

MANAGING CORE RISKS
IN BANKING:

ASSET-LIABILITY
MANAGEMENT (ALM)



BANGLADESH BANK

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EXECUTIVE SUMMARY

Managing Assets and Liabilities to foster a sustainable growth is one of the key issues of banking industry. After the GFC, managing the Liquidity and Market risk of banks attracts much more attention of the regulators and supervisors globally. The outcome of this concern was well reflected in the activities of the Basel Committee for Banking Supervision while formulating the Basel 2.5 and Basel III documents. The Liquidity (LCR and NSFR) and leverage ratios are primarily meant to address the above risks. Bangladesh Bank has already declared the Roadmap for the implementation of Basel III in the banking sector. The Liquidity Ratios will be implemented as a prudential requirement from September 2015. On the other hand, after final adjustment by BB in 2017, Leverage Ratio requirements will become a separate capital standard for banks from January 2018.

Asset and Liability Management (ALM) of banks' will be centered on the above three ratios after implementation of Basel III. Asset and Liability management is an essential process for banks and when not well managed, it creates a threat to the existence of the bank itself. Banks must have their own ALM policy, essentially approved by the BODs (ALCO, in case of foreign banks). In order to formulate the policy the management and the BODs must understand the risks around each and every asset and liability of the bank. BB has issued a comprehensive Risk Management Guidelines for Banks in 2012 elaborating the determination and mitigation of various risks in this regard.

The Asset and Liability Management Committee (ALCO), comprising of the senior management of a bank, is primarily responsible for managing assets and liabilities under the set ALM policy. While setting any standard under the bank's ALM policy, the management and the BODs shall take necessary care, so that the minimum or maximum limits (where applicable) stated by BB in this ALM Guidelines upholds. In other cases, international best practices suitably customized for local banks depending on their capacity and needs may be used.

This ALM Guideline is a snapshot of what to do and how to do things regarding proper management of assets and liabilities of a bank. This should be considered as a basic framework for further developments in this area with evolving situation in the banking industry. The ALM policy, set out by the BODs, incorporating the limits and essence of this ALM Guidelines should be reviewed periodically and as and when necessary.

PART A: POLICY STATEMENT

Asset and liability management is a process which is managed by The Asset Liability Management Committee (ALCO) of the bank. In order to run the process smoothly, it should be guided by specific policy (ALM policy), essentially approved by the BODs of local banks and CEO of the foreign banks. The policy must be tailored depending on the size and nature of business of the bank. Although there is no specific model, the following are the best practices for an ALM Policy:

- ✓ Have substance, structure and focus.
- ✓ Ties-in other policy parameters, e.g., Investment Policy guidelines and the impact on liquidity.
- ✓ Includes description of how key assumptions are determined, and the source documents used to make the assumptions.
- ✓ Includes risk limits for maintaining liquid, unencumbered assets.
- ✓ Outlines expectations for independent review.
- ✓ Includes funding risk limits by maturity (e.g. limits on short-term, wholesale funding).

The following policies are set by BB for compliance by the commercial banks-

1.1 Basel III Liquidity Ratios:

BB has issued separate Guidance note on LCR and NSFR under Basel III. These ratios represent the way forward in ALM through liquidity measurement and management. These ratios along with the liquidity gap should be central to liquidity measurement and management.

1.1.1 Liquidity Coverage Ratio (LCR):

LCR or Liquidity Coverage Ratio is a new liquidity standard introduced by the Basel Committee. This standard is built on the methodologies of traditional liquidity coverage ratio used by banks to assess exposure to contingent liquidity events. The minimum acceptable value of this ratio is 100 percent.

1.1.1.1 Definitions for the LCR:

The calculation of the LCR requires three important quantities to be defined:

- A. Total value of stock of high quality liquid assets
- B. Total cash outflows, next 30 days (stressed scenario)
- C. Total cash inflows, next 30 days (stressed scenario)

LCR requirement is met if A is greater than B – C; that is, if high quality liquid assets exceed net cash outflows under the stressed scenario. (To make the metric even more conservative, C is capped at 75 percent of B.)

1.1.1.2 The Equation:

$$\text{LCR} = \frac{\text{Stock of high quality liquid assets}}{\text{Total net cash outflows over the next 30 calendar days}} \geq 100\%$$

Here, Stock Of high quality assets = A and

Total net cash outflow over the next 30 calendar days = B – C, where C is maximum 75% of B.

1.1.2 Net Stable Funding Ratio (NSFR):

NSFR or Net Stable Funding Ratio is another new standard introduced by the Basel Committee. The NSFR aims to limit over-reliance on short-term wholesale funding during times of abundant market liquidity and encourage better assessment of liquidity risk across all on- and off-balance sheet items. The minimum acceptable value of this ratio is 100 percent, indicating that available stable funding (ASF) should be at least equal to required stable funding (RSF).

1.1.2.1 Definitions of the NSFR:

The calculation of the NSFR requires two quantities to be defined:

- A. available stable funding (ASF) and
- B. required stable funding (RSF).

NSFR is met if ASF exceeds RSF, that is if $\text{ASF}/\text{RSF} > 1$ or 100%.

1.1.2.1 The Equation:

$$\frac{\text{Available amount of stable funding (ASF)}}{\text{Required amount of stable funding (RSF)}} > 100\%$$

Here, Available amount of stable funding (ASF) = A and

Required amount of stable funding (RSF) = B.

1.2 Leverage Ratio:

A minimum Tier 1 leverage ratio of 3% is being prescribed by BB both at solo and consolidated level. Banks have to maintain leverage ratio on quarterly basis. The ratio is defined as-

$$\frac{\text{Tier 1 Capital}}{\text{Total Assets}} = \frac{\text{Tier 1 Capital}}{\text{Total Assets}} \times 100\%$$

[*after related deductions]

(For more information see "Guidelines on Risk Based Capital Adequacy: Revised Regulatory Capital Framework for banks in line with Basel III" issued by BB in December 2014.)

1.3 Other significant policy statements:

To facilitate the ALM process, the Board of the Bank should set out other policy statements (keeping in mind the minimum requirements of LCR, NSFR and Leverage ratio) for the followings and an annual review (at least) should be done taking into consideration the changes in the balance sheet and market dynamics.

1.3.1 Advance to Deposit Ratio (ADR):

Although commonly known as Advance to deposit ratio, actually the ratio is determined by putting Advance in numerator and Liabilities (excluding capital) in denominator. The ratio should be fixed in such a manner so that there will be no unnecessary liquidity pressure on the bank in any point of time. Considering the regulatory liquidity requirements (CRR and SLR), the maximum value of the ratio shall be derived using the formula [ATDTL (100%)-CRR-SLR]. Depending upon the capital base, liquidity condition, NPL status etc. and above all the maintenance of LCR & NSFR, the board may decide adding highest 4.5% and 2%* (for conventional banks and Shariah based banks respectively) with the result of the above formula to fix a suitable AD ratio.

1.3.1.1 The Equation:

The formula for calculating AD ratio is as follows-

$$\text{ADR} = \frac{\text{Total Loans and Advances or Investment (for Shariah based banks)}}{(\text{Total Time and Demand Liabilities} + \text{Interbank deposit surplus})}$$

Interbank deposit surplus = Deposit from other banks - Deposit with other banks (if -ve then 0)

Bank should follow the instruction of BB regarding deduction of some items to calculate total loans and advances or Investment while calculating ADR. Total Time and Demand liabilities will be calculated according to DOS Circular No.01/2014.

1.3.1.2 ADR for Islamic banking operation of conventional banks:

Conventional banks having Islamic banking business have to calculate and maintain ADR separately for conventional banking and islamic banking operation. ADR for islamic banking operation is same as that of Islamic Shariah based banks.

1.3.1.3 Adjustment of the AD ratio limit:

It is important to adjust AD ratio limit with changing condition of bank's assets and liabilities. The Management of the bank should inform the board regarding AD ratio in every meeting so that the board may take quick decision necessary to adjust the ratio.

[Note: 1. * depends on SLR fixed by BB from time to time

2. ATDTL = Monthly Average Total Demand and Time Liabilities and shall be calculated according to DOS Circular No.01/2014.

3. CRR = bi-weekly rate as decided by BB from time to time.

4. SLR = as decided by BB from time to time.]

1.3.2 Wholesale Borrowing Guidelines (WBG):

The aim of wholesale borrowing (WB) guidelines is to set a limit for borrowed fund. The limit should be set in absolute amount based on bank's eligible capital (Tier-1 plus Tier-2) capital and considering liquidity needs due to maturity mismatch, borrowing capacity of the bank and historic market liquidity.

1.3.2.1 WB Limit:

WB covers call borrowing, Short Notice Deposit from banks and financial institutions, placement received with maturity less than 12 months, commercial papers/similar instruments and overdrawn Nostro-accounts. The WB Limit should be capped at 80% (for Non PD banks) and 100% (for PD banks) of bank's eligible capital on fortnightly average basis with maximum two deviations (not more than 90% and 110% of the eligible capital for Non PD and PD banks respectively) in a particular fortnight.

1.3.2.2 Scope of WB Limit:

The above limit shall be considered as an aggregate limit for banks having dual businesses (i.e. both conventional and islamic banking operation).

1.3.3 Commitments:

Commitments include undrawn portions of continuous loan including interest thereon and undrawn portions of term loans, outstanding irrevocable letters of credit and similar instruments, letters of guarantee, acceptances and similar instruments.

1.3.3.1 Commitment Limit:

The commitment limit should be fixed considering three important ratios. These are: i) Total commitments to total Assets, ii) Total commitments to Total Eligible Capital and iii) Total commitments to total High Quality Liquid Assets (HQLA). The highest acceptable limits of these ratios are less than 50%, less than 500% and less than 250% respectively. The commitment limit should be the lowest amount of the three ratios above.

1.3.3.2 Scope of Commitment Limit:

The above limit shall be considered as an aggregate limit for banks having dual businesses (i.e. for both conventional and islamic banking operation).

1.3.4 Structural Liquidity Profile (SLP):

The structural liquidity profile of a bank provides information regarding maturity transformation of assets and liabilities in a simple manner. The negative liquidity GAP (if exist), derived by considering assets and liabilities both in local and foreign currencies, may

be taken as a preliminary signal for the need of maturity adjustment of assets and liabilities in different time buckets. The Maximum Cumulative Outflow ratio may be considered as an important benchmark in this regard.

1.3.4.1 Maximum Cumulative Outflow (MCO):

MCO reflects the maximum cumulative outflow against total assets in a maturity bucket. MCO upto one month bucket should not be greater than the sum of daily minimum CRR plus SLR. For example, at the present rate of CRR and SLR, the MCO should be 19% (6% CRR+ 13% SLR) for conventional banks. The Shariah based banks, having higher ADR and Short nature of their investment are also allowed MCO at the same ratio. MCO in the other maturity buckets should be prudently fixed by the BODs (ALCO in case of foreign banks) depending on bank's business strategy. The board should take utmost care in setting these ratios as they have significant impact on bank's business strategy.

1.3.4.2 The Equation:

The formula for determining maximum cumulative outflow in one month bucket is-

$$\text{MCO} = \frac{\text{CRR} + \text{SLR}}{\text{CRR} + \text{SLR} + \text{MCO}} \times 100$$

Banks should follow the instruction of BB (Dos circular no-02,dt:29/03/2011) regarding preparation of Structural Liquidity Profile (SLP). Using the above equation bank should calculate MCO in other time buckets.

1.3.4.3 Scope of MCO:

Conventional banks having islamic banking operation should prepare combined SLP and MCO for better understanding of the overall position of the bank.

