ARTICLE NO.3

LIQUIDITY RISK MANAGEMENT IN BANK: A CONCEPTUAL FRAMEWORK

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Abstract: *Liquidity is a bank's capacity to fund increase in assets and meet both expected and unexpected cash and collateral obligations at reasonable cost and without incurring unacceptable losses. In the context of banking, liquidity, or the ability to fund increases in assets and meet obligations as they come due, is critical to the ongoing viability of the banking institution. Since there is a close association between liquidity and solvency of banks, sound liquidity management reduces the probability of banks becoming insolvent, thus reducing the possibilities of bankruptcies and bank runs. Ultimately, prudent liquidity management as part of the overall risk management of the banking institutions ensures a healthy and stable banking sector. Effective liquidity risk management helps ensure a bank's ability to meet its obligations as they fall due and reduces the probability of an adverse situation developing. This paper examines the sound practices for the liquidity risk management in banks. The paper goes along with the suggestions of the Basel Committee and Reserve Bank of India on management of liquidity risk. In this paper, we explain the meaning of liquidity, liquidity risk and liquidity risk management. It also discusses the process of building up of a liquidity risk management system.*

Keywords: *Liquidity Risk, Liquidity Risk Management, Basel Committee.*

I. Introduction

Liquidity is a bank's capacity to fund increase in assets and meet both expected and unexpected cash and collateral obligations at reasonable cost and without incurring unacceptable losses. Liquidity risk is the inability of a bank to meet such obligations as they become due, without adversely affecting the bank's financial condition. Effective liquidity risk management helps ensure a bank's ability to meet its obligations as they fall due and reduces the probability of an adverse situation developing. This assumes significance on account of the fact that liquidity crisis, even at a single institution, can have systemic implications. Traditionally, liquidity has been defined as: .the capacity of financial institutions to finance increases in their assets and comply with their liabilities as these mature. Bank liquidity has two distinct but interrelated dimensions: liability (or cash) liquidity, which refers to the ability to obtain funding on the market and asset (or market) liquidity, associated with the possibility of selling the assets. Both concepts are interrelated, and the interaction between them tends towards their mutual reinforcement.

However, under adverse conditions this dependency tends to weaken market liquidity because adverse circumstances that affect one dimension can rapidly be transferred to the other. Under

normal circumstances liquidity management is basically a cost-benefit trade off, because a financial institution will be able to obtain funding provided it is willing to pay the prevailing market prices, or has the choice of selling or committing its assets. In like manner a bank can store a stock of liquid assets to ensure some liquidity (liquidity warehousing), although at the expense of smaller returns. However, in the event of a crisis specific to a bank, its access to liquidity may be found to be severely restricted because its counterparties may be unwilling to provide it neither with funds, not even providing collateral nor in exchange for high rates. In a systemic liquidity crisis it may even be impossible for the bank to place its assets on the market.

