



Liquidity risk management practices at selected German credit institutions

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- Table of contents** **1**
- I. Introduction** **2**
 - I.1. Background to the study 2
 - I.2. Conceptual design of the study 3
- II. Results** **5**
 - II.1. Definition of liquidity risk and strategies to manage liquidity risk 5
 - II.1.1. Definition of liquidity risk 5
 - II.1.2. Strategies for liquidity risk management 5
 - II.1.3. Centralised versus decentralised liquidity risk management 6
 - II.2. Senior management role, reporting and organisational structure 8
 - II.2.1. Defining the liquidity risk strategy 8
 - II.2.2. Risk reporting 9
 - II.2.3. Organisational and operational structure 10
 - II.2.4. Liquidity risk management as a part of the bank’s overall risk management system 11
 - II.3. Analytical framework for risk measurement and management systems 12
 - II.3.1. Methods and benchmarks used to identify and quantify risk 12
 - II.3.2. Management indicators used: limits and observation ratios 14
 - II.3.3. Liquidity potential and the haircuts used 17
 - II.3.4. Diversification and concentration 18
 - II.3.5. Reviewing the methods and benchmarks of the internal systems 19
 - II.3.6. Managing the liquidity risk of off-balance-sheet items or complex products 19
 - II.4. Stress tests 21
 - II.4.1. Methods and approaches 21
 - II.4.2. Taking account of the findings from stress tests 23
 - II.5. Liquidity contingency plans 24
 - II.5.1. Triggers 24
 - II.5.2. Responsibilities, measures and channels of communication 25
- III. Outlook** **26**
- List of abbreviations** **27**

I. Introduction

I.1 Background to the study

The recent turbulence in the money and capital markets has created awareness among the general public of just how important efficient liquidity risk management is for the stability of individual banks and the financial system as a whole. Yet even before the outbreak of the "subprime crisis", supervisory authorities and international commissions had increasingly begun to focus on the topic of liquidity risk management.

- In May 2006 the Joint Forum, a cross-sectoral committee with members from the Basel Committee on Banking Supervision (BCBS), IAIS and IOSCO, which addresses issues relating to the efficient supervision of financial conglomerates, published a report entitled "The management of liquidity risk in financial groups".¹
- In 2002 the Banking Supervision Committee of the European Central Bank conducted its first survey of liquidity risk management practices at cross-border banks, looking partly at systemic stability in the financial sector. An updated version of this paper has been available since early 2007. Both of these papers are internal documents.
- The European Commission, in 2006, defined liquidity as one of the five pillars of a future "Supervisory Landscape". It seeks to examine the potential for convergence not only among the EEA rules on liquidity supervision but also regarding relevant context factors such as public intervention in liquidity problems ("lender of last resort" function) and deposit insurance.
- In 2007 the Basel Committee conducted a survey on national regulatory approaches in the field of liquidity risk. The final results of this study have thus far not yet been published.
- In March 2007 the Committee of European Banking Supervisors (CEBS) received a Call for Advice from the European Commission with a request to provide technical advice on national liquidity supervision regimes. This survey was conducted in parallel with the above-mentioned Basel Committee stock-taking on the basis of the same questionnaire. The results have been available since August 2007.² The Commission is expecting, over the course of 2008, to receive an in-depth analysis of sub-categories of liquidity risk management that have been acquiring increasing importance given the market developments over the past few years in response to the second part of the Call for Advice.

On the part of the banking industry, the Institute of International Finance (IIF) also addressed the topic of liquidity risk management, publishing its "Principles of Liquidity Risk Management" in March 2007.³ This report presents the IIF's understanding of "good practices" in banks' liquidity risk management.

¹ On the web at <http://www.bis.org/publ/joint16.htm>.

² On the web at http://www.c-eps.org/Advice/documents/CfA_8_LiquidityStockTakesurvey.pdf.

³ On the web at <http://www.afgap.org/documents/Divers/LiquidityPaper.pdf>.

In Germany, liquidity is a hot topic, and not just because of international events. The entry into force at the beginning of 2007 of the "Regulation on the liquidity of institutions" (Liquidity Regulation) was an additional event that led the German Federal Financial Supervisory Authority (BaFin) and the Deutsche Bundesbank to study the topic more closely. The Liquidity Regulation is divided into a Standardised Approach, which is largely identical to the regulation's predecessor, Principle II, and the "liberalisation clause" of section 10 of the Liquidity Regulation. This liberalisation clause allows institutions, under certain conditions, to use their own internal liquidity risk measurement and management systems (hereinafter "liquidity models"⁴ for short) for supervisory purposes in place of the Standardised Approach. BaFin, in cooperation with the Bundesbank, generally performs on-site examinations at institutions to determine whether the conditions are in place.

Such examinations represent, to a degree, a journey into uncharted waters not only for the institutions themselves but also for German supervisors. To be sure, both sides do already have experience of the organisational preparation, conduct and follow-up (*inter alia* writing examination reports) of approval examinations (market risk model, IRBA and AMA examinations). Supervisors accordingly were relatively quick to develop internal examination standards and an instruction sheet on approval to use an internal liquidity measurement and management system pursuant to section 10 of the German Liquidity Regulation.⁵ However, the principles-based and thus very general wording of the liberalisation clause of the Liquidity Regulation is exactly why it depends heavily on the individual institution how to evaluate certain phenomena when examining a liquidity model. Moreover, it may be necessary to take existing market practices into account for the overall assessment.

And therein also lies the particular challenge of a "principles-based approach". The greater internal freedom to design an approach that fulfils supervisory requirements is fraught with some uncertainty for individual institutions regarding the specific design or quality of processes and procedures necessary to this end. This became evident at various information events conducted between May and October 2007 by supervisors with associations and individual institutions.

I.2. Conceptual design of the study

To enable a better assessment of the current situation, supervisors decided to draft a "range of practices" paper. This paper presents – on an anonymised basis – the liquidity risk management practices of a total of 16 German institutions or groups of institutions, 14 of which are systemically relevant. The survey sought, wherever possible, to use information already available to supervisors (eg from

⁴ "Liquidity risk model" here means more than simply the modelling of future cash flows which in some areas rests on a stochastic foundation but is mostly based on expert judgement. Rather, this term, in the simplified sense in which it is used below, implies a broader context that covers not only the aspect of risk measurement but also the more extensive requirements regarding the management of risk and its place in the context of risk management throughout the bank.

⁵ The sheet can be found at

http://www.bundesbank.de/bankenaufsicht/bankenaufsicht_liquiditaet_merkblatt.en.php and http://www.bafin.de/cln_011/nn_721290/SharedDocs/Downloads/DE/Service/Merkblaetter/mb_071015_10liqv,templateId=raw,property=publicationFile.pdf/mb_071015_10liqv.pdf (both in German only).

audits of financial statements). Institutions were contacted only whenever specific phenomena could not be covered based on the information already available. The idea behind this approach was to minimise the burden on institutions caused by the survey for this range of practices paper.

The data were collected between May and October 2007 – precisely the period in which the subprime crisis became virulent. This “range of practices”, however, is not intended to be a chronicle of “lessons learnt”, even though – where available – information on the impact of the crisis has been included, especially on the way institutions have designed their stress tests and on the frequency of management reporting.

