

**Sound Practices
for
Managing Liquidity in Banking Organisations**

Basel Committee on Banking Supervision

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Risk Management Group of the Basel Committee on Banking Supervision

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Table of Contents

I. INTRODUCTION	1
Principles for the Assessment of Liquidity Management in Banking Organisations	1
<i>Developing a Structure for Managing Liquidity</i>	1
<i>Measuring and Monitoring Net Funding Requirements</i>	2
<i>Managing Market Access</i>	2
<i>Contingency Planning</i>	2
<i>Foreign Currency Liquidity Management</i>	2
<i>Internal Controls for Liquidity Risk Management</i>	3
<i>Role of Public Disclosure in Improving Liquidity</i>	3
<i>Role of Supervisors</i>	3
II. ONGOING LIQUIDITY MANAGEMENT	3
A. Developing a Structure for Managing Liquidity Risk	3
B. Measuring and Monitoring Net Funding Requirements	6
(a) <i>Assets</i>	9
(b) <i>Liabilities</i>	10
(c) <i>Off-balance-sheet activities</i>	12
(d) <i>Other assumptions</i>	12
C. Managing market access	13
D. Contingency planning	14
(a) <i>Strategy</i>	14
(b) <i>Back-up liquidity</i>	15
(c) <i>Asset Securitisation Programs</i>	15
III. FOREIGN CURRENCY LIQUIDITY MANAGEMENT.....	16
A. Funding domestic currency assets with foreign currency.....	16
B. Funding foreign currency assets	17
IV. INTERNAL CONTROLS FOR LIQUIDITY RISK MANAGEMENT	18
V. ROLE OF PUBLIC DISCLOSURE IN IMPROVING LIQUIDITY	19
VI. THE ROLE OF SUPERVISORS	19

Sound Practices for Managing Liquidity in Banking Organisations

I. Introduction

1. Liquidity, or the ability to fund increases in assets and meet obligations as they come due, is crucial to the ongoing viability of any banking organisation. Therefore, managing liquidity is among the most important activities conducted by banks. Sound liquidity management can reduce the probability of serious problems. Indeed, the importance of liquidity transcends the individual bank, since a liquidity shortfall at a single institution can have system-wide repercussions. For this reason, the analysis of liquidity requires bank management not only to measure the liquidity position of the bank on an ongoing basis but also to examine how funding requirements are likely to evolve under various scenarios, including adverse conditions.

2. In its work on the supervision of liquidity, the Basel Committee has focused on developing a greater understanding of the way in which banks manage their liquidity on a global, consolidated basis. Recent technological and financial innovations have provided banks with new ways of funding their activities and managing their liquidity. In addition, a declining ability to rely on core deposits, increased reliance on wholesale funds, and recent turmoil in financial markets globally have changed the way banks view liquidity. All of these changes have also resulted in new challenges for banks.

3. In light of the fact that standard practices for managing bank liquidity have changed since publication of its September 1992 paper “*A framework for measuring and managing liquidity*”, the Basel Committee is issuing this updated paper. This paper sets out several principles that highlight the key elements for effectively managing liquidity.

4. The formality and sophistication of the process used to manage liquidity depends on the size and sophistication of the bank, as well as the nature and complexity of its activities. While the paper focuses on large banks, the principles have broad applicability to all banks. In particular, good management information systems, analysis of net funding requirements under alternative scenarios, diversification of funding sources, and contingency planning are crucial elements of strong liquidity management at a bank of any size or scope of operations. The information systems and analysis needed to implement the approach, however, would typically absorb fewer resources and be much less complex at a smaller bank or one that is active in fewer markets than those at large, complex banks.

5. As with several other papers recently issued by the Basel Committee, this paper is organised around several key principles for managing liquidity. These principles are as follows:

Principles for the Assessment of Liquidity Management in Banking Organisations

Developing a Structure for Managing Liquidity

Principle 1: Each bank should have an agreed strategy for the day-to-day management of liquidity. This strategy should be communicated throughout the organisation.

Principle 2: A bank's board of directors should approve the strategy and significant policies related to the management of liquidity. The board should also ensure that senior management takes the steps necessary to monitor and control liquidity risk. The board should be informed regularly of the liquidity situation of the bank and immediately if there are any material changes in the bank's current or prospective liquidity position.

Principle 3: Each bank should have a management structure in place to execute effectively the liquidity strategy. This structure should include the ongoing involvement of members of senior management. Senior management must ensure that liquidity is effectively managed, and that appropriate policies and procedures are established to control and limit liquidity risk. Banks should set and regularly review limits on the size of their liquidity positions over particular time horizons.

Principle 4: A bank must have adequate information systems for measuring, monitoring, controlling and reporting liquidity risk. Reports should be provided on a timely basis to the bank's board of directors, senior management and other appropriate personnel.

Measuring and Monitoring Net Funding Requirements

Principle 5: Each bank should establish a process for the ongoing measurement and monitoring of net funding requirements.

Principle 6: A bank should analyse liquidity utilising a variety of "what if" scenarios.

Principle 7: A bank should review frequently the assumptions utilised in managing liquidity to determine that they continue to be valid.

Managing Market Access

Principle 8: Each bank should periodically review its efforts to establish and maintain relationships with liability holders, to maintain the diversification of liabilities, and aim to ensure its capacity to sell assets.

Contingency Planning

Principle 9: A bank should have contingency plans in place that address the strategy for handling liquidity crises and include procedures for making up cash flow shortfalls in emergency situations.

Foreign Currency Liquidity Management

Principle 10: Each bank should have a measurement, monitoring and control system for its liquidity positions in the major currencies in which it is active. In addition to assessing its aggregate foreign currency liquidity needs and the acceptable mismatch in combination with its domestic currency commitments, a bank should also undertake separate analysis of its strategy for each currency individually.

Principle 11: Subject to the analysis undertaken according to Principle 10, a bank should, where appropriate, set and regularly review limits on the size of its cash flow mismatches over particular time horizons for foreign currencies in aggregate and for each significant individual currency in which the bank operates.

Internal Controls for Liquidity Risk Management

Principle 12: Each bank must have an adequate system of internal controls over its liquidity risk management process. A fundamental component of the internal control system involves regular independent reviews and evaluations of the effectiveness of the system and, where necessary, ensuring that appropriate revisions or enhancements to internal controls are made. The results of such reviews should be available to supervisory authorities.

