



BERMUDA MONETARY AUTHORITY

**BANKS AND DEPOSIT COMPANIES ACT
1999:**

**PRINCIPLES FOR SOUND LIQUIDITY RISK MANAGEMENT AND
SUPERVISION**

DECEMBER 2010

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Introduction

0.1. Liquidity is the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. The fundamental role of banks in the maturity transformation of short-term deposits into long-term loans makes banks inherently vulnerable to liquidity risk¹. Effective liquidity risk management helps ensure a bank's ability to meet cash flow obligations, which are uncertain as they are affected by external events and other agents' behaviour. Liquidity risk management is of paramount importance because a liquidity shortfall at a single institution may have system-wide repercussions for the jurisdiction.

0.2. This policy paper is applicable to deposit taking institutions licensed under the Banks and Deposit Companies Act 1999. It is intended that the principles in this paper apply at the level of both individual licensed institutions in Bermuda and groups subject to consolidated supervisions by the Authority. References in the paper to “institutions” and “banks” should be interpreted to include all such groups and licence holders.

1. Approach to liquidity risk management

1.1. Deposit institutions licensed under the Banks and Deposit Companies Act 1999 (“BDCA”) are required to maintain adequate liquidity as a condition of on going licensing.

1.2. The Second Schedule of the BDCA sets out the minimum licensing criteria for deposit taking institutions. Subparagraph 4(4) specifies the following prudential criterion: *“An institution shall not be regarded as conducting its business in a prudent manner unless it maintains or, as the case may be, will maintain adequate liquidity, having*

¹ This paper focuses primarily on funding liquidity risk. Funding liquidity risk is the risk that a bank will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the bank. Market liquidity risk is the risk that a bank cannot easily offset or eliminate a position at the market price because of inadequate market depth or market disruption.

regard to the relationship between its liquid assets and its actual and contingent liabilities, to the times at which those liabilities will or may fall due and its assets mature, to the factors mentioned in subparagraph (3) and to any other factors appearing to the Authority to be relevant.”

1.3. This paper should be read in conjunction with the Authority’s October 2010 paper, “The Measurement and Monitoring of Liquidity”, which sets out the Authority’s approach to setting regulatory minimum liquidity standards and regulatory reporting.

1.4. It should be noted that the regulatory standards establish minimum levels of liquidity for Bermuda banks. Banks are expected to meet these standards as well as adhere to the principles set out in this paper.

2. Principles for the management of liquidity risk

2.0 This paper introduces 13 Principles applicable to banks along with supporting guidance.

2.1 It should be noted that while the principles have broad applicability to all types of banks, their implementation should be tailored to the size, nature of business and complexity of a bank’s activities. Where an institution has chosen to tailor implementation of the principles, the institution should be able to explain the rationale for such tailoring to the Authority. The Authority will seek to be satisfied that either, the risks which the tailored Principle are designed to address are not inherent in the business of the bank, owing to size, nature of business and complexity of activities, or that the institution adequately mitigates these risk through alternative controls and practices.

2.2 This paper also introduces 4 Principles which set expanded expectations for the Authority, requiring regular and comprehensive assessment of banks’ liquidity risk management frameworks. The Authority will therefore be seeking to put a more formal structure around its review of institutions’ liquidity risk management. This will involve

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periodic formal reporting of liquidity management policies evidencing institutions' adherence to the Principles and more in depth regulatory scrutiny.

2.3 Each high level Principle is provided in turn with supporting guidance notes.

Fundamental Principle

2.3.1 Principle 1: A bank is responsible for the sound management of liquidity risk. A bank should establish a robust liquidity risk management framework, commensurate with the size, nature of business and complexity of its activities, that ensures it maintains sufficient liquidity, including a cushion of unencumbered, high quality liquid assets, to withstand a range of stress events, including those involving the loss or impairment of both unsecured and secured funding sources.

2.3.1.1 A bank should establish a robust liquidity risk management framework that is well integrated into the bank-wide risk management process. A primary objective of the liquidity risk management framework should be to ensure with a high degree of confidence that the firm is in a position to both address its daily liquidity obligations and withstand a period of liquidity stress affecting both secured and unsecured funding, the source of which could be bank-specific or market-wide. In addition to maintaining sound liquidity risk governance and management practices, as discussed further below, a bank should hold an adequate liquidity cushion comprised of readily marketable assets to be in a position to survive such periods of liquidity stress. A bank should demonstrate that its liquidity cushion is commensurate with the complexity of its on- and off-balance sheet activities, the liquidity of its assets and liabilities, the extent of its funding mismatches and the diversity of its business mix and funding strategies. A bank should use appropriately conservative assumptions about the marketability of assets and its access to funding, both secured and unsecured, during periods of stress. Moreover, a bank should

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not allow competitive pressures to compromise the integrity of its liquidity risk management, control functions, limit systems and liquidity cushion.

Principles Applicable to Institutions

2.3.2 Principle 2: A bank should clearly articulate a liquidity risk tolerance that is appropriate for its business strategy and its role in the financial system.

A bank should set a liquidity risk tolerance in light of its business objectives, strategic direction and overall risk appetite. The board of directors is ultimately responsible for the liquidity risk assumed by the bank and the manner in which this risk is managed and therefore should establish the bank's liquidity risk tolerance. The tolerance, which should define the level of liquidity risk that the bank is willing to assume, should be appropriate for the business strategy of the bank and its role in the financial system and should reflect the bank's financial condition and funding capacity. The tolerance should ensure that the firm manages its liquidity strongly in normal times in such a way that it is able to withstand a prolonged period of stress. The risk tolerance should be articulated in such a way that all levels of management clearly understand the trade-off between risks and profits. There are a variety of qualitative and quantitative ways in which a bank can express its risk tolerance. For example, a bank may quantify its liquidity risk tolerance in terms of the level of unmitigated funding liquidity risk the bank decides to take under normal and stressed business conditions. As discussed in Principle 14, supervisors will assess the appropriateness of the bank's risk tolerance and any changes to the risk tolerance over time. The Authority will expect a bank to provide it with an explanation of the level of liquidity risk which the bank's board has decided it should assume.

2.3.3 Principle 3: Senior management should develop a strategy, policies and practices to manage liquidity risk in accordance with the risk tolerance and to ensure that the bank maintains sufficient liquidity. Senior management should continuously review information on the bank's liquidity developments and report to the board of directors on a regular basis. A bank's board of directors should review and approve the strategy, policies and practices related to the management of

liquidity at least annually and ensure that senior management manages liquidity risk effectively.

