Module 4:

Liquidity Risk Management

Table of Contents

Module 4: Liquidity Risk Management

Asset and Liability Management – Introduction
Module 4: Liquidity Risk Management

Introduction

The ALM rationale is used to enhance profitability and reduce risk; one of the risks that AL recognizes is liquidity risk. According to Basel Committee on Banking Supervision (BCBS). Liquidity is the ability of a bank to fund increases in assets and meet obligations as w due, without incurring unacceptable losses[1]. The main reasons behind deteriorating liquidity profile and, thus, increasing liquidity risk are high concentration in illi assets and mismatching between maturity tenor of assets and liabilities, where liabiliti e faster than assets.

Through this module we will explore the role and duties of ALM i naging liquidity risk. Explanation of the trade- off between keeping excess amo of or iquid assets with low return, against less liquidity but with higher return, and t ffec using conservative strategy toward liquidity on profitability will be provided.

The meaning of liquidity gap and the meaning of liquid ri ill be defined and explained. After that we move to explain the tools used f eas managing the liquidity risk, its meaning, how to be calculated, and how i us

One of the most important points in this demonstrate the link between the liquidity crisis and events that can leads to k's failure and the role of Contingency Funding Plan (CFP) in this regard. Finally fo casting the sources and uses of fund in banking sector will be explained.

Importance

The importance of liquidity the nk cannot be overestimated. Unlike most of other risks which adversely aff s prof liquidity is not only needed for growth, but the lack of it poses a direct th on bank's survival. This came evident, especially, during the recent financial crisis. H easuring and managing liquidity risk deserves a great deal of attention.

Overvi

Based on th ous introduction this session will present and discuss the following points:

- e of ALM in managing liquidity risk
- e-off between liquidity and profitability
- The main techniques used in measuring and managing liquidity risk
- The link between a liquidity crisis and events that can lead to a bank failure
- The structure of an effective Contingency Funding Plan (CFP)
- The importance of forecasting the sources and uses of bank funds

[1] "Principles of sound liquidity risk management and supervision"; September 2008

Learning Objectives

Upon the completion of this module, you will be able to:

- Explain the role of ALM in managing liquidity risk
- Explain the trade-off between maintaining excess amounts of liquidity and earnings
- Describe the main techniques used in measuring and managing liquidity risk
- Describe types of liquidity crises and how it can lead to a bank failure
- Recognize the structure and components of a robust Contingency Fund[illegible]n (CFP); including its triggers and the role of liquidity stress testing in this respect
- Express the importance of forecasting the sources and uses of bank's f[illegible]nds

The role of ALM in managing liquidity risk

The ALM risk objective in the banking culture is to manage liquidity and interest rate risks. Responsibilities of managing the assets and liabilities are usually assigned to Treasury Department under oversight from ALCO, but as highlighted before and to effectively appl the fundamental concept of segregation of duties, the risk counters should be separated fr the business line and assigned to Risk Group.

Despite of the optimal organization structure designed for addressing liquidity risk, its role in this regard could be generally summarized as follows:

Risk identification:

This includes defining the main risk factors that the bank is exposed to, and could adversely impact its liquidity profile. Examples of those factors are the degree of stability of the sources and uses of funds, high level of illiquid assets, undue mismatch between maturity of assets and liabilities, high concentration of deposits in a limited number of customers, and reputation risk which could lead to deposits run-off.

Types of Liquidity Risk

To be able to determine the sources and liquidity risk factors we need to define the types of liquidity risk as follows:

- **Funding Liquidity Risk**
  The risk of incurring undue losses due to the incapacity of accessing unencumbered liquidity sources at economically acceptable costs for meeting liability (cash) obligations.
- **Market or Asset Liquidity Risk**
  The risk of incurring losses due to the incapacity of converting assets into cash for the purpose of meeting liability obligations.

Risk measurement and reporting:

Using measurement tools (will be discussed later) like liquidity gaps and liquidity ratios with an appropriate reporting frequency (daily/weekly/monthly). To be able to achieve this task, an adequate and solid Management Information System (MIS) must be in place.

