Ch4 Chapter 12 ***Liquidity Risk***

***1-INTRODUCTION***

The previous Chapters examined how **the major problems** of *interest rate risk*, *market risk*, *credit risk*, *off-balance-sheet risk*, *operational and technology risk*, *foreign exchange risk*, and *sovereign risk* can threaten *the solvency* of an FI. This chapter looks at the problems created by ***liquidity risk***.

Unlike risks that threaten the very solvency of an FI, **liquidity risk** is a normal aspect of the everyday management of an FI. ***For example***, DIs must manage liquidity so they can pay out **cash** as deposit holders request withdrawals of their funds. Only in **extreme cases** do liquidity risk problems develop into solvency risk problems, where an FI cannot generate **sufficient cash** to pay creditors as promised.

***This chapter*** identifies **the causes of liquidity risk** on the **liability side** of an FI’s balance sheet as well as on **the asset side**.

We discuss ***methods used to measure an FI’s liquidity risk exposure*** ***نناقش الطرق المستخدمة لقياس تعرض الوسيط المالي لمخاطر السيولة*** and ***consequences of extreme liquidity risk*** (such as deposit or liability drains and runs) and briefly examine regulatory mechanisms put in place to ease liquidity problems and prevent runs on depository institutions.

\*\*\*\* **Moreover**, some FIs are more exposed to liquidity risk than others. At one extreme, ***depository institutions( Banks)*** are highly exposed; in the middle, ***life insurance companies*** are moderately expoed; and at the other extreme, mutual funds, hedge funds, pension funds, and property–casualty insurance companies have relatively low exposure. However, these FIs are certainly exposed to some liquidity risk.

 ***For example***,

* In September 2006, ***Amaranth Advisors***, *a hedge fund* with assets of $9.2 billion, **lost $6.5 billion** when its position in natural gas future contracts became too big to liquidate. When the fund’s creditors threatened to cut off credit due to Amaranth’s lack of funds, the hedge fund was forced to shut down.
* As well, the financial crisis of 2008 – 2009 was, in part; due to liquidity risk. We examine the reasons for liquidity risk differences.

**2*- CAUSES OF LIQUIDITY RISK (بصفة عامة )***

Liquidity risk arises for ***two reasons***: a liability-side reason and an asset-side reason.

* **The liability-side reason** occurs when ***an FI’s liability holders***, أصحاب الحقوق such as depositors or insurance policyholders, seek to **cash** in their financial claims immediately. When liability holders demand **cash** by withdrawing deposits, the FI needs to ***borrow additional funds*** or ***sell assets*** to meet the withdrawal. The most liquid asset is **cash**; FIs use this asset to pay ***claim holders*** who seek to withdraw funds. However, FIs tend to minimize their holdings of cash reserves as assets because those reserves pay no interest. To generate interest revenues, most FIs invest in less liquid and/or longer-maturity assets. While most assets can be turned into cash eventually, for some assets this can be done only at a high cost when the asset must be liquidated immediately. The price the asset holder must accept for immediate sale may be far less than it would receive with a longer horizon over which to negotiate a sale.

**Thus**, **some assets may be liquidated** only at low fire-sale prices, thus threatening

the solvency of the FI. Alternatively, rather than liquidating assets, an FI may seek

to purchase or borrow additional funds.

* **The second cause of liquidity risk is *asset-side liquidity risk***, such as the ability to fund the exercise of off-balance-sheet **loan commitments**. As we described before, a loan commitment allows ***a customer to borrow (take down) funds from an FI*** (over a commitment period) on demand. When a borrower draws on its loan commitment, the FI must fund the loan on the balance sheet immediately; this creates *a demand for liquidity*. As it can with liability withdrawals, an FI can meet such a liquidity need by ***running down its cash asset***s, selling off other liquid assets, or borrowing additional funds.

***To analyze the differing degrees of importance of liquidity risk across FIs***, we next consider **liquidity risk problems** faced by **depository institutions**, ***insurance companies,*** and ***mutual and pension funds.***

**Fire-sale price: The price received for an asset that has to be liquidated (sold) immediately.**

 ***عرض مشاكل خطر السيوله liquidity risk problems***

***3- LIQUIDITY RISK AT* DEPOSITORY *INSTITUTIONS (بصفة خاصة )***

Now we can discuss the Liquidity risk and its effect on both ***liability-side*** and ***asset-side*** as follows:-

***3.1- Liability-Side Liquidity Risk***

**A depository institution’s (DI’s) balance sheet** typically has ***a large amount*** of short-term liabilities, such as ***demand deposits*** and ***other transaction accounts***, which fund relatively long-term assets. Demand deposit accounts and other transaction accounts are contracts that give **the holders** the right to put their claims back to the DI on any given day and demand immediate repayment of the face value of their deposit claims in cash. Thus, **an individual** demand **deposit account** **holder** with a balance of $10,000 can demand cash to be repaid immediately, as can a corporation with $100 million in its demand deposit account. **In theory**, at least, a DI that has 20 percent of its liabilities in demand deposits and other transaction accounts must stand ready **to pay out that amount by liquidating** an equivalent amount of assets on any banking day.