2.3.3.1 Senior management is responsible for developing and implementing a liquidity risk management strategy in accordance with the bank's risk tolerance. The strategy should include, where relevant, specific policies on liquidity management, such as: the composition and maturity of assets and liabilities; the diversity and stability of funding sources; the approach to managing liquidity in different currencies, across borders, and across business lines and legal entities; the approach to intraday liquidity management; and the assumptions on the liquidity and marketability of assets. The strategy should take account of liquidity needs under normal conditions as well as liquidity implications under periods of liquidity stress, the nature of which may be institution-specific or market-wide or a combination of the two. The strategy may include various high-level quantitative and qualitative targets. The board of directors should approve the strategy and critical policies and practices and review them at least annually. The board should ensure that senior management translates the strategy into clear guidance and operating standards (e.g. in the form of policies, controls or procedures). The board should also ensure that senior management and appropriate personnel have the necessary expertise and that the bank has processes and systems to measure, monitor, and control all sources of liquidity risk.

2.3.3.2 The liquidity strategy should be appropriate for the nature, scale and complexity of a bank's activities. In formulating this strategy, the bank should take into consideration its legal structures (e.g. mix of foreign branches versus foreign operating subsidiaries), key business lines, the breadth and diversity of markets, products, and jurisdictions in which it operates, and home and host regulatory requirements.

2.3.3.3 Senior management should determine the structure, responsibilities and controls for managing liquidity risk and for overseeing the liquidity positions of all legal entities, branches and subsidiaries in the jurisdictions in which a bank is active, and outline these elements clearly in the bank's liquidity policies. The structure for managing liquidity (i.e. the degree of centralisation or decentralisation of a bank's liquidity risk management) should take into consideration any legal, regulatory or operational restrictions on the

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transfer of funds. In some cases there may be strict regulatory restrictions on funds being transferred between entities or jurisdictions. When a group contains both bank and non-bank entities, group level management should understand the different liquidity risk characteristics specific to each entity, both with respect to the nature of the business and with respect to the regulatory environment. Whatever structure is employed, senior management should be able to monitor the liquidity risks across the banking group and at each entity on an on going basis. Processes should be in place to ensure that the group's senior management is actively monitoring and quickly responding to all material developments across the group and reporting to the board of directors as appropriate.

2.3.3.4 In addition, senior management and the board should have a thorough understanding of the close links between funding liquidity risk and market liquidity risk, as well as how other risks, including credit, market, operational and reputation risks affect the bank's overall liquidity risk strategy.

2.3.3.5 The liquidity strategy, key policies for implementing the strategy, and the liquidity risk management structure should be communicated throughout the organisation by senior management. All business units conducting activities that have an impact on liquidity should be fully aware of the liquidity strategy and operate under the approved policies, procedures, limits and controls. Individuals responsible for liquidity risk management should maintain close links with those monitoring market conditions, as well as with other individuals with access to critical information, such as credit risk managers. Moreover, liquidity risk and its potential interaction with other risks should be included in the risks addressed by risk management committees and/or independent risk management functions.

2.3.3.6 Senior management should ensure that the bank has adequate internal controls to ensure the integrity of its liquidity risk management process. Senior management should ensure that operationally independent, appropriately trained and competent personnel are responsible for implementing internal controls. It is critical that personnel in independent control functions have the skills and authority to challenge information and modelling assumptions provided by business lines. When significant changes impact the

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effectiveness of controls and revisions or enhancements to internal controls are warranted, senior management should ensure that necessary changes are implemented in a timely manner. Internal audit should regularly review the implementation and effectiveness of the agreed framework for controlling liquidity risk.

2.3.3.7 Senior management should closely monitor current trends and potential market developments that may present significant, unprecedented and complex challenges for managing liquidity risk so that they can make appropriate and timely changes to the liquidity strategy as needed. Senior management should define the specific procedures and approvals necessary for exceptions to policies and limits, including the escalation procedures and follow-up actions to be taken for breaches of limits. Senior management should ensure that stress tests, contingency funding plans and liquidity cushions are effective and appropriate for the bank, as discussed in later principles.

2.3.3.8 The board should review regular reports on the liquidity position of the bank. The board should be informed immediately of new or emerging liquidity concerns. These include increasing funding costs or concentrations, the growing size of a funding gap, the drying up of alternative sources of liquidity, material and/or persistent breaches of limits, a significant decline in the cushion of unencumbered, highly liquid assets, or changes in external market conditions which could signal future difficulties. The board should ensure that senior management takes appropriate remedial actions to address the concerns.

2.3.4 Principle 4: A bank should incorporate liquidity costs, benefits and risks in the internal pricing, performance measurement and new product approval process for all significant business activities (both on- and off-balance sheet), thereby aligning the risk-taking incentives of individual business lines with the liquidity risk exposures their activities create for the bank as a whole.

2.3.4.1 Senior management should appropriately incorporate liquidity costs, benefits and risks in the internal pricing, performance measurement and new product approval process

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for all significant business activities (both on- and off-balance sheet). Senior management should ensure that a bank's liquidity management process includes measurement of the liquidity costs, benefits and risks implicit in all significant business activities, including activities that involve the creation of contingent exposures which may not immediately have a direct balance sheet impact. These costs, benefits and risks should then be explicitly attributed to the relevant activity so that line management incentives are consistent with and reinforce the overarching liquidity risk tolerance and strategy of the bank, with a liquidity charge assigned as appropriate to positions, portfolios, or individual transactions. This assignment of liquidity costs, benefits and risks should incorporate factors related to the anticipated holding periods of assets and liabilities, their market liquidity risk characteristics, and any other relevant factors, including the benefits from having access to relatively stable sources of funding, such as some types of retail deposits.

2.3.4.2 The quantification and attribution of these risks should be explicit and transparent at the line management level and should include consideration of how liquidity would be affected under stressed conditions.

2.3.4.3 The analytical framework should be reviewed as appropriate to reflect changing business and financial market conditions and so maintain the appropriate alignment of incentives. Moreover, liquidity risk costs, benefits and risks should be addressed explicitly in the new product approval process.

2.3.5 Principle 5: A bank should have a sound process for identifying, measuring, monitoring and controlling liquidity risk. This process should include a robust framework for comprehensively projecting cash flows arising from assets, liabilities and off-balance sheet items over an appropriate set of time horizons.

2.3.5.1 A bank should define and identify the liquidity risk to which it is exposed for all legal entities, branches and subsidiaries in the jurisdictions in which it is active. A bank's liquidity needs and the sources of liquidity available to meet those needs depend

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significantly on the bank's business and product mix, balance sheet structure and cash flow profiles of its on- and off-balance sheet obligations. As a result, a bank should evaluate each major on and off balance sheet position, including the effect of embedded options and other contingent exposures that may affect the bank's sources and uses of funds, and determine how it can affect liquidity risk.

