CHAPTER 1

Funding and Market Liquidity

We introduce funding liquidity risk in this first chapter and the stance of some regulators on the controls expected. The first section highlights some facts, events and changes in market conditions that have increased the importance of this risk type, so relevant in recent years. It should also provide an overview of the challenges that banks' treasury functions will face and will suggest how a financial institution could address and possibly manage them, in particular when one is experiencing stressed, difficult market conditions. The second section presents some indications on the management of liquidity funding risk, based on the author's experience and lessons learnt. The third and longest section describes and comments on regulatory frameworks – focusing on the International Basel Committee, EBA, PRA, USA FED – on liquidity and funding liquidity requirements and indications.

1.1 LIQUIDITY IN THE FINANCIAL MARKETS

Like seatides going up and down, the financial markets history shows a recurrence of events and conditions can be seen as recursive. Further, we can see that something influential at times of abundance

becomes suddenly crucial and pricey under other market conditions that are stable, and prices that are reliable when the tide goes out could then change substantially as it comes in. So it was, for example, in the money markets and interbank lending, with the exchange of deposits and funds amongst banks and companies, and then across government and countries. The term liquidity risk can refer to different aspects of risk exposure, indeed though generically indicated as liquidity, one has quite a range of exposures. Possibly, the first distinction we want to make is that between trading versus banking book liquidity exposure, the market liquidity risk and funding liquidity risk. We can define market liquidity risk as the impact on the price of an asset when one disposes of it onto the market/liquidates it. The varying market conditions at the moment of the liquidation of that specific asset are commonly addressed as market liquidity risk or liquidity at risk and this is usually an additional risk element of the overall market risk that takes specifically into account the cost of selling or trying to sell the whole stock of a specific asset. It is quantified in terms of changes in the bid-ask spread and asset price itself as a result of the sale. While many markets are very liquid and deep, this is not the case for some securities and markets, and situations vary depending on market conditions as stress market conditions and rating deterioration will have a great impact. Funding liquidity risk is instead conceptually related to the banking book and the bank's capacity to ensure its payment obligations as due contractually. This is also referred to as the refinancing risk (Figure 1.1 below presents the European Central Bank official refinancing rate from March 2008 through March 2013) and it can be divided, in turn, into short-term refinancing – where banks have to meet deadlines in a few days or a few months, sometimes having to ensure balancing of cash inflows and outflows of billions – and that of long-term equilibrium or imbalances in funding maturity profiles and invested assets.

For banks, liquidity represents the capacity to secure the necessary funding, either through attracting deposits – wholesale or

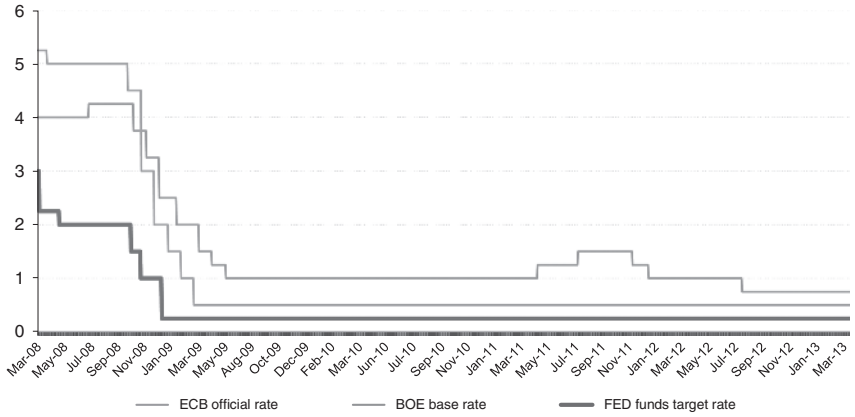

FIGURE 1.1 Central banks' official rates.
Source: ECB, BoE, FED.

individual – or from their own immediately available cash or through pledging unencumbered assets to other financial institutions that can easily be converted into cash in the markets. Banks' current operations also generate income flows that can be considered for liquidity ends, as any means of attracting additional inflows over time can also be considered part of banks' cash sources.

So then, liquidity risk is the diminished capacity to gather cash against payment needs in normal market conditions. The capacity for meeting financing obligations ought to include sudden reductions in funding capacity or unexpected peaks in cash demands. The assets available for funding capacity should be sufficient to offset the net outflow in both normal conditions and during financial market crises; the available counterbalancing capacity is a measure of banks' refinancing, buffers or liquidity reserve that will permit banks to tackle unexpected adverse net cash flows. However, on the government side, systemic risk is the paramount risk; sudden deposit runs and withdrawals may require larger buffers than banks might desire in terms of risk appetite and cost efficiency.

Banks' liquidity buffers encompass cash and securities, kept to sustain liquidity needs in periods of market stress: these consist of

cash and other unencumbered stocks and allow them to meet payments in critical market conditions, setting also a target minimum survival period. One should build counterbalancing capacity during normal market conditions, therefore anticipating this complexity when a liquidity crisis heats up is a core part of regular liquidity refinancing and target plans, balancing the cash inflows and outflows to guarantee adequate sources of funding are provided and appropriately used.

Regulators typically address both sides of the balance sheet and the importance of timing: liquidity becomes the ability to make payments as they fall due and to ensure asset growth or lending renewal. More recently, there has been a focus on the negative impact on earnings and capital. Regulators may differentiate between several subsets of liquidity risk depending on the time horizon considered (e.g. strategic vs. tactical), distinguishing between normal and stressed periods (contingency liquidity risk) and types of risks (e.g. funding vs. market liquidity risk).

1.1.1 Definition of funding and liquidity risks

Liquidity risk is the current or prospective risk arising from an institution's inability to meet its liabilities/obligations as they come due without incurring unacceptable losses. This is usually referred to as *funding liquidity risk*. There is also a market dimension to liquidity risk that has become more relevant in recent years as institutions' reliance on market or wholesale funding has increased.

Market liquidity risk is the risk that a position cannot easily be unwound or offset at short notice without significantly influencing the market price, because of inadequate market depth or market disruption.

One way to cover a funding shortfall is through asset sales, here the ability to obtain funds through the sale of assets mitigates funding liquidity risk. Market illiquidity or reduced market liquidity

can disrupt an institution's ability to raise cash, and thus its ability to manage its funding liquidity risk.

Expert discussion suggests this definition of market liquidity risk might be considered too narrow, in that the absence of market liquidity to unwind or offset a position, which only affects changes in value, does not impact cash flows. The change in value could result in liquidity demand via margin calls or additional collateral requirements and could be of such a magnitude as to cause a material erosion in the capital strength of the institution and/or a rating downgrade.