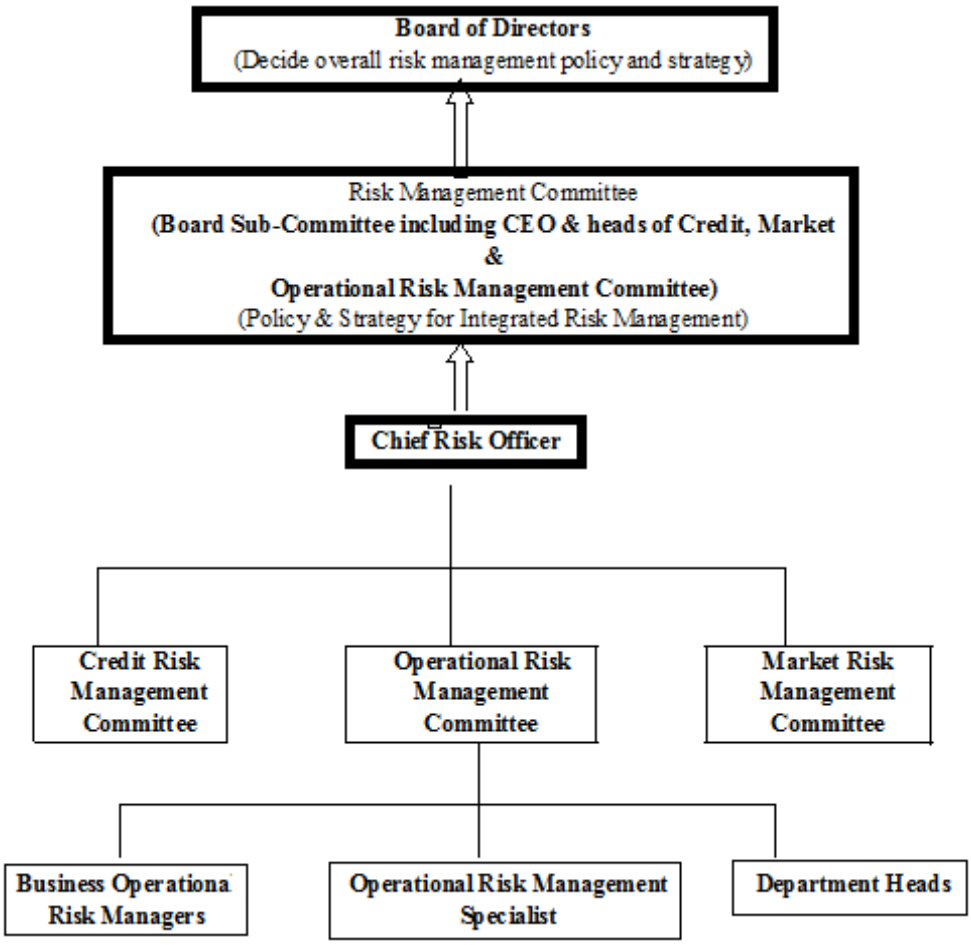
II. Liquidity Risk and Liquidity Risk Management

The liquidity risk of banks arises from funding of long-term assets by short-term liabilities, thereby making the liabilities subject to rollover or refinancing risk. Liquidity risk is usually of an individual nature, but in certain situations may compromise the liquidity of the financial system. As in overall terms it is about a situation that is very dependent on the individual characteristics of each financial institution, defining the liquidity policy is the primary responsibility of each bank, in terms of the way it operates and its specialization. Bank Deposits generally have a much shorter contractual maturity than loans and liquidity management needs to provide a cushion to cover anticipated deposit withdrawals. Liquidity is the ability to efficiently accommodate deposit as also reduction in liabilities and to fund the loan growth and possible funding of the off-balance sheet claims. The cash flows are placed in different time buckets based on future likely behavior of assets, liabilities and off-balance sheet items. The liquidity risk is closely linked to other dimensions of the financial structure of the financial institution, like the interest rate and market risks, its profitability, and solvency, for example. The interest rate risk that results from mismatches of maturities or the dates for interest rate adjustments may appear as either market or refinancing (and/or reinvestment) risk. Also, as it operates to transform maturities, subject to these risks, the bank collects a yield that is related to its profitability. Having a larger amount of liquid assets or improving the matching of asset and liability flows reduces the liquidity risk, but also its profitability. This relationship also operates in the opposite direction: loans in an irregular situation will impact jointly on profitability and liquidity, as the expected cash flows do not appear. In addition, there is a relationship with solvency: more capital reduces liquidity creation, but allows for more strength to face financial crises.