2.3.5.2 A bank should consider the interactions between exposures to funding liquidity risk and market liquidity risk. A bank that obtains liquidity from capital markets should recognise that these sources may be more volatile than traditional retail deposits. For example, under conditions of stress, investors in money market instruments may demand higher compensation for risk, require roll over at considerably shorter maturities, or refuse to extend financing at all. Moreover, reliance on the full functioning and liquidity of financial markets may not be realistic as asset and funding markets may dry up in times of stress. Market illiquidity may make it difficult for a bank to raise funds by selling assets and thus increase the need for funding liquidity.

2.3.5.3 A bank should ensure that assets are prudently valued according to relevant financial reporting and supervisory standards. A bank should fully factor into its risk management the consideration that valuations may deteriorate under market stress, and take this into account in assessing the feasibility and impact of asset sales during stress on its liquidity position. For example, a bank's sale of assets under duress to raise liquidity could put pressure on earnings and capital and further reduce counterparties' confidence in the bank, further constraining its access to funding markets. In addition, a large asset sale by one bank may prompt further price declines for that type of asset due to the market's difficulty in absorbing the sale. Finally, the interaction of funding liquidity risk and market liquidity risk may lead to illiquidity spirals, with banks stockpiling liquidity and not on-lending in term interbank markets because of pessimistic assumptions about future market conditions and their own ability to raise additional funds quickly in the event of an adverse shock.

2.3.5.4 A bank should recognise and consider the strong interactions between liquidity risk and the other types of risk to which it is exposed. Various types of financial and

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operating risks, including interest rate, credit, operational, legal and reputational risks, may influence a bank's liquidity profile. Liquidity risk often can arise from perceived or actual weaknesses, failures or problems in the management of other risk types. A bank should identify events that could have an impact on market and public perceptions about its soundness, particularly in wholesale markets.

2.3.5.5 Liquidity measurement involves assessing a bank's cash inflows against its outflows and the liquidity value of its assets to identify the potential for future net funding shortfalls. A bank should be able to measure and forecast its prospective cash flows for assets, liabilities, off-balance sheet commitments and derivatives over a variety of time horizons, under normal conditions and a range of stress scenarios, including scenarios of severe stress.

2.3.5.6 Regarding the time horizons over which to identify, measure, monitor and control liquidity risk, a bank should ensure that its liquidity risk management practices integrate and consider a variety of factors. These include vulnerabilities to changes in liquidity needs and funding capacity on an intraday basis; day-to-day liquidity needs and funding capacity over short- and medium-term horizons up to one year; longer-term liquidity needs over one year; and vulnerabilities to events, activities and strategies that can put a significant strain on internal cash generation capability.

2.3.5.7 A bank should identify, measure, monitor and control its liquidity risk positions for:

- (a) future cash flows of assets and liabilities;
- (b) sources of contingent liquidity demand and related triggers associated with off-balance sheet positions;
- (c) currencies in which a bank is active; and
- (d) correspondent, custody and settlement activities.

(a) Future cash flows of assets and liabilities

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2.3.5.8 A bank should have a robust liquidity risk management framework providing prospective, dynamic cash flow forecasts that include assumptions on the likely behavioural responses of key counterparties to changes in conditions and are carried out at a sufficiently granular level. A bank should make realistic assumptions about its future liquidity needs for both the short and long term that reflect the complexities of its underlying businesses, products and markets. A bank should analyse the quality of assets that could be used as collateral, in order to assess their potential for providing secured funding in stressed conditions. A bank also should attempt to manage the timing of incoming flows in relation to known outgoing sources in order to obtain an appropriate maturity distribution for its sources and uses of funds.

2.3.5.9 In estimating the cash flows arising from its liabilities, a bank should assess the “stickiness” of its funding sources – that is, their tendency not to run off quickly under stress. In particular, where it relies to a material extent on wholesale funding, both secured and unsecured, a bank should assess the likelihood of roll-over of funding lines and the potential for fund providers to behave similarly under stress, and therefore consider the possibility that secured and unsecured funding might dry up in times of stress. For secured funding with overnight maturity, a bank should not assume that the funding will automatically roll over. In addition, a bank should assess the availability of term funding back up facilities and the circumstances under which they can be utilised. A bank should also consider factors that influence the “stickiness” of retail deposits, such as size, interest-rate sensitivity, geographical location of depositors and the deposit channel (e.g. direct, internet or brokered). In addition, national differences in deposit insurance regimes can have a material impact on the “stickiness” of customer deposits. In times of stress, the coverage and the actual or perceived speed with which a depositor is paid out through a national deposit insurance regime, as well as the manner in which problem banks are resolved in a jurisdiction, can affect the behaviour of retail depositors.

(b) Sources of contingent liquidity demand and related triggers associated with off-balance sheet positions

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2.3.5.10 A bank should identify, measure, monitor and control potential cash flows relating to off-balance sheet commitments and other contingent liabilities. This should include a robust framework for projecting the potential consequences of undrawn commitments being drawn, considering the nature of the commitment and credit worthiness of the counterparty, as well as exposures to business and geographical sectors, as counterparties in the same sectors may be affected by stress at the same time.

2.3.5.11 A bank issuer should monitor, at inception and throughout the life of the transaction, the potential risks arising from the existence of recourse provisions in asset sales, the extension of liquidity facilities to securitisation programmes and the early amortisation triggers of certain asset securitisation transactions.

2.3.5.12 A bank's processes for identifying and measuring contingent funding risks should consider the nature and size of the bank's potential non-contractual "obligations", as such obligations can give rise to the bank supporting related off-balance sheet vehicles in times of stress. This is particularly true of securitisation and conduit programmes where the bank considers such support critical to maintaining ongoing access to funding. Similarly, in times of stress, reputational concerns might prompt a bank to purchase assets from money market or other investment funds that it manages or with which it is otherwise affiliated.

2.3.5.13 Given the customised nature of many of the contracts that underlie undrawn commitments and off-balance sheet instruments, triggering events² for these contingent liquidity risks can be difficult to model. It is incumbent upon the management of the risk originating business activity, as well as the liquidity risk management group, to implement systems and tools to analyse these liquidity trigger events effectively and to measure how changes to underlying risk factors could cause draws against these facilities, even if there has been no historical evidence of such draws. This analysis should include appropriate assumptions on the behaviour of both the bank and its obligors or counterparties.