Beyond the general definition of liquidity, attention should be paid to the liquidity of each individual asset. The general liquidity squeeze prompted by the Lehman crisis, during which presumed highly liquid assets became completely illiquid for more than six months, calls for fresh contemplation of what constitutes a liquid asset and the definition and application in banks of sound liquidity risk management.

In assessing the liquidity value of liquid assets, the time-to-cash period (the time necessary to convert assets into cash) should be considered. A distinction can be made between assets pledged/deposited at central banks, which can be drawn on immediately, and assets on the balance sheet that may have been pledged as eligible collateral, which may take some time to draw on. The time needed to convert a drawn currency to the currency required should also be considered.

Central banks are an important potential provider of funding through refinancing operations, which are distinct from intraday credit. But institutions do not know in advance how much funding they will receive: they receive only what they are allocated in the auction process. In addition, funds are distributed only once per week. Banks can also draw on central banks' overnight facilities in the course of normal business, but liquidity management should take into account the reputation risk (kind of *stigma*) potentially associated with the possibility of extraordinary drawings.

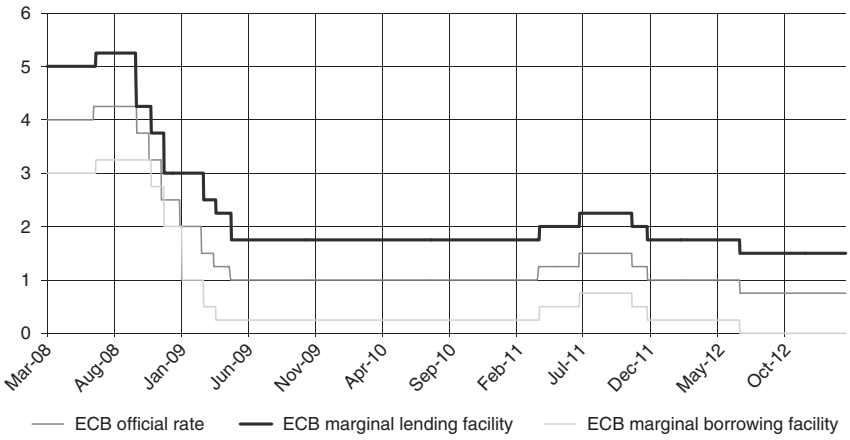

FIGURE 1.2 ECB monetary policy corridor.
Source: ECB.

Thus banks should not rely too heavily on obtaining funding from central banks.

In times of stress, market liquidity may deteriorate. Depending on the type of stress, the deterioration may be specific to certain kinds of assets or it may be more general. The central bank will continue to provide liquidity against eligible assets. When the broader asset market liquidity deteriorates, central bank eligibility may become more important (Figure 1.2 presents the European Central Bank official, lending and borrowing rates from March 2008), as observed during the 2007–08 crisis or the later Greek crisis. Banks may tend to pledge their relatively illiquid assets at central banks, when eligible, in order to use their most liquid/marketable assets to extend their liquidity buffer as much as possible.

Liquid assets are usually defined as assets that can be quickly and easily converted into cash in the market at a reasonable cost. In this respect, due consideration should be made of the time-to-cash period. In order to analyse the liquidity of an asset, institutions and supervisory authorities need to differentiate between normal and stressed times, taking into account the role of central banks' refinancing policies, particularly in times of stress.

Liquidity risk can also be triggered by credit risk, the bank being exposed to the failure of its counterparties and their obligations due; as a counterparty to other market participants it may fail to meet commitments at a reasonable and timely cost, and as a provider of credit it is exposed to liquidity risk linked to the credit quality of its portfolio.

Reputation risk can affect banks' funding capacity; liquidity problems tend to rapidly become visible to the market, seriously damaging reputation or rating.

Market risk, mainly interest rate volatility, drives liquidity risk management and the market value of securities depends on the number of market participants, their size, the frequency of the transactions and assets' ratings. Critical market conditions lead to uncertainty over the value of assets; margin calls on derivatives in such cases also have implications. Large banks also rely on regular functioning of foreign exchange markets, while interruptions in that functioning can trigger liquidity risk.

Concentration may also generate liquidity risk: funding concentration risk emerges when withdrawal of a few liabilities could be significant to the bank's overall funding and difficult to replace in a timely manner. Operational risk coming from payment system disruptions or delays can be very dangerous during severe and prolonged liquidity crises.

A bank should not undertake imprudent liquidity risk management and hold lower levels of liquidity owing to the expectation that central banks will provide support in the event of a market-wide stress and – for firms whose failure might have systemic consequences – firm-specific stress. Although managers and shareholders have strong incentives, arguably without regulation, to build in some resilience to liquidity stress by holding sufficient amounts of liquidity, these incentives may well prove insufficient. This would not be a problem if the consequences of a firm's insufficient resilience to liquidity stress were confined solely to shareholders and managers. But, as recent events have shown, this is not the case.

A bank will remain liquid as long as creditors have confidence in it, and believe other creditors also have confidence. A sudden loss of confidence, whether rational or irrational, will result in liquidity difficulties. We do not consider that holding a buffer of liquid assets designed to protect against liquidity stress is sufficient. Each firm should know its gross liquidity risk, not just the mechanisms to mitigate the risk when crystallized. At all times, we would expect firms to stress test their balance sheets against the stress test scenarios outlined in Chapter 3 and, where any weaknesses are identified, to limit or restrict the impact of the stress. The key is to ensure that the entire liquidity profile of the firm is such that liquidity risk in the firm does not exceed acceptable levels.

History has demonstrated that during a severe liquidity crisis it is the individual position of the various legal entities within a group that matters most. Supervisors, therefore, have to be satisfied with the liquidity position of the locally incorporated entity or local branch. While some major internationally active groups may strongly disagree with this assertion, recent events have clearly shown that internationally active financial groups can default and that, in such an event, local creditors and customers can be significantly disadvantaged.

The market turbulence of the last decade has also demonstrated that many tend to underestimate the potential extremity of liquidity stresses in their stress testing and CFPs. Regulation has to address this potential shortcoming in firms' liquidity risk management approach. This will be of particular importance in the medium- to long-term future, when the effects of the current crisis have abated and the lessons once learned may have been forgotten.

Contrary to widely held assumptions, extreme liquidity events are not all that rare in the global financial markets. While the length and intensity of the current crisis may be unprecedented, name-specific and even wider liquidity events occur with some frequency. As noted above, any crisis of confidence will invariably have certain liquidity implications. It is therefore necessary for our new regime to

prepare for the next crisis and ensure that firms' resilience to liquidity stresses remains high, even during business-as-usual periods.