Liquidity risk can be sub-divided into funding liquidity risk and asset liquidity risk. Asset liquidity risk designates the exposure to loss consequent upon being unable to effect a transaction at current market prices due to either relative position size or a temporary drying up of markets. Having to sell in such circumstances can result in significant losses. Funding liquidity risk designates the exposure to loss if an institution is unable to meet its cash needs. This can create various problems, such as failure to meet margin calls or capital withdrawal requests, comply with collateral requirements or achieve rollover of debt. These problems may force an institution to liquidate assets; in such a case, asset liquidity and funding liquidity risks may combine if the institution is forced to sell illiquid assets at fire-sale prices. In such a situation, if portfolio leverage is high, the forced selling may create a positive feedback loop

between falling prices (resulting in margin calls) and additional rounds of forced selling. Liquidity risk is managed through controlling concentrations and relative market sizes of portfolios in the case of asset liquidity risk, and through diversification, securing credit lines or other back-up funding, and limiting cash flow gaps in the case of funding liquidity risk.

RISK MANAGEMENT ARCHITECTURE FOLLOWED BY BANKS



At the apex level, there is the Supervisory Committee of Directors on Risk Management, which is a Board level Committee and oversees the Risk Management functioning of the Bank. Next come the Executive level Committees such as Asset Liability Management. Committee (ALCO) for Market Risk, Credit Risk Management Committee for Credit Risk and Operational Risk Management Committee for Operational Risk function at the Bank. These Committees meet regularly to supervise and monitor the risks in various areas on an ongoing basis. Some Banks have appointed Consultants for advising and assisting the Management in implementing the Risk Management Systems and making the Bank Basel compliant. The shift from transaction based supervision to Risk based Supervision was necessitated due to the complexity of modern times. The most important of the risks viz., Credit Risk, Market Risks (Interest Rate Risk, Foreign Exchange Risk and Liquidity Risk), Operational risk (People Risk, Control Risk, IT Risk, Legal/Regulatory Risk and Reputational Risk) need deft planning and careful handling by the Banks. The Supervisory mechanism too needs to upgrade their skills

for prompt detection of the failure of the Risk Management systems. The Reserve Bank over a period of time has guided and insisted on setting up proper Risk Management Systems in Banks. It is to the credit of the Indian Regulatory Agencies like the RBI, Securities Exchange Board of India (SEBI) and the Insurance Regulatory and Development Authority (IRDA) that the Indian Financial System remained comparatively unscathed despite the catastrophic failures of the financial systems elsewhere in the world.

Liquidity risk management in banks is defined as the risk of being unable either to meet their obligations to depositors or to fund increases in assets as they fall due without incurring unacceptable costs or losses. This risk occurs when the depositors collectively decide to withdraw more funds than the bank immediately has on hand, or when the borrowers fail to meet their financial obligation to the banks. In the other words, liquidity risk occurs in two cases. Firstly, it arises symmetrically to the borrowers in their relationship with the banks, for example when the banks decide to terminate the loans but the borrowers cannot afford it. Secondly, it arises in the context of the banks' relationships with their depositors, for example, when the depositors decide to redeem their deposits but the banks cannot afford it. In practice, the banks regularly find imbalances (gaps) between the asset and the liability side that need to be equalized because, by nature, banks accept liquid liabilities but invest in illiquid. If a bank fails to balance such a gap, liquidity risk might occur, followed by some undesirable consequences such as insolvency risk, government bailout risk, and reputation risk. The failure or inefficiency of liquidity management is caused by the strength of liquidity pressure, the preparation of a bank's liquid instruments, the bank's condition at the time of liquidity pressure, and the inability of the bank to find internal or external liquid sources.

Table below lists some internal and external factors in banks that may potentially lead to the liquidity risk problems.