Role of Public Disclosure in Improving Liquidity

Principle 13: Each bank should have in place a mechanism for ensuring that there is an adequate level of disclosure of information about the bank in order to manage public perception of the organisation and its soundness.

Role of Supervisors

Principle 14: Supervisors should conduct an independent evaluation of a bank's strategies, policies, procedures and practices related to the management of liquidity. Supervisors should require that a bank has an effective system in place to measure, monitor and control liquidity risk. Supervisors should obtain from each bank sufficient and timely information with which to evaluate its level of liquidity risk and should ensure that the bank has adequate liquidity contingency plans.

II. Ongoing Liquidity Management

A. Developing a Structure for Managing Liquidity Risk

6. As with managing other types of risk, sound liquidity risk management involves setting a strategy for the bank, ensuring effective board and senior management oversight, as well as operating under a sound process for measuring, monitoring and controlling liquidity risk. The formality and sophistication of the liquidity management process should be appropriate for the overall level of risk incurred by the bank.

Principle 1: Each bank should have an agreed strategy for the day-to-day management of liquidity. This strategy should be communicated throughout the organisation.

7. A key activity of banks is the creation of liquidity. Many bank activities depend directly or indirectly on a bank's ability to provide liquidity to customers. Banks are thus particularly vulnerable to liquidity problems, both of an institution-specific nature and those

which affect markets as a whole. Virtually every financial transaction or commitment has implications for a bank's liquidity. In view of this, banks need to be attentive to their liquidity strategy, policies and management approach. The liquidity strategy should set out the general approach the bank will have to liquidity, including various quantitative and qualitative targets. This strategy should address the bank's goal of protecting financial strength and the ability to withstand stressful events in the marketplace.

8. A bank's liquidity strategy should enunciate specific policies on particular aspects of liquidity management, such as the composition of assets and liabilities, the approach to managing liquidity in different currencies and from one country to another, the relative reliance on the use of certain financial instruments, and the liquidity and marketability of assets. There should also be an agreed strategy for dealing with the potential for both temporary and long-term liquidity disruptions.

9. The strategy for managing liquidity risk should be communicated throughout the organisation, particularly in light of the fact that in many banks, managing liquidity is no longer purely the responsibility of the treasury function. In addition, new products or business strategies, such as the development of commercial credit securitisation, can have an important and sometimes complex impact on liquidity risk. A breakdown in operating systems can also have a substantial impact on liquidity risk. All businesses units within the bank that conduct activities having an impact on liquidity should be fully aware of the liquidity strategy and operate under the approved policies, procedures and limits.

10. Senior management and the appropriate personnel should have a thorough understanding of how other risks, including credit, market and operational risk, impact on the bank's overall liquidity strategy. For example, credit problems with specific counterparties may affect the amount of anticipated cash inflows and necessitate alternative actions by the bank.

Principle 2: A bank's board of directors should approve the strategy and significant policies related to the management of liquidity. The board should also ensure that senior management takes the steps necessary to monitor and control liquidity risk. The board should be informed regularly of the liquidity situation of the bank and immediately if there are any material changes in the bank's current or prospective liquidity position.

11. Because of the critical importance of liquidity management to the viability of any bank, the board should approve the bank's strategy for managing liquidity risk. The board should approve significant policies that govern or influence the bank's liquidity risk. The board should also approve policies and procedures that identify lines of authority and responsibility for managing liquidity exposures.

12. The board of directors should ensure that senior management provides clear guidance on the level of acceptable liquidity risk in order to comply with the bank's liquidity strategy. The board should also ensure that senior management has the policies and procedures in place to effectively monitor and control liquidity risk.

13. The board should monitor the performance and liquidity risk profile of the bank and periodically review information that is timely and sufficiently detailed to allow them to understand and assess the liquidity risk facing the bank's key portfolios and the bank as a whole. Banks holding significant funding concentrations or having significant changes in the composition of holdings would be expected to have more frequent reviews by their boards.

14. The board should also review the contingency plans of the bank for handling disruptions to its ability to fund some or all of its activities in a timely manner and at a reasonable cost.

Principle 3: Each bank should have a management structure in place to execute effectively the liquidity strategy. This structure should include the ongoing involvement of members of senior management. Senior management must ensure that liquidity is effectively managed, and that appropriate policies and procedures are established to control and limit liquidity risk. Banks should set and regularly review limits on the size of their liquidity positions over particular time horizons.

15. As with other elements of risk management, a bank should have a liquidity management structure in place to execute effectively the bank's liquidity strategy, policies and procedures. Banks should assign ultimate responsibility for setting liquidity policy and reviewing liquidity decisions to the bank's highest level of management. The responsibility for managing the overall liquidity of the bank should be placed with a specific, identified group within the bank. This might be in the form of an Asset/Liability Committee comprised of senior management, the treasury function or a risk management department. In all cases, the appropriate checks and balances should be in place.

16. A schedule of frequent routine liquidity reviews and less frequent, but more in-depth reviews should be established. These reviews provide the opportunity to re-examine and refine a bank's liquidity policies and practices in the light of a bank's liquidity experience and developments in its business.

17. Bank management must make decisions related to the structure for managing liquidity. It may completely centralise liquidity management, it may decentralise by assigning business units responsibility for their own liquidity, subject to limits imposed by senior management, or it might do a combination of the two. In all instances, the management structure should allow the necessary flexibility while ensuring that the liquidity strategy approved by the board can be effectively implemented. Whatever structure is used, it is critical that there be close links between those individuals responsible for liquidity and those monitoring market conditions, as well as other individuals with access to critical information such as credit risk managers. This is particularly important in developing and analysing stress scenarios.

18. Banks' management should set limits to ensure adequate liquidity and these limits should be reviewed by supervisors. Alternatively, supervisors may set the limits. Limits could be set, for example, on the following:

- I. The cumulative cashflow mismatches (i.e. the cumulative net funding requirement as a percentage of total liabilities) over particular periods – next day, next five days, next month. These mismatches should be calculated by taking a conservative view of marketability of liquid assets, with a discount to cover price volatility and any drop in price in the event of a forced sale, and should include likely outflows as a result of drawdown of commitments etc.
- II. Liquid assets as a percentage of short term liabilities. Again, there should be a discount to reflect price volatility. The assets included in this category should only be those which are highly liquid – i.e. only those in which there is judged to be a ready market even in periods of stress.