² Triggering events are events which enable commitments to be drawn upon and thus may create a liquidity need. For example, triggering events could include changes in economic variables or conditions, credit rating downgrades, country risk issues, specific market disruptions (e.g. commercial paper), and the alteration of contracts by governing legal, accounting, or tax systems and other similar changes

2.3.5.14 The management of liquidity risks of certain off-balance sheet items is of particular importance due to their prevalence and the difficulties that many banks have in assessing the related liquidity risks that could materialise in times of stress. Those items include special purpose vehicles; financial derivatives; and guarantees and commitments.

Special purpose vehicles

2.3.5.15 A bank should have a detailed understanding of its contingent liquidity risk exposure and event triggers arising from any contractual and non-contractual relationships with special purpose vehicles. A bank should determine whether a special purpose subsidiary or other special purpose vehicle (in either case an “SPV”) of a bank is considered to be a source or use of liquidity based upon the likelihood that such a source or use will occur if either the bank or SPV experience adverse liquidity circumstances, irrespective of whether or not the SPV is consolidated for accounting purposes.

2.3.5.16 Where the bank provides contractual liquidity facilities to an SPV, or where it may otherwise need to support the liquidity of an SPV under adverse conditions³, the bank needs to consider how the bank’s liquidity might be adversely affected by illiquidity at the SPV. In such cases, the bank should monitor the SPV’s inflows (maturing assets) and outflows (maturing liabilities) as part of the bank’s own liquidity planning, including in its stress testing and scenario analyses. In such circumstances, the bank should assess the liquidity position of the bank with the SPV’s liquidity draws (but not its liquidity surplus) included.

2.3.5.17 With respect to the use of securitisation SPVs as a source of funding, a bank needs to consider whether these funding vehicles will continue to be available to the bank under adverse scenarios. A bank experiencing adverse liquidity conditions often will not

³ For example, a bank needs to consider that an SPV’s need for liquidity could result in a draw on the bank’s resources in situations where the bank sponsors a securitisation SPV and has contractual, reputational or business reasons for providing support to such SPV (for instance if customers of a bank utilised an affiliated SPV to finance their assets and then the bank would be called on to finance those assets if the SPV failed, if the bank promoted the sale of securities issued by the SPV to its customers and decided to purchase such securities to maintain its business relationships, or if the SPV is used by the bank to securitise the bank’s assets and a crisis at the SPV would remove this source of funding for the bank).

have continuing access to the securitisation market as a funding source and should reflect this in its prospective liquidity management.

2.3.5.18 As mentioned above, an SPV's liquidity surplus should not be included by a bank as a source of liquidity under adverse conditions because: (a) when a bank is experiencing severe strain, the SPV's cash surplus may cease to be available to the bank (e.g. the SPV's managers may be required to, or may decide to, decrease exposure to the bank – for example, by depositing funds with another bank); and (b) a high correlation often exists between liquidity strains for most banks and the SPV's they sponsor and administer (e.g. concerns related to a bank's financial strength or the SPV's performance can trigger liquidity pressures for the other entity). Therefore, a bank should not include surplus liquidity at an SPV as a source of liquidity for the bank. Where a bank has received a deposit of surplus cash from an SPV, the withdrawal of deposits placed by the SPV with the bank could lead to a large and sudden loss of funds – this should, based on the probability of such a loss, be modelled as a possible source of liquidity drain.

Financial derivatives

2.3.5.19 A bank should incorporate cash flows related to the repricing, exercise or maturity of financial derivatives contracts in its liquidity risk analysis, including the potential for counterparties to demand additional collateral in an event such as a decline in the bank's credit rating or creditworthiness or a decline in the price of the underlying asset. Timely confirmation of OTC derivatives transactions is fundamental to such analyses, because unconfirmed trades call into question the accuracy of a bank's measures of potential exposure.

Guarantees and commitments

2.3.5.20 Undrawn loan commitments, letters of credit and financial guarantees represent a potentially significant drain of funds for a bank. A bank may be able to ascertain a

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"normal" level of cash outflows under routine conditions, and then estimate the scope for an increase in these flows during periods of stress. For example, an episode of financial market stress may trigger a substantial increase in the amount of drawdowns of letters of credit provided by the bank to its customers.

2.3.5.21 Similarly, liquidity issues can arise when a bank relies on committed lines of credit or guarantees provided by others. For example, a bank that holds assets whose creditworthiness is dependent on the guarantees of a third party or has raised funds against such assets could face significant demands on its funding liquidity if the third party's credit standing is highly correlated with the credit quality of the underlying assets. In such cases (e.g. as in the experience of 2007-2008 with a number of financial guarantors), the value of the protection a bank purchased from the guarantor on the underlying assets could deteriorate at a time when the assets also are deteriorating; moreover, the bank could be called upon to post additional margin in respect of borrowings against such assets.

(c) Currencies in which a bank is active

2.3.5.22 A bank should assess its aggregate foreign currency liquidity needs and determine acceptable currency mismatches. A bank should undertake a separate analysis of its strategy for each currency in which it has significant activity, considering potential constraints in times of stress. The size of foreign currency mismatches should take into account: (a) the bank's ability to raise funds in foreign currency markets; (b) the likely extent of foreign currency back-up facilities available in its domestic market; (c) the ability to transfer a liquidity surplus from one currency to another, and across jurisdictions and legal entities; and (d) the likely convertibility of currencies in which the bank is active, including the potential for impairment or complete closure of foreign exchange swap markets for particular currency pairs.

2.3.5.23 A bank should be aware of, and have the capacity to manage, liquidity risk exposures arising from the use of foreign currency deposits and short-term credit lines to fund domestic currency assets as well as the funding of foreign currency assets with domestic currency. A bank should take account of the risks of sudden changes in foreign

exchange rates or market liquidity, or both, which could sharply widen liquidity mismatches and alter the effectiveness of foreign exchange hedges and hedging strategies.

2.3.5.24 Moreover, a bank should assess the likelihood of loss of access to the foreign exchange markets as well as the likely convertibility of the currencies in which the bank carries out its activities. A bank should negotiate a liquidity back-stop facility⁴ for a specific currency, or develop a broader contingency strategy, if the bank runs significant liquidity risk positions in that currency.

(d) Correspondent, custody and settlement activities

2.3.5.25 A bank should understand and have the capacity to manage how the provision of correspondent, custodian and settlement bank services can affect its cash flows. Given that the gross value of customers' payment traffic (inflows and outflows) can be very large, unexpected changes in these flows can result in large net deposits, withdrawals or line-of-credit draw-downs that impact the overall liquidity position of the correspondent or custodian bank, both on an intraday and overnight basis (also see Principle 8 on intraday liquidity). A bank also should understand and have the capacity to manage the potential liquidity needs it would face as a result of the failure-to-settle procedures of payment and settlement systems in which it is a direct participant.