Models have only a limited role to play in liquidity regulation, as liquidity stresses are heterogeneous events that make it difficult to construct meaningful probability distributions. We agree that internal models can play a useful role in a firm's liquidity risk management, however, they are only one of many tools a firm should apply.

1.2 MANAGING LIQUIDITY RISK

Funding liquidity is closely monitored by banking regulators and it is increasingly the focus of internal projects as well as of staff search companies and specialized training firms; it is nowadays considered of strategic importance. It has followed somewhat the same development as the operational risk in banking: once it was considered somehow of lesser importance compared to credit or market risk exposure, then liquidity risk management became a pivotal element of banks' strategic plans, investments and organization. Besides liquidity risk measurement and control, the very change in relevance of such a risk to banks has assured the greatest importance and management role. Banks then need to ensure a comprehensive review and assessment of liquidity risk exposure, control and management processes is in place. An integral element of the overall risk culture framework is ensuring that there is a widespread understanding throughout the organization of liquidity exposure and how this needs to be managed, and how liquidity is specifically reflected in the risk appetite.

1.2.1 Liquidity risk's framework

We should first point out that banks should develop their risk culture through policies, examples, communication and training of staff regarding their responsibilities on risk. Staff should be fully aware of

their responsibilities relating to risk management and this should not be confined to risk specialists or control functions. Business units, under the oversight of the management body, should be primarily responsible for managing risks on a day-to-day basis, taking into account the bank risk tolerance/appetite and in line with its policies, procedures and controls.

As repeatedly addressed in previous Basel capital accords, banks should have a risk management framework extending across all their business, support and control units, recognizing fully the economic substance of its risk exposures and encompassing all relevant risks (e.g. financial and non-financial, on and off balance sheet, and whether or not contingent or contractual). Its scope should not be limited to credit, market, liquidity and operational risks, but should also include concentration, reputation, compliance and strategic risks.

The liquidity risk framework should enable the institution to make informed decisions based on information derived from identification, measurement or assessment and monitoring of risks. Risks should be evaluated bottom-up and top-down, through the management chain as well as across business lines, using consistent terminology and compatible methodologies throughout the institution and its group.

The liquidity risk management framework should be subject to independent internal or external review and reassessed regularly against the institution's risk tolerance/appetite, taking into account information from the risk control function and, where relevant, the risk committee. Factors that should be considered include internal and external developments, including balance sheet and revenue growth, increasing complexity of the institution's business, risk profile and operating structure, geographic expansion, mergers and acquisitions and the introduction of new products or business lines. The remuneration policy and practices should be consistent with its risk profile and promote sound and effective risk management. The bank remuneration policy should be coherent with its values, business strategy, risk tolerance/appetite and long-term

interests. It should not encourage excessive risk-taking. Guaranteed variable remuneration or severance payments that end up rewarding failure are not consistent with sound risk management nor the pay-for-performance principle and should, as a general rule, be prohibited.

For staff whose professional activities have a material impact on the risk profile of an institution (e.g. management body members, senior management, risk-takers in business units, staff responsible for internal control and any employee receiving total remuneration that takes them into the same remuneration bracket as senior management and risk takers), the remuneration policy should set up specific arrangements to ensure their remuneration is aligned with sound and effective risk management.

It is of the utmost importance that control function staff should be adequately rewarded so as to ensure they fulfil their objectives and that performance is not linked to that of the business they are monitoring. In particular, where a variable component is included, it should relate to that of the overall risk division compensation, while defining individual valuation factors that are not purely economic/results related is also necessary. The performance assessment for bonus/variable pay should include adjustments for the different risks, including that of liquidity risk. The bank's management should be ensured a balanced percentage of basic salary and variable bonus payments. A significant bonus as a percentage of basic salary should not be composed solely of cash but should be flexible and include risk-adjusted weights, while timing of the bonus payment should ensure it considers the bank's risk performance. We should have liquidity funding in the overall risk management framework and this needs to include policies, procedures, limits and controls providing adequate, timely and daily identification. It is necessary to be assessing, monitoring and reporting the risks of the individual desks and business lines as well as the overall exposure. The risk management framework needs to encompass specific guidance on the implementation of strategies, ensuring and maintaining

appropriate risk limits given the set risk appetite, available capital base and strategies. The bank aggregate risk exposures should respect these set limits; the bank's management should follow up any relevant breaches of limits and ensure these are escalated and resolved (see Chapter 5).

When we are identifying and measuring risks, we should combine forward and backward looking analysis with the monitoring of daily risk exposures, considering the combination of different risk types and businesses, so as to control concentration exposure. Scenario analysis and stress testing are analyses meant to spot potential risk exposures, while standard historical controls are designed to identify the current risk exposure.

Management decisions on setting the risk limits should not only rely on quantitative information or model outputs, but consider the limitations of metrics and models following a qualitative approach such as expert assessment or an internal analysis. Macroeconomic trends and data are other important factors to include on exposure and portfolio risk assessment, remembering that we also need to base decisions on these analyses.

We need established regular and clear reporting to the senior management, business and other control functions involved: we need to design reports that are distributed in a timely manner, are accurate and highlight the key risk factors, so that management can understand anomalies or jump in exposures and proceed then to the necessary course of action.

We need to bear in mind that the reporting framework isn't just a document for information, it is key evidence for auditors and regulators and the base for presenting and assessing exposure: so management attention and effort must be devoted to its regular preparation and discussion and it needs to represent appropriately the business set-up and its changes over time. We need to ensure the reporting responsibilities are part of dedicated internal policies and there are specific internal procedures. We must also consider report production in the contingency plans. We need to make sure

that the bank risk committee receives regular formal reports from the designated risk control functions.

We need a structured liquidity internal control framework, independent from business and risk takers, with appropriate skills, staffing, systems and budget to ensure they comply with responsibilities. The risk control framework should be designed to ensure effective and efficient processes, adequate control of risks in compliance with laws, regulations, supervisory requirements, internal rules and decisions taken. The internal control framework should cover the entire bank and should be tailored to its business structure, with adequate administrative and accounting procedures.

In developing the liquidity internal control framework, we need to outline a clear, transparent and documented decision-making process, setting out responsibilities for implementing internal rules and decisions. In order to implement such a robust liquidity internal control framework in all areas of the institution, the business and support units should be responsible in the first place for setting and maintaining control policies and procedures.

A functioning liquidity internal control framework also requires that an internal audit verifies that these policies and procedures are correctly applied. Second level control functions must not report to the risk-taking functions and also ought to be independent from each other, as are those performing types of control (compliance, audit, risk management). For smaller banks, risk control and compliance functions may be combined.