All we will do in the following sections is to describe the institutions’ management practices as brought to light by the survey. This “range of practices” paper is not meant to be construed as a preliminary assessment or evaluation by supervisors towards developing “good” or “best” practices and accordingly does not contain a summary evaluation.

Part one of this paper introduces the various definitions of liquidity risk and discusses the degree to which liquidity risk management is centralised. Part two subsequently explains the role of management and the organisational and operational structure of liquidity risk management in the broader sense (identifying, measuring, monitoring and managing liquidity risk). Part three presents an overview of the methods and benchmarks used and the associated management indicators. Part four deals with banks’ internal stress testing while part five, in conclusion, examines the institutions’ contingency plans for liquidity crises.

The quality of any model – whether for liquidity risk or other types of risk – is based on the quality of the model’s data input. Supervisors, however, have pointedly refrained from studying data quality and stability in more depth in this “range of practices” paper. Data quality problems have already presented a challenge when examining other types of risk models – a challenge which spills over to many areas of banking activity and is not specific to liquidity risk modelling. Moreover, a comprehensive survey that would have been suitable for comparison purposes would have gone beyond the scope of this paper.

The information collected for making this transversal comparison can be related to single entities and financial groups alike. Because the sample is composed almost exclusively of systemically relevant banking groups, the following information about certain practices in an “institution” generally refer to the group that institution belongs to.

Finally, we wish to point out that the information collected from each institution (or group of institutions) varied in terms of detail and timeliness. It is therefore quite possible that the information obtained from some institutions on given topics either could not be interpreted at all or could not be interpreted with absolute clarity. Therefore, if, in the text, a given number of institutions are listed as belonging to a certain category, it does not necessarily follow that the rest of the sample does not belong to this category. By the same token, percentage statements (eg “one-third of institutions”) always refer only to those institutions for which information was actually available and thus not necessarily to the total number of institutions in the sample.

II. Results

II.1 Definition of liquidity risk and strategies to manage liquidity risk

II.1.1. Definition of liquidity risk

With regard to liquidity risk, institutions mostly distinguish between

- liquidity risk in the narrower sense (insolvency risk), ie the danger that a bank will be unable to meet its present and future payment obligations completely or on time;
- refinancing risk, ie the danger that additional refinancing can be obtained only at higher market interest rates;
- and market liquidity risk, ie the danger that, owing to exceptional circumstances, assets can be liquidated in the market only at a haircut. Market liquidity risk under this definition is almost always considered to be part of market risk management rather than liquidity risk management.

In terms of the time dimension, institutions mostly distinguish between structural and non-structural liquidity, which largely corresponds to a distinction between medium and long-term liquidity, on the one hand, and short-term liquidity, on the other. This reflects the classic distinction between capital market and money market activities, which at most banks are performed by separate organisational units. For non-structural liquidity, institutions also use such terms as situational, tactical or operational liquidity. Some institutions, however, use the term operational liquidity to refer solely to intraday liquidity.

The time threshold between structural and non-structural liquidity, for most institutions, is at 12 months; for a very few institutions, however, it can be as soon as six months or as late as two years.

II.1.2. Strategies for liquidity risk management

The type of liquidity risk involved can result in a variety of implications as to how each individual institution manages its liquidity risk. However, the available information shows that all banks generally pursue the same objectives. These are usually

- to ensure solvency at all times;
- to optimise intragroup cash flows (eg by “pooling” liquidity, thereby reducing dependency on external refinancing);
- to optimise the refinancing structure; and
- to coordinate issuance of own instruments in the money and capital markets.

The specific design of liquidity risk management depends on features specific to each institution such as the size, degree of internationalisation and group membership as well as on the type, extent and complexity of its business.

However, there appears to be a market-wide consensus that liquidity risk in the narrower sense is not backed by internal capital. The explicit reason given by some banks is that, from their vantage point, liquidity risk is located directly at the payment level and not at the earnings level. Nonetheless, in isolated cases capital is allocated to the earnings risk on which ongoing refinancing activity is based.

II.1.3. Centralised versus decentralised liquidity risk management

Many aspects of liquidity risk management in the broader sense are performed centrally, ie group-wide.⁶

Examples of centralised functions of non-position-keeping organisational units⁷ include, in particular, the definition of group-wide standards (eg the "Group Liquidity Policy") and the consolidation of the individual locations' liquidity positions at group level. Other activities performed by a central unit for the group include, in particular,

- group-level reporting, eg to the board of directors;
- group-wide analysis of the liquidity position;
- developing, reviewing and adapting the liquidity model, including the documentation of the mathematical and statistical procedures and workflows;
- designing and running global stress tests;
- deriving separate limits for individual locations from the overall bank limit and reviewing compliance with limits as well as granting approval to exceed limits;
- calculating medium and long-term refinancing, including an issuance plan;
- setting transfer prices for the internal transfer of liquidity; and
- approving liquidity transfers between subsidiaries and foreign branches.

Many institutions use their liquidity policy to set group-wide minimum requirements for measuring and monitoring liquidity risks. These requirements have to be met by all subsidiaries and branches (hereinafter referred to as "locations"). For their part, the locations provide the central liquidity risk management (LRM) or liquidity risk control (LRC) function with the data required to draft group-wide liquidity analyses. Communication with the individual locations' LRM units is conducted, among other ways, through a special committee whose membership includes, for instance, the Group Treasurer and the individual local Treasurers as well as, where appropriate, asset-liability management staff.

The foreign currency positions regularly listed in the management reports indicate that the institutions have implemented a system for measuring,

⁶ A distinction has to be made between liquidity risk management in the broader sense and "liquidity management" in the sense of day-to-day liquidity management in trade. We are dealing here with the concrete investment or procurement of liquidity in the market, eg by the "money market trading" unit. Institutions often use the term "asset-liability management" to denote the trading units responsible for capital market activities. In the following, we will also use the term "position-keeping units" to denote the units responsible for liquidity management.

⁷ Usually called "liquidity risk management", "liquidity controlling" or "Treasury" by banks.

monitoring and controlling liquidity positions for all material foreign locations which also covers significant foreign currency positions. Where foreign currency positions are not listed in the management reports, at least separate evaluations for foreign currencies can be generated as and when necessary.

As some foreign locations are, by the banks' own account, negligible in terms of size, they have been intentionally omitted from the calculations of the group liquidity position. This does not necessarily mean that these locations do not have their own liquidity risk management. In the case of one bank, one of its subsidiary units, the liquidity position of which is not included in the calculation of the group's liquidity position, has its own liquidity model that is more comprehensive than that of the group since, owing to the much higher interest rate level, it also recognises interest payments as cash flows.

In some cases, institutions have intentionally refrained from breaking down positions by currency since they assume that the key currencies in which, according to these institutions, nearly all foreign currency cash flows take place, are fully and freely convertible.

The position-keeping units, too, generally have a head at the group's headquarters to which the local position-keeping units report and separately perform liquidity management functions for their regions (operational implementation of money and capital market refinancing plans, with different organisational units being responsible for money market activities and capital market activities). The tasks of this central leadership include managing centralised portfolios with liquid assets and maintaining liquidity in the respective foreign currency across time zones.