**TABLE 17–1** **Assets and Liabilities of U.S. Banks, June 2006** (in billions of dollars)

 **Assets Liabilities**\*

*Total cash assets* $ 397.6 4.14% *Total deposits $6,383.0 73.96%*

Total securities 2,731.1 28.44 Borrowings 1,954.3 22.64

Total loans 5,589.3 58.21 Other liabilities 293.2 3.40

Other assets 884.3 9.21 **Total liabilities $8,630.5**

**Total assets $9,602.3**

\*Excluding bank equity capital.

**Table 17–1** shows **the aggregate balance sheet of the assets and liabilities of U.S. commercial banks.** As seen in this table, *total deposits are 73.96* percent of total liabilities (with 3.40 percent **demand deposits** and other transaction accounts). By comparison, ***cash assets*** *are only 4.14* percent of total assets. Also note that ***borrowed funds*** are 22.64 percent of total liabilities.

In reality, *a depository institution* knows that normally only a small proportion of its deposits will be withdrawn on any given day. Most **demand deposits** act as **consumer core deposits** on a day-by-day basis, providing a relatively stable or long-term source of savings and time deposit funds for the DI.

**Moreover,** ***deposit withdrawals*** may in part be offset by *the inflow of new deposits* (and income generated from the DI’s on- and off-balance-sheet activities). **The DI manager** must monitor the resulting **net deposit withdrawals** or net deposit drains. Specifically, over time, a DI manager can normally predict—with a good degree of accuracy—**the probability distribution of** **net deposit drains** (the difference between **deposit withdrawals** and **deposit additions**) on any given normal banking day.

**Consider** ***the two possible distributions*** shown ***in Figure 17–1***.

 **In panel (A) of Figure 17–1** , *the distribution is assumed to be strongly* ***peaked*** at the 5 percent **net deposit withdrawal level—**this DI expects approximately 5 percent of its **net deposit funds** to be withdrawn *on any given day* with the highest probability.

FIGURE 17–1 Distribution of Net Deposit Drains



**TABLE 17–2 Effect of Net Deposit Drains on the Balance Sheet**

 **(in millions of Dollars )**

**Panel A**: ***Balance Sheet Immediately before and after Deposit Drainاستنزاف او سحب الودائع***

 **Before the Drain After the Drain**

 ***Assets*** ***Liabilities*** ***Assets*** ***Liabilities***

Assets 100 Deposits 70 Assets 100 Deposits 65

 Borrowed funds 10 Borrowed funds 10

 Other liabilities 20 Other liabilities 20

 100 100 100 95

**Panel B:** ***Adjusting to a Deposit Drain استنزاف الودائع through Liability Management***

 ***Assets*** ***Liabilities***

Assets 100 Deposits 65

 يشترى سيوله هنا مدير المؤسسه Borrowed funds 15 ***Purchased Liquidity***

 Other liabilities 20

 **100** **100**

**In panel (A**) a net deposit drain means that the DI is receiving ***insufficient*** additional deposits(and other cash inflows) to offset deposit withdrawals. The DI in **panel (a)** has a mean, or expected, **net positive drain** on deposits, so its new deposit funds and other cash flows are expected to *be insufficient* to offset deposit withdrawals. *The liability side of its balance sheet* is contracting. Table 17–2 illustrates an actual 5 percent net drain of deposit accounts (or, in terms of dollars, a drain of $5 million).

***\*\*\*\*For a DI to be growing***, it must have ***a mean*** or ***average deposit drain*** such that new deposit funds ***more than*** offset deposit withdrawals. **Thus**, the peak of the net deposit drain probability distribution would be at a point to the left of zero. See the - 2 percent in **panel (b)** in Figure 17–1 , where the distribution of net deposit drains is peaked at - 2 percent, or the FI is receiving net cash inflows with the highest probability.

 How DI Manager mange the ***deposit drain؟ أو سحب استنزاف الودائع***

***A DI can manage* a drain on deposits** in ***two*** ***major ways***:

 (1) purchased liquidity management and/or

 (2) stored liquidity management.

