MAP) introduced by RBI
- Interest Rate sensitivity(SIR) by RBI for forex risk



Forex Exposure

- Transaction Exposure : A cash flow exposure
- Translation Exposure : An accounting Exposure
- Both Balance Sheet and P & L Account to be consolidated. Translating at average or end exchange rate alters profits as exchange rate varies.



Methods for Translation Exposure Accounting

There are Four Methods

- Current- Non current
- All Current (Closing Rate Method)
- Monetary/ Non Monetary Method
- Temporal Method



Current- Non Current Method

- Translates current exposure at closing rate
 - and non current exposure at historical rate.
 - Long term debt is not exposed.
-
- The method is neither logical nor popular



All Current (Closing Rate Method)

- Translates all items denominated in foreign currency at closing exchange rate.
- Accounting exposure is given by net assets.
- Simple and popular method.



Monetary/ Non Monetary Method

- Monetary items are Assets, Liabilities and Capital at Closing rate
- Non monetary items at historic cost
- Accounting exposure is Net Monetary Assets



Temporal Method

- Uses closing rate method for all items stated at replacement cost, realisable value, market value or expected future value.
- or closing rate for all items stated at current rate.



Forex Risk Management Techniques

- Internal techniques of exposure management
- External techniques of exposure management



Internal techniques of Forex exposure management

- Netting
- Matching
- Leading and Lagging
- Pricing Policy- Transfer Pricing
- Asset/ liability Management



External techniques of Forex exposure management

- Forward Contracts
- Swaps
- Options
- Futures



- Derivatives as an Asset/ Liability Management Tool



Derivatives as an Asset/ Liability Management Tool

- Derivatives are used to minimise Interest Rate Risk
 - by Hedging or
 - Speculation
- Orange County in USA, Procter & Gamble, Barings plc used speculation



When Interest Rates are falling

- If $ISA > ISL$, NIM will decline
- Bank may increase its Fixed Rate Assets
- Reduce its ISA
- Increase its ISL
- The strategy carry Credit Risk and may also be cost prohibitive



Derivatives- To reduce Short Term Exposure

- Bank may purchase a one year Treasury contract in the Future Market
- or Purchasing a Call Option on Treasury Future



Derivatives- To reduce Medium and Long Term Exposure

- Banks may have Interest Rate SWAP i.e.
- Swap a portion of variable Interest Payment Stream for Fixed Rate Interest Payment Stream.
- Banks would lose the profit potential should Interest Rate rise.
- Banks can also enter into Floor Contracts with an intermediary and retain potential for profit in case interest rate increase.



When Interest Rates are rising...

- NIM will deteriorate if Banks have –ve gap.
- Banks may therefore:-
 - increase its price sensitive assets
 - decrease its price sensitive liabilities



When Interest Rates are rising

In Short Term	In Medium and Long Term
<ul style="list-style-type: none">- Sell a one year treasury contract in Future or- Purchase a Put Option on Treasury Future	<ul style="list-style-type: none">-SWAP a fixed income stream for a variable rate stream-- entre into a rate capped SWAP Contract or SWAPTION



Uncertain Interest Rate Environment

- Banks may have prudential GAP limits for Short, Medium and Long Term
- e.g.
- 0.90 to 1.10 for Short Term
- 0.85 to 1.15 for Medium Term
- 0.80 to 1.20 for Long Term Positions
- If ST exposure is +ve and MT and LT exposure is –ve, banks may simultaneously purchase a Call Option on the Treasury Future and Enter into a variable for a fixed rate SWAP contract to Hedge intermediate and long term gap



Derivatives and Speculators

- Speculators provide liquidity to the market



Issues – Derivatives and ALM

- Derivatives may be used for hedging or speculation
- SWAPs have Credit risk
- Banks should fully understand regulatory environment relating to Derivatives – CRAR
- Banks should be familiar with the accounting issues, pricing of derivatives, mark to market, disclosure norms, tax implications.



Thanks