Measurement tools

2.3.5.26 A bank should employ a range of customised measurement tools, or metrics, as there is no single metric that can comprehensively quantify liquidity risk. To obtain a forward looking view of liquidity risk exposures, a bank should use metrics that assess the structure of the balance sheet, as well as metrics that project cash flows and future

⁴ As discussed in paragraphs 2.3.7.4 to 2.3.7.13, a bank needs to carefully manage market access to ensure that liquidity sources – including credit lines – can be accessed when needed.

liquidity positions, taking into account off-balance sheet risks. These metrics should span vulnerabilities across business-as-usual and stressed conditions over various time horizons. Under business-as-usual conditions, prospective measures should identify needs that may arise from projected outflows relative to routine sources of funding. Under stress conditions, prospective measures should be able to identify funding gaps at various horizons, and in turn serve as a basis for liquidity risk limits and early warning indicators.

2.3.5.27 Management should tailor the measurement and analysis of liquidity risk to the bank's business mix, complexity and risk profile. The measurement and analysis should be comprehensive and incorporate the cash flows and liquidity implications arising from all material assets, liabilities, off-balance sheet positions and other activities of the bank. The analysis should be forward-looking and strive to identify potential future funding mismatches so that the bank can assess its exposure to the mismatches and identify liquidity sources to mitigate the potential risks. In the normal course of measuring, monitoring and analysing its sources and uses of funds, a bank should project cash flows over time under a number of alternative scenarios. These pro-forma cash flow statements are a critical tool for adequately managing liquidity risk. These projections serve to produce a "cash flow mismatch" or "liquidity gap" analysis that can be based on assumptions of the future behaviour of assets, liabilities and off-balance sheet items, and then used to calculate the cumulative net excess or shortfall over the time frame for the liquidity assessment. Measurement should be performed over incremental time periods to identify projected and contingent flows, taking into account the underlying assumptions associated with potential changes in cash flows of assets and liabilities.

2.3.5.28 Given the critical role of assumptions in projecting future cash flows, a bank should take steps to ensure that its assumptions are reasonable and appropriate, documented and periodically reviewed and approved. The assumptions around the duration of demand deposits and assets, liabilities, and off-balance sheet items with uncertain cash flows and the availability of alternative sources of funds during times of liquidity stress are of particular importance. Assumptions about the market liquidity of such positions should be adjusted according to market conditions or bank-specific circumstances.

Liquidity risk control through limits

2.3.5.29 A bank should set limits to control its liquidity risk exposure and vulnerabilities. A bank should regularly review such limits and corresponding escalation procedures. Limits should be relevant to the business in terms of its location, complexity of activity, nature of products, currencies and markets served.

2.3.5.30 Limits should be used for managing day-to-day liquidity within and across lines of business and legal entities under “normal” conditions. For example a commonly employed type of limit constrains the size of cumulative contractual cashflow mismatches (e.g. the cumulative net funding requirement as a percentage of total liabilities) over various time horizons. This type of limit also may include estimates of outflows resulting from the drawdown of commitments or other obligations of the bank.

2.3.5.31 The limit framework also should include measures aimed at ensuring that the bank can continue to operate in a period of market stress, bank-specific stress and a combination of the two. Simply stated, the objective of such measures is to ensure that, under stress conditions, available liquidity exceeds liquidity needs. This is discussed further in Principle 12 on liquidity cushions.

Early warning indicators

2.3.5.32 While management and staff have the responsibility to utilise good judgement to identify and manage underlying risk factors, a bank should also design a set of indicators to aid this process to identify the emergence of increased risk or vulnerabilities in its liquidity risk position or potential funding needs. Such early warning indicators should identify any negative trend and cause an assessment and potential response by management in order to mitigate the bank’s exposure to the emerging risk.

2.3.5.33 Early warning indicators can be qualitative or quantitative in nature and may include but are not limited to:

- rapid asset growth, especially when funded with potentially volatile liabilities

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- growing concentrations in assets or liabilities
- increases in currency mismatches
- a decrease of weighted average maturity of liabilities
- repeated incidents of positions approaching or breaching internal or regulatory limits
- negative trends or heightened risk associated with a particular product line, such as rising delinquencies
- significant deterioration in the bank's earnings, asset quality, and overall financial condition
- negative publicity
- a credit rating downgrade
- stock price declines or rising debt costs
- widening debt or credit-default-swap spreads
- rising wholesale or retail funding costs
- counterparties that begin requesting or request additional collateral for credit exposures or that resist entering into new transactions
- correspondent banks that eliminate or decrease their credit lines
- increasing retail deposit outflows
- increasing redemptions of CDs before maturity
- difficulty accessing longer-term funding
- difficulty placing short-term liabilities (e.g. commercial paper).

2.3.5.34 A bank also should have early warning indicators that signal whether embedded triggers in certain products (e.g. callable public debt, OTC derivative transactions) are about to be breached or whether contingent risks are likely to crystallise (such as back up lines to asset-backed commercial paper conduits) which would cause the bank to provide additional liquidity support for the product or bring assets onto the balance sheet.

Monitoring system

2.3.5.35 A bank should have a reliable management information system designed to provide the board of directors, senior management and other appropriate personnel with timely and forward-looking information on the liquidity position of the bank. The

management information system should have the ability to calculate liquidity positions in all of the currencies in which the bank conducts business – both on a subsidiary/branch basis in all jurisdictions in which the bank is active and on an aggregate group basis. It should capture all sources of liquidity risk, including contingent risks and the related triggers and those arising from new activities, and have the ability to deliver more granular and time sensitive information during stress events. To effectively manage and monitor its net funding requirements, it is desirable that a bank should have the ability to calculate liquidity positions on an intraday basis, on a day-to-day basis for the shorter time horizons, and over a series of more distant time periods thereafter. The management information system should be used in day-to-day liquidity risk management to monitor compliance with the bank's established policies, procedures and limits.

2.3.5.36 To facilitate liquidity risk monitoring, senior management should agree on a set of reporting criteria, specifying the scope, manner and frequency of reporting for various recipients (such as the board, senior management, asset – liability committee) and the parties responsible for preparing the reports. Reporting of risk measures should be done on a frequent basis (e.g. daily reporting for those responsible for managing liquidity risk, and at each board meeting during normal times, with reporting increasing in times of stress) and should compare current liquidity exposures to established limits to identify any emerging pressures and limit breaches. Breaches in liquidity risk limits should be reported and thresholds and reporting guidelines should be specified for escalation to higher levels of management, the board and supervisory authorities.