1.3.5 Interest Rate Risk Limit:

The BODs should set a limit on the interest rate risk in the banking book. The limit should be set according to the risk appetite of the bank. The BODs should also set the management action plan to reduce interest rate risk if the situation warrants. Both NII (Net Interest Income) and MVE (Market Value of Equity) Limits and action plan should be set so that management can act promptly. Bank should follow the instruction of Risk Management Guidelines for Banks issued by Bangladesh Bank in 2012.

1.3.6 Swapped Funds Limit:

Swapped fund is the difference between assets and liabilities including capital denominated in the same currency.

Assets and liabilities will not always be in the same currencies. A bank would be exposed to the risk that it may not meet its currency-wise obligations as they fall due. Swapped funds position result from reliance on foreign exchange markets and therefore needs to be controlled.

Swapped funds limits are established on the maximum amount that may be swapped out of foreign currency into local currency and swapped out of local currency into foreign currency.

1.3.7 Liquidity Contingency Plan (LCP):

A liquidity contingency plan needs to be approved by the BODs (ALCO in case of foreign banks). A contingency plan needs to be prepared keeping in mind that enough liquidity is available to meet the funding requirements in liquidity crisis situation.

1.3.7.1 Essential characteristics of a LCP:

An acceptable LCP should have some essential characteristics:

- ✓ The LCP should identify and assess the adequacy of financial resources (source of funds) for contingent needs. The plan should identify all back-up facilities, the conditions related to their use, and the circumstances under which the bank might use them. Periodically, management should test all sources of its contingency funding plan with the goal of ensuring that there are no unexpected impediments or complications in case the bank needs to use its contingency lines. Management should understand the various conditions, such as notice periods, that could affect access to back-up funding sources.
- ✓ The LCP should distinguish between bank-specific and general market liquidity situations, and have appropriate responses to each situation.
- ✓ The LCP should define responsibilities and decision-making authority so that all personnel understand their role during a problem situation.

- ✓ The LCP should identify the sequence that the bank will mobilize and commit key sources of funds for contingent needs. The degree of uncertainty as to the magnitude, timing, and availability of recourses may call for different priorities in different situations.
- ✓ The LCP should address implementation issues such as procedures the bank should use to obtain emergency funds or release funds from one use to transfer to another. It must ensure that there are no constraints, such as blanket liens on all collateral, which may limit availability of other liquidity sources.
- ✓ The LCP should identify other actions necessary in the event of an unexpected contingency.
- ✓ The LCP should assess the potential for funding erosion (magnitude and rate of outflow) by source of funds under different scenarios.
- ✓ The LCP should assess the potential liquidity risk posed by other activities, such as asset sales and securitization programs.

1.3.7.2 Preparation and review/update of LCP:

The Contingency Management Plan needs to be prepared by the Treasury Department. The Plan needs to be reviewed/ updated by ALCO and approved by the BODs (ALCO for foreign banks) of the bank at least annually or more frequently.

1.3.7.3 Elements of a typical LCP:

Every bank should have an up-to-date Liquidity Contingency Plan. The plan should contain measures to ensure that the bank is able to respond to a crisis/ specific problem in the local market. The Contingency Management Plan identifies the trigger events that could cause a liquidity crisis and describes actions to be taken to manage the situation. A typical LCP includes the following elements:

1.3.7.3.1 Trigger Events:

Trigger events could include breach in liquidity guidelines/ ratios for certain consecutive reporting dates, not being able to meet stress cash flows, unsubstantiated rumors, difficulty in either capital or funding, market-wise stress, etc. as appropriate.

1.3.7.3.2 Contingency Management Team (CMT):

Bank should have a specific contingency management team consisting of ALCO members. The MD/CEO may include any other relevant personnel as deemed appropriate.

1.3.7.3.3 Purpose of the Contingency Management team

The purpose of the CMT is to investigate cause and magnitude of the crisis, assess steps to prevent occurrence/ escalation, understand expected duration of the crisis, assess market sentiment, and decide on remedial action to mitigate effects of the crisis.

1.3.7.3.4 Details of Action Plan

This would include information and sources of information/ reports, review of funding sources and liabilities, plan for asset disposal/ liquidation, plan for communication, liquidity management plan, etc. It is important to clearly specify the responsible persons for each of the action items identified. This will ensure that the tasks/ activities during a crisis situation are undertaken smoothly.

1.3.7.3.5 Critical Contact Information

Contact numbers of critical internal persons as well as central bank/ interbank contacts need to be included in the Contingency Management Plan. This will ensure that in times of a crisis, the numbers are handy.

1.3.7.3.6 Brief Summary of Regulations, and Contingency Liquidity Sources

This will include information on CRR/ SLR and other regulatory liquidity requirements, liquidity facilities offered by central bank, and a quantification of the liquidity that may be assumed to be available from different sources.

1.3.8 Regulatory Compliance:

There should be a firm policy on compliance with Bangladesh Bank requirements relevant to ALM, such as CRR and SLR, CRAR, Single Borrower Exposure Limit, etc.

PART B: ORGANIZATION OF THE ALCO

The Asset and Liability Committee (ALCO) is responsible for balance sheet risk management. Managing the assets and liabilities to ensure maximum level of structural balance sheet stability and optimum profitability is an important responsibility of the ALCO.

2.1 Responsibilities of ALCO:

According to the Risk Management Guidelines issued in February 2012 by Bangladesh Bank, the major responsibilities of ALCO are as follows:

- ✓ Ensure that bank's measurement and reporting systems accurately convey the degrees of liquidity and market risk.
- ✓ Monitor the structure and composition of bank's assets and liabilities and identify balance sheet management issues that are leading to underperformance
- ✓ Decide on the major aspects of balance sheet structure, such as maturity and currency mix of assets and liabilities, mix of wholesale versus retail funding, deposit mix etc
- ✓ Decide on how to respond to significant, actual and expected increases and decreases in required funding
- ✓ Review maturity profile and mix of assets and liabilities
- ✓ Articulate interest rate view of the bank and decide on balance sheet strategy
- ✓ Approve and periodically review the transfer pricing policy of the bank
- ✓ Evaluate market risk involved in launching of new products
- ✓ Review deposit-pricing strategy, and
- ✓ Review liquidity contingency plan for the bank

Balance sheet risk management is not limited to collection of data only. ALCO is required to understand the implications of the numbers generated from analyses and formulate appropriate responses and strategies for the bank.

2.1.1 Organizational structure of ALCO:

The structure of ALCO would typically be as follows:

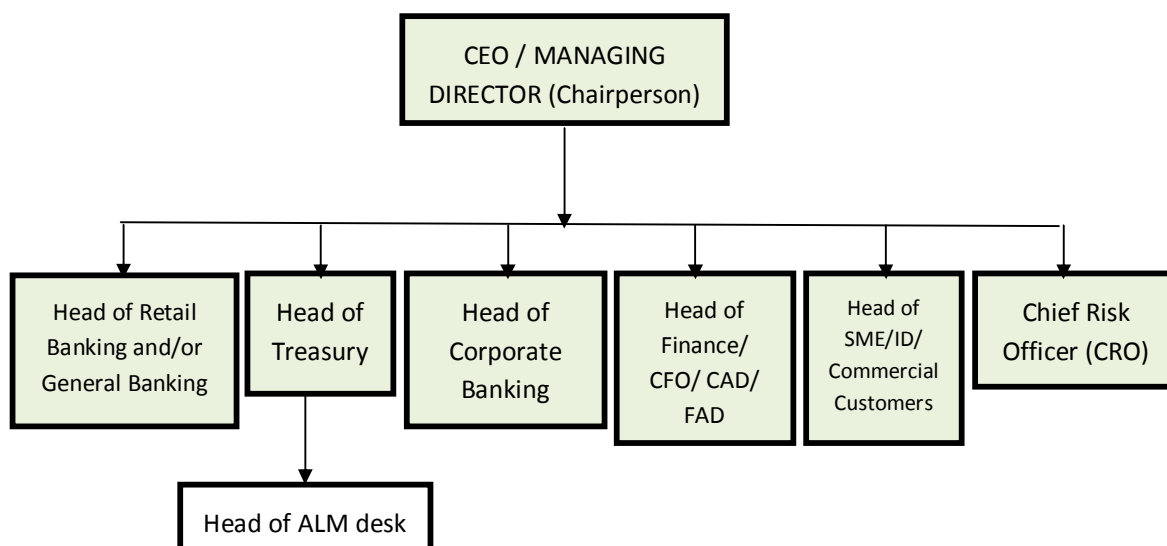


Fig. Structure of ALCO

2.1.1.1 Key Roles and Responsibilities of the Treasury Department:

The prime responsibility of Asset and liability Management (ALM) is on the Treasury Department of the bank, specifically its ALM desk. The Head of Treasury will act as the member secretary of ALCO. The results of balance sheet analysis, along with recommendations, are to be placed in the ALCO meeting by the Head of Treasury Department.

2.1.1.2 Clearance regarding availability of funds from the Treasury Department:

The Treasury Department is solely responsible for maintaining the liquidity position of the bank. There should be a specific policy (approved by the BODs of local banks or CEO in case of Foreign banks) requiring other departments to take necessary clearance (documented) from the Treasury Department regarding availability of fund before sanctioning of any new facility (above a minimum amount of funded and non-funded) to a customer. For other loan facilities (below the minimum amount mentioned before) clearance for the bulk amount (may be based on projection) is also necessary from the treasury department.

2.1.1.3 Key Roles and Responsibilities of the ALM Desk:

The ALM desk is responsible for day to day management of the, market risk and liquidity risk of the bank. The broad responsibilities of the ALM desk are as follows:

1. To oversee the growth and sustainability of assets and the liabilities.
2. To manage and oversee the overall activities of Money Market.
3. To manage liquidity and market risk of the bank.
4. To understand the market dynamics i.e. competition, potential target markets etc. for expansion of the business.
5. To Provide inputs regarding market views and to suggest proper balance sheet movement (expand or shrink) to cope with the changing situation in the market or in the economy.
6. To keep records of ALCO meetings, to monitor the implementation status of the action taken in ALCO meetings etc.

PART C: THE ALCO PROCESS

3.1. Constitution of the ALCO:

The CEO/Managing Director of the bank shall be the chairman of ALCO. Head of Treasury shall work as the member secretary of ALCO. The committee shall be constituted as follows:

- Chief Executive Officer / Managing Director
- Head of Retail banking and/or General banking
- Head of Treasury
- Head of Corporate Banking
- Head of Finance/Chief Financial Officer/Head of Central accounts / Head of FAD
- Head of SME/International Division/Commercial Customers
- Chief Risk Officer

Conventional banks having Islamic banking business shall include the Head of Islamic banking as a member of the ALCO committee. Banks having Off-shore Banking shall also include representative (as a member) from the Off-shore Banking Unit (OBU). The head of ALM desk should be a permanent invitee of the ALCO meeting. The Chairperson of ALCO may invite any other related person (maximum 2) in any meeting.

3.1.1 Meeting of the committee:

The committee shall sit at least once in a month to discuss various aspects of ALM. The presence of all the members or his/her representative (in case of the absence of the member) is mandatory in every meeting.

3.1.2 Key Agenda

The key agenda (includes Islamic banking operation of conventional banks and also the operation of OBU) of ALCO meetings should be at least, but not limited to, the following:

- (i) Review of actions taken in previous ALCO and the status of implementation.
- (ii) Review of monthly changes in various key parameters
- (iii) Overall fund position including loanable funds, maintenance of CRR and SLR, LCR and NSFR position, Structural Liquidity Profile, etc.
- (iv) Asset position:
 - concentration
 - quality

- (v) Liability position:
 - deposit mix
 - market situation
 - concentration
 - cost of fund
- (vi) Foreign exchange related asset and liability position:
 - forward agreement
 - net Forex liability
 - OBU position: assets and liabilities
 - SWAP position
 - Sight L/C
- (vii) Economic and Market Status and Outlook.
- (viii) Liquidity Risk related to the Balance Sheet.
- (ix) Review of the price / interest rate structure:
 - interest rate risk in banking book
 - interest rate risk in trading book
 - equity price risk
- (x) Off-balance position:
 - Unused portion of lines of credit (undrawn commitments)
 - Acceptances
 - Guarantees
 - Maturity profile of other L/Cs
- (xi) Capital Market Investment position: Solo and Consolidated basis.
- (xii) Investment in associates
- (xiii) Leverage Ratio
- (xiv) Stress Test, VaR (Value at Risk) analysis, Gap Analysis and others with proper interpretation.
- (xv) Actions to be taken by whom and by when.