Risk monitoring and control:

- The risk reporting unit and ALCO should monitor the liquidity risk reports on periodic basis,
- Keep an alerted eye on early warning signals of liquidity problems (e.g. high runoff levels or credit downgrade of the bank or the country where it operates),
- Take proactive actions in case a specific or systemic liquidity crisis is foreseen.
- Take adequate corrective actions if the bank is facing a liquidity crisis (the role of Contingency Funding Plan in this respect will be discussed later).

Different Dimensions of Mismatch between Assets and Liabilities

This mismatching could be recognized in two ways:

- The mismatch between assets and liabilities according to maturity tenor for assets and liabilities. This kind is called the liquidity gap. To measure liquidity gap all assets and all liabilities must be grouped based on the tenor, then the gap will be calculated for each tenor.
- The mismatching between interest re-pricing of assets and liabilities, this kind of gap called interest rate gap, and will be discussed in details in Interest Rate Risk module.

The Trade-off between Liquidity and Earnings

The liquidity risk arises when the bank become unable to refinance its liabilities as they come due or unable to liquidate assets with acceptable market impact. For this reason the bank will keep a large portion of its available funds in highly liquid assets usually associated with a very low return, which in turn reduce the bank's profit and negatively affect the ultimate goal of maximizing the shareholders wealth.

Maintaining an ample liquidity position is costly for the bank mainly because of:

- Generally, the more liquid the assets, the lower the return
- The longer the liabilities, the lesser the liquidity risk, however, this comes with a higher the cost (under normal yield curve)
- The higher the funding base diversification the least advantage of cheapest source

Despite these factors, liquidity is vital for the bank survival; thus, priceless.

First – Liquidity Risk Measurement Techniques

Above and beyond the CBE regulatory liquidity and reserve ratios—will be covered in the regulatory framework module—there exists a range of other widely recognized tools including:

Liquidity Gap

The liquidity gap measures the amount of mismatch between assets and liabilities for each maturity tenor.

$$\textbf{\textit{Liquidity Gap} = maturing assets} - \textbf{maturing liabilities}$$

Following this, for any tenor, the gap could assume a positive value if $assets > liabilities$, negative if $assets < liabilities$, or zero if $assets = liabilities$.

The calculated gap from the above equation is called current gap. Another type of gaps is the cumulative gap which at any given tenor equals the sum of the current gaps for all preceding tenors up to and including the tenor for which we calculate the cumulative gap.

With the tendency of banks to borrow short and lend long to benefit from the difference in interest rates and enlarge their spreads (under normal yield curve), the liquidity gap tends to be negative in the short term tenors, and positive in the medium and long term.

The liquidity risk is the one that associated with excessive negative gap. The process of liquidity gap calculation is not a very simple and straightforward task, mainly due to:

- The need for a strong and dependable MIS reporting system with minimal manual adjustments, as the liquidity gap should be projected on a daily or at least weekly basis.
- The complexity of the treatment of non-contractual products which have no specific maturity date like current accounts, saving accounts and equities. In this regard, CBE recommended 5-years historical study for those products maturity behavior, taking into consideration the prevailing economic and political conditions during the study period, and paying attention to seasonality factors. The objective of this study is to calculate the core (sticky) portion of the product which is assumed to last into medium and long terms; the remaining portion is assumed to mature in the short term.[2]

[2] CBE circular "Development of liquidity management systems in banks"; March 2005

In practice

To illustrate the construction of liquidity gaps take the following four transactions executed at the end of December 2015 and convert them into two liquidity gaps; one as of end of December 2015 and the other as of end of January 2016.

Amounts [illegible]

Uses			Sources		
Account	**Amount**	**Description**	**Account**	**Amount**	**Description**
T-Bills	300	3-Mth at 9%	**Current Account**	800	Non [illegible] bearing, 70% of balance [illegible]re; the remaining is [illegible]y distributed in short term [illegible]
Commercial Loans	700	3-year floating loan priced at corridor + 2.5% and repriced every month	**CDs**	[illegible]200	[illegible]year fixed rate at 9%

EGP Liquidity Gap as of December 31, 2015

	Up to 1Mth	1-3 Mth	[illegible]-6	6-12 Mth	Over 12 Mth	Total
Assets:						1,000
T-Bills		300				300
Commercial Loans					700	700
Liabilities						1,000
Current Accounts*	20	40	60	120	560	800
CDs					200	200
Current	(20)	260	(60)	(120)	(60)	0
Cumulative	(20)	240	180	60	0	

*[illegible]ent [illegible]ount balance is distributed according to the historical study of maturity behavior as [illegible]:

	Up to 1Mth	1-3 Mth	3-6 Mth	6-12 Mth	Over 12 Mth	Total
Weight of ST/MT&LT			30%		70%	100%
Weight of tenors	1/12	2/12	3/12	6/12	1	300
Amount	800*30%*1/12	800*30%*2/12	800*30%*3/12	800*30%*6/12	800*70%*1	800

What about the EGP Liquidity Gap as of January 31, 2016?