19. Banks should analyse the likely impact of different stress scenarios on their liquidity position and set their limits accordingly. Limits should be appropriate to the size, complexity and financial condition of the bank. Management should define the specific procedures and approvals necessary for exceptions to policies and limits.

20. Senior management should ensure that there are adequate internal controls in place to protect the integrity of the established liquidity risk management process.

Principle 4: A bank must have adequate information systems for measuring, monitoring, controlling and reporting liquidity risk. Reports should be provided on a timely basis to the bank's board of directors, senior management and other appropriate personnel.

21. An important element of the liquidity management framework is a management information system designed to provide the board of directors, senior management and other appropriate personnel with timely information on the liquidity position of the bank. A strong management information system is integral to making sound decisions related to liquidity. Such a system should be flexible enough to deal with various contingencies that may arise. The management information system should have the ability to calculate liquidity positions in all of the major currencies in which the bank deals, both individually and on an aggregate basis. All banks should have the ability to calculate their liquidity positions, on a day to day basis for the shorter time horizons (e.g. out to five days) and over a series of specified time periods thereafter, including for more distant periods, in order to enable them to effectively manage and monitor their net funding requirements.

22. The management information system should be used to check for compliance with the bank's established policies, procedures and limits. Reporting of risk measures should be done on a timely basis and compare current liquidity exposures with any set limits. The information system should also enable management to evaluate the level of trends in the bank's aggregate liquidity exposure. Assumptions should be set out clearly so that management can evaluate the validity and consistency of key assumptions and understand the implications of various stress scenarios.

B. Measuring and Monitoring Net Funding Requirements

Principle 5: Each bank should establish a process for the ongoing measurement and monitoring of net funding requirements.

23. An effective measurement and monitoring process is essential for adequately managing liquidity risk. At a very basic level, liquidity measurement involves assessing all of a bank's cash inflows against its outflows to identify the potential for any net shortfalls going forward. This includes funding requirements for off-balance sheet commitments. A number of techniques can be used for measuring liquidity risk, ranging from simple calculations and static simulations based on current holdings to highly sophisticated modelling techniques. As all banks are affected by changes in the economic climate and market conditions, the monitoring of economic and market trends is key to liquidity risk management.

24. An important aspect of managing liquidity is making assumptions about future funding needs. While certain cash inflows and outflows can be easily calculated or predicted, banks must also make assumptions about future liquidity needs, both in the very short-term

and for longer time periods. One important factor to consider is the critical role a bank's reputation plays in its ability to access funds readily and at reasonable terms. For that reason, bank staff responsible for managing overall liquidity should be aware of any information (such as an announcement of a decline in earnings or a downgrading by a rating agency) that could have an impact on market and public perceptions about the soundness of the institution.

25. Whereas many banks have historically relied on core deposits for the bulk of their funding, in today's market environment, banks have a wide variety of funding sources that should be considered in managing liquidity on an ongoing basis. Cash inflows arise from such things as maturing assets, saleable non-maturing assets, access to deposit liabilities, established credit lines that can be tapped, and, to an increasing extent, through securitisation. These must be matched against cash outflows stemming from such things as liabilities falling due and contingent liabilities, especially committed lines of credit that can be drawn down. Cash outflows can also arise from unexpected events.

26. A maturity ladder is a useful device to compare cash inflows and outflows both on a day-to-day basis and over a series of specified time periods. The analysis of net funding requirements involves the construction of a maturity ladder and the calculation of a cumulative net excess or deficit of funds at selected maturity dates. A bank's net funding requirements are determined by analysing its future cash flows based on assumptions of the future behaviour of assets, liabilities and off-balance-sheet items, and then calculating the cumulative net excess or shortfall over the time frame for the liquidity assessment.

27. In constructing the maturity ladder, a bank has to allocate each cash inflow or outflow to a given calendar date from a starting point, usually the next day. (A bank must be clear about the clearing and settlement conventions and timeframes it is using to assign cashflows to particular calendar dates.) As a preliminary step to constructing the maturity ladder, cash inflows can be ranked by the date on which assets mature or a conservative estimate of when credit lines can be drawn down. Similarly, cash outflows can be ranked by the date on which liabilities fall due, the earliest date a liability holder could exercise an early repayment option, or the earliest date contingencies can be called. Readily marketable assets may be "slotted in" to the earliest point in the maturity ladder at which they could be liquidated. Banks or supervisors should consider what discount should be applied to assets which are "slotted in" in this way in order to reflect market risks. Significant interest and other cash flows should also be included. In addition, certain assumptions can be made based on past experiences. The difference between cash inflows and cash outflows in each period, the excess or deficit of funds, becomes a starting-point for a measure of a bank's future liquidity excess or shortfall at a series of points in time.

28. The relevant time-frame for active liquidity management is generally quite short, including intra-day liquidity. In particular, the first days in any liquidity problem are crucial to maintaining stability. The appropriate time-frame will depend on the nature of the bank's business. Banks which are reliant on short-term funding will concentrate primarily on managing their liquidity in the very short term (say the period out to five days). Ideally, these banks should be able to calculate their liquidity position on a day-to-day basis for this period. Other banks (i.e. those that are less dependent on the short term money markets) might actively manage their net funding requirements over a slightly longer period, perhaps one to three months ahead.

29. In addition, banks should collect data and monitor their liquidity positions in more distant periods. Typically, a bank may find substantial funding gaps in distant periods and

should endeavour to fill these gaps by influencing the maturity of transactions so as to offset the gap. Collecting data on distant periods will maximise the opportunity for a bank to close the gap well in advance of it crystallising. Supervisors regard it as important that any remaining borrowing requirement should be limited to an amount which experience suggests is comfortably within the bank's capacity to fund in the market. Clearly, banks active in markets for longer term assets and liabilities will need to use a longer time-frame than banks which are active in short-term money markets and which are in a position to fill funding gaps at short notice. However, even this latter category of banks may find it worthwhile to tailor the maturity of new transactions to offset gaps further out in the future. A longer time horizon may also generate useful information on which to base strategic decisions on the extent to which a bank may rely on particular markets.

Principle 6: A bank should analyse liquidity utilising a variety of “what if” scenarios.