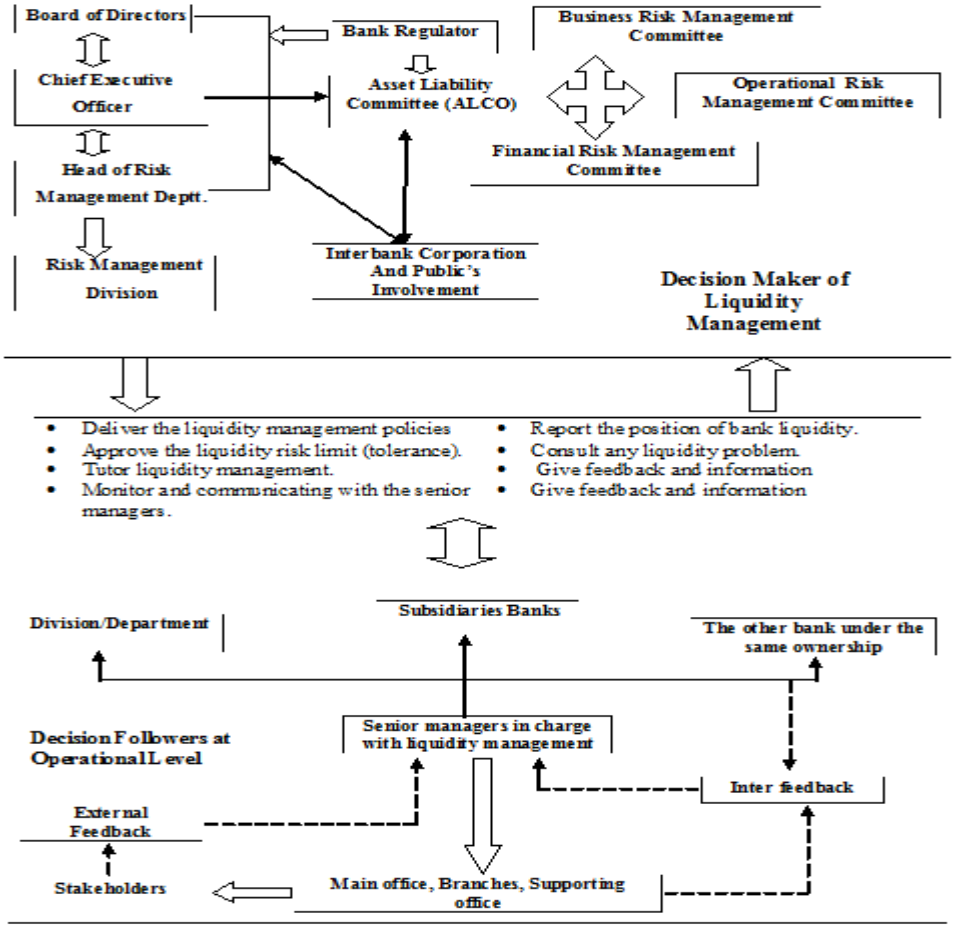
Internal Banking Factors	External Banking Factors
High off-balance sheet exposures.	Very sensitive financial markets depositors.
The banks rely heavily on the short-term corporate deposits.	External and internal economic shocks.
A gap in the maturity dates of assets and liabilities.	Low/slow economic performances.
The banks' rapid asset expansions exceed the available funds on the liability side	Decreasing depositors' trust on the banking sector.
Concentration of deposits in the short term Tenor	Non-economic factors
Less allocation in the liquid government instruments.	Sudden and massive liquidity withdrawals from depositors.
Fewer placements of funds in long-term deposits.	Unplanned termination of government deposits.

The banks should consider putting in place certain prudential limits to avoid liquidity crisis:

1. Cap on inter-bank borrowings, especially call borrowings;
2. Purchased funds vis-à-vis liquid assets;

3. Core deposits vis-à-vis Core Assets i.e. Cash Reserve Ratio, Liquidity Reserve Ratio and Loans;
4. Duration of liabilities and investment portfolio;
5. Maximum Cumulative Outflows. Banks should fix cumulative mismatches across all time bands;
6. Commitment Ratio – track the total commitments given to Corporates/banks and other financial institutions to limit the off-balance sheet exposure;
7. Swapped Funds Ratio, i.e. extent of Indian Rupees raised out of foreign currency sources

Organization Framework of Liquidity Management in Banks



Source: the management of liquidity risk in Islamic Banks: a case study of Indonesia; Ph.d Thesis by Ismal Rifki

III. Ratios in respect of Liquidity Risk Management

Certain critical ratios in respect of liquidity risk management and their significance for banks are given in the Table below**.** Banks may monitor these ratios by putting in place an internally defined limit approved by the Board for these ratios. The industry averages1 for these ratios are

given for information of banks. They may fix their own limits, based on their liquidity risk management capabilities, experience and profile. The stock ratios are meant for monitoring the liquidity risk at the solo bank level.