In setting up the liquidity risk control function, four conditions need to be respected: it must be separate from the activities it is assigned to monitor and control; it should report to a function that has no responsibility for managing the activities it is assigned to monitor and control; it should report directly to the management board; and remuneration of liquidity control staff should not be linked to the performance of the activities that the control function monitors and controls. We need to ensure the liquidity risk control function is adequately staffed in terms of numbers and skills throughout the

controlled legal entities that have such exposure. The risk control staff must be regularly trained and have appropriate systems, accessing the data necessary to perform the control tasks.

The liquidity risk control functions should regularly report to the management board and committees on identified weaknesses, and follow up on previous risk management interventions and any recommendations. The liquidity risk control function is ensuring that liquidity risk exposure is identified and properly measured, providing the relevant independent information, analysis and view on the decisions made by the business, checking consistency of the bank's risk appetite, and recommending improvements if deemed necessary.

When banks are large, complex and sophisticated it might be considered valuable to further articulate the liquidity risk control functions; however, it is important that there is an overall central liquidity risk control in charge of providing a consolidated view. The liquidity risk control function needs to be actively involved in elaborating and reviewing the bank's risk strategy and tolerance/appetite levels proposed by business units. Preparing the bank's risk strategy and policy should be done together with the risk officer and business units. The business units should comply with risk limits, liquidity risk control should be responsible for ensuring the limits are in line with the institution's overall risk appetite/risk tolerance and monitoring on an on-going basis that the institution is not taking on excessive risk. Liquidity risk function involvement in the decision-making processes should ensure risk considerations are appropriately considered: responsibility for the decisions taken remains with the risk-taking units and the management board. The liquidity risk function needs to analyse trends and recognize emerging risks arising from market conditions, back-testing risk outcomes against previous estimates to assess and improve the accuracy and effectiveness of the liquidity risk management process. We are also expected to monitor the liquidity exposures in the subsidiaries. The liquidity risk control shall assess limit breaches or rule violation, informing the business units concerned.

1.2.2 Chief Risk Officer's role

The role of the bank's Chief Risk Officer, a role that should be present in all banks as well as the compliance officer and internal audit, is one of exclusive responsibility for monitoring the different risks and the set-up of the risk management framework across the entire organization. The risk officer is in charge of ensuring comprehensive and understandable information on risks, thus enabling the Management Board to understand the bank's overall risk profile, therefore he/she should have sufficient operating experience, independence and seniority to face other senior business managers and have the capacity, if necessary, to challenge or halt decisions that could negatively affect the bank. The risk officer and the Management Board (or relevant committees) are expected to discuss key risk issues, including developments that may be diverging from set risk tolerance/appetite and strategy.

When the risk officer has the right to veto decisions, we should include within internal risk the circumstances in which the risk officer is authorized to do this (e.g. a credit or investment decision or the setting of a limit), indicating escalation procedures and Management Board involvement. If the bank does not assign such responsibility to the CRO, such a function must be assigned to another senior officer, provided there is no conflict of interest. We need internal processes in place to assign the position of the risk officer and to withdraw his or her responsibilities, and if the CRO is replaced it should be done with the prior approval of the Management Board.

1.3 REGULATORY FRAMEWORKS

In December 2010 the Basel Committee on Banking Supervision issued a new set of rules specifically designed to normalize liquidity risk management in banks following the Lehman crisis and troubles experienced then. This detailed set of rules, commonly referred to as the third Basel capital accord or Basel 3, follows a previous

recommendations document – the sound principles for sound liquidity risk management, published in 2008 – where the Committee indicated principles on management and control processes. The two sets are meant to be integrated and their guidelines applied by banks to liquidity risk management. The December 2010 standards address two requirements: short-term liquidity refinancing to guarantee bank survival in the case of very tense market conditions and a long-term funding balance to ensure sustainable balance sheet financing. The intention of the Basel Committee is that such liquidity control standards should be adopted by national regulators and compelled in financial institutions by January 2015 at the latest for short-term liquidity and January 2018 for long-term structural funding. Discussions are still taking place and final requirements or deadlines for adoption may vary.

Basel 3's short-term liquidity requirements assess and strengthen banks' survival capacity, checking the drain of funding under stressed market conditions and imposing stocks of assets to counterbalance such adverse conditions. The target is building a buffer of assets, mostly securities, available for sale or refinancing and always in the hands of the bank's treasury to meet contractual set payments for a period of 30 calendar days. The rationale of Basel 3 for setting this to one month is based on the belief that a national bank, financial authorities and the bank's management will then have sufficient time available to find means to meet their obligations. Whether this is a sound estimate is one of the points this book will address, articulated specifically in Chapter 4. The liquidity cover ratio, LCR, results from the bank's high quality liquid assets (see later) over the total net cash outflows on the following 30 calendar days and it is set to be always at least greater than one (namely stock high quality assets/net cash outflows over 30 days).

The Basel Committee provides some minimum standards: rather than being prescriptive and supplying parameters and detailed approaches, the preferred approach – as in previous Basel requirements – has been more focused on the principles and drivers banks

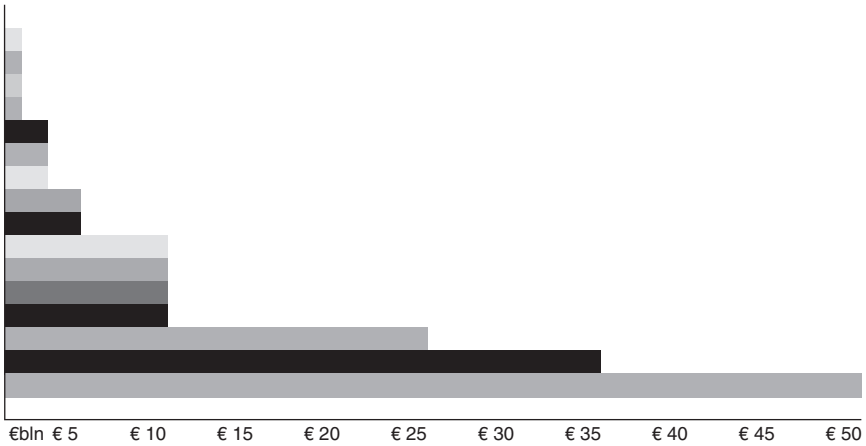

FIGURE 1.3 EU gross liquidity shortfall. Each line represents a country. *Source:* EBA voluntary LCR monitoring exercise.

should follow. This has been the common approach as the Basel rules are supranational and will have to be implemented and national rules issued that provide more detailed indications. In any case, the indications listed before for stress testing are considered a base scenario, banks are not only entitled but encouraged to further analyse and develop their own scenarios and hypotheses, as that in Basel mostly summarizes lessons learnt during market liquidity crises. The objective of the new ratio requirement is to ensure that banks, even in extremely penalizing market liquidity conditions, have 30 working days' survival, especially the large, systemic international banks, so allowing sufficient time for intervention and hopefully avoiding contagion (see Figure 1.3 showing the results of an EBA voluntary exercise on potential LCR requirements' liquidity shortfall for different EU countries).