**Traditionally**, DI managers have relied on *stored liquidity management* as the primary mechanism of liquidity management. **Today**, many DIs—especially the largest banks with access to the money market and other no deposit markets for funds—rely on purchased liquidity (or liability) management to deal with ***the risk of cash shortfalls***. We can briefly discuss *the alternative methods of liquidity risk management* as follows:-

1. ***Purchased Liquidity Management***

A DI manager who purchases liquidity turns to the markets for purchased funds,

such as **the federal funds market** and/or the repurchase agreement markets, which are **interbank markets** for short-term loans. ***Alternatively***, the **DI manager** could issue additional fixed-maturity wholesale certificates of deposit or even sell some notes and bonds. ***For example***, Table 17–2 , **panel A** shows a DI’s balance sheet immediately before and after **a deposit drain of $5 million**. As long as the total amount of funds raised equals $5 million, the DI in Table 17–2 could fully fund its net deposit drain. However, this can be ***expensive for the DI*** since it is paying market rates for funds in the wholesale money market to offset net drains on low-interest-bearing deposits. Thus, the higher the cost of purchased funds relative to the rates earned on assets, the less attractive this approach to liquidity management becomes. **Further**, since most of these funds are not covered by deposit insurance, their availability may be limited should the depository institution ***incur insolvency*** difficulties. **Table 17–2** , **panel B,** shows the DI’s balance sheet if it responds to deposit drains by using purchased liquidity management techniques.

***ملحوظه هامه***

***Note that*** purchased **liquidity management** has allowed the DI to maintain its overall balance sheet size of $100 million without disturbing the size and composition of the asset side of its balance sheet—*that is*, the complete adjustment to the deposit drain occurs on the liability side of the balance sheet.

**Purchased liquidity management:** An adjustment to a deposit drain that occurs on the liability side of the

 balance sheet.

1. ***Stored Liquidity Management***

Instead of meeting the net deposit drain by purchasing liquidity in the wholesale

money markets, the DI could use stored liquidity management. **That is**, the FI could ***liquidate some of its assets***, utilizing its stored liquidity. Traditionally, U.S. DIs have held **stored cash reserves** only at the **Federal Reserve** and in their vaults خزائنfor this very purpose. The Federal Reserve sets minimum reserve requirements for the cash reserves banks must hold. Even so, على الرغم من ذلك, DIs still tend to hold cash reserves in excess of the minimum required to meet liquidity drains. ***As an example***, the United Kingdom has no official central bank–designated cash reserve requirements; even so, banks still hold 1 percent or more of their assets in cash reserves.

***TABLE 17–3 Composition of the DI’s Balance Sheet (in millions of dollars)***

**Panel A:** ***Balance Sheet Immediately before Deposit Drain***

 Assets Liabilities

Cash 9 Deposits 70

Other assets 91 Borrowed funds 10

 Other liabilities 20

 100 100

**Panel B:** ***Adjusting to a Deposit Drain through Stored Liquidity Management***

 ***Assets Liabilities***

Cash 4 ) *بعد* *اخذ 5 من الاحتياطى* (Deposits 65

Other assets 91 Borrowed funds 10

 Other liabilities 20

 95 95

Suppose, in our example, that on the asset side of the balance sheet the DI normally holds $9 million of its assets in cash (of which $3 million are to meet Federal Reserve minimum reserve requirements and $6 million are in an “excess” cash reserve). We depict the situation before the net drain in liabilities in Table 17–3 , **Panel A**. As depositors withdraw $5 million in deposits, the DI can meet this directly by using the excess cash stored in its vaults or held on deposit at other DIs or at the Federal Reserve. If the reduction of $5 million in deposit liabilities is met by a $5 million reduction in cash assets held by the DI, its balance sheet will be as shown in Table 17–3, Panel B.

When the DI uses **its cash** as the liquidity adjustment mechanism, both sides of its balance sheet contract. ***In this example***, the DI’s total assets and liabilities shrink from $100 to $95 million. The cost to the DI from using stored liquidity, apart from decreased asset size, is that it must hold excess non-interest-bearing assets in the form of cash on its balance sheet. Thus, the cost of using cash to meet liquidity

needs is the forgone return (or opportunity cost) of being unable to invest these funds in loans and other higher-income-earning assets.

***ملحوظة هامة***

***Finally***, note that while *stored liquidity management* and *purchased liquidity management* are alternative strategies *for meeting deposit drains*, a **DI** can **combine the two methods** by using some purchased liquidity management and some stored liquidity management to meet liquidity needs.

**Stored liquidity management: An adjustment to a deposit drain that occurs on the asset side of the balance sheet**

***3.2- Asset-Side Liquidity Risk***

Just as deposit drains can cause a DI liquidity problems, so can **loan** requests and the exercise by borrowers of their loan commitments and other credit lines.

وكذلك يمكن لطلبات القروض وممارسة المقترضين لالتزامات قروضهم وخطوط الائتمان الأخرى

In recent years, DIs, especially *commercial banks*, have increased their loan commitments tremendously, with the belief they would not be used.