Generally speaking, every location is independently responsible for ensuring operational solvency. This is ensured through appropriate access to the money market. In principle, however, the individual locations initially have to obtain refinancing from the group pool. Only where this option is unavailable can locations then go to the market. The idea is to avoid locations unwittingly entering into competition with one another in the external market, thereby obtaining refinancing at worse terms than would have been possible internally.

At a very few banks, operational liquidity management is completely decentralised, with each location having an independent liquidity management function.

Treasury is normally responsible for transferring group liquidity to locations, whereas the respective locations are responsible for ensuring they comply with local regulatory liquidity requirements. We also observed that at least the key locations are obliged to manage their liquidity in such a manner that they can get by without centralised liquidity measures over a given time period.

There are different rules across institutions as to whether the individual locations' liquidity management is conducted through limits set by the group. Around one-third of the institutions stated that binding limits are set only for the group as a whole but not for the individual locations. In the case of slightly less than another one-third of institutions, limits are set for both the group and the individual locations.

In individual cases, either no limit has been set for the group, its subsidiaries or foreign affiliates or the group-level reporting and limit monitoring systems are still a work in progress.

II.2 Senior management role, reporting and organisational structure

II.2.1. Defining the liquidity risk strategy

The involvement of senior management, in particular, demonstrates the importance attached to liquidity risk management. In this regard, there are some fundamental inter-institutional similarities. The basic organisational and operational structure of liquidity risk management, including the process of establishing liquidity risk limits, is defined in a liquidity policy, the amount of detail for which varies widely. Liquidity policies that are more principles-based mostly contain detailed annexes to which the reader is referred.

The (group) liquidity policy contains, for the most part, information on limits, responsibilities, the delegation of tasks, responsibilities and competencies of liquidity risk management and controlling, and its method of approval varies from one bank to another. In some cases, it is approved by the chief risk officer, or CRO, alone, while in other cases it is approved by several board members (eg CRO, CFO, CEO and the director of Treasury) and, in others, has to be signed off by the entire board of directors. Moreover, the liquidity policy is generally reviewed at least once a year by the same group of people.

The individual board member or entire board of directors regularly delegates responsibilities to specific committees, the composition and tasks of which vary depending on how close they are to day-to-day liquidity management. The committees' competencies are closely related to the presence of board members; the fewer board members are represented in these committees, the more the function of these committees is advisory and the fewer decision-making powers they have. If the committees have actual decision-making authority, they take measures at short notice when necessary, eg amending liquidity policy before the annual review date. The board committees can also make changes to limits set by the board of directors before the annual review date.

The number of board members represented in a committee that reports directly to the entire board of directors varies considerably. In some cases only just shy of half of the board members are represented, while in other cases the whole board of directors sits on the committee. Occasionally, individual board members, eg the CRO, head additional (sub-)committees. The frequency of committee meetings varies among the individual banks depending on the strategic importance and tactical necessity of ongoing liquidity management. The committees reporting directly to the entire board of directors generally meet at least once a month, in some cases every two months. The committees reporting to the CRO or other individual board members meet one to three times a week. At times considerable increase in the frequency of meetings became visible as fallout from the subprime crisis.

Day-to-day liquidity management is influenced not only by the liquidity policy but also by other board decisions (eg refinancing plans).

II.2.2. Risk reporting

The entire board of directors is generally informed of the institution's liquidity situation at least once a month. In exceptional cases, such reports are presented weekly or even daily. However, in this case the reports only comprise a very few highly aggregated ratios. The information contained in the management reports generally includes

- a general verbal assessment of the liquidity situation;
- an analysis of structural liquidity; and
- an overview of the development of the liquidity gap and/or liquidity position within the meaning of this paper (see section II.3.1.), including utilisation of the relevant limits.

Depending on the institution, some additional itemised or aggregate information could be contained in the report, to include

- an overview of the issuance of new instruments;
- a report of the institution's credit spreads in the capital markets;
- stress test results;
- borrowing concentration risks;
- potential of unsecured funding;
- a liquidity preview specially for the municipal or mortgage register; and/or
- the volume of share buybacks.

Moreover, other events of special importance are reported on an ad hoc basis (eg the use of irrevocable credit lines).

Frequently, at longer intervals, mostly quarterly, more detailed reports on liquidity risk are drafted for the entire board of directors or the directly subordinate committee. Individual board members, or the committees they head, are informed more frequently (up to daily) or on a case-by-case basis, especially where changes to limits or issuance calendars are concerned.

The monitoring of the limits and the liquidity position by the organisational unit(s) in charge of risk controlling is usually performed daily. If unusual patterns are spotted or certain early warning stages or limits reached, an ad hoc report is sent, eg to the head of Treasury or Risk Control or the CRO.

A more detailed report on the results of stress tests is usually submitted to the entire board of directors (or at least, in individual cases, the directly subordinate committee) at least once a month. The frequency in other cases is at least quarterly or, in isolated cases, only annually. Some institutions inform the entire board of directors weekly, while others do this only ad hoc.

In many cases, the stress test results are integrated into the management reporting such that the liquidity preview contains the pattern of the liquidity position under the "normal scenario" and the underlying sensitivity analysis or the most important scenario test.

In the case of liquidity squeezes, most banks have provided for much more frequent reports to the entire board of directors (eg weekly) and the directly subordinate committees (eg daily) on the results of the stress tests. As the

subprime crisis progressed, the majority of banks actually did see a significant rise in the reporting frequency, including management reporting.

In addition, the supervisory and administrative boards are also sent regular updates on liquidity management issues, albeit less frequently and, in some cases, with lesser detail than the reports sent to the board of directors. The reporting frequency here varies between every two months and quarterly. Owing to the current financial market situation, intensified reporting to the supervisory and administrative boards was likewise observed.

II.2.3. Organisational and operational structure

A key aspect in looking at liquidity risk management across institutions is to ensure that supervisors and institutions are using the same clearly defined terminology. The organisational unit known as "Treasury" is a case in point.

As surely as one will find a "Treasury" unit in any major bank, it is equally sure that the functions and reporting lines will vary. Treasury can have responsibility for positions, ie it can manage its own trading activities, or it can be "merely" a medium for coordinating liquidity requirements between position-keeping units. By the same token, the head of Treasury can report to the executive board member in charge of trading business – or be subordinate to the CRO, for instance.

All in all, the institutions listed the following key elements of liquidity risk management in the broader sense:

- liquidity risk measurement;
- developing, reviewing and adapting the liquidity risk model, including the documentation of the mathematical and statistical procedures and workflows;
- ensuring that position data are correctly recorded;
- stress testing;
- reviewing compliance with limits and giving approval to exceed limits;
- involvement in the addition of new products to the liquidity model;
- giving senior management adequate information on the day-to-day risk situation; and
- developing and implementing contingency plans for liquidity crises.

The following additional elements may come into play:

- setting internal prices for transferring liquidity;
- defining the medium and long-term refinancing structure, to include a plan for the bank to issue its own debt instruments in the money and capital markets; and
- approving liquidity transfers between locations.