3.1.3 ALCO Paper:

An ALCO paper, covering all the above issues must be presented in every meeting of ALCO. The Treasury department will be responsible to present the paper incorporating all necessary information, analysis and suggestions from the related Departments including its

own opinion, if necessary, on the related issues. A separate observation from CRO regarding market and liquidity risk shall also be included in the ALCO paper. The decision taken against each issue should be carefully noted and preserve for a reasonable time (not less than 3 years).

3.1.3.1 Contents of the ALCO Paper

The following are the key elements that an ALCO paper should contain and need ALCO's oversight on.

3.1.3.1.1 Confirmation of Minutes of last meeting:

This section contains formal confirmation of the last ALCO meeting minutes.

3.1.3.1.2 Review of the action items of the previous meetings:

This section contains detailed discussion on the progress on the action item and review deadline if appropriate.

3.1.3.1.3 Review of Economy and Markets:

This section may start with the review of key global economic developments. Specific reference to countries whose economies have direct bearing on Bangladesh's economy (exports, imports, remittances, etc.) is important.

The section may go on with an update of the local economy and interbank market. On the economy items that may be included are: GDP growth, inflation, credit growth, govt. borrowing, exports, import, remittance, FX Reserves, current account balance. On markets, items that can be included are: movement of interbank market liquidity, call money rates, term money rates, govt. securities yield. Also a comparison of interest rate offered by comparable banks can be important.

The idea of this section is to identify the key elements in the context of Global and local economy and the impact they might/ would likely to have on the business of the bank in Bangladesh. ALCO uses this information for making decisions regarding the bank's business.

3.1.3.1.4 Review of Balance Sheet and Liquidity Limits:

This section presents the structural balance sheet limits and their utilization - AD ratio,

Commitments, LCR, NSFR, Loan and Deposit Concentrations (if applicable), etc. It is important to observe the last few months' trends to get a better perspective. Items which are not at acceptable levels are reviewed further in details and corrective actions proposed.

The section also presents the short term liquidity management limits and their utilization – Wholesale borrowing Limits, VaR, etc. Observation of the last few months trend is important to get a better perspective.

This section would also present the other limits (as appropriate) required in section 2 above.

3.1.3.1.5 Review of the Status of Regulatory Compliance:

This section lists the various regulatory liquidity requirements (CRR, SLR, Capital Adequacy, etc.) and compliance with those.

3.1.3.1.6 Top 10 Depositors List:

This section lists the top 10 depositors of the bank and their share of the total deposits. The data can be looked at currency wise, tenor-wise, and the share of each of the depositors as percentage of total deposits. The trend of the past few months will give important perspective. Maturity bucketing for each of the depositors (call, 1 week, 1 month, etc.) may be helpful. This helps the bank to have a greater visibility on where the deposit concentrations are coming from. It is important to track the behavior of these deposits and take measures so as to avoid any untoward liquidity issues.

3.1.3.1.7 Top 10 Borrowers List:

This section lists the top 10 borrowers and looks using the same set of parameters as for the top 10 depositors.

3.1.3.1.8 Capital Maintenance:

This section includes details and composition of the capital maintained by the bank in relation to the minimum capital requirement. This can be compared to future expected capital requirement (e.g. due to asset growth forecasted, dividend payout, etc). It is also important to look at the Return on Risk Weighted assets of the bank – again the trend of the past few months give good perspective – so as to understand how efficiently the

bank is deploying its capital.

3.1.3.1.9 Details of Loans and Deposits Movement:

Segment-wise (retail, corporate, etc.), product-wise (current account, savings, SND, etc.) and currency wise (if of significance) AD ratio movements for the last few periods can be included in this section.

3.1.3.1.10 Loans and Deposit Projections:

It is important that monthly projections of loans and deposits for the year/ for the next 3-6 months are presented to ALCO by the respective businesses. The information is used by ALCO to understand future liquidity requirements and strategies accordingly.

In this respect, it is also important to review the historical projection accuracy to understand the level of adjustments that can be qualitatively applied to the current projections.

The projections should be given both for FCY and LCY as this is more meaningful. If deemed important, ALCO can also seek segment-wise projections (e.g. retail, corporate, etc.) in addition to total loans deposit projections from the respective department/division/ business.

3.1.3.1.11 Trend of Lending Rates and Deposit Rates:

This section includes the trend of the lending and deposit rates. Product-wise, segment-wise, and currency-wise breakdown of the rates is important.

3.1.4 Responsibility of related departments:

All the departments should be liable to provide necessary information, analysis and suggestions regarding the issues related with them which are stated in Section 3.1.2 above within a stipulated time to the Treasury Department. The Treasury Department ensures that these are incorporated in the ALCO Paper.

3.2 Major Issues:

Following are the major issues regarding asset and liability management within the scope of these guidelines-

3.2.1 Market Risk:

The risk arising from market risk factors such as interest rates, foreign exchange rates, and equity prices and the roles and responsibilities of board and senior management of the bank have been discussed in the Risk Management Guidelines issued on February 2012 by Bangladesh Bank (see Appendix-1).

The ALCO should work out on various limits [explicitly, maximum allowable funding gap to achieve desired level of NIM (Net interest margin) and NII (Net interest income) maximum trading loss limit by a dealer, daily loss limit in a portfolio (securities and equities), Stop Loss Limit] which must be approved by the board ensure proper and effective implementation of the same.

[For Foreign Exchange Risk management, see the Risk Management Guidelines issued on February 2012 and Foreign Exchange Risk management Guidelines issued by BB.]

3.2.2 Liquidity Risk:

Liquidity risk arises from either the bank's inability to meet its obligations as they fall due or to fund increases in assets without incurring unacceptable cost or losses. The Risk Management Guidelines issued on February 2012 by Bangladesh Bank provided a detailed view regarding the roles and responsibilities of board and senior management of the bank as well as liquidity risk detection and mitigation techniques (see Appendix-2). Moreover, LCR and NSFR introduced recently cover a wider aspect of liquidity risk detection and monitoring by the banks under stress situation.

The ALCO should closely monitor the developments around various liquidity issues in each and every meeting. The effectiveness of the CFP should also be verified in the meetings. It is mandatory to inform regarding various liquidity issues (e.g. CRR/SLR, SLP, LCR, NSFR, and ADR) in every board meeting.

Appendix-1
(Extracted from the Risk Management Guidelines for banks, issued in February 2012 by BB)

Market risk management

5.1 Defining market risk

It is the risk of potential losses in the on-balance sheet and off-balance sheet positions of a bank, stems from adverse movements in market rates or prices such as interest rates, foreign exchange rates, equity prices, credit spreads and/or commodity prices.

Banks may be exposed to market risk in variety of ways. Market risk exposure-

- a) may be explicit in portfolios of securities/equities and instruments that are actively traded;
- b) may be implicit such as interest rate risk due to mismatch of assets and liabilities; and
- c) may arise from activities categorized as off-balance sheet items

The risk arising from market risk factors such as interest rates, foreign exchange rates, and equity prices have been discussed below.

5.2 Interest rate risk

Interest rate risk is the potential impact on a bank's earnings and net asset values due to changes in market interest rates. Interest rate risk arises when a bank's principal and interest cash flows (including final maturities), both on- and off-balance sheet, have mismatched re-pricing dates. The amount at risk is a function of the magnitude and direction of interest rate changes and the size and maturity structure of the mismatch position. Bank's lending, funding and investment activities give rise to interest rate risk.

Interest rate risk management must be conducted within the context of a comprehensive business plan.

5.2.1 Effects of interest rate risk

The immediate impact of a variation in interest rates is on the bank's net interest income, while a long term impact is on the bank's net worth since the economic value of bank's assets, liabilities and off-balance sheet exposures are affected. Consequently, there are two common perspectives for the assessment of interest rate risk.

- a) **Earning perspective:** In the earning perspective, the focus of analysis is the impact of variation in interest rates on accrual or reported earnings. This is a traditional approach to interest rate risk assessment and obtained by measuring the changes in the net interest income (NII), the

difference between the total interest income and the total interest expense or net interest margin (NIM) i.e. net interest income to gross interest-earning assets. Variation in earnings is an important focal point for interest rate risk analysis because reduced earnings or outright losses can threaten the financial stability of a bank by undermining its capital adequacy and by reducing market confidence.

- b) Economic value perspective:** Variations in market interest rates can also affect the economic value of a bank's assets, liabilities, and OBS positions. The economic value of a bank can be viewed as the present value of the bank's expected net cash flows, defined as the expected cash flows on assets minus the expected cash flows on liabilities plus the expected net cash flows on OBS positions. In this sense, the economic value perspective reflects one view of the sensitivity of the net worth of the bank to fluctuations in interest rates. Since the economic value perspective considers the potential impact of interest rate changes on the present value of all future cash flows, it provides a more comprehensive view of the potential long-term effects of changes in interest rates than is offered by the earnings perspective.
- c) Embedded losses:** A bank should also consider that past interest rates may have some impact on future performance. In particular, instruments that are not marked to market may already contain embedded gains or losses due to past rate movements. These gains or losses may be reflected over time in the bank's earnings.

5.2.2 Sources of interest rate risks

The sources of interest risk are:

- a. Re-pricing risk:** This risk arises from the timing differences in the maturity (for fixed-rate) and re-pricing (for floating-rate) of bank assets, liabilities, and OBS positions. For instance, a bank that funded a long-term fixed-rate credit with a short-term deposit could face a decline in both the future income arising from the position and its underlying value if interest rates increase. These declines arise because the cash flows on the credit are fixed over its lifetime, while the interest paid on the funding is variable, and increases after the short-term deposit matures.
- b. Yield curve risk:** Yield curve risk arises when unanticipated shifts of the yield curve have adverse effects on a bank's income or underlying economic value. For instance, the underlying economic value of a long position in 10-year treasury bond hedged by a short position in 5-year treasury bond could decline sharply if the yield curve steepens, even if the position is hedged against parallel movements in the yield curve.

- c. **Basis risk:** Basis risk arises from the changing rate relationships among different yield curves effecting bank activities. It arises from imperfect correlation in the adjustment of the rates earned and paid on different instruments with otherwise similar re-pricing characteristics. When interest rates change, these differences can give rise to unexpected changes in the cash flows and earnings spread between assets, liabilities and OBS instruments of similar maturities or re-pricing frequencies.
- d. **Optionality:** An additional and increasingly important source of interest rate risk arises from the options embedded in many bank assets, liabilities, and OBS portfolios. Formally, an option provides the holder the right, but not the obligation, to buy, sell, or in some manner alter the cash flow of an instrument or financial contract. Options may be stand-alone instruments such as exchange-traded options and over-the-counter (OTC) contracts, or they may be embedded within otherwise standard instruments. While banks use exchange-traded and OTC options in both trading and non-trading accounts, instruments with embedded options are generally more important in non-trading activities. Examples of instruments with embedded options include various types of bonds and notes with call or put provisions, credits which give borrowers the right to prepay balances, and various types of non-maturity deposit instruments which give depositors the right to withdraw funds at any time, often without any penalties. If not adequately managed, the asymmetrical payoff characteristics of instruments with optionality features can pose significant risk particularly to those who sell them, since the options held, both explicit and embedded, are generally exercised to the advantage of the holder and the disadvantage of the seller. Moreover, an increasing array of options can involve significant leverage which can magnify the influences (both negative and positive) of option positions on the financial condition of the firm.