**A recent study by regulators** found that banks’ unused loan commitments to”on-hand liquidity” (such as deposit accounts and CDs) grew from a ratio of 3.5 in 1994 to 11 in the early 2000s. Thus, ***loan commitments*** ***outstanding*** are dangerously high for banks and other DIs. **Table 17–4 , *Panel A*, s**hows the effect of a $5 million exercise of a loan commitment by a borrower. **As a result**, the DI must fund $5 million in additional loans on the balance sheet. Consider **part (a**) in **Table 17–4 , Panel A,** (the balance sheet before the commitment exercise) and **part (b**) (the balance sheet after the exercise). In particular, the exercise of the loan commitment means that the DI needs to provide $5 million in loans immediately to the borrower (other assets rise from $91 to $96 million). This can be done either by purchased liquidity management (borrowing an additional $5 million in the money market and lending these funds to the borrower) or by stored liquidity management (decreasing the DI’s excess cash assets from $9 million to $4 million). We present these two policies in Table 17–4 , Panel B.

**TABLE 17–4 Effects of a Loan Commitment Exercise (in millions of dollars)**

**Panel A: Balance Sheet Immediately before and after Exercise**

1. **Before Exercise (b) After Exercise**

 ***Assets Liabilities Assets Liabilities***

Cash 9 Deposits 70 Cash 9 Deposits 70

Other assets 91 Borrowed funds 10 Other assets 96 Borrowed funds 10

 Other liabilities 20 Other liabilities 20

 100 100 105 100

**Panel B: Adjusting the Balance Sheet to a Loan Commitment Exercise**

 **(a) Purchased Liquidity Management (b) Stored Liquidity Management**

 Assets Liabilities Assets Liabilities

Cash 9 Deposits 70 Cash 4 Deposits 70

Other assets 96 Borrowed funds 15 other assets 96 Borrowed funds 10

 Other liabilities 20 Other liabilities 20

 105 105 100 100

***4- Measuring a DI’s Liquidity Exposure***

There are ***some methods for measuring liquidity***, but before we indicate these methods, we can determine ***the Sources and Uses of Liquidity*** as follows:-

**4.1 Sources and Uses of Liquidity**

As discussed above, **a DI’s liquidity risk** arises from ongoing conduct of business such as **a withdrawal of deposits** or from **new loan demand**, and the subsequent need to meet those demands through liquidating assets or borrowing funds.

) الطريقه الأولى **DI’s net liquidity position.(**

 ***a net liquidity statement*** يقوم المدير بعمل

Therefore, ***a DI manager*** must be able to measure *its liquidity position on* ***a daily basis,*** *if possible.* A useful tool is ***a net liquidity statement*** that lists sources and uses of liquidity and thus provides a measure of a DI’s net liquidity position. Such a statement for a hypothetical U.S. money center bank المركز المالى الافتراضي للبنك is presented in Table 17–6.

***The DI can obtain liquid funds*** in ***three*** ways.

 **First**, it can ***sell its liquid assets such as T-bills*** immediately with little price risk and low transaction cost.

 **Second,** it can ***borrow funds*** in the money/purchased funds market up to a maximum amount (this is an internal guideline based on the manager’s assessment of the credit limits that the purchased or borrowed funds market is likely to impose on the DI).

**Third**, it can ***use any excess cash reserves*** over and above the amount held to meet regulatory imposed reserve requirements.

**In Table 17–6**, the DI’s sources of liquidity total $14,500 million. Compare this with the DI’s uses of liquidity, in particular the amount of borrowed or purchased funds it has already utilized (e.g., fed funds, RPs borrowed) and the amount of cash it has already borrowed from the Federal Reserve through discount window loans. These total $7,000 million.

**TABLE 17–6 Net Liquidity Position (in millions of dollars)**

**Sources of Liquidity**

1. Total cash-type assets $ 2,000

2. Maximum borrowed funds limit 12,000

3. Excess cash reserves 500

 Total $14,500

**Uses of Liquidity**

1. Funds borrowed $ 6,000

2. Federal Reserve borrowing 1,000

 Total 7,000

 ***Total net liquidity******$ 7,500***

 ما يجب على DI Manger عمله

***As a result,*** the DI has ***a positive net liquidity position of $7,500 million***. ***These***

***liquidity sources and uses*** can be easily tracked on تتبع مصادر السيولة والاستخداماتa day-by-day basis.

The net liquidity position in Table 17–6 lists management’s expected sources and

uses of liquidity for a hypothetical money center bank المركز المالى الافتراضي للبنك. *All FIs report their historical sources and uses of liquidity in their annual and quarterly* *reports*.

***ملحوظة هامه***

As an FI manager deals with liquidity risk, *historical sources and uses of liquidity statements* can assist the manager in determining where future liquidity issues may arise.