Note that we moved one month ahead from the previous gap. This means that the four deals will appear in the 1month less tenor. This is usually called as the shifting effect and caused due to move in time. Shifting is an important feature of gaps and should be planned for.

Of course this is a simplified example. In practice all balance sheet items whether contractu or non-contractual are slotted into liquidity gaps according to its actual or modeled maturit Limits are set for both current and cumulative gaps.

Weighted Average Remaining Maturity (Effective Matur y)

On the level of total assets and liabilities or the level of each product, WARM measures the average remaining life in years, weighted by the balance in each tenor. Assume for simplicity that 30% of the balance of CDs will mature in 9 months while the remaining 70% will mature in 2 years, $CDs\ WARM = (0.3 * \frac{9}{12}) + (0.7 * 2) = 1.6$ years.

Limits per currency could be set to control the mismatch between assets and liabilities WARM.

Liquidity Stress Testing

Stress testing should be performed periodically or as warranted, assuming adverse developments pertaining to market wide or bank specific liquidity conditions.

Examples of liquidity stress testing scenarios include:

- Above historical average run-off on current and saving deposits.
- Simultaneous withdrawal of the balances of the 5, 10, or 20 largest depositors.
- Market wide economic/political disturbance.
- Negative ratings.
- Bank specific or countrywide credit rating downgrades.

Second – Management of Liquidity Risk

To manage the liquidity risk, a bank should at least do the following:

- Try to distribute the sources of fund over many tenors. Concentrating a large portion on a specific tenor or limited numbers of tenors could lead to excessive withdrawal at the time those funds become due.
- Match the sources and uses of fund and try to control the size of gap in each point of time.
- Forecast the future gap by accounting for budgeted growth and follow on market trends, to proactively identify the appropriate action plan in case unfavorable level of liquidity risk could be detected.
- Keep a sufficient portion of the bank's assets in a very liquid form.
- Optimize the level of cash kept in central vault, branches, ATMs and cash in transit. This is done by ensuring sufficient level of cash is available to meet the daily customer needs, while minimizing excess cash levels that represents an opportunity cost for the bank. Managing cash in a scientific way is essential to ensure this optimization, by conducting demographical analysis for branches needs and study the cash withdrawal behavior of clients. Encouragement of dealing through electronic means (e.g. credit cards) is highly recommended to minimize the cost of keeping unneeded levels of cash.
- Assessment of prepayment risk inherent in some products like CDs and early redemption of personal loans is required to be taken into account.
- Possible liquidity needs related to off-balance sheet accounts like letters of credit (LCs) and Letters of Guarantee (LGs) must also be considered. This is referred to as Contingent Liquidity Risk.

Third – Liquidity Crises and Bank Failures

Banks could face two forms of liquidity crises. The first is systematic crisis which disturbs the banking system in general and over which the bank has little, if any, control. The second is specific crisis (idiosyncratic crisis) which hits the bank individually due to its deteriorating liquidity profile. The risk of the later type could be minimized or completely avoided with sound and rigorous liquidity risk management practices.

Being in a liquidity crisis, events could escalate in a very fast manner and out the bank control that will eventually leads to bankruptcy. One of the most basic scenarios for the escalation of events begins with the bank facing a deep liquidity shortage; due to information leakage the shortage issue becomes known to the public. Customers who believe that their deposits are in danger, run to the bank's branches to withdraw their money. Now the bank becomes in a worse position as more liquidity is needed, which amplifies the original problem even more. Finally, the rest of customers who firstly thought the bank could withstand its problem enters in a phase of panic and rushes in large numbers into branches to get as much as they can from their deposits, which eventually leads to bank's failure.