30. Evaluating whether a bank is sufficiently liquid depends in large measure on the behaviour of cash flows under different conditions. Analysing liquidity thus entails laying out a variety of "what if" scenarios. Under each scenario, a bank should try to account for any significant positive or negative liquidity swings that could occur. These scenarios should take into account factors that are both internal (bank-specific) and external (market-related). While liquidity will typically be managed under “normal” circumstances, the bank must be prepared to manage liquidity under abnormal conditions.

31. A bank will need to assign the timing of cash flows for each type of asset and liability by assessing the probability of the behaviour of those cash flows under the scenario being examined. These decisions about the specific timing and the size of cash flows are an integral part of the construction of the maturity ladder under each scenario. For each funding source, for example, a bank would have to decide whether the liability would be: (1) repaid in full at maturity; (2) gradually run off over the next few weeks; or (3) virtually certain to be rolled over or available if tapped. The bank's historical experience of the pattern of flows and a knowledge of market conventions could guide a bank's decisions, but judgement often plays a large role, especially in difficult scenarios. A bank will never have perfect information when choosing between courses of action, and this warrants a conservative approach that would bias the bank toward assigning later dates to cash inflows and earlier dates to cash outflows.

32. Hence, the timing of cash inflows and outflows on the maturity ladder can differ among scenarios and the assumptions may differ quite sharply. For example, a bank may believe, based upon its historical experience, that its ability to control the level and timing of future cash flows from a stock of saleable assets in a bank-specific funding crisis would deteriorate little from normal conditions. However, in a general market crisis, this capacity may fall off sharply if few institutions are willing or able to make cash purchases of less liquid assets. On the other hand, a bank that has a strong reputation in the market may actually benefit from a flight to quality as potential depositors seek out the safest place for their funds. In making this assessment, banks should have regard not only to their own historical experience, but also to the experience of other banks in a liquidity crisis.

33. The evolution of a bank's liquidity profile under one or more scenarios can be tabulated or portrayed graphically, by cumulating the balance of expected cash inflows and cash outflows at several time points as well as each day over a certain period. A stylised liquidity graph can be constructed enabling the evolution of the cumulative net excess or deficit of funds to be compared under the major scenarios employed by the bank in order to provide further insights into a bank's liquidity and to check how consistent and realistic the

assumptions are for the individual bank. For example, a high quality bank may look very liquid under normal circumstances and remain so in a general market crisis, suffering from illiquidity only in a bank specific crisis. In contrast, a weaker bank might be equally illiquid in a general- and a bank-specific crisis.

Principle 7: A bank should review frequently the assumptions utilised in managing liquidity to determine that they continue to be valid.

34. Since a bank's future liquidity position will be affected by factors that cannot always be forecast with precision, assumptions need to be reviewed frequently to determine their continuing validity, especially given the rapidity of change in banking markets. The total number of major assumptions to be made, however, is fairly limited. This section attempts to catalogue the liquidity assumptions under four broad categories: (a) assets, (b) liabilities, (c) off-balance-sheet activities, and (d) other.

(a) Assets

35. Assumptions about a bank's future stock of assets include their potential marketability and use as collateral which could increase cash inflows, the extent to which assets will be originated and sold through asset securitisation programs, and the extent to which maturing assets will be renewed, and new assets acquired. In some countries, supervisors have observed a trend for relying more heavily on a stock of liquid assets (a liquidity warehouse) in order to offset greater uncertainty about liability holder behaviour.

36. Determining the level of a bank's potential assets involves answering three questions:

- what proportion of maturing assets will a bank be able and willing to roll over or renew?
- what is the expected level of new loan requests that will be *approved*?
- what is the expected level of draw-downs of commitments to lend that a bank will need to fund? These commitments may take the form of: committed commercial lines without material adverse change (MAC) clauses and covenants, which a bank may not be legally able to turn away even if the borrower's financial condition has deteriorated; committed commercial lines with MAC clauses which some customers could draw down in crisis scenarios; and other commercial and consumer credit lines.

In estimating its normal funding needs, some banks use historical patterns of roll-overs, draw-downs and new requests for loans; others conduct a statistical analysis taking account of seasonal and other effects believed to determine loan demand (e.g., for consumer loans). Alternatively, a bank may make judgmental business projections, or undertake a customer-by-customer assessment for its larger customers and apply historical relationships to the remainder.

37. Draw-downs and new loan requests represent a potential drain of funds for a bank. Nevertheless, a bank has some leeway to control these items depending on current conditions. For example, during adverse conditions, a bank might decide to risk damaging some business relationships by refusing to approve new loan requests that it would approve under normal conditions, or it might refuse to honour lending commitments that are not binding.

38. The growth of secondary markets for various asset classes has broadened a bank's opportunities to sell or securitise more assets with greater speed. Under normal circumstances, these assets can be quickly and easily converted to cash at reasonable cost and many banks include such assets in their analysis of available sources of funds. However, over reliance on the securitisation and sale of assets, such as loans, as a means of providing liquidity raises concerns about a bank's true ability to match cash flows received from the sale of assets with funding needs. Recent market turmoil has shown that selling or securitising assets may not be a viable source of funds for liquidity purposes.

39. In determining the marketability of assets, they can be segregated into four categories by their degree of relative liquidity:

- the most liquid category includes components such as cash and government securities which are eligible as collateral in central banks' routine open market operations; these assets may be used to either obtain liquidity from the central bank or may be sold or repurchased, or otherwise used as collateral in the market;
- a second category is other marketable securities, for example equities, and interbank loans which may be saleable but which may lose liquidity under adverse conditions;
- a less liquid category comprises a bank's saleable loan portfolio. The task here is to develop assumptions about a reasonable schedule for the disposal of a bank's assets. Some assets, while marketable, may be viewed as unsaleable within the time frame of the liquidity analysis;
- the least liquid category includes essentially unmarketable assets such as loans not capable of being readily sold, bank premises and investments in subsidiaries, as well as, possibly, severely troubled credits;
- assets pledged to third parties are deducted from each category.

40. The view underlying the classification process is that different banks could assign the same asset to different categories on the maturity ladder because of differences in their internal asset-liability management. For example, a loan categorised by one bank as a moderately liquid asset - saleable only late in the liquidity analysis time-frame - may be considered a candidate for fairly quick and certain liquidation at a bank that operates in a market where loans are frequently transferred, that routinely includes loan-sale clauses in all loan documentation and that has developed a network of customers with whom it has concluded loan-purchase agreements.