 طرق قياس السيوله ***Measuring a DI’s Liquidity Exposure***

 **الطريقه الثانيه**

***4.2 Peer Group Ratio Comparisons مقارنات النسب في بنوك أخرى مثيله***

**Another way** **to measure a DI’s liquidity exposure** is to compare ***certain key*** ***ratios*** and balance sheet features of the DI—such as

1. its loans to deposits,
2. borrowed funds to total assets, and
3. commitments to lend to assets ratios—with those of DIs of a similar size and geographic location.

**A high ratio** **of loans to deposits** and **borrowed funds to total assets** means that the DI relies heavily on **the short-term money market** rather than on **core deposits** to fund loans. This could mean future liquidity problems if the DI is at or near its borrowing limits in the purchased funds market.

**Similarly**, **a high ratio of loan commitments to assets** indicates the need for a *high degree of liquidity to fund any unexpected takedowns of these loans*—high- commitment DIs often face more liquidity risk exposure than do low-commitment DIs.

***Example***

**Table 17–7 lists** the September 2006 values of **these ratios for two banks**: Northern Trust Bank (NT) and Bank of America (BOA). BOA (a money center bank) relies on borrowed funds more heavily than does NT (a non–money center bank). The banks’ ratios of borrowed funds to total assets were 20.06 percent for NT and 31.47 percent for BOA. Their ratios of core deposits (the stable deposits of the FI, such as demand deposits, NOW accounts, MMDAs, other savings accounts, and retail CDs) to total assets, on the other hand, were 58.36 percent and 38.51 percent for NT and BOA, respectively.

***As a major***, money center bank, BOA gets more of its liquid funds from the borrowed funds markets than core deposit markets.

**TABLE 17–7 Liquidity Exposure Ratios for Two Banks, 2006 Values**

 ***Northern Trust Bank Bank of America***

Borrowed funds to total assets 20.06% 31.47%

Core deposits to total assets 58.36 38.51

Loans to deposits 55.60 53.27

Commitments to lend to total assets 34.18 93.08

**Northern Trust**, a smaller, non–money center bank, uses core deposits much more

than borrowed funds to get its liquid funds. **الخلاصه*The result is*** that BOA is subject to greater liquidity risk than NT. Furthermore, **NT** had a ratio of loan commitments (or credit lines) to total assets of 34.18 percent, while **BOA** had a much greater ratio of 93.08 percent. If these commitments are “taken down سحب” (see Chapter 13), BOA must come up with the cash to fulfill these commitments, more so than NT.

 ***خلاصة القول***

**Thus**, BOA is exposed to substantially greater liquidity risk than NT from unexpected takedowns of loan commitments by its customers.

**الطريقه الثالثه**

***4.3 Liquidity Index مؤشر السيولة***

***A third way to measure liquidity risk*** is to use ***a liquidity index***. Developed by **Jim**

**Pierce** *at the Federal Reserve*, ***this index*** *measures the potential losses an FI could*

*suffer from a sudden or fire-sale disposal of assets compared with the amount it*

*would receive at a fair market value established under normal market (sale) conditions*—which might take a lengthy period of time as a result of a careful search and bidding process.

The greater the differences between immediate fire-sale asset prices (P i) and fair market prices (PI \*), the less liquid is the DI’s portfolio of assets كلما قلت السيولة في محفظة أصول الشركة .

Define **an index I** such that:

 I =  ***Liquidity Index*** formula

where w i is the percent of each asset in the FI’s portfolio:

  = 1

***ملحوظه هامه***

**The liquidity index** will always lie between 0 and 1. The liquidity index for this DI could also be compared with similar indexes calculated for ***a peer group of similar DIs.***

**liquidity index** A measure of the potential losses an FI could suffer as the result of sudden (or fire-sale) disposal of assets. التصرف المفاجئ (أو البيع المحروق) للاصول

***EXAMPLE 17–1 Calculation of the Liquidity Index***

*Suppose that a DI has* ***two assets****: 50 percent in one-month Treasury bills and 50 percent in real estate loans. If the DI must liquidate its T-bills* ***today*** *(P1), it receives $99 per $100 of face value; if it can wait to liquidate them on maturity (in* ***one month’s time****), it will receive $100 per $100 of face value ( P1 \*). If the DI has to liquidate its real estate loans today, it receives $85 per $100 of face value (P2); liquidation at the end of one month (closer to maturity) will produce $92 per $100 of face value (P2 \*).*

*Thus, the one-month liquidity index value for this DI’s asset portfolio is:*

 *I = [1/2 (0.99 / 1.00 )] [1/2 (0.85 /0.92 )]*

 *= 0.495 + 0.462*

 *= 0.957*

***Suppose, alternatively****, that* ***a slow or thin real estate market*** *caused the DI to be able to liquidate the real estate loans at only $65 per $100 of face value (P2). The one-month liquidity index for the DI’s asset portfolio is:*