2.3.6 Principle 6: A bank should actively monitor and control liquidity risk exposures and funding needs within and across legal entities, business lines and currencies, taking into account legal, regulatory and operational limitations to the transferability of liquidity.

2.3.6.1 Regardless of its organisational structure and degree of centralised or decentralised liquidity risk management, a bank should actively monitor and control liquidity risks at the level of individual legal entities, and foreign branches and

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subsidiaries, and the group as a whole, incorporating processes that aggregate data across multiple systems in order to develop a group-wide view of liquidity risk exposures and identify constraints on the transfer of liquidity within the group.

2.3.6.2 For each country in which it is active, a bank should ensure that it has the necessary expertise about country-specific features of the legal and regulatory regime that influence liquidity risk management, including arrangements for dealing with failed banks, deposit insurance, and central bank operational frameworks and collateral policies. This knowledge should be reflected in liquidity risk management processes.

2.3.6.3 In the case of a localised systemic stress event, a bank should have processes in place to allow for allocation of liquidity and collateral resources to affected entities, to the extent that transferability is permitted. A bank should also consider the possibility that a local event could lead to a liquidity strain across the whole group due to reputational contagion (i.e. when market counterparties assume that a problem at one entity implies a problem for the group as a whole). The group as a whole, and individual legal entities, should be resilient to such shocks to a degree consistent with the board's defined risk tolerance.

2.3.6.4 Cross-entity funding channels are a mechanism through which liquidity pressures can either be alleviated or spread through the group. For example, an entity that provides regular funding to other entities of the group may be unable to continue providing this funding when it faces its own liquidity strain or when another entity is in need of extraordinary funding. While cross-entity funding channels could help relieve liquidity pressures at one entity, a bank should consider establishing internal limits on intragroup liquidity risk to mitigate the risk of contagion under stress. A bank also may establish limits at the subsidiary and branch level to restrict the reliance of related entities on funding from elsewhere in the bank. Internal limits also may be set for each currency used by a bank. The limits should be stricter where ready conversion between currencies is uncertain, particularly in stress situations.

2.3.6.5 To mitigate the potential for reputational contagion, effective communication with counterparties, credit rating agencies and other stakeholders when liquidity problems arise is of vital importance. In addition, group-wide contingency funding plans, liquidity cushions and multiple sources of funding are mechanisms that may mitigate reputational contagion.

2.3.6.6 The specific market characteristics and liquidity risks of positions in foreign currencies should be taken into account, particularly where fully developed foreign exchange markets do not exist. For currencies trading in well-developed foreign exchange markets, a more global approach to management of the currency may be taken, including the use of swaps. However, the bank should critically assess the risk that the ability to swap currencies may erode rapidly under stressed conditions. Given the particular relationship between the Bermuda and US dollar, institutions may for liquidity purposes treat them as identical.

2.3.6.7 Assumptions regarding the transferability of funds and collateral should be transparent in liquidity risk management plans that are available for the Authority's review. A bank's assumptions should fully consider regulatory, legal, accounting, credit, tax and internal constraints on the effective movement of liquidity and collateral. They should also consider the operational arrangements needed to transfer funds and collateral across entities and the time required to complete such transfers under those arrangements.

2.3.7 Principle 7: A bank should establish a funding strategy that provides effective diversification in the sources and tenor of funding. It should maintain an on going presence in its chosen funding markets and strong relationships with funds providers to promote effective diversification of funding sources. A bank should regularly gauge its capacity to raise funds quickly from each source. It should identify the main factors that affect its ability to raise funds and monitor those factors closely to ensure that estimates of fund raising capacity remain valid.

2.3.7.1 A bank should diversify available funding sources in the short-, medium- and long-term. Diversification targets should be part of the medium- to long-term funding

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plans and be aligned with the budgeting and business planning process. Funding plans should take into account correlations between sources of funds and market conditions. The desired diversification should also include limits by counterparty, secured versus unsecured market funding, instrument type, securitisation vehicle, currency, and geographic market.

2.3.7.2 As a general liquidity management practice, banks should limit concentration in any one particular funding source or tenor. Some banks are reliant on wholesale funding, which tends to be more volatile than retail funding. Consequently, these banks should ensure that wholesale funding sources are sufficiently diversified to maintain timely availability of funds at the right maturities and at reasonable costs. Furthermore, banks reliant on wholesale funding should maintain a relatively higher proportion of unencumbered, highly liquid assets than banks that rely primarily on retail funding. For institutions active in multiple currencies, access to diverse sources of liquidity in each currency is required, since banks are not always able to swap liquidity easily from one currency to another.

2.3.7.3 Senior management and the Board should be aware of the composition, characteristics and diversification of the bank's assets and funding sources. Senior management and the Board should regularly review the funding strategy in light of any changes in the internal or external environments.

2.3.7.4 An essential component of ensuring funding diversity is maintaining market access. Market access is critical for effective liquidity risk management, as it affects both the ability to raise new funds and to liquidate assets. Senior management should ensure that market access is being actively managed, monitored and tested by the appropriate staff.

2.3.7.5 Managing market access can include developing markets for asset sales or strengthening arrangements under which a bank can borrow on a secured or unsecured basis. A bank should maintain an active presence within markets relevant to its funding strategy. This requires an on going commitment and investment in adequate and

appropriate infrastructures, processes and information collection. A bank should not assume it can access markets in a timely manner for which it has not established the necessary systems or documentation, or where these arrangements have not been periodically utilised or the bank has not confirmed that willing counterparties are in place. The inclusion of loan-sale clauses in loan documentation and the regular use of some asset-sales markets may help enhance a bank's ability to execute asset sales with various counterparties in times of stress. In all cases, a bank should have full knowledge of the legal framework governing potential asset sales, and ensure that documentation is reliable and legally robust.

2.3.7.6 Normally reliable funding markets can be seriously disrupted when put under stress. A bank should consider the impact of both market disruptions and name-risk issues on cash flows and access to short- and long-term funding markets. In particular, stresses (both name-specific and market-wide) can arise for which a portion of a bank's assets cannot be sold or financed at reasonable prices.

2.3.7.7 A bank should identify and build strong relationships with current and potential investors, even in funding markets facilitated by brokers or other third parties. Building strong relationships with various key providers of funding can give a bank insights into providers' behaviour in times of bank-specific or market-wide shocks and provide a line of defence should a liquidity problem arise. The frequency of contact and the frequency of use of a funding source are two possible indicators of the strength of a funding.

2.3.7.8 Although developing and maintaining strong relationships with fund providers is important, a bank should take a prudent view of how those relationships may alter in times of stress. Institutions that reliably provide funds in normal conditions may not do so in times of widespread stress because of uncertainty about their own liquidity needs. In the formulation of its stress test scenarios and contingency funding plan, a bank should consider these second order effects and take into account that sources of funds may dry up and that markets may close.