5.2.3 Sound interest rate risk management practices

Sound interest rate risk management involves the application of following basic elements in the management of assets, liabilities, and OBS instruments:

- a) Appropriate board and senior management oversight;
- b) Adequate risk management policies and procedures;
- c) Appropriate risk measurement, monitoring, and control functions; and
- d) Comprehensive internal controls and independent audits.

As with other risk factor categories, interest rate risk should be monitored on a consolidated, comprehensive basis, to include interest rate exposures in subsidiaries. At the same time, banks

should fully recognize any legal distinctions and possible obstacles to cash flow movements among affiliates and adjust their risk management process accordingly. While consolidation may provide a comprehensive measure in respect of interest rate risk, it may also underestimate risk when positions in one affiliate are used to offset positions in another affiliate. This is because a conventional accounting consolidation may allow theoretical offsets between such positions from which a bank may not in practice be able to benefit because of legal or operational constraints. Management should recognize the potential for consolidated measures to understate risks in such circumstances.

5.2.4 Measurement of interest rate risk

Managing interest rate risk requires a clear understanding of the amount at risk and the impact of changes in interest rates on this risk position. To make these determinations, sufficient information must be readily available to permit appropriate action to be taken within acceptable, often very short, time periods. The longer it takes a bank to eliminate or reverse an unwanted exposure, the greater the possibility of loss.

Each bank needs to use risk measurement techniques that accurately and frequently measure the impact of potential interest rate changes on the bank. In choosing appropriate rate scenarios to measure the effect of rate changes, the bank should consider the potential volatility of rates and the time period within which the bank could realistically react to close the position.

Ideally, a bank's interest rate risk measurement system would take into account the specific characteristics of each individual interest sensitive position, and would capture in detail the full range of potential movements in interest rates.

Re-pricing schedules and simulation approaches are the commonly used interest rate risk measurement techniques. Each bank should use a combination of these techniques in managing its interest rate risk exposure. Each technique provides a different perspective on interest rate risk, has distinct strengths and weaknesses, and is more effective when used in combination with another.

5.2.4.1 Maturity/re-pricing schedules

The simplest techniques for measuring a bank's interest rate risk exposure begin with a maturity/re-pricing schedule that distributes interest-sensitive assets, liabilities, and OBS positions into a certain number of predefined time bands according to their maturity (if fixed-rate) or time remaining to their next re-pricing (if floating-rate). Those liabilities lacking definitive re-pricing intervals (e.g. sight

deposits or savings accounts) are assigned to re-pricing time bands according to the judgment and past experience of the bank.

i) Gap analysis

Simple maturity/re-pricing schedules can be used to generate simple indicators of the interest rate risk sensitivity of both earnings and economic value to changing interest rates. When this approach is used to assess the interest rate risk of current earnings, it is typically referred to as gap analysis.

To evaluate earnings exposure, interest rate-sensitive liabilities (ISL) in each time band are subtracted from the corresponding interest rate-sensitive assets (ISA) to produce a re-pricing “gap” for that time band.

A negative or liability-sensitive gap occurs when interest-bearing liabilities exceed interest-earning assets (including OBS positions) in a given time band, that is more interest-bearing liabilities re-price than interest-earning assets. This gap implies that an increase in market interest rates could cause a decline in net interest income. In this situation, a decrease in interest rates should improve the net interest rate spread in the short term, as deposits are rolled over at lower rates before the corresponding assets. An increase in interest rates lowers earnings by narrowing or eliminating the interest spread. Conversely, a positive or asset-sensitive gap occurs when interest-earning assets exceed interest-bearing liabilities (including OBS positions) in a given time band, that is, more interest-earning assets re-prices than interest-bearing liabilities. This gap implies that a decrease in market interest rates could cause a decline in net interest income. In this situation, a decline in interest rates should lower or eliminate the net interest rate spread in the short term, as assets are rolled over at lower rates before the corresponding liabilities. An increase in interest rates should increase the net interest spread.

An interest sensitive gap ratio is also a good indicator of bank’s interest rate risk exposure.

Relative IS GAP = IS GAP/Bank’s Total Asset

Also an ISA to ISL ratio of bank for particular time band could be a useful estimation of a bank’s position.

Interest Sensitive Ratio = ISA/ISL

ii) Measuring risk to net interest income (NII)

Gap schedules can provide an estimate of changes in bank’s net interest income given changes in interest rates. The gap for particular time band can be multiplied by a hypothetical change in interest rate to obtain an approximate change in net interest income. The formula to translate gaps into the amount of net interest income at risk, measuring exposure over several periods, is:

$$\Delta \text{NII} = \Delta i \times \text{Periodic Gap} \times \text{Maturity Bucket}$$

Where,

ΔNII = Change in net interest income

Δi = Change in interest rate

Periodic Gap = (RSA-RSL)

Maturity Buckets = 1 day, 2-7 days, 8 days to 1 month, 1-3 months, 3-12 months, 1-5 years, and 5⁺ years.

The size of the interest rate movement used in the analysis can be based on a variety of factors, including historical experience, simulation of potential future interest rate movements, and the judgment of bank management.

While such gap measurements apparently seem perfect, practically there are some problems such as interest paid on liabilities of a bank which are generally short term tend to move quickly compared with that being earned on assets many of which are relatively longer term. This problem can be minimized by assigning weights to various ISA and ISL that take into account the tendency of the bank interest rates to vary in speed and magnitude relative to each other and with the up and down business cycle.

The gap reports are important to an interest rate risk management program because they indicate how much net interest income is at risk, and, to some extent, the timing of the risk. However, gap analysis has a number of shortcomings.

- a) gap analysis provides an objective measure of risk associated with current positions only; it does not incorporate future growth or changes in the mix of business;
- b) gap analysis does not capture basis risk or investment risk, is generally based on parallel shifts in the yield curve;
- c) gap analysis does not take account of variation in the characteristics of different positions within a time band;
- d) gap analysis does not account for the time value of money;
- e) gap does not take into account any changes in the timing of payments that might occur as a result of changes in the interest rate environment; and
- f) most gap analyses fail to capture variability in non-interest revenue and expenses, which is potentially an important source of risk to current income.

Accordingly, the use of gap reports should be complemented with present-value sensitivity systems, such as duration analysis or simulation models.

iii) Duration analysis

Duration is the time-weighted average maturity of the present value of the cash flows from assets, liabilities and off-balance sheet items. It measures the relative sensitivity of the value of these instruments to changing interest rates (the average term to re-pricing), and therefore reflects how changes in interest rates will affect the bank's economic value, that is, the present value of equity. In this context, the maturity of an investment is used to provide an indication of interest rate risk.

Generally, the longer the term to maturity (next re-pricing date) of an investment and the smaller the payments that occur before maturity (e.g. coupon payments), the higher the duration (in absolute value). Higher duration implies that a given change in the level of interest rates will have a larger impact on economic value.

Duration-based weights can be used in combination with a maturity/re-pricing schedule to provide a rough approximation of the change in a bank's economic value that could occur given a particular set of changes in market interest rates.

Specifically, an "average" duration is assumed for the positions that fall into each time band. The average durations are then multiplied by an assumed change in interest rates to construct a weight for each time band. In some cases, different weights are used for different positions that fall within a time band, reflecting broad differences in the coupon rates and maturities (for instance, one weight for assets, and another for liabilities). In addition, different interest rate changes are sometimes used for different time bands, generally to reflect differences in the volatility of interest rates along the yield curve. The weighted gaps are aggregated across time bands to produce an estimate of the change in economic value of the bank that would result from the assumed changes in interest rates.

Alternatively, a bank could estimate the effect of changing market rates by calculating the precise duration of each asset, liability, and OBS position and then deriving the net position for the bank based on these more accurate measures, rather than by applying an estimated average duration weight to all positions in a given time band. This would eliminate potential errors occurring when aggregating positions/cash flows. As another variation, risk weights could also be designed for each time band on the basis of actual percentage changes in market values of hypothetical instruments that would result from a specific scenario of changing market rates. That approach - which is sometimes referred to as effective duration- would better capture the non-linearity of price movements arising from significant changes in market interest rates and, thereby, would avoid an important limitation of duration.

Duration incorporates an instrument's remaining time to maturity, the level of interest rates, and intermediate cash flows. If a fixed income instrument has only one cash flow, as a zero coupon bond does, duration will equal the maturity of the instrument: a zero coupon bond with five years remaining to maturity has duration of five years. If coupon payments are received before maturity, the duration of the bond declines, reflecting the fact that some cash is received before final maturity.

Properties of duration

In general, duration exhibits the following characteristics:

- a) As maturity increases, duration increases and the bond's price becomes more sensitive to interest rate changes;
- b) For two instruments with the same maturity, a high-coupon instrument will have a lower duration than a low-coupon instrument and will also be less price-sensitive. A larger proportion of a high coupon's cash flows will be received sooner and thus the average time to receipt of the cash flows will be less;
- c) A given fixed income instrument will have a higher duration in a low interest rate environment than in a high interest rate environment;
- d) Duration may be positive or negative. A fixed rate instrument would have a positive duration, and an increase in interest rates would generally decrease the market value of the instrument. Mortgage servicing rights and interest only (IO) mortgage-backed securities generally have a negative duration, since an increase in interest rates would decrease the prepayment speed of the underlying mortgages, increasing the market value of the instruments; and
- e) Durations are additive when weighted by the amount of the contract. For example, if a portfolio consists of two bonds of equal market value, one with duration of six and the other with duration of two, the duration of the portfolio would be four.

Duration of equity

The duration of equity is derived from the duration of all assets, liabilities, and off-balance-sheet contracts.

To understand how the duration of equity measures risk, the economic value of portfolio equity may be viewed as a net bond position. Assets are analogous to long bond positions with positive durations, and liabilities are analogous to short bond positions with negative durations. Duration

indicates whether the economic value of the net bond position or portfolio equity will increase or decrease with a change in rates.

A bank with long-term assets funded by short-term liabilities will generally have duration of equity that is positive. The economic value of portfolio equity of this bank will decline as interest rates rise. A bank with short-term assets funded with long-term liabilities will generally have a negative duration of equity. The economic value of this bank will increase as interest rates rise. The higher the duration of a bank's equity (whether the number is positive or negative), the more sensitive is its economic value to changes in rates.

Modified duration

Modified duration is standard duration divided by $1 + r$, where r is the level of current market interest rates. It reflects the percentage change in the economic value of the instrument for a given percentage change in $1 + r$. As with simple duration, it assumes a linear relationship between percentage changes in value and percentage changes in interest rates.

Effective duration

Effective duration (sometimes called option-adjusted duration) further refines the modified duration calculation and is particularly useful when a portfolio contains callable securities. Effective duration is derived by using simulation techniques to calculate the change in price of an instrument for a given change in interest rates. Effective duration incorporates a bond's yield, coupon, final maturity and call features into one number that indicates how price-sensitive a bond or portfolio is to change in interest rates. For assets with variable cash flows, it is appropriate to calculate the effective duration rather than the modified duration.

Duration of single instrument

To measure the duration of a single instrument, a bank has to calculate the weighted average of each cash flow at time t by the following formula:

$$w_t = \frac{CF_t / (1 + r)^t}{\sum_{t=1}^T CF_t / (1 + r)^t}$$

These weighted averages are then summed to get duration by using the following formula:

$$Duration = \sum_{t=1}^T w_t \times t$$

Here,

W_t = Weighted average of cash flow at time t

CF_t = Cash flow at time t

y = Yield to maturity

T = Number of cash flow periods

Duration of a portfolio of instruments

The duration of a portfolio of assets or liabilities is the market value of weighted average of the individual duration of each asset or liability on the bank's balance sheet.