 *I = [1/2 (0.99 / 1.00)] [1/2 (0.65 /0.92)]*

 *= 0.495 + 0.353*

 *= 0.848*

***الخلاصه***

***The value of the one-month liquidity index*** *decreases(from0.957 to 0.848) as a result of* ***the larger discount on* the fire-sale price*—from the fair (full value) market price of real estate—****over the one-month period. The larger the discount from fair value, the smaller the liquidity index or higher the liquidity risk the DI faces.*

**الطريقه الرابعه**

***4.4 Financing Gap and the Financing Requirement***

***A fourth way to measure liquidity risk exposure*** is to determine ***the DI’s financing gap.***

As we discussed earlier, even though **demand depositors** can withdraw their funds immediately, they do not do so in normal circumstances. ***On average***, most demand deposits stay at DIs for quite long periods—often two years or more. Thus,

a DI manager often thinks of ***the average deposit base***, including *demand deposits,*

*as a core source of funds* that over time can fund a DI’s average amount of loans.

 **كيف تحدد *financing gap***

We define ***a financing gap*** as the difference between a DI’s average loans and

average (core) deposits, or:

 ***Financing gap Average = loans - Average deposits***

If this financing gap is **positive**, the DI must fund it by using its cash and liquid

assets and/or borrowing funds in the money market. Thus:

 ***Financing gap = - Liquid assets + Borrowed funds***

We can write this relationship as:

***Financing gap + Liquid assets = Financing requirement (borrowed funds)***

As expressed in this fashion, the liquidity and managerial implications of the financing requirement (the financing gap plus a DI’s liquid assets) are that ***the level***

***of core deposits and loans*** as well as ***the amount of liquid assets*** determines the DI’s borrowing or purchased fund needs. ***In particular***, the larger a DI’s financing gap and liquid asset holdings**,** the larger the amount of funds it needs to borrow in the money markets and the greater is its exposure to liquidity problems from such a reliance.

 **The balance sheet in Table 17–8** indicates the relationship between the financing gap, liquid assets, and the borrowed fund-financing requirement. See also the following equation:

 ***Financing gap + Liquid assets = Financing requirement (borrowed funds)***

 ***($5 million) ($5 million) ($10 million)***

**A widening financing gap can warn of future liquidity problems for a DI** since

it may indicate increased deposit withdrawals (core deposits falling below $20

million in Table 17–8 ) and increasing loans due to increased exercise of loan commitments (loans rising above $25 million). If the DI does not reduce its liquid

assets—they stay at $5 million—the manager must resort to more money market borrowings. As these borrowings rise, sophisticated lenders in the money market may be concerned about the DI’s creditworthiness. They may react by imposing higher risk premiums on borrowed funds or establishing stricter credit limits by not rolling over funds lent to the DI. I**f the DI’s financing requirements exceed such limits, it may become *insolvent*.** *A good example* of an excessive financing requirement resulting in bank insolvency was the failure of Continental Illinois in 1984. This possibility of insolvency also highlights the need for DI managers to engage in active liquidity planning to avoid such crises.

**TABLE 17–8 Financing Requirement of a DI (in millions of Dollars)**

 **Assets Liabilities**

Loans $25 Core deposits $20

Liquid assets 5 Financing requirement 10

 \_\_\_ (borrowed funds)\_\_\_

Total $30 Total $30

***- Liquid assets + Borrowed funds وهى تساوى من المعادله السابقه*** Financing gap 5

**طرق أخرى جديده**

***5- New liquidity Risk Measures implemented by Bank for International Settlements*** بنك التسويه الدوليه

 **D**uring the **financial crisis**, many DIs struggled to maintain **adequate liquidity**.

**Indeed**, extraordinary levels of liquidity assistance were required from ***central banks*** in order to maintain the financial system. Even with this extensive support, a number of DIs failed or were forced into mergers. Recognizing the need for DIs to improve their liquidity risk management and control their liquidity risk exposures, *the bank for* *international Settlement’s* ***Basel Committee*** *on Banking Supervision*

 لجنة بازل للتسوية الدولية للرقابة المصرفية في بنك التسويه الدوليه developed ***two new regulatory standard for liquidity risk supervision***. The standards are intended to “ *enhance tools*, *metrics*, and *benchmarks* that supervisors can use to assess the resilience المرونة of banks’ liquidity cushions والغرض من هذه المعايير هو "تعزيز الأدوات والمقاييس والمعايير التي يمكن أن يستخدمها المشرفون لتقييم مرونة وسائد السيولة لدى البنوك

any weakening in liquidity maturate profiles, diversity of funding sources and stress testing practices.

***The two new liquidity ratio*** to be maintained by DIs are

* ***The liquidity coverage ratio*** **(LCR)** (beginning in 2015 and to be fully implemented in 2019) and
* ***A net stable funds ratio*** (to be implemented in 2018).