41. In categorising assets, a bank would also have to decide how an asset's liquidity would be affected under different scenarios. Some assets that are very liquid during times of normal business conditions may be less so under adverse conditions. This asymmetry of liquidity is increasingly an issue as markets for higher credit risk instruments and structured financial transactions have expanded. Consequently, a bank may place an asset in different categories depending on the type of scenario it is forecasting.

(b) Liabilities

42. Analysing the liability side of the balance sheet for sources of funding requires a bank to understand the characteristics of their fund providers and funding instruments. To

evaluate the cash flows arising from a bank's liabilities, a bank would first examine the behaviour of its liabilities under normal business conditions. This would include establishing:

- the normal level of roll-overs of deposits and other liabilities;
- the effective maturity of deposits with non-contractual maturities, such as demand deposits and many types of savings accounts;
- the normal growth in new deposit accounts.

43. As in assessing roll-overs and new requests for loans, a bank could use several possible techniques to establish the effective maturities of its liabilities, such as using historical patterns of deposit behaviour. For sight deposits, whether of individuals or businesses, many banks conduct a statistical analysis that takes account of seasonal factors, interest rate sensitivities, and other macroeconomic factors. For some large wholesale depositors, a bank may undertake a customer-by-customer assessment of the probability of roll-over. The difficulty of establishing such estimates of liability behaviour has increased with the growing competition of investment alternatives to deposits.

44. In examining the cash flows arising from a bank's liabilities under abnormal circumstances (bank-specific or general market problems), a bank would examine four basic questions:

- which sources of funding are likely to stay with the bank under any circumstance, and can these be increased?
- which sources of funding can be expected to run off gradually if problems arise, and at what rate? Is deposit pricing a means of controlling the rate of runoff?
- which maturing liabilities or liabilities with non-contractual maturities can be expected to run off immediately at the first sign of problems? Are there liabilities with early withdrawal options that are likely to be exercised?
- does the bank have back-up facilities that it can draw down and under what circumstances?

45. The first two categories represent cash-flow developments that tend to reduce the cash outflows projected directly from contractual maturities. In addition to the liabilities identified above, a bank's capital and term liabilities not maturing within the horizon of the liquidity analysis provide a liquidity buffer. Long-term liabilities are a particularly important form of liquidity buffer.

46. The liabilities that make up the first category may be thought to stay with a bank, even under a "worst-case" projection. Some core deposits generally stay with a bank because, in some countries, retail and small business depositors may rely on the public-sector safety net to shield them from loss, or because the cost of switching banks, especially for some business services such as transactions accounts, may be prohibitive in the very short run.

47. The second category, liabilities that are likely to stay with a bank during periods of mild difficulties and to run off relatively slowly in a crisis, may include such liabilities as core deposits that are not already included in the first category. In addition to core deposits, in some countries, some level of particular types of interbank funding may remain with a bank

during such periods. A bank's own liability roll-over experience as well as the experiences of other troubled institutions should help in developing a timetable for these cash flows.

48. The third category comprises the remainder of the maturing liabilities, including some without contractual maturities, such as wholesale deposits. Under each scenario, this approach adopts a conservative stance and assumes that these remaining liabilities are repaid at the earliest possible maturity, especially in crisis scenarios, because such money may flow to government securities and other safe havens. Factors such as diversification and relationship building are seen as especially important in evaluating the extent of liability run-off and a bank's capacity to replace funds. Nevertheless, when market problems exist, some high-quality institutions may find that they receive larger-than-usual wholesale deposit inflows, even as funding inflows dry up for other market participants. However, banks should be wary of relying on this as a source of funding, as customers may equally decide to favour holding cash or transferring their assets outside the domestic banking system.

49. Some banks, for example smaller banks in regional markets, may also have credit lines that they can draw down to offset cash outflows. While these sorts of facility are somewhat rare among larger banks, the possible use of such lines could be addressed with a bank's liability assumptions. Where such facilities are subject to material adverse change clauses, then they may be of limited value, especially in a bank specific crisis.

(c) *Off-balance-sheet activities*

50. A bank should also examine the potential for substantial cash flows from its off-balance-sheet activities (other than the loan commitments already considered). The contingent nature of most off-balance-sheet instruments adds to the complexity of managing off-balance-sheet cash flows. In particular, during stressful situations, off-balance-sheet commitments can have a significant drain on liquidity.

51. Contingent liabilities, such as letters of credit and financial guarantees, represent potentially significant drain of funds for a bank, but are usually not dependent on a bank's condition. A bank may be able to ascertain a "normal" level of cash outflows under routine conditions, and then estimate the scope for an increase in these flows during periods of stress. However, a general market crisis may trigger a substantial increase in the amount of draw-downs of letters of credit because of an increase in defaults and bankruptcies in the market.

52. Other potential sources of cash outflows include swaps, written over-the-counter (OTC) options, other interest rate and forward foreign exchange rate contracts, margin calls, and early termination agreements. Since over-the-counter derivative and foreign exchange products are principal to principal contracts, counterparties are likely to be sensitive to the credit rating of the bank and may ask for early cash-out collateral in the event of a decline in the bank's credit rating or creditworthiness.

(d) *Other assumptions*

53. Looking solely at instruments may ignore some factors that could significantly impact a bank's cash flows. Besides the liquidity needs arising from their own business activities, banks also require funds to support other operations. For example, many large banks provide correspondent banking services for foreign banks or provide access to payment systems for smaller domestic banks and other financial institutions. Where banks provide

clearing services to correspondent banks, especially for trading activities, the value of their payment traffic will often be sufficiently large to affect the overall liquidity position of the payment bank. Banks should ask these customers to forecast their payment traffic so that the bank can plan its overall liquidity needs, although an element of unpredictability will remain. In the case of payment inflows, the correspondent is dependent on the sender making the payment as expected. If these plans are revised, there may be a delay before it, in turn, gives information to the payment bank. In the case of payment outflows, the bank may have some element of control over the scheduling of a payment during the day, although certain payments may have to be made before intra-day deadlines. The bank will, however, remain vulnerable to cancellation or delay of a payment by its customer, or an unexpected need to make a payment.

54. In real-time gross settlement (RTGS) payment systems, unexpected fluctuations in the payment patterns of their customers may require banks to borrow further funds intra-day in order to make payments. Most central banks are willing to supply intra-day liquidity for this purpose, although many require banks to provide high quality collateral. Consequently, banks in these countries may need to hold a stock of such securities that can be pledged or repoed to the central bank, if necessary.