The calculation of duration depends on three factors:

- a) The final maturity of the financial instruments
- b) The size and timing of cash flows (coupon payments)
- c) The yield to maturity (YTM)

The duration of a portfolio of assets can be calculated by computing the weighted average maturity of all the cash flows in the portfolio individually. Banks can estimate the duration of a portfolio of contracts by weighting the durations of the individual contracts and summing them.

Measuring duration gap

To measure duration gap and the impact of net changes in the market value of equity, a bank should:

- a) Estimate the market value of each on-balance sheet rate sensitive assets and liabilities of the bank to arrive at market value of equity;
- b) Calculate the durations of each asset and liability of the on-balance sheet portfolio arrive at the aggregate weighted average duration of assets and liabilities;
- c) Calculate the duration GAP by subtracting aggregate duration of liabilities from that of assets;
- d) Estimate the changes in the economic value of equity due to change in interest rates on on-balance sheet positions based on the three interest rate changes i.e. 1%, 2%, and 3%;
- e) Calculate surplus/(deficit) on off-balance sheet items under the assumption of three different interest rate changes i.e. 1%, 2%, and 3%; and
- f) Estimate the impact of net change (both for on-balance sheet and off-balance sheet) in the market value of equity.

Formulae:

Weighted average duration of assets, $(D_A) = \sum_{i=1}^n W_i \times D_i$

Weighted average duration of liabilities, $(D_L) = \sum_{i=1}^n W_i \times D_i$

Duration gap: $DGAP = D_A - \frac{1+y}{1+y} DL$

$\Delta MVE = (-DGAP) \times \frac{\Delta y}{1+y} \times \text{Total Assets}$

Where,

$y = \text{YTM}$

Total Assets = Market value of total assets

iv) Simulation models

Banks having complex financial instruments or otherwise having complex risk profiles may employ more sophisticated interest rate risk measurement systems.

Simulation models are sophisticated models and a valuable complement to gap and duration analysis. In *static simulations*, the cash flows arising solely from the bank's current on-balance sheet and off-balance sheet positions are assessed. In a *dynamic simulation* approach, the simulation builds in more detailed assumptions about the future course of interest rates and expected changes in a bank's business activity over that time.

Simulation models are useful tools for strategic planning; they permit banks to effectively integrate risk management and control into the planning process. Their forecasts are based on a number of assumptions including:

- a) future levels and directional changes of interest rates;
- b) the slope of the yield curve and the relationship between the various indices that the bank uses to price credits and deposit;
- c) pricing strategies for assets and liabilities as they mature; and
- d) the growth, volume and mix of future business.

Simulation is usually used to measure interest rate risk by estimating what effect changes in interest rates, business strategies, and other factors will have on net interest income, net income and interest rate risk positions. Simulation models can also be used to calculate the present value and durations of assets and liabilities.

Regardless of the measurement system, the usefulness of each technique depends on the validity of the underlying assumptions and the accuracy of the basic methodologies used to model risk exposure. Further the integrity and timeliness of data relating to current positions is key element of risk measurement system.

While measuring risk in traded portfolios banks should use a valuation approach. They should develop risk measurement models that relate market risk factors to the value of the traded portfolios or the estimated value of non-traded portfolios. The underlying liquidity of markets for traded portfolios and the potential impact of changes in market liquidity should be specifically addressed by market risk measures. There should be separate risk factors corresponding to each of the equity markets in which the bank has positions. The banks measurement of equities risk should include both price movements in the overall equity market (e.g. a market index) and specific sectors of the equity market (for instance, industry sectors or cyclical and non-cyclical sectors), and individual equity issues.

5.2.5 Interest risk management program

Significant factors in managing interest rate risk include the frequency, volatility and direction of rate changes, the slope of the interest rate yield curve, the size of the interest-sensitive position and the basis for re-pricing at rollover dates.

A comprehensive interest rate risk management program requires:

- a) establishing and implementing sound and prudent interest rate risk policies;
- b) developing and implementing appropriate interest rate risk measurement techniques; and
- c) developing and implementing effective interest rate risk management and control procedures.

5.2.6 Interest rate risk management policies

Sound and prudent interest rate risk management requires clear policies. These policies need to include:

- a) an interest rate risk philosophy governing the extent to which the bank is willing to assume interest rate risk; and
- b) explicit and prudent limits on the bank's rate risk exposure.

a) Interest rate risk philosophy

The capacity of each bank to assume rate risk will vary with the extent of other risks (e.g., liquidity, credit risk, foreign exchange risk, investment risk) and its ability to absorb potential losses. The objective of interest rate risk management need not necessarily be the complete elimination of exposure to changes in interest rates. Rather, it should be to manage the impact of interest rate changes within self-imposed limits set after careful consideration of a range of possible interest rate environments.

b) Interest rate risk limits

Each bank needs to establish explicit and prudent interest rate risk limits, and ensure that the level of interest rate risk exposure does not exceed these limits.

Interest rate risk limits need to be set within a bank's overall risk profile, which reflects factors such as its capital adequacy, liquidity, credit quality, investment risk and foreign exchange risk. Interest rate positions should be managed within a bank's ability to offset such positions if necessary.

Interest rate risk limits need to be reassessed on a regular basis to reflect potential changes in interest rate volatility, the institution's overall risk philosophy and risk profile.

Risk limits are usually defined in terms of earnings or in terms of the present value of equity at risk and are normally expressed in terms of the allowable amounts of mismatched positions for specified or cumulative maturity periods.

Earnings are the reported net income before taxes. Changes in interest rates may affect earnings by:

- a) affecting the interest income or expenses relating to assets, liabilities and off-balance sheet items; and
- b) affecting the value of fixed-rate assets, liabilities and off-balance sheet items that are carried on a market valuation basis.

Present value of equity is the present value of assets and off-balance sheet items generating cash inflows, less the present value of liabilities and off-balance sheet items generating cash outflows. Changes in interest rates affect the present value of the cash flows from, and the value of these items, and therefore the economic value of shareholders' equity.

Limits may also appropriately be defined in terms of regulatory capital, shareholders' equity and earning assets.

5.2.7 Interest rate risk management and control procedures

Each bank needs to develop and implement effective and comprehensive procedures and information systems to manage and control interest rate risk in accordance with its interest rate risk policies. These procedures should be appropriate to the size and complexity of the bank's interest rate risk-taking activities.

Internal inspections/audits are a key element in managing and controlling a bank's interest rate risk management program. Each bank should use them to ensure compliance with, and the integrity of, the interest rate risk policies and procedures. Internal inspections/audits should, at a minimum, randomly test all aspects of interest rate risk management activities in order to:

- a) ensure interest rate risk management policies and procedures are being adhere to;
- b) ensure effective management controls over interest rate risk positions;
- c) verify the adequacy and accuracy of management information reports; and
- d) ensure that personnel involved in interest rate risk management fully understand the bank's interest rate risk policies and risk limits and have the expertise required to make effective decisions consistent with the interest rate risk policies.

Assessments of the interest rate risk operations should be presented to the board on regular basis for review.

5.4 Equity price risk

Equity price risk is the risk of losses caused by changes in equity prices. These losses could arise because of changes in the value of listed shares held directly by the bank; changes in the value of listed shares held by a bank subsidiary; changes in the value of listed shares used as collateral for loans from a bank or a bank subsidiary, whether or not the loan was made for the purpose of buying the shares; and changes in the value of unlisted shares.

Equity price risk associated with equities could be systematic or unsystematic. The former refers to sensitivity of portfolio's value to changes in overall level of equity prices, while the later is associated with price volatility that is determined by firm specific characteristics.

From an accounting perspective (although not an economic perspective) in Bangladesh, equity risk is "one-sided" – equity securities must be held at the lower of cost or market value. If market value drops below cost, banks are required to form loss allowances or "provisions" on the liability side of the balance sheet, by means of an expense on the profit and loss statement. However, if market

values rise above cost, there is no corresponding income recorded unless the security is sold. Even though the one-sided risk is purely in an accounting sense, it will have a real implication for banks that fall below required levels of regulatory capital because of declines in the market value of securities they hold. Accordingly, it is vitally important for banks to measure, monitor, and control their equity market risk.

5.4.1 Effective equity price risk management

An effective equity risk management system should have the following criteria:

- a) Policies for equity investments should reflect the board's risk appetite, and should provide clear authorities, conservative limits, and assigned responsibilities;
- b) Policies should permit risk-taking authority consistent with the expertise of bank personnel;
- c) Management should have broad capital markets experience and should establish strong policy controls and risk limits;
- d) Policy exceptions should be properly approved. There should be formal procedures to report how and why exceptions have occurred, and how they have been resolved;
- e) Trading and sales personnel should have broad experience in the products traded, technically competent, and comfortable with the bank's culture;
- f) Risk management personnel should have an in-depth understanding of equity market risk and risk management principles, including VaR;
- g) Equity investments in companies that the bank has never before invested in are subject to a formal review program, with all relevant bank units participating in risk assessment and control procedures;
- h) The firms in whose shares the bank or its subsidiary is considering investing is should be analyzed rigorously, and by reviewing as much or even more financial information, as would be reviewed in a credit decision;
- i) Management reports should be prepared independently of the investing and trading function and should provide a comprehensive and accurate summary of investing and trading activity. Reports should assess compliance with policy limits, measure loss potential in both normal and stressed markets and produced in time. Management at all levels should understand and monitor equity market risk;
- j) Incompatible duties should be properly segregated. Risk monitoring, valuation, and control functions should be independent of the trading and investing functions;
- k) The bank should have to conducts stress tests regularly and has a precise understanding and measurement of how much and why profitability, balance sheet capital, and regulatory capital

will be affected by major declines in the equity market overall, or in the value of individual shares;

- l) If the bank has a subsidiary that invests in shares directly or lends to customers for the purchase of shares, the bank should closely monitor the financial condition and performance of the subsidiary, and calculate its risk-adjusted return on the invested capital in that subsidiary. The bank should redeploy that capital away from its subsidiary if the risk-adjusted returns are low;
- m) If the bank has shares in unlisted companies, the bank should consider these investments as extremely high-risk, and devote significant staff resources to obtain, verify, and analyze financial information on these companies; and
- n) Given the illiquidity of investments in unlisted companies, the bank should have a detailed exit strategy for disposing of these investments in the event that they no longer fit into the bank's desired business strategy, are prohibited by regulatory requirements, or suffer significant losses in value.

5.4.2 Securities portfolio management program

Sound securities portfolio management involves prudently managing the risk/reward relationship and controlling and minimizing securities portfolio risks across a variety of dimensions, such as quality, portfolio concentration/diversification, maturity, volatility, marketability, type of security, and the need to maintain adequate liquidity.

A comprehensive securities portfolio management program requires:

- a) establishing and implementing sound and prudent policies to effectively manage the securities portfolio, securities activities and position risk;
- b) developing and implementing effective securities portfolio management processes governing securities investment decision making and authority; and
- c) developing and implementing comprehensive procedures to effectively monitor and control the nature, characteristics, and quality of the securities portfolio and the extent of position risk assumed.

a) Securities portfolio management policies

The foundation of an effective securities portfolio management program is the development and implementation of clearly defined policies, formally established in writing that set out the securities

portfolio management objectives of the bank and the parameters under which securities activities are to be undertaken and controlled.

Each bank needs to establish explicit and prudent securities portfolio management objectives governing:

- i. the extent to which a bank is willing to assume position risk;
- ii. general areas of securities activities in which a bank is prepared to engage or is restricted from engaging, including the bank's policy with respect to acquiring securities of related parties;
- iii. minimum quality and rate of return expectations for the securities portfolio; and
- iv. securities portfolio concentration and exposure limits.