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2.3.7.9 Additionally, increased uncertainty about a bank's repayment ability can cause significant deterioration in the willingness of counterparties to provide funding. In such situations the quality and strength of a bank's capital cushion can positively influence the willingness of counterparties to maintain funding relationships. Stress test scenarios and contingency funding plans should consider the effects that losses and the resulting reduction in capital can have on the bank's ability to maintain funding relationships.

2.3.7.10 A bank needs to identify alternative sources of funding that strengthen its capacity to withstand a variety of severe yet plausible institution-specific and market-wide liquidity shocks. Depending on the nature, severity and duration of the liquidity shock, potential sources of funding include the following:

- deposit growth
- the lengthening of maturities of liabilities
- new issues of short- and long-term debt instruments
- intra-group fund transfers, new capital issues, the sale of subsidiaries or lines of business
- asset securitisation
- the sale or repo of unencumbered, highly liquid assets
- drawing down committed facilities

2.3.7.11 However, not all of these options may be available in all circumstances and some may be available only with a substantial time delay. Bank management should regularly review and test its fund-raising options to evaluate their effectiveness at providing liquidity in the short-, medium- and long-term.

2.3.7.12 Asset securitisation raises particular liquidity considerations. The growth in viable secondary markets internationally has broadened banks' opportunities to securitise more assets with greater speed. Normally, these assets can be quickly and easily converted to cash. Consequently, many banks include such assets in their analysis of available sources of funds. However, over-reliance on the securitisation of assets as a source of liquidity raises concerns about a bank's ability to match cash flows received with funding needs in times of bank-specific stress when the markets do not make liquidity available to the bank or in cases of market-wide disruptions in the securitisation market. This reinforces the point that banks should have access to a diversified funding base.

2.3.7.13 There is, however, no securitisation market in Bermuda at present and while it may be possible to securitise certain assets, in the absence of established markets, this would take time and it is not clear that overseas investors would have a ready appetite for these assets, Bermuda mortgages for example. The Authority will review very carefully any plans by a bank to rely to any material extent on the securitisation of assets to meet its liquidity needs.

2.3.8 Principle 8: A bank should actively manage its intraday liquidity positions and risks to meet payment and settlement obligations on a timely basis under both normal and stressed conditions and thus contribute to the smooth functioning of payment and settlement systems.

2.3.8.1 Intraday liquidity management is both an important component of a bank's broader liquidity management strategy and critical to implementing other longer-term aspects of that strategy. A bank's failure to manage intraday liquidity effectively could leave it unable to meet its payment obligations at the time expected, thereby affecting its own liquidity position and that of other parties. First, particularly in the face of credit concerns or general market stress, counterparties may view the failure to settle payments when expected as a sign of financial weakness and in turn withhold or delay payments to the bank, causing additional liquidity pressures. Second, it also could leave counterparties unexpectedly short of funds, impair those counterparties' ability to meet payment obligations, and disrupt the smooth functioning of payment and settlement systems. Given the interdependencies that exist among systems, a bank's failure to meet certain critical payments could lead to liquidity dislocations that cascade quickly across many systems and institutions. If risk controls are overwhelmed, these dislocations could alter many banks' intraday or overnight funding needs and potentially affect conditions in money markets. The delay of other less critical payments also might cause other institutions to postpone their own payments, cause many banks to face increased uncertainty about their overnight funding needs and potentially increase the impact of any operational outages.

2.3.8.2 A bank should adopt intraday liquidity management objectives that allow it to (a) identify and prioritise time-specific and other critical obligations in order to meet them when expected, and (b) settle other less critical obligations as soon as possible. In pursuing these objectives, however, a bank should consider also how its liquidity risk profile changes as payments are sent and received and new contractual obligations are agreed throughout the day, including risks related to positions that are typically eliminated by the end of the day. For example, in managing its provision of credit to customers, including intraday credit, a bank may sometimes need to delay a customer's outgoing payments until that customer has sufficient resources (balances or credit) to make them.⁵

2.3.8.3 A bank may face a number of challenges in managing its intraday liquidity positions and meeting its objectives. First, the level of a bank's gross cash inflows and outflows may be uncertain, in part because those flows may reflect the activities of its customers, especially where the bank provides correspondent or custodian services. Second, the timing of a bank's gross cash inflows and outflows may also be subject to various degrees of uncertainty. On the one hand, a number of a bank's payment obligations may be due by specific times during the day, and the timing of some outgoing payments may be determined by the bank's customers. On the other hand, the timing of many cash inflows will be determined by a bank's counterparties (or the counterparties' correspondents). Because a bank's daily gross cash outflows can often far exceed its net overnight balances, differences in the timing of gross inflows and outflows could result in significant intraday liquidity shortfalls. In some cases, the banks' customers may face similar challenges. As a result, a bank may seek to borrow funds on an intraday basis to manage its intraday liquidity position and to meet its intraday liquidity management objectives. If intraday shortfalls become much larger than expected, there may be circumstances where a bank may also seek to prioritise its outflows to meet critical payments. In the event that a bank has borrowed intraday credit, but does not receive cash inflows as expected prior to the end of the business day, it may need to borrow additional overnight funds from the market.

⁵ A bank's potential actions in this regard should be consistent with its contractual arrangements with its customer.

2.3.8.4 A bank's strategy to achieve its intraday liquidity management objectives should include at least six operational elements. First, a bank should have the capacity to measure expected daily gross liquidity inflows and outflows, anticipate the intraday timing of these flows where possible, and forecast the range of potential net funding shortfalls that might arise at different points during the day. Given the challenges discussed above, it is important that banks: understand the rules of all payment and settlement systems in which they participate; identify key counterparties (and their correspondents or custodians) that act as the source of incoming or outgoing gross liquidity flows; identify key times, days and circumstances where liquidity flows and possible intraday credit needs might be particularly high; and understand the business needs underlying the timing of liquidity flows and intraday credit needs of internal business lines and key customers. A bank should ask key customers, including customer banks, to forecast their own payment traffic to facilitate this process.

2.3.8.5 Second, a bank should have the capacity to monitor intraday liquidity positions against expected activities and available resources (balances, remaining intraday credit capacity, available collateral). Monitoring key positions frequently during the day can help a bank judge when to acquire additional intraday liquidity or restrict liquidity outflows to meet critical payments. Monitoring can also help a bank allocate intraday liquidity efficiently among the bank's own needs and those of its customer banks and firms. It may also allow the bank to react quickly to unexpected payment flows and adjust any overnight funding positions.