A fundamental element of all the regulation and the core of the debate between banking industry representatives and financial regulators is the stock of securities and cash that banks ought to keep at any time available for refinancing. Clearly the debate focuses on the amount: banks do not like the idea of being forced to keep low yield,

large portfolios of securities at all times. Regulators would instead favour large portfolios of bonds and cash, unpledged, to face potential shortcomings in funding. Other than a matter of capital standards and deposits assurance, there is a strong debate on the banks' profitability and therefore economic sustainability. Large portfolios of unsecured bonds will not only reduce profitability if these are of the highest rating. They will also significantly reduce the bank's capacity to finance companies and private customers, hindering growth in times of crisis. Holding liquid assets and securities defined as *high quality* (see Chapters 2 and 3 for an extensive list and description), presents tradeoffs and I do not believe it is the solution to liquidity crises: such assets experience varying prices and dynamics if we look at US treasuries or German bunds, and these move at different times following political and economic speculations and expectations that then change substantially, even reverting valuation extremely quickly. An interesting example in this regard is the fluctuations since 2008 of gold prices, reaching an all-time peak during the Greek and Italian crisis when the market feared European Union breakdown, to post-August 2012 stability and then rapid decline: discussions have taken place over the rationales, however the regulators' inclination to assume gold is the safest and most liquid asset type for liquidity refinancing at times of crisis might be correct in some circumstances but prove untrue if situations vary, as just presented. I am therefore of the opinion that the Basel 3 prescriptions on high liquid stock need further analysis and that banks are more likely to cope well at times of crisis with well-managed processes, credit underwriting and careful strategic planning of their funding needs rather than by increasing their holding of large quantities of AAA rated bonds.

In Chapters 2 and 3 we will outline the LCR and net stable funding ratio components and their calculation. In the first section I will focus on the main rationales underlying the liquidity regulatory framework: strengthening the banks' available resource to withstand market turbulence and unexpected liquidity needs. Securities of the

TABLE 1.1 The new Basel liquidity regulatory framework application phases.

	1 January 2015	1 January 2016	1 January 2017	1 January 2018	1 January 2019
min LCR	**60%**	**70%**	**80%**	**90%**	**100%**

Source: Basel Committee on Banking Supervision.

highest standing and liquidity are intended for pledging and to ensure collateral facilities: in cases of their simultaneous disposal by many banks, even the highest rated have incurred price decline and could even actually collapse if there was a definite attempt to dispose of large quantities and there were no buyers. Thus, the actual objective is ensuring refinancing, rather than selling securities in the market. The crisis in Europe presented a situation where banks simply stopped lending to each other even against highly rated pledged bonds and preferred using these for central bank facilities. Then it was up to the European Central Bank to ensure money market transmission and it was through this rather than normal interbank lending that liquidity flows were ensured. It is therefore an element to consider that holding the lowest yielding, highest rated securities is not going to change the way banks ensure liquidity in stressed conditions, this being through the central bank. There, the haircuts applied to higher or lower rated securities were an issue and hampered financing capacity; but it was through large refinancing operations that the falling prices of some government bonds and higher haircuts were, in the end, resolved. Table 1.1 shows the new Basel liquidity framework implementation schedule for the Liquidity Coverage Ratio.

The regulators found out that the event triggering Lehman's default was an intraday liquidity drain and the bank's management failing to regularly and timely verify funds available net of those pledged either in repos or as trade collateral. *Unencumbered* means not used to secure explicitly or implicitly other transactions

(e.g. derivatives, repos, loans). The securities that the bank receives in reverse repo and securities financing transactions that are deposited at the bank and are available contractually to be reused can also be practically part of the stock and can be added to own funds. Supervisors, looking at the dynamic of the Lehman crisis, discovered that another problem was the unclear attribution of securities for pledging to trading rather than for banking book payment flows netting: at a time of difficulty this proved another dangerous element for timely risk management intervention. So we should keep a stock of liquid assets dedicated to payments on banking books and customer deposits neatly separated from those securities assigned and used for trading position collateral management: the bank's counterbalancing capacity must be separated, clearly identified, monitored through daily reporting and should be strategically managed as the bank's source of emergency or contingent liquidity (Figure 1.4 reports the available high quality liquid assets that would become eligible for counterbalancing with the introduction of the LCR, based on a sample of 357 banks).

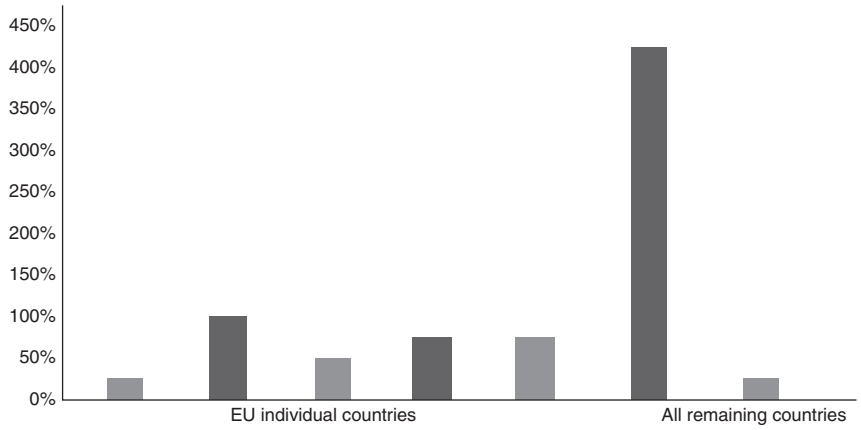

FIGURE 1.4 Banks' volume of high quality liquid assets eligible by introduction of LCR as a percentage of gross liquidity shortfall, single bars referring to an individual country.
Source: EBA voluntary LCR monitoring exercise.

I want to mention here another issue regarding a bank's available securities for refinancing: regulators are indicating that client securities that have been used by the bank, typically against a fee, for money market liquidity, cannot be included in the official counterbalancing capacity stock. The point is clear: banks should not arbitrage and transform clients' funds to offset regulatory requirements. On the other hand, offering such an option to retail brokerage clients can be handy and prove convenient for the bank and its customer: here risk management must be aware of the potential risk and must assess the size and types of securities targeted, together with the necessary compliance function valuation. The possibility of exposing the bank's customer to unwanted or unclearly disclosed risks must be carefully understood and monitored.