55. Where customers are unable to forecast their end-of-day positions accurately, payment banks may be faced with unexpected positions on their central bank settlement account late in the day. They may therefore need to borrow or place funds in the market overnight or, alternatively, use overnight facilities provided by the central bank. Again, if the bank needs to borrow funds from the central bank, this is likely to require the provision of collateral.

56. In addition, net overhead expenses, such as rent, salary and tax payments, although generally not significant enough to be considered in banks' liquidity analyses, can in some cases also be sources of cash outflows.

C. Managing market access

Principle 8: Each bank should periodically review its efforts to establish and maintain relationships with liability holders, to maintain the diversification of liabilities, and aim to ensure its capacity to sell assets.

57. A critical component of managing liquidity is assessing market access and understanding various funding options. Quite simply, a bank needs to understand how much funding they can expect to receive from the market, both under normal and adverse circumstances.

58. Senior management needs to ensure that market access is being actively managed by the appropriate staff within the bank. Relationships might exist with trading counterparties, correspondent banks, corporate customers and payments systems. Building strong relationships with key providers of funding can provide a line of defence in a liquidity problem and form an integral part of a bank's liquidity management. The frequency of contact and the frequency of use of a funding source are two possible indicators of the strength of a funding relationship.

59. Concentrations in funding sources increase liquidity risk. Consequently, as a check for adequate diversification of liabilities, a bank needs to examine the level of reliance on particular funding sources, both at an individual level and by instrument type, nature of the provider of funds, and geographic market. In addition, a bank should strive to understand and evaluate the use of intercompany financing for its individual business offices. The treasury function or some other specified group within the bank should be responsible for monitoring the various funding options and the current trends in such options. In all banks, senior management must constantly be aware of the composition, characteristics and diversification of its funding sources.

60. Developing markets for asset sales or exploring arrangements under which a bank can borrow against assets is another element of managing market access. The inclusion of loan-sale clauses in loan documentation and the frequency of use of some asset-sales markets are two possible indicators of a bank's ability to execute asset sales under adverse scenarios.

D. Contingency planning

Principle 9: A bank should have contingency plans in place that address the strategy for handling liquidity crises and include procedures for making up cash flow shortfalls in emergency situations.

61. A bank's ability to withstand both temporary or longer-term disruptions in its ability to fund some or all of its activities in a timely manner and at a reasonable cost can depend on the adequacy of its formal contingency plans. As banks rely less and less on core deposits as a stable funding source and rely more on secondary sources of funding, the need for contingency plans becomes even more critical. Effective contingency plans should address two major questions:

- does management have a strategy for handling a crisis?
- does management have procedures in place for accessing funds in an emergency?

Senior management needs to address these questions realistically in order to determine how the bank may fare under abnormal adverse circumstances. In addition, management needs to identify and understand the types of events that may trigger liquidity contingency plans.

(a) Strategy

62. A contingency plan for dealing with liquidity problems should consist of several components. Most important are those that involve managerial coordination. A contingency plan needs to spell out procedures to ensure that information flows remain timely and uninterrupted, and that they provide senior management with the precise information it needs in order to make quick decisions. A clear division of responsibility must be set out so that all personnel understand what is expected of them during a problem situation.

63. Another major element in the plan should be a strategy for taking certain actions to alter asset and liability behaviours. While assumptions can be made as to how an asset or liability will behave under certain conditions (as discussed above), a bank may have the ability to change these characteristics. For example, a bank may conclude that it will suffer a

liquidity deficit in a crisis based on its assumptions regarding the amount of future cash inflows from saleable assets and outflows from deposit run-offs. During such a crisis, however, a bank may be able to market assets more aggressively, or sell assets that it would not have sold under normal conditions and thus augment its cash inflows.

64. Other components of the contingency plan involve maintaining customer relationships with liability-holders, borrowers, and trading and off-balance-sheet counterparties. As the intensity of problems increases, banks must decide which assets to shed. Typically banks review the entire asset side of the balance sheet and select the assets that are least detrimental to business relationships and public perceptions about the bank's soundness (e.g., Government stock). At the same time, relationships with liability-holders become more important under adverse conditions. If a bank's strategy requires liability managers to maintain strong ongoing links with counterparties and large liability-holders during periods of relative calm, the bank may be better positioned to secure sources of funds under abnormal circumstances.

(b) Back-up liquidity

65. Contingency plans should also include procedures for making up cash flow shortfalls in adverse situations. Banks have available to them several sources of such funds, including previously unused credit facilities. Depending on the severity of the liquidity problems, a bank may choose - or be forced - to use one or more of these sources. The plan should spell out as clearly as possible the amount of funds a bank has available from these sources, and under what scenarios a bank could use them. Banks must be careful not to rely excessively on back-up lines and need to understand the various conditions, such as notice periods, that could affect the bank's ability to access quickly such lines. Indeed, banks should have contingency plans for times when their back-up lines become unavailable.

66. Banks should consider under what circumstances and for what purposes they would establish committed lines of funding, for which they pay a fee, which will be available to them under abnormal circumstances if uncommitted facilities fail.

(c) Asset Securitisation Programs

67. The existence of recourse provisions in asset sales, the extension of liquidity facilities to securitisation programs, and the early amortisation triggers of certain asset securitisation transactions can involve significant liquidity risk to institutions engaged in these secondary market credit activities. Institutions should ensure that their liquidity contingency plans fully incorporate the potential risk posed by their secondary market credit activities. With the issuance of new asset-backed securities, the issuing banking organisation should determine the potential effect on its liquidity at the inception of each transaction and throughout the life of the securities in order to better ascertain its future funding needs.

68. An institution's contingency plans should take into consideration the need to obtain replacement funding, and specify the possible alternative funding sources, in the event of the early amortisation of outstanding asset-backed securities. It should be recognised that an early amortisation of a banking organisation's asset-backed securities could impede its ability to fund itself--either through re-issuance or other borrowings--since the institution's reputation with investors and lenders may be adversely affected.