Responsibility for the individual elements of liquidity risk management is generally spread out across different units (eg "Risk Management", "Risk Control" or "Treasury"), which, as appropriate, divide certain tasks up amongst themselves. Moreover, responsibilities can change over time; as a case in point, "Treasury" might originally develop the liquidity model and then transfer control over the methodology to the "Liquidity Control" unit.

II.2.4. Liquidity risk management as a part of risk management for the overall bank

There is a connection between liquidity risk and other types of risk. Inflows and outflows of funds are generally based on activities that involve other risks (especially market risk and credit risk). Liquidity risk is therefore occasionally also referred to as “derived” risk or “secondary” risk. The value of liquid assets and the availability of external refinancing, too, depend not least on the market situation. For that reason, it appears sensible to integrate liquidity risk management with the management of other types of risk. There are various instruments for such integration; examples discussed in the IIF study include

- integrating liquidity risk and market risk control under a superordinated risk control unit;
- integrating all types of risk when developing stress tests; or
- committees which unite representatives from liquidity, credit and/or market risk management.

Actually, in nearly half of banks, liquidity risk management is organisationally closely linked to market risk management or control insofar as both activities, despite being performed by different organisational units, report to the same directly superordinated unit. In one-third of banks, market price risk control and liquidity risk control are located within the same organisational unit.

In most cases, the head of the unit in charge of liquidity risk management is also a member of the risk committees that report directly to the board. Furthermore, liquidity risk management is represented in the local liquidity risk committees, which regularly include members of other risk management areas.

In the stress tests, liquidity risk is regularly analysed separately from other types of risk. However, in isolated cases it can be seen that liquidity risk is materially intertwined with market risk management (eg to determine the value of liquid assets and formulate market risk stress scenarios), credit risk management (eg ways of treating individual liquidity risk factors such as drawing on committed credit lines) and operational risk management (eg to formulate the liquidity risk stress scenarios for operational risk).

The events surrounding the subprime crisis led some observers to suggest intensifying the interrelationships between liquidity risk management and the management of other types of risk, with one institution currently implementing an “integrated stress test” covering all types of risk.

II.3. Analytical framework for risk measurement and management systems

II.3.1. Methods and benchmarks used to identify and quantify risk

The basic structure of banks' risk measurement and control systems is similar. However, the institutions often use different terms to describe the same situations or approaches. We will use the following terms for simplicity and ease of comparison.

- A gap analysis (sometimes also called funding matrix) is a comparison of total cash inflows and cash outflows up to a given point in time.
- A liquidity gap exists if, at a given point in time, total cash outflows exceed total cash inflows.⁸
- The liquidity that can potentially be additionally generated to bridge a liquidity gap is the so-called liquidity potential.
- The sum of the liquidity gap and liquidity potential is the institution's liquidity position.

Gap analysis

The centrepiece of measuring non-structural liquidity is the gap analysis. It shows the liquidity surplus or shortfall for each observed projection period, eg each individual day or on individual reference dates (eg reporting over one week, one month or one year).

Cash inflows and outflows are compared — where they are available and this makes economic sense — according to their respective contractual maturities. This comparison is initially performed in a "normal scenario", ie in a non-stressed situation. The repayment of received time deposits, for instance, is always recognised in the liquidity position at the time of contractual maturity irrespective of the fact that experience has shown that such deposits are highly likely to be rolled-over.

Where roll-overs are assumed, the positions may no longer be reported at their contractual maturity but at their economic maturity (also known as behavioural maturity). This is regularly practiced for withdrawal risk in the case of savings and sight deposits and for committed credit lines, to name one example. Since these positions are estimated on the basis of certain assumptions, the term "modelled cash flows" is also used. Here, "modelling" means that the positions are input into the gap analysis only at their estimated (as opposed to actual) level and maturity. Moreover, in individual cases the renewal of fiduciary funds, repos and reverse repos and the liquidity of assets held for trading are modelled based on their economic maturity.

In addition to a "normal scenario", all banks forecast a liquidity gap under certain stress conditions (for more details see section II.4.). These stress tests are increasingly being based on economic maturities.

⁸ Some institutions also list this separately for the most important currencies.

A detailed analysis of the modelling approaches was beyond the scope of this survey. What we can note, however, is that, for cash flows spread evenly across the month, a monthly average is used in some cases (eg for sight deposits), whereas, for other low-volatility, stable cash flows (eg certain savings products), linear regressions are used. The cash flows from drawing on irrevocable credit commitments, or the probability of such drawdowns on committed lines, are in some cases generated using credit risk models. There are also differences with regard to the time periods across which these cash flows are modelled.

The forecast quality of the models and the assumptions made therein are reviewed regularly by all banks, especially regarding the longer-term part of deposits which can be withdrawn at short notice (residues) and the assumed drawdowns of granted credit lines (see also section II.3.5.).

There are different ways of recording off-balance-sheet cash flows, especially from derivatives. Although many institutions attempt at least to roughly calculate these cash flows, not all include them in the projection that is relevant for management purposes.

The liquidity gaps could theoretically be recalculated daily. In practice, however, this decision is made after a cost-benefit analysis, especially with regard to the respective availability of data processing capacity. Around one-third of banks calculate this figure daily and some institutions weekly; only in exceptional cases is it calculated every 14 days.

For the most part, interest payments are completely disregarded in the gap analysis since most institutions do not consider their impact on the liquidity situation to be material and recording them in detail would generate several times the amount of data.

Liquidity potential

Since a liquidity gap would *per se* lead to insolvency, the option of procuring additional liquidity to cover an identified liquidity gap must be included as an additional parameter in the context of liquidity management. This additionally available liquidity is defined in a variety of ways. For some institutions, it comprises both the available liquid assets at that particular point in time and the available funding options (eg credit lines committed by other banks). Others only count liquid assets, as they assume that unsecured funding in the market will no longer be an option in the event of a liquidity bottleneck.

Institutions use terms such as “counterbalancing capacity”, “balance sheet liquidity” or “liquidity reserve” to denote the entire range of assets (and lines of refinancing) that can be used to cover potential liquidity shortfalls. The term “liquidity reserve”, however, only corresponds to the same term in trade law in exceptional circumstances. As defined at the beginning of the chapter, we will use, in the following, the term “liquidity potential” for all of these concepts.

The liquidity potential – like the result of the gap analysis – is calculated or estimated for every day or at least for specific reference dates.

The choice of assets used to calculate the value of liquid assets, and the level at which they are weighted (with the nominal values usually subject to “haircuts”),

depends on the type of the assets concerned. Capitalised securities holdings are listed in the liquidity position, taking into account their (often high) market liquidity. Many securities can be sold short-term in the capital markets or can be used to procure liquidity at short notice by way of a repo transaction.

Many institutions divide liquid assets into liquidity-asset classes, generally on the basis of ratings and maturity. Irrespective of the legal maturity, the liquidity potential is mapped to several sub-quantities and maturities which take account of the market liquidity of each respective asset class. Here, assumptions are made regarding the liquidity values. These assumptions are presented as discounts from the market price, or haircuts; the haircuts used are generally based on the values defined by the ECB, plus, as the case may be, an additional deduction.