1.3.1 Total net cash outflows

The term total net cash outflows – the payments made and received – is another pillar of the liquidity risk assessment in regulatory frameworks. In the Basel 3 approach, the payments received and obligations need to be projected for the following 30 calendar days, applying predetermined stressed assumptions to verify the potential impact and available resources to fund unexpected gaps; while the total expected cash outflows are calculated by multiplying the outstanding balances of various categories or types of liabilities and off-balance-sheet commitments by the rates at which these are expected to be withdrawn as the total expected cash inflows are determined, multiplying the outstanding balances of various receivables by the rates at which they are expected to flow in, with a set cap on total expected cash outflows (total net cash outflows over the next 30 calendar days are calculated as *outflows – minimum (inflows; set outflows %)*). We need to carefully verify the correct assignments of cash flows to time buckets and apply consistent rules for mapping into limited granular time sets, checking also that these are standard across the different business lines and data sources (we need to take

into account that roll-off, draw-down rates and similar factors will be identical across countries as per the Basel 3 accord; some parameters can be set by national regulators).

1.3.2 Long-term funding requirements

In the Basel 3 requirements there is a specific one on maintaining the bank's long-term balance of maturing assets and funding liability, with the objective of ensuring that the banks are best prepared to tackle stressed market conditions. The metric hinges on a minimal acceptable amount of stable funding based on the characteristics of assets for maturity over one year, the separation point of LCR and NSFR measurements. The latter, or net stable funding ratio, is the other side of the coverage ratio and completes the quantitative requisites for banks' funding liquidity.

In general, wholesale banks approach the balance sheet maturity transformation as an integral part of their business. The medium long-term standard is designed to ensure that long-term assets are funded with a core set of similar longer term liabilities to ensure balance. We will discuss again the problem of imposing such a strict balance on banks' profitability further on: the financial industry's worried reaction towards a strict application of the medium long-term balance is driven by profitability concerns, especially during economic recessions, low interest rates and many banks going through heavy deleveraging asset programmes, such that it will be uncertain and very difficult to ensure a stable and profitable credit spread from companies and retail customer financing and at the same time balance these with maturing financing liabilities.

The long-term ratio hinges on the net liquid asset and cash capital methodologies used widely by international banks, equity analysts and rating agencies. In computing the amount of assets that should be backed by stable funding, the ratio calculation encompasses the estimated stable funding for all assets and securities on banks' balance sheets. This should be carried out irrespective of the accounting

classification of assets into trading or available-for-sale or held-to-maturity. The stable funding sources to be considered for the ratio are also intended to be held for potential liquidity requirements deriving also from off-balance-sheet posts. The long-term ratio is thus the amount of stable funding for assets maturing in the longer term and ought to be greater than one: funding considered stable is considered to be the amount of equity and liability financing assumed to remain as sources of funding over a one-year time horizon and primarily in stressed market conditions; the amount needed to ensure stability for asset financing will vary according to the types of assets including off-balance-sheet exposures and changes in the combination of the two.

1.3.3 Banks' funding

A number of market developments have created new challenges for banks, like the increasing reliance on market funding and the use of complex financial instruments, combined with the globalization of financial markets. More recently, large banks have shifted from deposit-based funding to market funding sources, the originate-to-distribute model: supporting banks managing new challenges like the decline in the retail deposit base (especially long-term deposits) and more volatile retail customer tendencies, it has increased reliance on market sources of funding – banks are originating and underwriting credit assets and distributing them to various types of investors through syndication, securitization and credit derivatives.

We know that retail deposit funding is relatively stable and presents lower credit and interest rate sensitivity than other funding sources. So the bank's higher use of market funding sources leads to a higher exposure to price and credit sensitivities for major fund providers, like wholesale certificates of deposit. As the wholesale funding pricing also tends to be more expensive than retail deposit funding, this change will likely reduce the bank's profitability: most wholesale funding needs to be rolled over frequently, often

daily, and it is therefore exposed to changes in the funding liquidity conditions. The increasing share of interbank exposures and money market instruments in banks' funding can provide an additional source of liquidity risk. We are now aware that in times of stress reliance on the full functioning and liquidity of financial markets may not be correct, and those banks that rely heavily on wholesale funding, securitization or have significant contingent liquidity commitments (e.g. conduits) will mostly be affected.

Based on experience we know that funding liquidity can be driven by factors such as:

- The shortening of maturity in the interbank market, where the borrowing gradually reduces to overnight or just a few days.
- A marked shift towards secured lending such as repos (i.e. reduced unsecured lending) and cancellation of committed liquidity lines by other wholesale banks.
- Reduced CDs and CPs funding market.
- ABS markets disappearing, irrespective of the issuer rating, therefore reducing funding through securitization and impacting greatly on SPV or conduit funding.
- Hampered issuance of medium- and long-term bonds.
- A decrease in liquidity on cross-currency swap markets also in some major currencies (USA dollar, Euro).

These elements are typically also leading to an increase in the cost of funding, and when there is an over-dependence on wholesale funding this can lead to a great liquidity problem (e.g. Northern Rock bank).

We note that the originate-to-distribute model has increased banks' dependence on capital markets as the global financial system increases the risk of a domino effect to the whole market. As cost and availability of unsecured lending depends firstly on a bank's credit quality/rating, if it incurs significant losses (and these are publicly known) then the bank might also struggle to obtain funding at acceptable cost, unless posting guarantees.

The use of complex financial derivatives is also exposing banks to additional complex liquidity risk forms; where we need assessment and understanding of whether the underlying liquidity of the market will bear market stress conditions, mark-to-market values of the positions may be difficult to determine during liquidity crises, likely leading to additional funding requirements:

- Mark-to-market losses will affect earnings and the capital base, then hampering access to unsecured credit markets possibly only at higher prices, again further affecting earnings and capital.
- Adverse changes in mark-to-market positions, either from a change in the value of the trading position or a decline in the collateral, will result in additional margin calls.

In general, as complex products can be illiquid and prices difficult to determine (e.g. see IFRS 13 Level 3 Fair Value Adjustments rules) and given that valuation depends on data-intensive statistical models and on scenario analysis, these will generate a greater model risk meant as the possibility of errors in evaluating and pricing the position. For example, an asset can be difficult to value if it is based on dynamic parameters that can change with market conditions or for which no external data are available. Market illiquidity generates additional risk types, like the so-called warehouse risk when the bank is unable to find buyers and is then forced to keep positions: in these circumstances, if the bank does not have sufficient available assets, it will have to post a greater amount of collateral in order to get additional funding sources, while additional asset pledging to get more funding will decrease financial flexibility and affect its credit standing. In the case, for example, of structured securities, it is difficult to forecast how the cash flows generated might behave during market stress, as these are not actively traded and price transparency is limited. Wider bid-ask spreads due to thin trading volumes and the potential for sharp swings in demand can significantly increase their liquidity risk, while for off-balance-sheet obligations this could

result in price volatility and liquidity risk in other circumstances. Derivatives and complex financial products pose significant challenges in terms of funding liquidity and should therefore be treated with extreme caution, taking the interlink between the different risk types they generate.