Securities portfolio management objectives reflect a bank's risk philosophy, codify investment criteria, establish the foundation for the development of securities portfolio management strategies, and provide the basis for monitoring portfolio characteristics and measuring portfolio performance. Securities portfolio objectives provide overall parameters governing securities investment decisions by describing the broad purpose and goals of securities investments as a means for profitability. Securities portfolio objectives assist in ensuring that securities investments are sound and prudent, and that the securities portfolio risk is acceptable given the expected return.

In establishing securities portfolio management objectives, each bank needs to give consideration to a number of factors, including the bank's nature of liabilities, its liquidity needs, market volatility, the extent of other risks assumed (e.g. credit risk, interest rate risk, foreign exchange risk), the bank's ability to absorb potential losses and its overall strategic business objectives.

To be effective, securities portfolio management objectives must be communicated in a timely fashion, be implemented through all levels of the organization by appropriate procedures and revised periodically in light of changing circumstances.

b) Securities portfolio management process

To develop and maintain a sound securities portfolio, each bank must have:

- i. an effective formal evaluation process that provides for an objective analysis and assessment of securities investment proposals; and
- ii. clearly defined, prudent and appropriate levels of delegation of securities transaction approval authority, formally established in writing.

c) Securities portfolio monitoring & control procedures

Each bank needs to develop and implement effective and comprehensive procedures, accounting policies and information systems to monitor and manage the characteristics and quality of its securities portfolio. These procedures should be appropriate to the size and complexity of the bank's securities activities and, at a minimum, need to include:

- i. Systems to measure and monitor securities positions;
- ii. Controls governing the management of the securities portfolio; and
- iii. Independent inspections or audits.

i) Systems to measure & monitor

Managing securities activities requires a clear understanding of the nature and characteristics of the securities portfolio and securities positions. To make these determinations, each bank needs to ensure that:

- a) effective information systems are developed and used to appropriately record, regularly monitor and evaluate the securities portfolio;
- b) effective and appropriate quality and performance criteria are developed and implemented, and that the portfolio is regularly assessed against these criteria; and
- c) appropriate and conservative accounting policies and procedures are developed, documented and implemented to properly classify and carry securities on the books of account of the bank and recognize income related to such securities.

Regular evaluations of the securities portfolio should be carried out so as to provide an effective means of ensuring that portfolio performance and quality is meeting the bank's securities portfolio management policies and objectives, and that the portfolio is not unduly concentrated by type of security, and by single and associated groups of issuers, particularly issuers connected to the bank.

ii) Securities portfolio management controls

Effective procedures and controls ensure that securities activities are in compliance with the bank's securities portfolio management policies and provide safeguards to protect a bank from potential losses by ensuring that unauthorized exposure does not occur from improper or uncontrolled securities activities.

Although the controls over securities activities will vary among banks depending upon the nature and extent of their activities, the key elements of any securities portfolio management control program are well-defined guidelines governing:

- a) organizational controls to ensure that there exists a clear and effective segregation of duties between those persons who authorize, initiate or supervise securities activities and those persons who are responsible for operational functions such as the physical custody of securities, or arranging prompt and accurate settlement of securities transactions, or account for securities activities;
- b) procedural controls to ensure that securities are properly recorded and accounted for by the bank, transactions are settled in a timely and accurate manner and unauthorized securities activities are quickly identified and reported to the management; and
- c) controls to ensure that securities activities are monitored frequently against the bank's securities portfolio management policies and risk limits, and excesses reported.

Moreover, each bank needs to ensure that employees conducting securities trading activities on behalf of the bank do so with a written code of conduct or guideline governing securities dealing. Such a guideline or code of conduct should provide guidance respecting trading with related parties and transactions in which potential conflicts of interest exist. These should include trading with affiliated entities, personal trading and investment activities of securities portfolio management personnel, including trading on insider information and taking personal gain from one's position, and trading relationships with securities dealers with whom the bank deals.

iii) Independent inspection/audit

Independent inspections/audits provide an objective assessment of the securities portfolios' existence, quality and value, the integrity of the securities portfolio management process, and they promote the detection of problems relating thereto. Each bank should use them to ensure compliance with, and the integrity of, the securities portfolio management policies and procedures. Independent inspections/audits should, at a minimum, and over a reasonable period of time, test the bank's securities portfolio management activities in order to:

- a) ensure that securities activities are in compliance with the bank's securities portfolio management policies and procedures, and with the laws and regulations to which these activities are subject;
- b) ensure that securities transactions are duly authorized and accurately and completely recorded on the books of the bank;
- c) ensure that recorded securities are conservatively valued on the books of the bank;
- d) confirm that securities held by depositories to the order of the bank conform with the records of the bank;

- e) ensure that management has established suitably designed controls over securities positions and that such controls operate effectively;
- f) ensure the adequacy and accuracy of management information reports regarding the bank's securities portfolio management activities; and
- g) ensure that personnel involved in securities portfolio management are provided with accurate and complete information on the bank's securities portfolio management policies and risk limits and have the expertise required to make effective decisions consistent with these policies.

5.4.3 Securities portfolio concentration limits

Clearly defined and documented securities portfolio concentration limits ensure that the nature and level of a bank's exposure in the form of securities position is appropriately diversified and does not exceed sound and prudent limits.

Securities portfolio concentration occurs when a bank's securities portfolio contains an excessive level of exposure to one type or class of security or a single or group of associated issuers of securities.

At a minimum, securities portfolio diversification policies must place sound and prudent aggregate and individual exposure limits for each type or class of security, and for single issuers and groups of associated issuers in which the bank is permitted to invest. Usually, limits by class of security include limits for how much of the portfolio should be made up of specific types of securities such as equities and the portfolio concentration by industrial sector. Such limits need to be established in the context of the bank's aggregate exposure to a single issuer or group of associated issuers in terms of both securities and credit exposures. The management of such aggregate exposures is usually done at a level senior to securities traders and lending personnel so as to ensure that appropriate "firewalls" are maintained between the securities portfolio and credit risk management areas of the bank. Securities concentrations by single or associated issuer need to be reviewed regularly.

5.4.4 Securities analysis and assessment

Securities investment decisions should be made only after careful examination and consideration of several areas including:

- a) the bank's securities portfolio management policies, and other corporate objectives and policies, such as the nature of the bank's liabilities and the need to maintain adequate liquidity;

- b) potential risks and returns related to a particular security within the overall context of the bank's securities portfolio management policies, the composition of the securities portfolio and the reasonable expectation of a fair return or appreciation given the nature of the security, and the risk of loss or impairment;
- c) current and projected regulatory and economic/financial environment under which securities transactions are made; and
- d) investment alternatives.

5.4.5 Securities transaction approval authorities

Clearly defined and appropriate levels of securities transaction authority help ensure that a bank's securities activities are appropriately undertaken and that securities positions do not exceed the limits established under its securities portfolio management policies.

Approval limits may relate to type of security, size, maturity, or other criteria, such as the retention or delegation of voting rights acquired through securities. Authorities may be absolute, incremental or a combination thereof, and may also be individual, pooled, or shared within a committee.

The delegation of authority needs to be clearly documented, and should include as a minimum:

- a) the absolute and/or incremental securities transaction approval being delegated;
- b) the units, individuals, positions or committees to whom securities transaction authority is being delegated;
- c) the ability of recipients to further delegate approval authority; and
- d) the restrictions, if any, placed on the use of delegated authority.

The degree of delegation of securities transaction authority will depend on a number of variables including:

- i. the bank's securities portfolio management objectives and overall risk philosophy;
- ii. the quality of the securities portfolio;
- iii. the ability of the bank to absorb losses;
- iv. the size and types of securities and the complexities of risks being assessed; and
- v. the experience and ability of the individuals responsible for carrying out the securities portfolio management activities.

Assessments of the securities portfolio management activities should be presented to the bank's board on a timely basis for review.

5.4.6 Measuring equity price risk

Value at risk

Value at Risk (VaR) is generally accepted and widely used tool for measuring market risk inherent in trading portfolios. VaR summarizes the predicted maximum loss (or worst loss) over a target horizon within a given confidence level.

It is a statistical estimate of expected potential loss that is derived by translating the riskiness of any financial instrument into a common standard. Banks may use a 99% or a 95% confidence level, and each day return on its trading portfolios. That means about once (with 99% confidence) or five (with 95% confidence) in every one hundred days the trading position are expected to lose more than the VaR estimate.

An inherent limitation of VaR is that it gives no information about how much losses could exceed their expected levels.

Generally there are three methods of computing VaR:

- a) Parametric or variance-covariance method
- b) Historical simulation method
- c) Monte Carlo simulation method

Among these methods, the historical simulation method is simple to apply and fairly straightforward to explain. Data sets used for this method are easily available. Therefore, banks are encouraged to calculate VaR for secondary market shares that are held for trading using historical simulation method. However, to calculate the VaR for overall investment portfolio (except credits), banks may use the variance covariance method.

Variance-covariance method

The following formula can be used to assess the VaR of a portfolio consisting more than two stocks:

Portfolio VaR= Total Portfolio X SD of Portfolio

Where,

Standard Deviation, $SD = [S_1^2 + S_2^2 + S_3^2 + 2S_1S_2P(1,2) + 2S_1S_3P(1,3) + 2S_2S_3P(2,3)]^{1/2}$

Here,

S_1 = the standard deviation or volatility of the first asset

S_2 = the standard deviation or volatility of the second asset

S_3 = the standard deviation or volatility of the third asset

P = Correlation

Historical simulation method

Let us assume a bank has a portfolio of three stocks of one unit each. To calculate VaR of that portfolio the bank needs to collect the historical market price of each of the stocks in the portfolio for last 100 days. Then, the following formulae are to be applied:

a) Weight $A = \frac{\text{Market value of stock 1}}{\text{Total market value of portfolio}}$

b) Total weighted return to portfolio market price (%) = $\frac{\text{Weighted return to portfolio market price}}{\text{Total market value of portfolio}} \times 100$

Then, the 99th percentile will be the VaR at 99% confidence level.

5.5 Managing market risk

Each bank should put in place a set of systems and procedures appropriate to its size and complexity of its operations for identifying, measuring monitoring and controlling market risk. The risk appetite in relation to market risk should be assessed keeping in view the capital of the bank as well as exposure to other risks. Once the market risk appetite is determined, the bank should develop a strategy for market risk-taking in order to maximize returns while keeping exposure to market risk at or below the pre-determined level.

5.6 Stress testing

Bank's risk measurement system should support a meaningful evaluation of the effect of stressful market conditions on the bank. Stress testing should be designed to provide information on the kinds of conditions under which strategies or positions would be most vulnerable, and thus may be tailored to the risk characteristics of the bank. Possible stress scenarios might include:

- a) abrupt changes in the general level of market rates;
- b) changes in the relationships among key market rates (i.e. basis risk);
- c) changes in the slope and the shape of the yield curve (i.e. yield curve risk);

d) changes in the liquidity of key financial markets or changes in the volatility of market rates;
or

e) conditions under which key business assumptions and parameters break down.

In conducting stress tests, special consideration should be given to instruments or markets where concentrations exist as such positions may be more difficult to liquidate or offset in stressful situations. Banks should consider "worst case" scenarios in addition to more probable events. Management and the board of directors should periodically review both the design and the results of such stress tests, and ensure that appropriate contingency plans are in place.

Appendix-2
(Extracted from the Risk Management Guidelines for banks, issued in February 2012 by BB)

6.2 Liquidity risk indicators

Given below are some early warning indicators that have potential to ignite liquidity problem for a bank. Bank management needs to monitor carefully such indicators and exercise careful scrutiny wherever it deems appropriate. Examples of such internal indicators are:

- a) A negative trend or significantly increased risk in any area or product line;
- b) Concentrations in either assets or liabilities;
- c) Deterioration in quality of credit portfolio;
- d) A decline in earnings performance or projections;
- e) Rapid asset growth funded by volatile large deposit;
- f) A large size of off-balance sheet exposure;
- g) Deteriorating third party evaluation (negative rating) about the bank and negative publicity;
and
- h) Unwarranted competitive pricing that potentially stresses the banks.