Sl. No.	Ratio	Significance	Industry Average (in %)
1	**(Volatile liabilities – Temporary Assets)/ (Earning Assets – Temporary Assets)**	Measures the extent to which volatile money supports bank's basic earning assets. Since the numerator represents short-term, interest sensitive funds, a high and positive number implies some risk of illiquidity.	40
Volatile Liabilities: (Deposits + borrowings and bills payable up to 1 year). Letters of credit – full outstanding. Component-wise CCF of other contingent credit and commitments. Swap funds (buy/ sell) up to one year. Current deposits (CA) and Savings deposits (SA) i.e. (CASA) deposits reported by the banks as payable within one year (as reported in structural liquidity statement) are included under volatile liabilities. Borrowings include from RBI, call, other institutions and refinance. **Temporary assets** = Cash + Excess CRR balances with RBI + Balances with banks + Bills purchased/discounted up to 1 year + Investments up to one year + Swap funds (sell/ buy) up to one year. **Earning Assets** = Total assets – (Fixed assets + Balances in current accounts with other banks + Other assets excluding leasing + Intangible assets)			
2	**Core deposits5/Total Assets**	Measures the extent to which assets are funded through stable deposit base.	50
Core deposits = All deposits (including CASA) above 1 year (as reported in structural liquidity statement)+ net worth			
3	**(Loans + mandatory SLR + mandatory CRR + Fixed Assets)/Total Assets**	Loans including mandatory cash reserves and statutory liquidity investments are least liquid and hence a high ratio signifies the degree of 'illiquidity' embedded in the balance sheet.	80
4	**(Loans + mandatory SLR + mandatory CRR + Fixed Assets) / Core Deposits**	Measure the extent to which illiquid assets are financed out of core deposits.	150
5	**Temporary Assets/Total Assets**	Measures the extent of available liquid assets. A higher ratio could impinge on the asset utilization of banking system in terms of opportunity cost of holding liquidity.	40
6	**Temporary Assets/ Volatile Liabilities**	Measures the cover of liquid investments relative to volatile liabilities. A ratio of less than 1 indicates the possibility of a liquidity problem.	60

7	**Volatile Liabilities/Total Assets**	Measures the extent to which volatile liabilities fund the balance sheet.	60

As mentioned above, the above stock ratios are only illustrative and banks could also use other measures / ratios. For example to identify unstable liabilities and liquid asset coverage ratios banks may include ratios of wholesale funding to total liabilities, potentially volatile retail (e.g. high cost or out of market) deposits to total deposits, and other liability dependency measures, such as short term borrowings as a percent of total funding.

While the liquidity ratios are the ideal indicator of liquidity of banks operating in developed financial mar surplus or deficit of funds at selected maturity dates is recommended as a standard tool. The format prescribed by RBI in this regard under ALM System should be adopted for measuring cash flow mismatches at different time bands. The cash flows should be placed in different time bands based on future behavior of assets, liabilities and off-balance sheet items. In other words, banks should have to analyze the behavioral maturity profile of various components of on / off-balance sheet items on the basis of assumptions and trend analysis supported by time series analysis. Banks should also undertake variance analysis, at least, once in six months to validate the assumptions. The assumptions should be fine-tuned over a period which facilitate near reality predictions about future behavior of on / off-balance sheet items. Apart from the above cash flows, banks should also track the impact of prepayments of loans, premature closure of deposits and exercise of options built in certain instruments which offer put/call options after specified times. Thus, cash outflows can be ranked by the date on which liabilities fall due, the earliest date a liability holder could exercise an early repayment option or the earliest date contingencies could be crystallized. The difference between cash inflows and outflows in each time period, the excess or deficit of funds becomes a starting point for a measure of a bank's future liquidity surplus or deficit, at a series of points of time.