1.3.4 Funding through securitization

While traditional securitization allows banks to get liquidity from previously illiquid assets (such as mortgage or loan portfolios), it also makes them more reliant on the smooth functioning and stability of financial markets. If the liquidity in the securitization market disappears, one could expect some cascade effects; the originating bank will be left with a sudden funding need – and during the crisis some were forced to defer some securitization, so resulting in asset stocks needing to be financed. It is common to first fund the lending book with short-term funding and then replace shorter-term funding with securitizations; if this funding market vanishes, short-term funding will have to be rolled, thus increasing the funding liquidity risk exposure.

All types of securitization also entail contingent liquidity risk, this being the possibility that we might have to ensure liquidity suddenly and likely at a time when it is already harder to access the market. Banks offer liquidity facilities to ensure timely payment of principal and interest if certain set conditions occur (e.g. in the case of a rating downgrade). Some banks have faced additional liquidity calls to support off-balance-sheet investments, as not providing such support would damage their reputation and, in turn, affect their funding capacity (this is discussed at length throughout the book). When the securitized assets are long-term assets, such as residential mortgages, and we are exposed to roll-over risk or the assets are taken back on the balance sheet, this will deteriorate the bank maturity mismatch and short-term funding may come at a higher price. If the overall credit rating deteriorates, or the market illiquidity condition

deteriorates, or the liquidity requirements are urgent, we may be pushed to sell assets at then market prices, affecting earnings. Considering that own asset securitization has considerably high origination and management costs and that it is quite a regular funding source for companies, then it may be from here that significant liquidity problems are triggered, especially when there is financial market volatility; securitizations can also generate unexpected outflows when they are required to ensure liquidity to meet contractual commitments.

Linked to securitization are the covenants, the legal clauses relating to specific financial conditions or events that affect the terms of a contract. Financial covenants are commonly included in financial contracts to protect creditors. If the conditions are met, the creditors are allowed to waive the normal terms of the contract on a discretionary basis. In such cases they may require, for example, ending the contract or some other contractually specified action or consequence – such as the posting of additional collateral or a step-up in the interest rate. Covenants can be regarded as a kind of purchased trigger option for the creditors, as they give them a discretionary contingent right. Typical financial covenants included in corporate loan contracts give institutions contingent rights without increasing their liquidity risk. It is not only the covenants included in complex financial instruments used for innovative funding structures that raise liquidity risk management issues, especially during times of stress. For example, various kinds of market adverse condition clauses in securitization contracts contain downgrade triggers and performance triggers (relating to recourse provisions leading to early amortization) that can impose collateral requirements. Drawings on liquidity back-up facilities provided to conduits are based on trigger covenants included in the contracts, and additional collateral requirements could be based on sponsor-linked rating triggers in the context of credit enhancement. The liquidity risk posed by this kind of covenant is often of a low probability–high impact nature. Various triggers can have a substantial liquidity impact, due to extended

back-up facilities, early termination/buy-backs, or collateral requirements or margin calls in cash. Even when the conditions of covenants are not fully met, an institution may be forced to buy back assets because of reputation risk. Active management of this reputation risk may avoid additional liquidity risk. Documentation risk can be an element in the liquidity risk of covenants if a dispute arises due to unclear covenant language, for example regarding received liquidity facilities. Due to the limited information available, business activities using complex financial instruments with low probability/high impact liquidity risk may not be visible to the treasury function and thus may not be included in liquidity plans and stress tests. In securitization documents, covenants link to regulatory actions or breaches of thresholds – for example, providing that such actions or breaches trigger early amortization – and could undermine the objectives of those supervisory actions and thresholds. Early amortization can exacerbate liquidity and earnings problems as well as collateral demands and margin calls: for large positions, this may lead to disposal and then impact market liquidity, affecting prices and, in turn, affecting funding capacity for all market participants using the same collateral.

1.3.5 Behavioural changes of customers or investors

Several changes can be observed in retail customers' responses. First, there has been a long-term change from bank deposits to investment or pension funds; this determined deposit bases that were not following loan dynamics, leading to alternative funding sources for banks. There is also a trend of higher price sensitivity and awareness, higher volatility of retail deposits, weaker relevance of the customer relationship, and an increased importance of electronic banking. Many direct obstacles to possibly more volatile cross-border investments, such as restrictions on foreign purchases of domestic assets and limitations on the ability of domestic residents to invest abroad, have

been contained: indirect obstacles to cross-border flows – such as high costs of foreign transactions, inadequate information on foreign investments, linguistic obstacles – declined significantly, diminishing the habit of holding on to domestic savings. Another new challenge to liquidity risk management is the uncertainty regarding the degree of commitment to the market of increasingly active unregulated providers of liquidity. There are also doubts over the willingness to invest in credit derivatives and over structured products, such as hedge funds, holding on to their investments in adverse market conditions.

1.3.6 Payment systems

Payment settlement systems process a large part of banks' liquidity flows and have a fundamental role in ensuring smooth functioning of financial markets; their importance has increased with globalization, European integration and Asian countries' greater relevance in the world economy. For liquidity purposes, it becomes clear that regular functioning of these systems is essential to ensure there are no impacts on financial markets and the banks. Larger value payment systems settle predominantly in real time gross settlement, while retail payment systems instead apply net settlement: technological improvements have allowed net settlement systems to become faster and very reliable, decreasing the time for netting and becoming very close to a real-time payment, combined with a reduction and improved efficiency in the collateral posting when gross settlement applies. There has been a move from net towards real-time mechanisms, supported by regulators as gross models are less exposed to systemic risk. Netting reduces credit and liquidity risk, including intraday liquidity requirements, as it lowers the positions held with other banks to a net position, it also has a positive impact on necessary capital. Close-out netting settles with one single payment all claims for the counterparties subject to the netting: these are made

on the occurrence of a defined event (e.g. insolvency). We should verify that close-out netting arrangements are legally recognized. We also need to remember that settlement is completed only at the end of day and we should consider payments final only then: if a bank does not ensure payment, other payment orders could be closed with other banks being, in turn, affected. If we are using netting arrangements to mitigate risks, institutions should consider and take into account legal and operational elements to ensure that liquidity risk is measured. Banks use several payment systems, increasing the complexity in intraday payment management as net payment systems need collateral posting to ensure transaction processing. In the case of gross settlement systems, individual payments are processed one by one, thereby containing the settlement risk. We are required to post ensured adequate intraday funds for the smooth processing of transactions. In addition we can use intraday credit facilities, monitoring collateral availability during the day. Trade settlement requires banks to provide funds and collateral as per set contractual agreements and banks' internal functions must verify that contractual requirements are well understood and monitored, and that the correct calculation of margins and collateral requirements are performed.