Many institutions look not only at the normal scenario (mostly also called the “going concern scenario”⁹) but also at one or more scenarios in which the liquidity potential is predicted under stressed conditions. Under stressed conditions, the value of the liquidity potential is *ceteris paribus* lower than under normal circumstances. However, the liquidity position in the short-term maturity bands can, under stressed conditions, appear more favourable than in the normal scenario. One possible reason is that some banks take into account contingency measures such as the liquidation of securities in the trading portfolio, which means that the matching incoming cash flows are allocated to earlier maturity bands than would be the case in a normal scenario. If, in a stressed scenario, liquidity potential includes such assets that are not covered in the normal scenario, it can likewise increase in a stressed situation.

II.3.2. Management indicators used: limits and observation ratios

Concrete liquidity management measures are taken depending on the results of a comparison of the liquidity gap and the respective liquidity potential. The balance or the ratio between the two variables is not permitted to fall below a given threshold. If an indicator comes within a certain distance of such a threshold, this triggers countermeasures, irrespective of whether the limit is explicit or implicit.

For their non-structural liquidity, most banks have set explicit limits on their liquidity positions. This is not the case with all banks, however. Irrespective of this, a reaction also occurs in these cases whenever a management indicator reaches a value deemed critical.

The institutions have different “philosophies” on how they use limits. In the restrictive interpretation, “limits are made to be complied with”, ie their violation is never tolerated and countermeasures are generally taken once the management indicator has come to within a certain distance of the limit. In other cases, it is quite permissible for limits to be exceeded before specific countermeasures are taken.

Where explicit limits for liquidity management do exist, they are regularly defined in a multistep procedure. The uppermost limits (and, in some cases, the limits directly below them) are set by the board, with the lower limits generally

⁹ “Going concern” is an expression with its origins in accounting and denotes the intention to keep the company operating indefinitely without it going out of business or liquidating its assets.

being set by the liquidity risk committee, which reports directly to the board. Operational limits, to round off the list, are set mostly by the Money Market Trading or Treasury unit.

In some cases, not only the overall liquidity position but also the liquidity potential is separately planned and managed. For instance, the percentage of eligible securities needs to correspond to at least the amount of liquidity required within a certain number of business days (eg the first three business days) or the ratio between liquidity potential and money market liabilities, including withdrawal risk-prone positions, may not fall below a given threshold (1, for instance).

In isolated cases, limits are also imposed on liquidity risk from Pfandbrief business. There also exist isolated instances of limits to restrict the use of uncollateralised refinancing, where a distinction is made according to financing volume and period.

If the uncollateralised refinancing is not limited, it is generally at least monitored. Other observation ratios used include

- customer concentration thresholds, eg for the ten largest depositors;
- diversification of the funding structure regarding the following criteria: market, region, financing instrument (product concentration) or maturity;
- liquidity risks specific to Pfandbrief business;
- central banks' free refinancing potential;
- the level and composition of liquid assets, mostly broken by region and currency;
- potential outward cash flows from off-balance-sheet business (ABCPs, undrawn committed credit lines, collateral for derivatives positions).

Regarding the number of maturity bands used for which the cash flows are compared/monitored and reported to the board of directors, there are in some cases wide disparities between institutions.

For some institutions, the short-term segment of one month or less is subdivided into at least four separate maturity bands because of the particular significance for gauging solvency. Around one-third of institutions report payment flows per business day for the first week or at least for the first two business days. Moreover, around one-quarter of institutions report such flows weekly for at least the following two weeks, followed by a report for the first subsequent month. In some cases, reports occur daily throughout the third month. The remaining money market segment up to one year is divided into at least two (three and six months) and not more than an additional nine maturity bands (ie each month separately).

Some institutions set their limit such that the cumulative outflows in the first fourteen days may never exceed cumulative inflows (including liquidity potential). For other institutions this period comprises the first four or the first eight weeks, in some cases even the first half or whole year.

The position-keeping units are regularly responsible for ensuring intraday solvency since very quick actions and reactions are necessary in order to ensure that the central bank account is sufficiently covered at all times. Some banks

argue that placing management duties outside the position-keeping unit would be too cumbersome. Specific data on the management of intraday liquidity were not gathered in this comparison.

Liquidity position-based management is supplemented in all banks by stress testing. In some cases the results of the stress tests are factored into the calculation of the degree of limit utilisation by, for instance, not allowing the short-term refinancing needs to exceed the free refinancing potential with the key central banks calculated on the basis of a stress scenario. Another possible outcome of taking stress test results into account in management is that the limit shows a different value for each reported maturity band every time a gap analysis is re-run (and is therefore variable). For instance, the net limit can be calibrated such that the liquidity requirements in each stress test scenario can be covered by the end of a multi-week horizon. The fluctuating limit levels are thus inherent in these approaches (eg simulations) and not caused by changes to the methodology.

Another example is the "traffic light" strategy for limitation (with three stages: green, yellow, red) in which various scenarios are examined. These are likewise variable limits. Although utilisation is always limited to 100%, the assumptions underlying the calculation of the degree of utilisation vary depending on the scenario.

Funding and issuance plans are generally developed for medium and long-term (structural) liquidity. The structural liquidity risk (generally > 1 year) is measured and monitored mostly in the form of a variable that reflects the ratio between the medium or long-term liabilities and assets. Here, some banks limit the quantity of medium to long-term assets they accept. One way of doing so is to mandate that, from a given point in time on (eg two years' residual maturity), medium or long-term liabilities should make up a given percentage (eg at least 80%) of medium or long-term assets, or by stating that the ratio of cash flows from asset instruments to those from liability instruments do not fall below a certain value (eg 90%) with a given maturity (eg longer than one year).

To gauge the medium to long-term refinancing structure, between 9 and 18 additional bands in one or two-year intervals are examined, generally over a maximum period of 30 years – although the period was even up to 99 years in one case.

The banking world is familiar with the distinction between material and immaterial risk positions. In the case of liquidity risk management, however, it appears, at first glance, neither common nor pronounced to think in terms of materiality. All the same, the phenomenon that certain positions or locations are given special treatment in liquidity risk management can be observed; this is largely grounded in cost-benefit considerations. Projected cash flows from derivatives have, for the most part, not to date been included in the liquidity position since their contribution to the overall liquidity position is not rated as being material. In addition, individual locations are incorporated into the group-wide system not with their individual positions but only with their cash-flow balances. These are recorded only via the once-a-day marginal offsetting of subsidiaries' cash-flow balance against the liquidity pool. In similar fashion, the largely non-recorded interest payments with banks are only implicitly included in

the calculation through the daily smoothing of central bank accounts at the end of the business day.

In some cases, at the time of the survey, no final decision had yet been taken on limiting liquidity risks. It was also not clear how high, and of what quality, the banks believe the liquidity potential is supposed to be in order to cover insolvency risk.

Excursus: liquidity-at-risk models

None of the banks in the sample used stochastic models, which estimate the expected net payment requirement, which will, with a given probability, not be exceeded, based on historical surpluses from a bank's autonomous payments to manage liquidity.¹⁰ Supervisors, however, are informed that, in individual other institutions, such approaches are used for internal purposes.