IV. Fundamental principles for the management and supervision of liquidity risk

Principle 1 ⇨	A bank is responsible for the sound management of liquidity risk. A bank should establish a robust liquidity risk management framework that ensures it maintains sufficient liquidity, including a cushion of unencumbered, high quality liquid assets, to withstand a range of stress events, including those involving the loss or impairment of both unsecured and secured funding sources. Supervisors should assess the adequacy of both a bank's liquidity risk management framework and its liquidity position and should take prompt action if a bank is deficient in either area in order to protect depositors and to limit potential damage to the financial system.

Governance of liquidity risk management

Principle 2 ⇨	A bank should clearly articulate a liquidity risk tolerance that is appropriate for its business strategy and its role in the financial system.

Principle 3 ⇨	Senior management should develop a strategy, policies and practices to manage liquidity risk in accordance with the risk tolerance and to ensure that the bank maintains sufficient liquidity. Senior management should continuously review information on the bank's liquidity developments and report to the board of directors on a regular basis. A bank's board of directors should review and approve the strategy; policies and practices related to the management of liquidity at least annually and ensure that senior management manages liquidity risk effectively.
Principle 4 ⇨	A bank should incorporate liquidity costs, benefits and risks in the internal pricing, performance measurement and new product approval process for all significant business activities (both on- and off-balance sheet), thereby aligning the risk-taking incentives of individual business lines with the liquidity risk exposures their activities create for the bank as a whole.

Measurement and management of liquidity risk

Principle 5 ⇨	A bank should have a sound process for identifying, measuring, monitoring and controlling liquidity risk. This process should include a robust framework for comprehensively projecting cash flows arising from assets, liabilities and off-balance sheet items over an appropriate set of time horizons.
Principle 6 ⇨	A bank should actively monitor and control liquidity risk exposures and funding needs within and across legal entities, business lines and currencies, taking into account legal, regulatory and operational limitations to the transferability of liquidity.
Principle 7 ⇨	A bank should establish a funding strategy that provides effective diversification in the sources and tenor of funding. It should maintain an ongoing presence in its chosen funding markets and strong relationships with funds providers to promote effective diversification of funding sources. A bank should regularly gauge its capacity to raise funds quickly from each source. It should identify the main factors that affect its ability to raise funds and monitor those factors closely to ensure that estimates of fund raising capacity remain valid.
Principle 8 ⇨	A bank should actively manage its intraday liquidity positions and risks to meet payment and settlement obligations on a timely basis under both normal and stressed conditions and thus contribute to the smooth functioning of payment and settlement systems.
Principle 9 ⇨	A bank should actively manage its collateral positions, differentiating between encumbered and unencumbered assets. A bank should monitor the legal entity and physical location where collateral is held and how it may be mobilized in a timely manner.

Principle 10 ⇨	A bank should conduct stress tests on a regular basis for a variety of short-term and protracted institution-specific and market-wide stress scenarios (individually and in combination) to identify sources of potential liquidity strain and to ensure that current exposures remain in accordance with a bank's established liquidity risk tolerance. A bank should use stress test outcomes to adjust its liquidity risk management strategies, policies, and positions and to develop effective contingency plans.
Principle 11 ⇨	A bank should have a formal contingency funding plan (CFP) that clearly sets out the strategies for addressing liquidity shortfalls in emergency situations. A CFP should outline policies to manage a range of stress environments, establish clear lines of responsibility, include clear invocation and escalation procedures and be regularly tested and updated to ensure that it is operationally robust.
Principle 12 ⇨	A bank should maintain a cushion of unencumbered, high quality liquid assets to be held as insurance against a range of liquidity stress scenarios, including those that involve the loss or impairment of unsecured and typically available secured funding sources. There should be no legal, regulatory or operational impediment to using these assets to obtain funding.