Here we will discuss just only **the first method** (i.e. **(LCR)**.

***Liquidity Coverage Ratio (LCR)***

**Liquidity Coverage Ratio (LCR)** aims to ensure that a DI maintains *an adequate level of high quality assets* that can be ***converted into cash*** to meet *liquidity needs for a 30-day time horizon under an “acute liquidity* stress scenario “specified by supervisors.

Maintenance of the LCR intended to ensure that DIs can survive a severe liquidity stress scenario for at least 30 days.

 *Stock of high quality liquid assets*

***Liquidity Coverage Ratio = ---------------------------------------------------------------------------------***

 *Total net cash outflows over the next 30 calendar days*

***We can identify this ratio as follows:-***

1. *the numerator*

***The stock of high quality liquid assets*** (**the numerator of the LCR)** is defined as follows:

* Liquid assets must remain liquid in time of stress (i.e., convertible into cash at little loss of value and can be used at the central bank discount window as collateral).
* Liquid assets are divided into *level 1* and *level 2*. Level 1 amount ***has no cap*** **ليس له سقف**, **level 2** amount is capped at 40 percent of total liquidity asset.

 Level 1= cash + central bank reserves + Sovereign debt

 Level 2A = (Mortgage –backed securities that are government

 Guaranteed ) + (corporate bonds [plain vanilla] rated at least AA-)

 Level 2B = (Residential Mortgage – backed securities that are not

 government guaranteed) + lower rated corporate bonds [plain

 vanilla] + (Blue chip equities)

* *A minimum 15 percent “haircut*” has to be applied to the value of each level 2 asset. ( على الأقل يستقطع 15% من level 2 )
* Level 2B assets may not account for more than 15 percent of a bank’s stock of high-quality liquid assets.
* Level 2 assets may not, in aggregate, account for more than 40 percent of a bank’s stock of high-quality liquid assets.
1. ***the denominator***

***Total net cash outflows*** (**the denominator of the ratio**) is defined as:

Total net cash outflows over the next 30 calendar days = Outflows - Min (inflows; 75% of out flows)

Where **cash outflows** and **inflows** are defined **in table 17.9.**

***Example***

***Example 17.2*** **Calculation of** **Liquidity Coverage Ratio**

 One Bank has the following **balance sheet** (in million dollars). Cash inflows over the next 30 days from the bank’s performing assets $ 5 million.

 ***Liquidity نسب السحب) ) Run- off***

***Assets level Liabilities and Equity Factor***

*Cash $10 level 1 stable retail deposits $95 3%*

*Deposits at the fed 15 level 1 less stable retail deposits 40 10*

*Treasury securities 100 level 1 unsecured wholesale funding from*

*GNMA securities 75 level 2A stable small business deposits 100 5*

*Loans to A rated corporations 110 level 2A less stable small business deposits 80 10*

*Loans to B rated corporations 85 level 2B Nonfinancial corporates 50 75*

*Premises 15 Equity 45*

***Total 410 $410***

**The Liquidity Coverage Ratio for One Bank is calculated as follows:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SOLUTION**

*Level 1 assets = $10 + $15 +$100= $125*

*Level 2A assets = ($75 + $110) × 0.85 =$157.25 capped at 40% of level 1 = $125 × 0.40 = 50*

*Level 2B assets = ($85 × 0.85(= $72.25 40% cap on level 2 assets already met ---*

***Stock of highly liquid assets $175***

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Cash outflows:*

*Stable retail deposits $95 × 0.03 = $2.85*

*Less stable retail deposits 40 × 0.10 = 4.00*

*Stable small business deposits 100 × 0.05 = 5.00*

*Less stable small business deposits 80 × 0.10 = 8.00 Nonfinancial corporates 50 × 0.75 = 37.50*

***Total Cash outflows over next 30 days $57.35***

*Total Cash inflows over next 30 days في الميزانيه $5.00*

**Total net Cash outflows over next 30 days $52.35**

***Liquidity Coverage Ratio = 175m/ $52.35 =334.29 % .The bank is in compliance with liquidity requirements based on the LCR.***

 ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_البنك في الامتثال لمتطلبات السيولة على أساس LCR. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

**Table 17.9** **Cash outflows and inflows** used in the ***Liquidity Coverage Ratio(LCR)***

***Cash outflows included in the LCR***

* **Retail deposit = stable + less stable**

**Stable =Deposit covered by deposit insurance (receive a minimum run –off factor of 3 %)**

 **less stable = Deposit not covered by deposit insurance ( receive a minimum run –off factor of 10 %)**

* **retail deposits with maturity > 30 days and no early withdrawals (0 % run –off factor)**
* **all unsecured wholesale funds with < 30 days maturity ( i.e., callable by funds provider) (100%run –off factor)**
* **secured funds backed by level 1 assets (0 % run –off factor) backed by level 2 assets(15%run –off factor)**
* **Loss of funding on commercial paper if maturity < 30 days (100 % run –off factor)**
* **All debt maturity within 30 days (100 % run –off factor)**
* **Loan commitment (draw-down) factors:**