II.3.3. Liquidity potential and the haircuts used

Banks hold varying amounts of assets, mostly liquid securities, to offset liquidity gaps, especially upon the onset of unforeseen events. The extent and value of these liquid assets vary among banks, especially as some institutions only count eligible securities among liquid assets (sometimes known as "prime liquid assets") whereas others also include other paper suitable for repo operations ("liquid assets"). This includes, however, only paper that are not part of a securities lending or repurchase transaction ("unencumbered securities"). Other banks, for their part, also count other types of securities as liquid assets (in some cases including the present-value overcollateralisation in the cover fund minus a given percentage). Different haircuts and different liquidation periods are assumed for liquid assets for both the normal scenario and under stress.

Along with assets, some institutions also count irrevocable credit lines with third parties among the liquidity potential.

Liquid assets – not least for regulatory reasons – are held not only at the institution's headquarters but also at foreign locations.

The amount of securities held group-wide as liquid assets generally fluctuates – owing in part to differences in definition – between tens of billions and the low hundreds of billions. The liquidity potential, too, changes over time.

An analysis of refinancing options reveals considerable differences between secured and unsecured funding options. At least the potential for collateralised central bank refinancing is gauged regularly (sometimes even daily). Depending on the business model, the free cover assets in the cover registers are also calculated (likewise up to daily).

The haircuts used for collateralised refinancing are generally those of the ECB, US Federal Reserve or other major central banks. The haircuts on eligible securities consequently generally range, depending on the instrument, from 0.5% to just shy of 10%. For collateral that is not eligible for central bank

¹⁰ Autonomous payments are defined here as those inpayments and outpayments which, in terms of amount and points in time, are not influenced by a bank's liquidity risk management under normal business operations.

operations but is eligible for repo transactions (collateralised money market), the haircuts are correspondingly higher, averaging between 5% and 20%. The (scarce) information on haircuts for ABCPs¹¹ consistently indicated figures of 40%. Securities eligible for tripartite repos are, in individual cases, subject to a 6% haircut, and the overcollateralisation from Pfandbrief business is subject to a haircut of between 5% and 20%. In isolated cases, no haircuts are made as a general rule. The stated reason is that the overall holdings of securities eligible for refinancing with the ECB or for repos is much higher than the potential liquidity requirements.

The haircuts for liquid assets are increased even further in stress scenarios relative to normal circumstances; in individual cases, by up to a factor of four. The largest haircuts are for subordinated securities, followed by state or municipal debt securities, uncovered bank debt securities, ABS/MBS, mortgage and public Pfandbriefe and, lastly, Federal bonds. Paper that is not eligible for either central bank refinancing or repos (eg non-investment-grade positions or shares) is subject to large haircuts even under normal conditions (between 10% and 100%).

The unsecured refinancing potential in the market appears to be systematically analysed only in exceptional cases since the potential can prove to be, in crisis situations, relatively unstable. However, some banks comprehensively analyse the uncollateralised refinancing options annually and the non-securitized money market monthly.

Even a review of the bank's own ability to acquire liquidity on the market seems to be regarded as relatively ineffective and fuels fears of potentially sending out the wrong signals in the market. Some banks point out that, in times of crisis, it might no longer be possible to acquire liquidity in the money markets even against collateral.

Most institutions review and appraise the value of haircuts regularly at, in some cases, quarterly intervals, but at least annually. It is a relatively simple matter to review the internal haircuts on securities that are eligible for central bank refinancing since the latest information provided by the central bank can be used. The remaining haircuts are generally defined on the basis of historical data or through expert opinions, which makes them more difficult to review and verify. This is also – and particularly – the case for haircuts that are used for stress scenarios.

In summary, there are some general criteria with which to assess the level of the haircuts in the case of refinancing capacity (although not every bank uses every criterion). These include

- short-term/long-term rating;
- ECB eligibility;
- type of issuer (sovereign, bank, corporate);
- sovereign rating;
- currency of issue; and
- whether or not it is listed on a noted exchange.

¹¹ During the course of the US subprime crisis, the US Federal Reserve accepted ABCPs as collateral for refinancing through its "discount window".

II.3.4. Diversification and concentration

Whether and how funding is diversified by depositor, investor, market or currency depends to a decisive extent on the bank's business strategy; therefore, a major universal bank will pursue a different strategy than, for instance, a Landesbank or a bank specialising in retail business.

Most banks regularly monitor their customer concentrations (eg the largest ten or 100 depositors) and the diversification of their refinancing sources, even if neither is necessarily limited. Some banks, for instance, refrain from limiting their customer concentration partly because, when the bank places its refinancing products (especially CP) via third parties, it is not always possible to verify the ultimate purchaser, which means flawed management incentives could potentially be set. In addition, concentrations among individual liquidity buyers are regarded as being covered indirectly through counterparty limits. Limits on the diversification of refinancing products, in turn, could reduce the trading desk's scope for refinancing above and beyond what is regarded as efficient.

II.3.5. Reviewing the methods and benchmarks of the internal systems

The institutions generally review their risk measurement and monitoring methods (eg modelling cash flows in the liquidity position, stress testing assumptions) at least once a year (in some cases twice a year or quarterly), with other reviews being event-driven (eg the subprime crisis). Some of the areas that institutions list as being covered in these reviews include

- the exhaustiveness of the modelling approach and the classifications made;
- assumptions about the refinancing and investment horizon in the individual product groups and business areas;
- assumptions about haircuts and timelines in the case of the short-term sale of free securities holdings;
- the occurrence of a termination, withdrawal and default in the lending business and the bank's own issues;
- probabilities of extension and
- acceptance of new business.

II.3.6. Managing the liquidity risk of off-balance-sheet or complex business

Drivers of liquidity risk from off-balance-sheet business include irrevocable committed funding lines, guarantees and downgrade trigger agreements (such as in the case of liquidity lines for SPVs/conduits or derivatives) as well as margin calls in futures exchanges. Most banks model their irrevocably committed lines, guarantees and guaranteed loans with the weightings used in the Liquidity Regulation (with a drawdown probability of 20% and 5% respectively). In some cases, the off-balance-sheet lines are not modelled but instead analysed separately with regard to their drawdown potential and backed appropriately by liquid assets, usually eligible collateral.

Potential drawdowns in connection with securitisation transactions are generally captured during the regular projection of cash flows, eg by modelling drawdowns from liquidity facilities, such as vis-à-vis conduits. Moreover, in most cases the

liquidity lines for conduits are also included in the stress scenarios, for instance by assuming a drawdown of 80% of the liquidity lines for ABCP programmes in the first month.

Some banks include cash flows from off-balance-sheet transactions completely in their regular liquidity projection. The majority of banks do not model cash flows in connection with derivatives because they feel the potential cash flow effects of derivatives are not very high and are out of proportion to the time and effort required to capture them explicitly.¹² In this case, however, the derivatives are monitored separately under liquidity aspects so that measures can be taken whenever necessary, ie if the cash flows should become material.

In the event that transactions with complex products (such as derivatives) which subject the institution to material contingent liabilities are not subject to (separate) limits, liquidity risk management can resort to other possible options for imposing sanctions in order to limit business in these types of transactions. For instance, according to the aforementioned IIF study, material transactions involving ABCP liquidity facilities could be subject to special trading limits or to a requirement that they be pre-approved by Treasury.