Liquidity risk management involves not only analyzing banks on- and off-balance sheet positions to forecast future cash flows, but also how the funding requirement would be met. The latter involves identifying the funding market the bank has access to, understanding the nature of those markets, evaluating banks current and future use of the market and monitor signs of confidence erosion.

6.3 Managing liquidity risk

The formality and sophistication of risk management processes established to manage liquidity risk should reflect the nature, size and complexity of a bank's activities. Sound liquidity risk management employed in measuring, monitoring and controlling liquidity risk is critical to the viability of any bank. Banks should have a thorough understanding of the factors that could give rise to liquidity risk and put in place mitigating controls.

A liquidity risk management involves not only analyzing banks on and off-balance sheet positions to forecast future cash flows but also how the funding requirement would be met. The later involves identifying the funding market the bank has access, understanding the nature of those markets, evaluating banks current and future use of the market and monitor signs of confidence erosion.

Bank's liquidity risk management procedures should be comprehensive and holistic. At the minimum, they should cover formulation of overall liquidity strategy, risk identification, measurement, and monitoring and control process.

6.4 Board oversight

The prerequisites of an effective liquidity risk management include an informed board, capable management, staff having relevant expertise and efficient systems and procedures. It is primarily the duty of board of directors to understand the liquidity risk profile of the bank and the tools used to manage liquidity risk. The board has to ensure that the bank has necessary liquidity risk management framework and the bank is capable of dealing with uneven liquidity scenarios. The board should approve the strategy and significant policies related to the management of liquidity. Generally, the responsibilities of the board include:

- a) providing guidance on the level of appetite for liquidity risk;
- b) appointing senior managers who have ability to manage liquidity risk and delegate to them the required authority to accomplish the job;
- c) continuously monitoring the bank's performance and overall liquidity risk profile through reviewing various reports; and
- d) ensuring that senior management takes the steps necessary to identify, measure, monitor and control liquidity risk.

6.5 Senior management oversight

Senior management is responsible for the implementation of sound policies and procedures keeping in view the strategic direction and risk appetite specified by the board. To effectively oversee the daily and long-term management of liquidity risk, senior management should at least:

- a) develop and implement procedures and practices that translate the board's goals, objectives, and risk appetite into operating standards that are well understood by bank personnel and consistent with the board's intent;
- b) adhere to the lines of authority and responsibility that the board has approved for managing liquidity risk;
- c) oversee the implementation and maintenance of management information and other systems that identify, measure, monitor, and control the bank's liquidity risk; and
- d) develop and recommend liquidity and funding policies for approval by the board and implement the liquidity and funding policies;

- e) develop lines of communication to ensure the timely, dissemination of the liquidity and funding policies and procedures to all individuals involved in the liquidity management and funding risk management process;
- f) ensure that liquidity is managed and controlled within the liquidity management and funding management programs;
- g) ensure the development and implementation of appropriate reporting systems with respect to the content, format and frequency of information concerning the bank's liquidity position, in order to permit the effective analysis and the sound and prudent management and control of existing and potential liquidity needs;
- h) projected future liquidity;
- i) monitor economic and other operating conditions to forecast potential liquidity needs;
- j) ensure that an internal inspection/audit function reviews and assesses the liquidity management program; and
- k) report comprehensively on the liquidity management program to the board at least once a year.

6.6 Liquidity risk strategy

Each bank should have an agreed liquidity strategy for the day-to-day management of liquidity. This strategy should address the bank's goal of protecting financial strength and the ability to withstand stressful events in the market place.

The liquidity risk strategy defined by board should enunciate specific policies on particular aspects of liquidity risk management, such as:

- (a) Composition of assets and liabilities:** The strategy should outline the mix of assets and liabilities to maintain liquidity. Liquidity risk management and asset/liability management should be integrated to avoid high costs associated with having to rapidly reconfigure the asset liability profile from maximum profitability to increased liquidity.
- (b) Diversification and stability of liabilities:** A funding concentration exists when a single decision or a single factor has the potential to result in a significant and sudden withdrawal of funds. Since such a situation could lead to an increased risk, the board and senior management should specify guidance relating to funding sources and ensure that the bank has diversified sources of funding day-to-day liquidity requirements. A bank would be more resilient to tight market liquidity conditions if its liabilities were derived from more stable

sources. To comprehensively analyze the stability of liabilities/funding sources a bank needs to identify:

- i. liabilities that would stay with the bank under any circumstances;
- ii. liabilities that run-off gradually if problems arise; and
- iii. liabilities that run-off immediately at the first sign of problems.

Each bank needs to have explicit and prudent policies that ensure funding is not unduly concentrated with respect to:

- i. individual depositor;
- ii. type of deposit instrument;
- iii. market source of deposit;
- iv. term to maturity; and
- v. currency of deposit, if the bank has liabilities (both on- and off-balance sheet) in foreign currencies.

(c) Managing liquidity in different currencies: The bank should have a strategy on how to manage liquidity in different currencies.

(d) Dealing with liquidity disruptions: The bank should put in place a strategy on how to deal with the potential for both temporary and long-term liquidity disruptions. The interbank market can be important source of liquidity. However, the strategy should take into account the fact that in crisis situations access to interbank market could be difficult as well as costly.

The liquidity strategy must be documented in the liquidity policies, and communicated throughout the bank. The strategy should be evaluated periodically to ensure that it remains valid.

6.7 Liquidity policies

Sound and prudent liquidity policies set out the sources and amount of liquidity required to ensure it is adequate for the continuation of operations and to meet all applicable regulatory requirements. These policies must be supported by effective procedures to measure, achieve and maintain liquidity.

Operating liquidity is the level of liquidity required to meet a bank's day-to-day cash outflow commitments. Factors influencing a bank's operating liquidity include:

- i. cash flows and the extent to which expected cash flows from maturing assets and liabilities match; and

- ii. the diversity, reliability and stability of funding sources, the ability to renew or replace deposits and the capacity to borrow.

For regulatory purposes a bank is required to hold a specific amount of assets classed as “liquid”, based on its deposit liabilities. Generally, undue reliance should not be placed on these assets, or those formally pledged, for operating purposes other than as a temporary measure, as legally they may not be available for encashment if needed.

In assessing the adequacy of liquidity, each bank needs to accurately and frequently measure:

- a) the term profile of current and approaching cash flows generated by assets and liabilities, both on- and off-balance sheet;
- b) the extent to which potential cash outflows are supported by cash inflows over a specified period of time, maturing or liquefiable assets, and cash on hand;
- c) the extent to which potential cash outflows may be supported by the bank’s ability to borrow or to access discretionary funding sources; and
- d) the level of statutory liquidity and reserves required and to be maintained.

The banks should formulate liquidity policies, which are recommended by senior management/ALCO and approved by the board. Board should ensure that there are adequate policies to govern liquidity risk management process. While specific details vary across banks according to the nature of their business, the key elements of any liquidity policy include:

- i. a statement of liquidity risk appetite;
- ii. general liquidity strategy (short- and long-term), specific goals and objectives in relation to liquidity risk management, process for strategy formulation and the level within the bank it is approved;
- iii. roles and responsibilities of individuals performing liquidity risk management functions, including structural balance sheet management, pricing, marketing, contingency planning, management reporting, lines of authority and responsibility for liquidity decisions;
- iv. Liquidity risk management structure for monitoring, reporting and reviewing liquidity;
- v. liquidity risk management tools for identifying, measuring, monitoring and controlling liquidity risk (including the types of liquidity limits and ratios in place and rationale for establishing limits and ratios);
- vi. Mechanisms for dealing with deviations from the policy and the restrictions it imposes; and
- vii. contingency plan for handling liquidity crises.

To be effective the liquidity policy must be communicated down the line throughout the bank. It is important that the board and senior management ensure that policies are reviewed on a regular basis (at least annually) and when there are any material changes in the bank's current and prospective liquidity risk profile. Such changes could stem from internal circumstances (e.g. changes in business focus) or external circumstances (e.g. changes in economic conditions).

Reviews provide the opportunity to fine-tune the bank's liquidity policies in light of the bank's liquidity management experience and development of its business. Any significant or frequent exception to the policy is an important barometer to gauge its effectiveness and any potential impact on bank's liquidity risk profile.

6.8 Procedures and limits

Banks should establish appropriate procedures, processes and limits to implement their liquidity policies. The procedural manual should explicitly narrate the necessary operational steps and processes to execute the relevant liquidity risk controls. The manual should be periodically reviewed and updated to take into account new activities, changes in risk management approaches and systems.

6.9 Liquidity management structure

The responsibility for managing the overall liquidity of the bank should be delegated to a specific, identified group within the bank. This may be in the form of an Asset Liability Committee (ALCO).

Since liquidity management is a technical job requiring specialized knowledge and expertise, it is important that responsible officers not only have relevant expertise but also have a good understanding of the nature and level of liquidity risk assumed by the bank and the means to manage that risk.

It is critical that there be close links between those individuals responsible for liquidity and those monitoring market conditions, as well as other individuals with access to critical information. This is particularly important in developing and analyzing stress scenarios.

6.10 Liquidity risk management process

An effective liquidity risk management process should include systems to identify, measure, monitor and control its liquidity exposures. Management should be able to accurately identify and quantify the primary sources of a bank's liquidity risk in a timely manner. To properly identify the sources, management should understand both existing as well as future risk that the bank can be exposed to. Management should always be alert for new sources of liquidity risk at both the transaction and portfolio levels.

Key elements of an effective risk management process include an efficient MIS to measure, monitor and control existing as well as future liquidity risks and reporting them to senior management and the board of directors.

6.11 Management information system

An effective management information system (MIS) is essential for sound liquidity management decisions. Information should be readily available for day-to-day liquidity management and risk control, as well as during times of stress. Data should be appropriately consolidated, comprehensive yet succinct, focused, and available in a timely manner. Ideally, the regular reports a bank generates will enable it to monitor liquidity during a crisis; managers would simply have to prepare the reports more frequently. Managers should keep crisis monitoring in mind when developing liquidity MIS. There is usually a trade-off between managing liquidity risk accuracy and timeliness. Liquidity problems can arise very quickly, and effective liquidity management may require daily internal reporting. Since bank liquidity is primarily affected by large, aggregate principal cash flows, detailed information on every transaction may not improve analysis.

Management should develop systems that can capture significant information. The content and format of reports depend on a bank's liquidity management practices, risks, and other characteristics. However, certain information can be effectively presented through standard reports such as "Funds Flow Analysis," and "Contingency Funding Plan Summary". These reports should be tailored to the bank's needs. Other routine reports may include a list of large funds providers, a cash flow or funding gap report, a funding maturity schedule, and a limit monitoring and exception report. Day-to-day management may require more detailed information, depending on the complexity of the bank and the risks it undertakes. Management should regularly consider how best to summarize complex or detailed issues for senior management or the board. Besides other types of information important for managing day-to-day activities and for understanding the bank's inherent liquidity risk profile should include:

- a) Asset quality and its trends;
- b) Earnings projections;
- c) Bank's general reputation in the market and the condition of the market itself;
- d) The type and composition of the overall balance sheet structure; and
- e) The type of new deposits being obtained, as well as its source, maturity, and price.

As far as information system is concerned, various units related to treasury activities, the dealing, the treasury operation and risk management department should be integrated. Furthermore, management should ensure proper and timely flow of information among front office, back office

and middle office in an integrated manner; however, their reporting lines should be kept separate to ensure independence of these functions.

6.12 Periodic reviews

Periodic reviews should be conducted to determine whether the bank complies with its liquidity risk policies and procedures. Positions that exceed established limits should receive prompt attention of appropriate management and should be resolved according to the process described in approved policies. Periodic reviews of the liquidity management process should also address any significant changes in the nature of instruments acquired, limits, and internal controls that have occurred since the last review.