 **- 5% draw-downs on committed credit and liquidity facilities to retail and small business customers**

 **- 10% draw-downs on committed credit facilities to financial corporate, sovereign and central banks, public-sector entities**

 **,and multilateral development banks.**

 **-30% draw-downs on committed liquidity facilities to nonfinancial corporate, sovereign and central banks, public-sector**

 **entities ,,and multilateral development banks.**

 **-40% draw-downs on committed credit and liquidity facilities to other legal entities. These entities include financial**

 **institutions (e.g. banks, securities firms and insurance companies), conduits and special – purpose vehicles, and**

 **fiduciaries beneficiaries.**

* **Cash outflows related to operating costs (0 % run –off factor)**

***Cash inflows included in the LCR***

* **Only include inflows for sources where no default is expected in next 30 days**
* **There is a 75 % cap on inflows meeting outflows so DIs do not just rely of inflows for liquidity.**
* **Assume that no lines of credit on other banks can be drawn on( 0% inflow)**
* **Assume 100 % inflow received on wholesale loans and 50 % inflow on retail loans from counterparties.**
* **100 % inflow on known derivative payments.**

***6- LIQUIDITY RISK AND LIFE INSURANCE COMPANIES***

Depository institutions are not the only FIs exposed to liquidity risk or run problems.

Like DIs, life insurance companies hold cash reserves and other liquid assets to meet policy cancelations (surrenders) and other working capital needs that arise in the course of writing insurance. The early cancelation of an insurance policy results in the insurer’s having to pay the insured **the surrender value** of that policy. In the normal course of business, premium income and returns on an insurer’s asset portfolio are sufficient to meet the cash outflows required when policyholders cash in or surrender their policies early. As with DIs, the distribution or pattern of premium income minus policyholder liquidations is normally predicable.

 When premium income is insufficient to meet surrenders, however, **a life insurer** can sell some of its relatively liquid assets, such as ***government bonds***. In this case, bonds act as **a buffer** or reserve asset source of liquidity for the insurer.

Nevertheless, concerns about ***the solvency of an insurer*** can result in a run in which ***new premium income dries up*** and existing policyholders seek to cancel their policies by cashing them in early. To meet exceptional demands for cash, a life insurer could be forced to liquidate the other assets in its portfolio, such as ***commercial mortgage loans*** and ***other securities***, potentially ***at fire-sale prices***. As with DIs, forced asset liquidations can push an insurer into insolvency.

***Surrender value****: The amount received by an insurance policyholder when cashing*

 *in a policy early*

***7- LIQUIDITY RISK AND PROPERTY–CASUALTY INSURERS***

Property–casualty (PC) insurers sell ***policies*** insuring against ***certain contingencies*** impacting either real property or individuals. Unlike those of life insurers, PC contingencies (and policy coverages) are relatively short term, often one to three years. With the help of ***mortality tables***, claims on life insurance policies ***are generally predictable***. **PC claims** (such as those associated with natural disasters), however, ***are virtually impossible to predict***.

**As a result**, PC insurers’ assets tend to be shorter term and more liquid than those of life insurers. PC insurers’ contracts and premium-setting intervals are usually relatively short term as well, so problems caused by policy surrenders are less severe.

PC insurers’ greatest liquidity exposure occurs when policyholders cancel or fail to renew policies with an insurer because of insolvency risk, pricing, or competitive reasons. This may cause ***an insurer’s premium cash inflow***, when added to its investment returns, to be insufficient to meet policyholders’ claims. **Alternatively**, large unexpected claims may materialize and exceed the flow of premium income and income returns from assets. Disasters such as Hurricane Andrew in 1991 and Hurricane Katrina in 2005 have caused severe liquidity crises and failures among smaller PC insurers.

***8- Summary***

Liquidity risk, as a result of heavier-than-anticipated liability withdrawals or loan commitment exercise, is a common problem faced by FI managers. Well-developed

policies for holding liquid assets or having access to markets for purchased funds are normally adequate to meet liability withdrawals. However, very large withdrawals can cause asset liquidity problems that can be compounded by incentives for liability claim holders to engage in runs at the first sign of a liquidity problem. These incentives for depositors and life insurance policyholders to engage in runs can push normally sound FIs into insolvency. Mutual funds are able to avoid runs because liabilities are marked to market so that losses are shared equally among

Liability holders. Since such insolvencies have costs to society as well as to private shareholders, regulators have developed mechanisms such as deposit insurance and the discount window to alleviate liquidity problems.