There are generally no special limits on liquidity risk from transactions in complex products; this risk is only entered into the aggregate risk measurement indicators. However, the responsible organisational unit (Treasury, LRM or LRC) may, in a liquidity crisis, set such limits at individual institutions. For instance, in cooperation with the trading desk, Treasury can set limits including individual consultation on each transaction with the decision resting with Treasury, for example, or Treasury can, as appropriate, limit or reduce the business volume of backstop facilities.

Some banks indicate that credit risk and market risk limit transactions in complex products and list this as a general risk mitigant. In individual cases, the maximum risk-weighted assets are limited for each business line. Also, by modifying transfer prices, the impact on profit of transactions can be influenced in the bank's internal accounting procedures. For instance, Treasury can pass on the costs of hedging liquidity facilities using primary liquid assets to the trading desk.

In this context, some banks point to relevant mechanisms in the NPP. LRM (LRC or Treasury) is regularly involved in the NPP. In this function, it reviews new products in terms of their implications for liquidity risk and for the bank's refinancing and develops approaches to capture them in the gap analysis. The risks from complex products (within the meaning of a separate control process from the usual NPP) were not seen to have a special role.

¹² One institution, for instance, quantified the net market value of derivatives at less than 0.5% of all modelled cash flows for the following day in its funding matrix. This figure was around 0.35% for another institution.

II.4. Stress tests

II.4.1. Methods and approaches

The following is based on the joint Basel Committee, CEBS and IIF definition of stress testing.¹³

As a matter of principle, all stress tests are based on the assumption of smaller or later inflows of cash and higher or earlier outflows of cash than would be expected under normal circumstances. Specifically, this means that the divergence of payments and times of payment from normal circumstances must be estimated as accurately as possible. This is usually performed by experts and, in exceptional circumstances (for certain cash flows), by mathematical and statistical forecasting models (eg residue modelling or modelling drawdown behaviour). Moreover, the duration of an imputed crisis or the effects thereof and the reaction period for suitable countermeasures need to be gauged.

The surveyed institutions generally conduct their stress tests monthly. Anywhere from two to seven scenarios are calculated depending on the bank. These are generally hypothetical scenario tests, centrally designed and conducted, and based on expert estimates in which the bank's own and third-party experience from historical liquidity crises are incorporated.

Institution-specific factors as well as general (eg market-related or macro) factors are taken into consideration as triggers of the simulated crisis scenarios. Each institution calculates the potential impact of a rating downgrade on its short-term refinancing options. The imputed downgrade is between one and three rating grades, with the focus being on a two-notch downgrade. Some institutions make a distinction between their short-run and long-run rating or make the performance of the relevant scenarios dependent on whether certain early warning indicators show up.

Additional institution-specific scenario tests refer to

- an operational risk event;
- a sudden and massive run on bank deposits as well as
- a market risk event that, owing to the institution's specific market position, can have a particularly damaging impact.

Overall, the banks list the following assumed disruptions that can be attributed to general market influences.

- Negative market developments (violent market disruptions with limited liquidity of securities and higher drawdowns of customer deposits and stronger recourse to committed credit lines);

¹³ "Stress testing is a risk-management technique used to evaluate the potential effects on an institution's financial condition of a specific event and/or movement in a set of financial variables. [...] Sensitivity analyses are generally less complex to carry out since they assess the impact on an institution's financial condition of a move in one particular risk factor, the source of the shock not being identified, whereas scenario tests tend to consider the impact of simultaneous moves in a number of risk factors, the stress events being well defined." (Contained in "Stress testing by large financial institutions: survey results and practice", Committee of the Global Financial System, January 2005.)

- a systemic shock at major trading centres in conjunction with a crisis in a market segment that is important for the bank (eg contagion to other markets, especially a collapse of the money and repo market),
- a national or global recession,
- the emergence of rumours on the capital markets and
- a global fund crisis.

Various banks combine several individual scenarios, with the parameters in some cases being weighted to the estimated likelihood of the respective underlying scenario coming to pass.

Institutions that conduct sensitivity analyses base them on the following risk parameters – either in isolation or a combination thereof.

- Complete or partial drawdown of interbank or customer deposits;
- sliding prices in the secondary markets for securities, which are counted among liquid assets;
- worsening of the rating of the bank and/or the parent;
- a reduction in the opportunities for issuing CP/CD;
- reversion of the refinancing of affiliated SPVs to the bank;
- default of significant borrowers;
- repurchase of own debt securities to stabilise the secondary market;
- no option for new issues of uncovered bonds (including subordinated debt securities);
- posting of additional collateral for OTC derivatives and guaranteed loans;
- increase in margin calls for derivatives.

Even prior to the outbreak of the subprime crisis, individual banks had already implemented specific scenarios for disruptions in the CD and CP markets. In most cases, the other banks have also, since the outbreak of the subprime crisis, been assuming a similar scenario or at least integrating the assumptions inherent in such a scenario (going as far as the complete collapse of the CP market and the need for a wholesale takeover of outstanding ABCP programmes by conduits into the bank's own balance sheet owing to the liquidity facilities granted to these conduits) into existing market-specific or institution-specific scenarios.

Only a few institutions have provided information on the period required, according to their own assumptions, to take suitable measures to avert a liquidity shortage in the aforementioned stress scenarios. Depending on the scenario, the bank-specific assumptions range between eight days and one month and between five and 120 days.

During liquidity risk stress tests, the institutions primarily look at the cash-flow level and largely ignore the impact on profits of each respective scenario. As a consequence of the connection between institutions' market liquidity and refinancing options which became increasingly apparent during the subprime crisis, the need for such analyses is likely to increase. The medium-term or even longer-term repercussions ("second-round" or "third-round effects") of a shortage of market liquidity on refinancing, such as changes in institutions' investment behaviour, have to date been largely disregarded.

The assumptions or results of the stress tests from other risk areas only enter into the liquidity risk stress testing in isolated cases. Assumptions of correlation

between liquidity risk and other types of risk were not corroborated, either.¹⁴ However, the following alternative efforts to mesh the liquidity risk stress tests with other stress tests were listed.

- Linking liquidity scenarios with interest scenarios;
- inclusion of rating information and probabilities of default (PDs); and
- efforts to create stress tests that are “integrated” across all types of risk.

Owing to differences in aims and focus, the assumptions in the liquidity risk stress scenarios generally deviate from the underlying assumptions of the stress tests for market and credit risk. The parametrisation (PDs, price volatility) of the risk factors for credit and market risk, too, is, in some cases, much more finely grained than for liquidity risk. For instance, in the case of credit risk, probabilities of default (PDs) and loss given default (LGD) are varied for each customer group, whereas in the liquidity risk scenarios wholesale PDs are often assumed across all customer groups. In addition, it must be noted that the liquidity risk time horizon focuses on the short-term liquidity shortfalls.