1.3.7 Correspondent and custody activities

Correspondent banking also funnels payment flows, in particular for intraday liquidity risk, as the collateral posting in terms of securities and/or cash through the corresponding banking may determine the provision as part of the intraday settlement of transactions and it can determine an increase in the intraday exposure. Liquidity exposure will depend on transaction type, securities available for posting and time of day, credit facilities and counterparty rating of those involved. It is important that we control intraday payments carried out through correspondent and custody, looking in particular at the concentration: unexpected changes in payment flows can trigger a domino effect on cash or collateral posting or credit facility use,

affecting the correspondent or custodian exposure. Transactions in foreign currencies are typically processed through CLS clearing payment, settling individual payment against others and allowing limits to liquidity risk, especially in foreign currencies. As several foreign exchange trades are settled through correspondent banking, liquidity risk can be contained by the CLS settlement system. We must be aware of the payment systems we are using and their functioning; we should also identify indicators to spot anomalies and duly intervene to avoid correspondence banking impacting our cash flows and liquidity position.

1.3.8 Accounting treatment and liquidity

According to international accounting standards (IFRS), financial assets and liabilities can be classified as held for trading when these are kept for speculation; we can also keep assets to maturity (Hold to Maturity) when we intend to keep them until their contractual expirations and these will then be valued at amortized historical cost.

These classifications for securities are also linked to their liquidity purposes: if we classify a security as H-t-M, it cannot be sold for liquidity purposes (only in specific exception cases, however it can be pledged as collateral for repo transactions. Irrespective of how banks classify securities for accounting purposes, the level of liquidity will still be driven by accounting classification but on financial market valuations. There may be some negative liquidity impact if assets are held in the H-t-M or as loans and receivables but this impact is not that significant.

1.3.9 Diversification of funding sources

Funding concentration materializes when we are overly reliant on one or few funding sources, either a customer or a preferred liquidity channel. Liquidity funding concentration depends on risk appetite and the bank's funding mix. We can define funding concentration as

the fund amount that, if withdrawn, would force structural changes in the funding sources. Liquidity funding concentrations typically include:

- Dependence on a restricted number of interbank market providers or large corporate customers.
- Concentration on specific funding purposes.
- Funding concentrations on certain maturity.
- Focus on secured funding.
- Geographical or currency concentrations.

1.3.10 Rating agency approaches to internal methodologies

Broadly speaking, liquidity risk is not a significant determinant of ratings, in comparison with other factors such as profitability and capital. This is especially the case for the largest banks, where the probability of liquidity problems arising is relatively low because of the quality of the banks' risk management systems and their low potential for solvency concerns, which can be a leading indicator of liquidity problems. The methods used by different rating agencies to assess liquidity risk can be quite diverse. The most common quantitative test applied by rating agencies is the assessment of how long a bank could survive without access to market funding; rating agencies allow banks to benchmark against their peers specifically on their liquidity risk systems.

1.3.11 Transparency to the market

We need to pay great attention to the level of disclosure on liquidity risk, taking into account the fact that the bank's reputation is critical to market funding and the funding costs: disclosure to the market becomes crucial. For accounting purposes (IFRS 7), financial

liabilities must be disclosed by contractual maturity, undiscounted cash flows and managerial available data. For derivatives, IFRS 7 indicates net amounts should be presented for pay float/receive fixed interest rate swaps for each contractual maturity category when only a net cash flow will be exchanged; a currency swap would need to be included in the maturity analysis using gross cash flows. Investors, customers, depositors and regulators need to be informed of the bank's liquidity risk, as well as the liquidity risk exposures or liquidity buffers.

There is no question of the need for qualitative indications on banks' liquidity risk management: specifically on internal governance and the policies and procedures for managing liquidity risk, a description of systems available and liquidity controls in place. This will help assess the capacity to manage liquidity.

1.3.12 Contingency plans

It is important to have dedicated policies and procedures in place for crisis management, in particular the existence of appropriate stress tests, the composition and robustness of liquidity buffers, and the effectiveness of contingency funding plans. One should check that robust and well-documented stress tests are in place, that their results trigger action and that the assumptions used are appropriate, conservative and regularly reviewed.

Regulators may regard quantitative requirements as a first step and integrate them within the qualitative part of their regime. Other supervisors consider that beyond a certain level of complexity the quantitative approach is less useful in assessing the level of liquidity risk and the quality of risk management than information defined on a case-by-case basis. These allow internal methodologies to replace quantitative requirements at some institutions. Prior to granting any form of recognition to internal methodologies in their approaches, they will assess them and gather supporting evidence that will give them the necessary assurances as to their adequacy.

Regardless of whether internal methodologies are subject to formal approval, assessment will cover:

- Governance, the definition of liquidity risk, risk strategy, involvement of senior management, organizational embedding of liquidity risk management, the structure of limits, interaction with other risks, reporting.
- Sound methodology, useful ratios in assessing the short-term and structural liquidity position of institutions, the composition of the liquidity buffer and the assumptions used, the definition of material cash flows, diversification strategy, internal validation of outcomes, consideration of off-balance-sheet positions, new product process, and the design and embedding of stress tests.
- Conservatism, the use of sufficiently conservative assumptions in calculating ratios.
- Completeness, internal methodologies sufficiently covering the institution's scope of consolidation, and ratios sufficiently covering all material anticipated and unanticipated future inflows and outflows of cash and liquid assets.
- Timeliness of the liquidity overview: data refreshing requirements, sufficiently high frequency of calculation of the ratios.
- Use test, institutions should actually use ratios in their liquidity management.
- Liquidity crisis planning: the contents of the contingency plan, time horizon, strategy for selling assets.
- Cross-border aspects of liquidity management: centralization vs. decentralization, cross-currency liquidity risk management.

Ratios should be useful for assessing both the individual and the aggregate liquidity position in the most important currencies. When using internal methodologies for supervisory purposes, supervisors should assess the adequacy of governance, the soundness of methodologies – including their conservatism and completeness – the timeliness of reviews, the robustness of stress testing, and resilience

to liquidity crisis, taking into account external constraints on the transferability of liquidity and the convertibility of currencies. Regulators could explore the possibility of developing a minimum set of common reporting requirements, applicable to all credit institutions and possibly to investment firms that are not restricted to activities on behalf of third parties.