III. Foreign Currency Liquidity Management

69. Following the currency problems in a number of markets in the 1990s, it is now clear that, for banks with an international presence, the treatment of assets and liabilities in multiple currencies adds a layer of complexity to liquidity management for two reasons. First, banks are often less well known to liability holders in foreign currency markets. Therefore, in the event of market concerns, especially if they relate to a bank's domestic operating environment, these liability holders may not be able to distinguish rumour from fact as well or as quickly as domestic currency customers. Second, in the event of a disturbance, a bank may not always be able to mobilise domestic liquidity and the necessary foreign exchange transactions in sufficient time to meet foreign currency funding requirements. These issues are particularly important for banks with positions in currencies for which the foreign exchange market is not highly liquid in all conditions.

Principle 10: Each bank should have a measurement, monitoring and control system for its liquidity positions in the major currencies in which it is active. In addition to assessing its aggregate foreign currency liquidity needs and the acceptable mismatch in combination with its domestic currency commitments, a bank should also undertake separate analysis of its strategy for each currency individually.

70. When dealing in foreign currencies, a bank is exposed to the risk that a sudden change in foreign exchange rates or market liquidity, or both, could sharply widen the liquidity mismatches being run. These shifts in market sentiment might result either from domestically-generated factors or from contagion effects of developments in other countries. In either event, a bank may find that the size of its foreign currency funding gap has increased. Moreover, foreign currency assets may be impaired, especially where borrowers have not hedged foreign currency risk adequately. The Asian crisis of the late 1990s demonstrated the importance of banks closely managing their foreign currency liquidity on a day-to-day basis.

71. The particular issues to be addressed in managing foreign currency liquidity will depend on the nature of the bank's business. For some banks, the use of foreign currency deposits and short-term credit lines to fund domestic currency assets will be the main area of vulnerability, while for others it may be the funding of foreign currency assets with domestic currency. As with overall liquidity risk management, foreign currency liquidity should be analysed under various scenarios, including stressful conditions.

A. Funding domestic currency assets with foreign currency

72. When foreign currency is used to fund a portion of domestic currency assets, banks need to analyse the market conditions that could affect access to the foreign currency and understand that foreign currency depositors and lenders may seek to withdraw their funding more quickly than domestic counterparties. Banks should also assess their access to alternative sources of funding to repay foreign currency liabilities.

73. If a bank is assuming that domestic currency deposits could be switched into a foreign currency to repay foreign currency liabilities, it needs to look at various scenarios regarding the foreign exchange markets. Banks need to consider that there may be difficulties in accessing certain markets and that foreign currency markets may lack liquidity and/or the foreign exchange rate may be sharply depreciated. In this context, banks having a substantial

amount of financing in the form of foreign currency credit lines, wholesale deposits or retail deposits that they use to fund domestic currency assets, are vulnerable to exchange rate movements in their domestic currency, which could have the effect of widening existing liquidity mismatches.

74. In a general market crisis, a run on the currency could trigger a run on deposits if there were fears that the devaluation would impair banks' solvency given their currency mismatches and those of their customers. Moreover, if interest rates were raised sharply to defend the exchange rate, the banks' customers could experience cash-flow problems which could adversely affect the recoverability of domestic assets, thus further worsening the banking sector's own liquidity position. Banks' domestic funding costs would also rise as a result of the hike in interest rates.

B. Funding foreign currency assets

75. When lending in a currency other than their domestic currency, banks need to consider carefully the various risks. Bank management needs to make a thorough and conservative assessment of the likely access to the foreign exchange markets and the likely convertibility of the currencies in which the bank carries out its activities, under the various scenarios in which they might need to switch funding from one currency to another. They further need to consider a range of possible scenarios for exchange rates, even where currencies are currently pegged or fixed. In many cases, an effective yet simple strategy for dealing with these issues would be for an institution to hold foreign currency assets in an amount equal to its foreign currency liabilities.

76. Local banks lending in foreign currency to domestic borrowers are vulnerable in a number of respects, as the Southeast Asian crisis demonstrated. In the case of a sudden devaluation, domestic borrowers may be unable to service or repay their foreign currency loans, creating cash flow problems for the lending bank. Banks should look carefully at the extent of foreign currency exposures built up by borrowers, and patterns across borrowers, and the extent to which the borrowers have access to foreign currency earnings to service their loans.

77. Overseas banks lending in a particular market in local currency also need to consider how they may be affected by particular adverse conditions. In the event of problems in the particular market, or in the home market of the bank, local deposits may not be renewed. The bank may have a strategy in this circumstance of drawing on home currency sources of funding and converting them or swapping them into the local currency in order to repay depositors in that market if necessary. Banks need to consider the extent to which, in the event of a crisis in the local market, they would be able to convert funding into that local currency.

78. A bank may decide that certain currencies make up a sufficient part of its liquidity needs to warrant separate liquidity back-up. In that case, either the head office or the regional treasurer for each currency would develop a contingency strategy and negotiate liquidity back-stop facilities in those currencies. Again, the bank would need to make an assessment of the availability of these back-up facilities under adverse conditions.

Principle 11: Subject to the analysis undertaken according to Principle 10, a bank should, where appropriate, set and regularly review limits on the size of its cash flow

mismatches over particular time horizons for foreign currencies in aggregate and for each significant individual currency in which the bank operates.

79. Banks should analyse the likely impact of different stress scenarios on their liquidity position, broken down by currency. This is particularly important for positions in currencies that are not highly liquid, though it should be borne in mind that, under stressful conditions, even apparently stable and liquid currencies may not be easily convertible to repay foreign currency deposits. Banks should reach a judgement on which currencies should be subject to individual limits, and regularly review the approach. Supervisors may have input into this process.

80. A bank would typically have lower mismatches for foreign currency liquidity than those tolerated for the domestic currency. The size of foreign currency mismatches should take into account the bank's ability to raise funds in foreign currency markets and the likely extent of foreign currency back-up facilities available in its domestic market.

IV. Internal Controls for Liquidity Risk Management

Principle 12: Each bank must have an adequate system of internal controls over its liquidity risk management process. A fundamental component of the internal control system involves regular independent reviews and evaluations of the effectiveness of the system and, where necessary, ensuring that appropriate revisions or enhancements to internal controls are made. The results of such reviews should be available to supervisory authorities.

81. Banks should have adequate internal controls to ensure the integrity of their liquidity risk management process. The internal controls should be an integral part of the bank's overall system of internal control. They should promote effective and efficient operations, reliable financial and regulatory reporting, and compliance with relevant laws, regulations and institutional policies. An effective system of internal control for liquidity risk includes:

- a strong control environment;
- an adequate process for identifying and evaluating liquidity risk;
- the establishment of control activities such as policies and procedures;
- adequate information systems; and,
- continual review of adherence to established policies and procedures.