Public trust is a prerequisite for a banking industry to function properly. That is why CBE reinforced and publicized its responsibility for guaranteeing 100% of customers' deposits in EGP and foreign currencies, to shield the banking sector from serious threat of failure with the general market disruption after January 25 revolution.

Contingency Funding Plan (CFP)

One of the most important tools that banks utilize to alleviate the effect of liquidity crisis is keeping an updated CFP. As it has been pointed out, even if the bank follows a very conservative approach regarding liquidity risk, it's still exposed to crisis threat from external factors (systematic crisis).

CFP details the procedures to be followed as the crisis becomes highly probable, during the crisis (Business Continuity Plan) and to restore business to normal conditions after the crisis (Disaster Recovery Plan). These procedures include:

- The triggers that will lead to put CFP into execution, also known as CFP activation triggers and their monitoring frequency (usually ongoing). Those triggers are quantitative and qualitative measures that uncover unacceptable level of deterioration in bank's liquidity profile and indicate a liquidity crisis is foreseen in the near future. Of the triggers are:
  - Output of stress tests showing unsteady and dangerous liquidity position
  - Elevated level of deposits run-off.
  - General market disruptions.
  - Widespread rumors that could cause public panic
- Responsible teams and their communication channels at each stage, and Alternate Site if needed; which is an alternate operating location to be used by business functions when the primary facilities are inaccessible.
- Specification of the spokesperson who is responsible for addressing the media and cool off the crowd.
- The most important part of the CFP is the one pertains to the dependable sources of funds that could be used during the crisis.
- The approving body, which should be Board Risk Committee (BRC), and frequency of review, which should be at least on annual basis.

Fourth – The Importance of Projecting the Sources and Uses of Funds

In managing its liquidity needs, analysis of the bank's existing status only (status quo analysis) is proved not to be sufficient. Projecting and forecasting the future liquidity needs is crucial for a successful liquidity risk management.

General considerations

- The prevailing economic conditions and potential market trends and their effects on both sources and uses of funds need to be methodically and comprehensively studied. Banks that followed the trend of CBE foreign currency reserves was in better place in anticipating the witnessed speculation on USD, and the resulting shortages in USD availability than banks that didn't.

Sources of funds considerations

- Diversification of sources of funds should be a central objective. This diversification could be thought of from many dimensions.
  - Tenor diversification is needed as discussed previously.
  - Size diversification means to avoid high concentrations of deposits sourced from a few customers; investing in developments in the 25 largest customers' balances is beneficial in this regard.
  - Product diversification lessens the possibility of sudden withdrawals due to the different liquidity natures of different products. Concerning this, and back to liquidity/earnings trade-off, CDs are less liquid than current accounts, but this come at higher cost.
- Keep and enhance strong relations with prime customers and maintain ample contingency overdraft lines with correspondent banks could be extremely constructive in special foreign currencies shortages.
- Wholesale funding (Interbank Takings) should not be treated as a normal source of fund, due to its undependability in case of systematic crisis.
- Creating loyalty among customers and ensuring a trustful market positioning is not an easy task but should be a strategic objective for the bank. Besides increasing the growth potential in general, this increases customers' confidence, hence, decreases the adverse effects from rumors, and strengthens banks' ability to bypass liquidity crises.

Uses of funds considerations

- Diversification by client and among various industries is an essential consideration. Some industries are pro-cyclical, others are counter-cyclical; diversifying adequately among such industries will level out the fluctuations in economic cycle, and ensure a steady stream of repayments over time.
- Projection of liquidity needs for deals in pipe line smooth the funding process.

Exercise: Measurement Techniques – Liquidity

Instructions:

1. *There are many techniques used to measure and manage the liquidity; list the discussed techniques and briefly describe how can they be used?*

Summary

In this module, you learned how to:

- Explain the role of ALM in managing liquidity risk
- Explain the trade-off between maintaining excess amounts of liquidity and earnings
- Describe the main techniques used in measuring and managing liquidity risk
- Describe types of liquidity crises and how it can lead to a bank failure
- Recognize the structure and components of an effective Contingency Funding Plan (CFP); including its triggers and the role of liquidity stress testing in this respect
- Express the importance of forecasting the sources and uses of bank's funds