II.4.2. Taking account of the findings from stress tests

For most institutions, no specific information is available about the conditions under which the stress test results trigger consequential measures. However, the institutions have indicated that they have consciously refrained from setting up an automatic chain reaction of countermeasures to be taken in the event of any breaches of limits triggered by stress tests. This does not rule out a pre-defined escalation procedure on the basis of the stress test results, however. In isolated cases, a three-step escalation procedure is applied which provides for a variety of measures depending on which escalation stage has already been reached. Other traffic light approaches refrain from using predefined consequences, choosing *ad hoc* measures instead.

The institutions claim that they validate and adapt their parameters in an ongoing review process at least twice a year but mostly annually. There is generally also an intra-year *ad hoc* adjustment. Only at a very few institutions is the board of directors informed directly of changes to assumptions or parameters; in most cases, subordinated committees (ALCO, Risk Committee) are notified instead.

In exceptional cases, the assumptions and parameters of the stress tests have thus far not been subjected to regular review.

¹⁴ Thus far, there have not been any methodological proposals in the academic literature to which institutions could refer.

II.5. Liquidity contingency plans

II.5.1. Triggers

Nearly all institutions have a liquidity contingency plan which governs responsibilities and the composition of crisis committees, internal and external channels of communication and the measures to be taken in the event of an emergency. For a very few institutions, this plan is still a work in progress. However, there are still differences regarding the detail of the contingency plans.

Whereas some contingency plans are very general, others have a detailed, structured and multistage escalation process (early-warning stage, liquidity crisis and contingency). Many institutions have such a gradation – usually in three stages – according to the severity of the liquidity crisis (and the resultant measures to be taken, such as having decision-making bodies meet more frequently or instituting initial measures to generate a greater volume of liquidity). By contrast, trigger events (eg rating downgrade, profit warning, stress test results, disasters, blocked access to sources of uncollateralised refinancing and the simultaneous drawdown of deposits) are not always precisely defined at every institution. Individual institutions expressly refrain from explicitly defining a contingency trigger.

Which events act specifically as contingency event triggers and which different indicators for defining escalation stages are used, if any, varies widely.

What follows is a partial list of indicators to identify the different stages.

- The refinancing spreads and refinancing ability have decreased slightly (stage 1).
- It is no longer possible to issue bonds and acquire liquidity in normal volumes (including a larger number of limits cancelled and rejection of the issuer) (stage 2).
- The issuer is excluded completely from market refinancing, with confirmed credit lines and ECB refinancing the only remaining sources of liquidity (stage 3).

In other cases, the liquidity emergency is defined as a state in which the bank is no longer able to meet its current and future payment obligations on time or fully through regular liquidity control means over a short period (eg five trading days). The internal events that trigger a liquidity emergency include

- severe mismanagement;
- failure of group units' key IT systems and
- negative communication about the course of business (eg profit warning).

External triggers include

- tightness and disruptions in the international financial markets;
- negative rumours about the institution's creditworthiness and about a liquidity shortage; or
- general technical problems (clearing systems, data lines etc) and disaster events.

Finally, in individual cases the bank creates a direct link to the stress test results by defining the conditions for entry into the first escalation stage of the contingency plan such that liquidity supply under one or more scenarios is not sufficient and the likelihood of such a scenario coming into play is significant. Irrespective of this, the responsible body must explicitly state the existence of a liquidity contingency prior to effective entry into the first escalation stage.

II.5.2. Responsibilities, measures and channels of communication

At the vast majority of institutions, a crisis committee takes over liquidity management in a contingency situation. The members come mostly from the trading desk or Treasury. The board of directors is always closely involved in this process, either directly through individual members or through ongoing reporting. Some institutions have a detailed catalogue of various immediate measures to be taken in an emergency. Some of the measures considered by the institutions in question include

- using free central bank facilities and other liquidity facilities;
- refraining from further purchases of illiquid assets;
- collateralised borrowing using collateral eligible for repos;
- adjusting maturities in the money market (reducing maturities for liquidity granted to other banks);
- increased acquisition of customer deposits;
- reduction in irrevocable credit commitments;
- issuance of Pfandbriefe; and
- restrictions in granting new loans.

In specific cases, the crisis committee (or the board of directors) decides on the measures to be taken.

Most institutions do not have any pre-defined, deterministic strategies for selling off assets or other types of refinance. Instead, a flexible decision should be possible where warranted. Accordingly, many banks hold stocks of eligible securities which can serve to tap the central bank's facilities or to procure liquidity through repurchase agreements. In addition, banks try to stem the outflow of liquidity as much as possible (by, for instance, avoiding drawing from lines which can be cancelled without any prior conditions being met). Where the sale of assets is deemed unavoidable, it should be regularly assumed that highly liquid assets will be sold off first (although some banks expect to launch the sell-off process using less liquid assets). In exceptional circumstances, the issuance of debt securities is also considered as a refinancing option.

Most institutions do not mention the assumed time period within which liquidity requirements would have to be met by contingency planning under crisis conditions. Some institutions intentionally leave open the time horizon to which their liquidity emergency planning refers. In the case of the banks which have specific ideas, the horizons range from very short stages of just a few days (five to seven) to one month to three months. A few isolated institutions generally rate the first two or four weeks after a liquidity shock as the most critical stage.

Given the available information, it is not clear whether the liquidity crisis schedules regularly define internal responsibilities and communication channels as well as external communication channels (making contact with central banks,

supervisory authorities, rating agencies, analysts, major liquidity providers, and the press). However, this was explicitly the case at least for some banks.

III. Outlook

This paper summarises the key elements of the liquidity risk management systems in use at the largest banking groups active in Germany. There are two particular ways in which this benefits supervisors. One is that the results obtained make it easier for examiners from BaFin and the Bundesbank to properly assess, through a cross-comparison, banks' liquidity risk measurement and control procedures in future MaRisk examinations or examinations pursuant to section 10 of the Liquidity Regulation. In addition, the German supervisors' representatives in international bodies will have a broader base of information than in the past for assessing how German institutions' liquidity risk management approaches compare with the rest of the world and for solidly representing Germany's position in the process of refining the international framework for liquidity regulation.

German supervisors will continue to seek out contact with German institutions and the associations thereof. This may serve to either update existing knowledge or to give detailed attention to micro aspects that could only be dealt with in passing, or not at all, during previous surveys. It is our hope that, through this range of practices paper, we have helped to increase transparency of current market practice in liquidity risk management for supervisors and institutions alike.

List of abbreviations

ABCP	Asset-backed commercial paper
ABS	Asset-backed securities
ALCO	Asset-liability committee
IRBA	Internal Ratings Based Approach
AMA	Advanced Measurement Approach
BCBS	Basel Committee on Banking Supervision
CEBS	Committee of European Banking Supervisors
CD	Certificate of deposit
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CP	Commercial paper
CRO	Chief Risk Officer
ECB	European Central Bank
EEA	European Economic Area
IAIS	International Association of Insurance Supervisors
IIF	Institute of International Finance
IOSCO	International Organisation of Securities Commissions
LaR	Liquidity-at-Risk
LGD	Loss given default
LRC	Liquidity Risk Control
LRM	Liquidity Risk Management
MBS	Mortgage-backed securities
NPP	New products process
OTC	Over-the-counter
PD	Probability of default
SPV	Special-purpose vehicle