Thus, a sound liquidity risk management system would envisage that:

- A bank should establish a robust liquidity risk management framework.
- The Board of Directors (BoD) of a bank should be responsible for sound management of liquidity risk and should clearly articulate a liquidity risk tolerance appropriate for its business strategy and its role in the financial system.
- The BoD should develop strategy, policies and practices to manage liquidity risk in accordance with the risk tolerance and ensure that the bank maintains sufficient liquidity. The BoD should review the strategy, policies and practices at least annually.
- Top management/ALCO should continuously review information on bank's liquidity developments and report to the BoD on a regular basis.
- A bank should have a sound process for identifying, measuring, monitoring and controlling liquidity risk, including a robust framework for comprehensively projecting cash flows arising from assets, liabilities and off-balance sheet items over an appropriate time horizon.
- A bank's liquidity management process should be sufficient to meet its funding needs and cover both expected and unexpected deviations from normal operations.
- A bank should incorporate liquidity costs, benefits and risks in internal pricing, performance measurement and new product approval process for all significant business activities.
- A bank should actively monitor and manage liquidity risk exposure and funding needs within and across legal entities, business lines and currencies, taking into account legal, regulatory and operational limitations to transferability of liquidity.

- A bank should establish a funding strategy that provides effective diversification in the source and tenor of funding, and maintain ongoing presence in its chosen funding markets and counterparties, and address inhibiting factors in this regard.
- Senior management should ensure that market access is being actively managed, monitored, and tested by the appropriate staff.
- A bank should identify alternate sources of funding that strengthen its capacity to withstand a variety of severe bank specific and market-wide liquidity shocks.
- A bank should actively manage its intra-day liquidity positions and risks.
- A bank should actively manage its collateral positions.
- A bank should conduct stress tests on a regular basis for short-term and protracted institution-specific and market-wide stress scenarios and use stress test outcomes to adjust its liquidity risk management strategies, policies and position and develop effective contingency plans.
- Senior management of banks should monitor for potential liquidity stress events by using early warning indicators and event triggers. Early warning signals may include, but are not limited to, negative publicity concerning an asset class owned by the bank, increased potential for deterioration in the bank's financial condition, widening debt or credit default swap spreads, and increased concerns over the funding of off- balance sheet items.
- To mitigate the potential for reputation contagion, a bank should have a system of effective communication with counterparties, credit rating agencies, and other stakeholders when liquidity problems arise.
- A bank should have a formal contingency funding plan (CFP) that clearly sets out the strategies for addressing liquidity shortfalls in emergency situations. A CFP should delineate policies to manage a range of stress environments, establish clear lines of responsibility, and articulate clear implementation and escalation procedures.
- A bank should maintain a cushion of unencumbered, high quality liquid assets to be held as insurance against a range of liquidity stress scenarios.
- A bank should publicly disclose its liquidity information on a regular basis that enables market participants to make an informed judgment about the soundness of its liquidity risk management framework and liquidity position.

V. Conclusion

Liquidity Risk being one of the reasons for financial distress should not be ignored. Following the Basel Committee recommendations and framing an effective liquidity risk management system is the only way to fight out its ill effects. Depression that fled away the Lehman Brothers was just an alarm to the leading developed and developing economies to cry out for such bitter experiences from a time before it strikes again. Banks and financial institutions all over the world are planning for such arrangements. India, although not systematically absent, is however, trying to find out the best possible way to meet out the current economical imbalances caused due to liquidity matters. Indian financial system is set sure to boldly face all situations as it comes in the future.

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