82. With regard to control policies and procedures, attention should be given to appropriate approval processes, limits, reviews and other mechanisms designed to provide a reasonable assurance that the institution's liquidity risk management objectives are achieved. Many attributes of a sound risk management process, including risk measurement, monitoring and control functions, are key aspects of an effective system of internal control. Banks should ensure that all aspects of the internal control system are effective, including those aspects that are not directly part of the risk management process.

83. In addition, an important element of a bank's internal control system over its liquidity risk management process is regular evaluation and review. This includes ensuring that personnel are following established policies and procedures, as well as ensuring that the procedures that were established actually accomplish the intended objectives. Such reviews and evaluations should also address any significant change that may impact on the effectiveness of controls. Management should ensure that all such reviews and evaluations are conducted regularly by individuals who are independent of the function being reviewed. When revisions or enhancements to internal controls are warranted, there should be a mechanism in place to ensure that these are implemented in a timely manner.

84. Although procedures for establishing limits and for operating within them may vary among banks, periodic reviews should be conducted to determine whether the organisation complies with its liquidity risk policies and procedures. Positions that exceed established limits should receive the prompt attention of appropriate management and should be resolved according to the process described in approved policies. Periodic reviews of the liquidity management process should also address any significant changes in the nature of instruments acquired, limits, and internal controls that have occurred since the last review.

85. The internal audit function should also periodically review the liquidity management process in order to identify any weaknesses or problems. In turn, these should be addressed by management in a timely and effective manner.

V. Role of Public Disclosure in Improving Liquidity

Principle 13: Each bank should have in place a mechanism for ensuring that there is an adequate level of disclosure of information about the bank in order to manage public perception of the organisation and its soundness.

86. Public disclosure is an important element of liquidity management. Experience has shown that when there is a more continuous stream of information about a bank, it is easier to manage market perceptions during times of stress. Banks should be certain to provide an adequate amount of information on an ongoing basis to the public at large and, in particular, to major creditors and counterparties.

87. As part of contingency planning, banks must decide how they will deal with the press and broadcast media when negative information about the bank is disseminated. Astute public relations management can help a bank counter rumours that can result in significant run-offs by retail depositors and institutional investors. For example, if material adverse information about the bank becomes public, the bank should be prepared to immediately announce corrective actions that are being taken. This will help allay the fears of market participants and demonstrate that the highest levels of management are attentive to the problems that exist.

VI. The Role of Supervisors

Principle 14: Supervisors should conduct an independent evaluation of a bank's strategies, policies, procedures and practices related to the management of liquidity. Supervisors should require that a bank has an effective system in place to measure,

monitor and control liquidity risk. Supervisors should obtain from each bank sufficient and timely information with which to evaluate its level of liquidity risk and should ensure the bank has adequate liquidity contingency plans.

88. The supervisor should verify that the bank's internal risk management processes reflect principles 1-13 as set forth in this paper, and that these processes are adhered to in practice. In conducting an independent evaluation of a bank's strategies, policies, procedures and practices, supervisors should review the effectiveness of a bank's management of its net funding requirements under alternative scenarios. Recognising that the board of directors and senior management bear the ultimate responsibility for an effective liquidity risk management process, supervisors should determine that these groups are actively involved in the liquidity management process and that they are receiving timely and sufficiently detailed information to understand and assess the bank's liquidity risk.

89. Supervisors also should assess the effectiveness of a bank's process to measure and monitor liquidity risk by reviewing the techniques and underlying assumptions to estimate future net funding requirements. In this regard, supervisors should consider the reasonableness of a variety of "what if" scenarios. Supervisors should ensure that senior management is reviewing key assumptions to determine their continuing validity in view of existing and potentially changing market conditions. Supervisors may find it useful to issue standards for liquidity risk management. Typically these would include regulatory requirements for certain limits or ratios. Supervisors may also find it useful to set guidelines on, for example, the definition of liquid assets, and treatment of undrawn commitments and other off-balance sheet liabilities. Only truly liquid assets should be treated as such in calculating liquidity mismatches or ratios.

90. Supervisors could verify that these supervisory liquidity guidelines are being adhered to on a day-to-day basis. A standardised supervisory reporting framework could be used for this purpose. This may be supplemented by management reports. These reports could cover not only a bank's adherence to short-term limits, but also provide supervisors with sufficient information to monitor banks' liquidity in the longer term.

91. Where a bank's foreign currency business is material, or where a currency is experiencing problems, supervisors should consider requiring banks to report on their liquidity positions in individual currencies and their aggregate exposure to foreign currency. The October 1998 G22 "Report of the Working Group on Strengthening Financial Systems" recommends that supervisors, when giving guidance about the appropriateness of individual banks' foreign currency mismatches, should consider what these would imply for the overall banking sector foreign currency liquidity mismatch gap. Supervisors should look at the magnitude of this overall gap relative to the central bank's ability to provide foreign exchange. The report recommends that in economies potentially subject to considerable instability, a supervisor's policy might be to ensure that the aggregate foreign currency mismatch for a country's banking system over the period out to, for example, six months, is not out of line with the foreign exchange reserves plus standby facilities available to the authorities.

92. Supervisors should consider a bank's liquidity risk in conjunction with its capital adequacy. To do this supervisors need to obtain from a bank sufficient and timely information with which to evaluate its liquidity risk. Depending on the specific situation, appropriate supervisory responses to a bank with higher liquidity risk may include requiring the maintenance of higher levels of capital and repositioning the asset portfolios or funding

arrangements to reduce liquidity risk. As part of this supervisory process, supervisors may also want to consider implementing regulatory requirements for certain liquidity limits or ratios.

93. An essential aspect of a sound liquidity risk management process is an effective system of internal controls. In this regard, supervisors should review the internal control process to ensure that regular independent reviews are being conducted and that appropriate and timely revisions to internal controls are made.

94. Supervisors should also have their own contingency plans for dealing with liquidity problems at individual banks or in the market as a whole. In order to carry out their contingency plans effectively, supervisors will need to obtain timely and accurate information from banks in a crisis. A bank should contact its supervisors (home and host) and the central bank as soon as it becomes aware of emerging liquidity problems.