6.13 Measurement of liquidity risk

An effective liquidity risk measurement system not only helps in managing liquidity in times of crisis but also optimize return through efficient utilization of available funds.

Banks should institute systems that enable them to capture liquidity risk ahead of time, so that appropriate remedial measures could be prompted to avoid any significant losses.

Liquidity risk of a bank varies depending upon its size and complexity of business and thus requires liquidity risk measurement techniques accordingly. For instance, banks having large networks may have access to low cost stable deposit, while small banks may only have significant reliance on large size corporate deposits. However, abundant liquidity does not obviate the need for a mechanism to measure and monitor liquidity profile of a bank.

At a very basic level, liquidity measurement involves assessing all of a bank's cash inflows against its outflows to identify the potential for any net shortfalls going forward. This includes funding requirements for off-balance sheet commitments. A number of techniques can be used for measuring liquidity risk, ranging from simple calculations and static simulations based on current holdings to highly sophisticated modeling techniques.

An important aspect of measuring liquidity is making assumptions about future funding needs. While certain cash inflows and outflows can be easily calculated or predicted, banks must also make assumptions about future liquidity needs, both in the very short-term and for longer time periods. One important factor to consider is the critical role a bank's reputation plays in its ability to access funds readily and at reasonable terms. For that reason, bank's staff responsible for managing overall liquidity should be aware of any information (such as an announcement of a decline in earnings or a downgrading by a rating agency) that could have an impact on market and public perceptions about the soundness of the bank.

Some commonly used liquidity measurement and monitoring techniques that may be adopted by the banks are:

6.14 Contingency funding plans

In order to develop comprehensive liquidity risk management framework, banks should have in place plans to address stress scenarios. Such a plan commonly known as Contingency Funding Plan (CFP), is a set of policies and procedures that serves as a blueprint for a bank to meet its funding needs in a timely manner and at a reasonable cost.

A CFP is a projection of future cash flows and funding sources of a bank under market scenarios including aggressive asset growth or rapid liability erosion. To be effective it is important that a CFP should represent management's best estimate of balance sheet changes that may result from a liquidity or credit event. A CFP can provide a useful framework for managing liquidity risk both short term and in the long term. Further it helps ensure that a bank can prudently and efficiently manage routine and extraordinary fluctuations in liquidity.

6.14.1 Use of CFP for routine liquidity management

For day-to-day liquidity risk management integration of liquidity scenario will ensure that the bank is best prepared to respond to an unexpected problem. In this sense, a CFP is an extension of ongoing liquidity management and formalizes the objectives of liquidity management by ensuring:

- a) A reasonable amount of liquid assets are maintained;
- b) Measurement and projection of funding requirements during various scenarios; and
- c) Management of access to funding sources.

6.14.2 Use of CFP for emergency and distress environments

It is not always that a liquidity crisis shows up gradually. In case of a sudden liquidity stress, it is important for a bank to seem organized, candid, and efficient to meet its obligations to the stakeholders. Since such a situation requires a spontaneous action, banks that already have plans to deal with such situation could address the liquidity problem more efficiently and effectively. A CFP can help ensure that bank management and key staffs are ready to respond to such situations. Bank liquidity is very sensitive to negative trends in credit, capital, or reputation. Deterioration in the bank's financial condition (reflected in items such as asset quality indicators, earnings, or capital), management composition, or other relevant issues may result in reduced access to funding.

6.14.3 Scope of CFP

The sophistication of a CFP depends upon the size, nature, and complexity of business, risk exposure, and organizational structure. To begin, the CFP should anticipate all of the bank's funding and liquidity needs by:

- a) Analyzing and making quantitative projections of all significant on- and off balance- sheet;
- b) Funds flows and their related effects;
- c) Matching potential cash flow sources and uses of funds; and
- d) Establishing indicators that alert management to a predetermined level of potential risks.

The CFP should project on the bank's funding position during both temporary and long-term liquidity changes, including those caused by liability erosion. The CFP should explicitly identify, quantify, and rank all sources of funding by preference, such as:

- i. Reducing assets;
- ii. Modification or increasing liability structure;
- iii. Using other alternatives for controlling balance sheet changes.

The CFP should include asset side as well as liability side strategies to deal with liquidity crises. The asset side strategy may include; whether to liquidate surplus money market assets, when to sell liquid or longer-term assets, etc. While liability side strategies specify policies such as pricing policy for funding, the dealer who could assist at the time of liquidity crisis, policy for early redemption request by retail customers, use of BB discount window etc. A CFP also chalks out roles and responsibilities of various individuals at the time of liquidity crises and the management information system between management, ALCO, traders, and others.

6.15 Maturity ladder

Banks may utilize flow measures to determine their cash position. A maturity ladder estimates a bank's cash inflows and outflows and thus net deficit or surplus (GAP) both on a day-to-day basis and over a series of specified time periods.

Banks need to focus on the maturity of its assets and liabilities in different tenors. Mismatch is accompanied by liquidity risk and excessive longer tenor lending against shorter-term borrowing can put a bank's balance sheet in a very critical and risky position. To address this risk and to make sure a bank does not expose itself in excessive mismatch, a bucket-wise (e.g. call, 2-7 days, 8 days-1 month, 1-3 months, 3-12 months, 1-5 years, over 5 years) maturity profile of the assets and liabilities to be

prepared to understand mismatch in every bucket. A structural maturity ladder has been furnished in the DOS circular no. 02 dated 29 March 2011.

The number of time frames in a maturity ladder is of significant importance and up to some extent depends upon the nature of bank's liabilities or sources of funds. Banks, which rely on short term funding, will concentrate primarily on managing liquidity on very short term. However, other banks might actively manage their net funding requirement over a slightly longer period. In the short term, a bank's flow of funds could be estimated more accurately and also such estimates are of more importance as these provide an indication of actions to be taken immediately. Further, such an analysis for distant periods will maximize the opportunity for the bank to manage the gap well in advance before it crystallizes. Consequently, banks should use short time frames to measure near term exposures and longer time frames thereafter.

Banks need to calculate daily gap for the next one or two weeks, monthly gap for next six months or a year and quarterly thereafter. While making an estimate of cash flows, the following aspects need to be considered:

- a) The funding requirement arising out of off- balance sheet commitments also need to be accounted for;
- b) Many cash flows associated with various products are influenced by interest rates or customer behavior. Banks need to take into account behavioral aspects along with contractual maturity. In this respect past experiences could give important guidance to make any assumption;
- c) Some cash flows may be seasonal or cyclical; and
- d) Management should also consider increases or decreases in liquidity that typically occur during various phases of an economic cycle.

Banks should have liquidity sufficient to meet fluctuations in loans and deposits. As a safety measure banks should maintain a margin of excess liquidity. To ensure that this level of liquidity is maintained, management should estimate liquidity needs in a variety of scenarios.

6.16 Liquidity ratios and limits

Banks may use a variety of ratios to quantify liquidity. These ratios can also be used to create limits for liquidity management. However, such ratios would be meaningless unless used regularly and interpreted taking into account qualitative factors. Ratios should always be used in conjunction with more qualitative information about borrowing capacity, such as the likelihood of increased requests

for early withdrawals, decreases in credit lines, decreases in transaction size, or shortening of term funds available to the bank. To the extent that any asset-liability management decisions are based on financial ratios, a bank's asset-liability managers should understand how a ratio is constructed, the range of alternative information that can be placed in the numerator or denominator, and the scope of conclusions that can be drawn from ratios. Because ratio components as calculated by banks are sometimes inconsistent, ratio-based comparisons of banks or even comparisons of periods at a single bank can be misleading.

Examples of ratios and limits that can be used are:

- (a) **Cash flow ratios and limits:** One of the most serious sources of liquidity risk comes from a bank's failure to "roll over" a maturing liability. Cash flow ratios and limits attempt to measure and control the volume of liabilities maturing during a specified period of time.

Maximum cumulative outflow (MCO) guidelines control the net outflow (inflow from asset maturity minus outflow from liability maturity) over the period overnight, one week and one month. However, as per DOS circular no. 02 dated 29 March 2011, the following formula is to be used by the banks:

$$MCO = \frac{\text{Total assets maturing in the period} - \text{Total liabilities maturing in the period}}{\text{Total assets maturing in the period} + \text{Total liabilities maturing in the period}}$$

- (b) **Liability concentration ratios and limits:** Liability concentration ratios and limits help to prevent a bank from relying on too few providers or funding sources. Limits are usually expressed either as a percentage of liquid assets or absolute amount. Sometimes they are more indirectly expressed as a percentage of deposits, purchased funds, or total liabilities.

- (c) **Other balance sheet ratios:** Examples of common ratios used by banks to monitor current and potential funding levels are:

- i. Total credit to total deposits;
- ii. Liquid assets to total deposits;
- iii. Liquid assets to short-term liabilities ; and
- iv. Borrowed funds to total assets; etc.

In addition to the statutory liquidity requirement and cash reserve requirement, the board and senior management should establish limits on the nature and amount of liquidity risk they are willing to assume. The limits should be periodically reviewed and adjusted when conditions or risk

tolerances change. When limiting risk exposure, senior management should consider the nature of the bank's strategies and activities, its past performance, the level of earnings, capital available to absorb potential losses, and the board's risk appetite. Balance sheet complexity will determine how much and what types of limits a bank should establish over daily and long term horizons. While limits will not prevent a liquidity crisis, limit exceptions can be early indicators of excessive risk or inadequate liquidity risk management.

6.17 Foreign currency liquidity management

Each bank should have a measurement, monitoring and control system for its liquidity positions in the major currencies in which it is active. In addition to assessing its aggregate foreign currency liquidity needs and the acceptable mismatch in combination with its domestic currency commitments, a bank should also undertake separate analysis of its strategy for each currency individually.

6.18 Internal controls

Banks should have adequate internal controls to ensure the integrity of their liquidity risk management process. These internal controls should be an integral part of the bank's overall system of internal control. They should promote effective and efficient operations, reliable financial and regulatory reporting, and compliance with relevant laws, regulations and internal policies. An effective system of internal control for liquidity risk includes:

- a) a strong control environment;
- b) an adequate process for identifying and evaluating liquidity risk;
- c) the establishment of control activities such as policies and procedures;
- d) adequate information systems; and
- e) continual review of adherence to established policies and procedures.

With regard to control policies and procedures, attention should be given to appropriate approval processes, limits, reviews and other mechanisms designed to provide a reasonable assurance that the bank's liquidity risk management objectives are achieved. Many attributes of a sound risk management process, including risk measurement, monitoring and control functions, are key aspects of an effective system of internal control. Banks should ensure that all aspects of the internal control system are effective, including those aspects that are not directly part of the risk management process.

In addition, an important element of a bank's internal control system over its liquidity risk management process is regular evaluation and review. This includes ensuring that personnel are following established policies and procedures, as well as ensuring that the procedures that were established actually accomplish the intended objectives. Such reviews and evaluations should also address any significant change that may impact on the effectiveness of controls. In particular, the review should identify if and when limits were breached, and, if so, what the consequences were for the staff that initiated and approved the breach. The board should ensure that all such reviews and evaluations are conducted regularly by individuals who are independent of the function being reviewed. When revisions or enhancements to internal controls are warranted, there should be a mechanism in place to ensure that these are implemented in a timely manner.

6.19 Monitoring and reporting risk exposures

Senior management and the board, or a committee thereof, should receive reports on the level and trend of the bank's liquidity risk at least quarterly. From these reports, senior management and the board should learn how much liquidity risk the bank is assuming, whether management is complying with risk limits, and whether management's strategies are consistent with the board's expressed risk appetite. The sophistication or detail of the reports should be commensurate with the complexity of the bank.