2.3.8.6 Third, a bank should arrange to acquire sufficient intraday funding to meet its intraday objectives. Correspondent or custodian banks sometimes provide intraday credit to customer banks, and intraday funds might also be available from other market sources (e.g. by arranging for overnight money market transactions to be delivered and returned at specific times). A bank's sources of intraday funds may need to vary within and across currencies.

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2.3.8.7 Fourth, a bank should have the ability to manage and mobilise collateral as necessary to obtain intraday funds (see Principle 9). A bank should have sufficient collateral available to acquire the level of intraday liquidity needed to meet its intraday objectives. It should have operational arrangements in place to pledge or deliver this collateral to central banks, correspondents, custodians and counterparties. A bank should also understand the timeframes required to mobilise different forms of collateral, including collateral held on a cross-border basis.

2.3.8.8 Fifth, a bank should have a robust capability to manage the timing of its liquidity outflows in line with its intraday objectives. It is also important that a bank have the ability to manage the payment outflows of key customers and, if customers are provided with intraday credit, that credit procedures are capable of supporting timely decisions. Internal coordination across business lines is important to achieving effective controls over liquidity outflows.

2.3.8.9 Finally, a bank should be prepared to deal with unexpected disruptions to its intraday liquidity flows. As described in Principles 10 and 11, a bank's stress testing and contingency funding plans should reflect intraday considerations. A bank also should understand the level and timing of liquidity needs that may arise as a result of the failure-to-settle procedures of payment and settlement systems in which it is a direct participant. Robust operational risk management and business continuity arrangements are also critical to the effectiveness of a bank's intraday liquidity management.

2.3.8.10 A bank should have policies, procedures and systems to support these operational objectives in all of the financial markets and currencies in which it has significant payment and settlement flows. The tools and resources applied should be tailored to the bank's business model and role in the financial system, as well as how it conducts its activities for a particular market, (e.g. via direct participation in a payment or settlement system or via correspondent or custodian banks) and whether it provides correspondent or custodian services and intraday credit facilities to other banks, firms or systems. If a bank relies heavily on collateralised funding markets, for example,

monitoring positions in securities settlement systems may be just as important as monitoring positions in real time gross settlement systems.

2.3.8.11 When a bank chooses to rely on correspondents or custodians to conduct payment and settlement activities, the bank should assure itself that this arrangement allows it to meet obligations on a timely basis and to manage its intraday liquidity risks under a variety of circumstances. In particular, a bank should recognise the potential for operational or financial disruptions at its correspondent or custodian to disrupt the bank's own liquidity management, and it should have alternative arrangements in place to ensure it can continue to meet its obligations in such situations.

2.3.9 Principle 9: A bank should actively manage its collateral positions, differentiating between encumbered and unencumbered assets. A bank should monitor the legal entity and physical location where collateral is held and how it may be mobilised in a timely manner.

2.3.9.1 A bank should have the ability to calculate all of its collateral positions, including assets currently pledged relative to the amount of security required and unencumbered assets available to be pledged. A bank's level of available collateral should be monitored by legal entity, by jurisdiction and by currency exposure, and systems should be capable of monitoring shifts between intraday and overnight or term collateral usage. A bank should be aware of the operational and timing requirements associated with accessing the collateral given its physical location (i.e. the custodian bank or securities settlement system with which the collateral is held). A bank should also ensure that it takes into account the extent to which counterparties with which it has deposited collateral may have re-hypothecated that collateral.

2.3.9.2 A bank must ensure that it monitors and manages the impact that the terms of existing funding or security arrangements, such as warranties, covenants, events of default, negative pledges and cross default clauses could have on its ability to mobilise collateral.

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2.3.9.3 A bank should assess the acceptability of assets to major counterparties and funds providers in secured funding markets. A bank should diversify its sources of collateral, taking into consideration capacity constraints, name-specific concentrations, the sensitivity of prices, haircuts and collateral requirements under conditions of name-specific and market-wide stress, and the availability of funds from private sector counterparties in various market stress scenarios.

2.3.9.4 A bank should adjust, as necessary, measures of available collateral to account for assets that are part of a “tied position” (e.g. assets used as part of a hedge of an off-balance sheet or derivative position, such as an equity/debt position as a hedge to a total return swap or a negative basis trade). A bank should have a detailed understanding of, and be able to demonstrate, the estimated period of time to liquidate those assets or put on a substitute hedge.

2.3.9.5 Effective collateral management requires a bank to be in a position to meet a range of collateral needs, including longer-term structural, short-term and intraday considerations. A bank should have sufficient collateral to meet expected and unexpected borrowing needs and potential increases in margin requirements over different timeframes, depending upon the bank’s funding profile.

2.3.9.6 For example, intraday collateral management requires monitoring collateral requirements and limits on intraday credit to ensure the ability to make payments on a timely basis, as discussed in Principle 8. In determining the level of collateral to pledge or deliver, a bank should consider the potential for significant uncertainty around the timing of intraday flows. A bank also should consider the potential for operational and liquidity disruptions that could necessitate the pledging or delivery of additional intraday collateral.

2.3.9.7 A bank that uses derivatives should take into account the potential for contractually specified additional collateral requirements as a result of changes in market positions or changes in the bank’s credit rating or financial position. A bank also should

consider other trigger events. For example, a bank that receives funding through the securitisation of a pool of assets, such as residential mortgages or credit card receivables, should monitor the embedded trigger events that could give rise to the need to hypothecate or deliver additional assets to the pool. A bank's information systems should be able to report whether the bank has sufficient unencumbered assets of the right type and quality for such a contingency.

2.3.10 Principle 10: A bank should conduct stress tests on a regular basis for a variety of short-term and protracted institution-specific and market-wide stress scenarios (individually and in combination) to identify sources of potential liquidity strain and to ensure that current exposures remain in accordance with a bank's established liquidity risk tolerance. A bank should use stress test outcomes to adjust its liquidity risk management strategies, policies, and positions and to develop effective contingency plans.

2.3.10.1 While a bank typically manages liquidity under "normal" circumstances, it should also be prepared to manage liquidity under stressed conditions. A bank should perform stress tests or scenario analyses on a regular basis in order to identify and quantify its exposures to possible future liquidity stresses, analysing possible impacts on the institution's cash flows, liquidity position, profitability and solvency. The results of these stress tests should be discussed thoroughly by management and, based on this discussion, should form the basis for taking remedial or mitigating actions to limit the bank's exposures, build up a liquidity cushion and adjust its liquidity profile to fit its risk tolerance. The results of stress tests should also play a key role in shaping the bank's contingency planning and in determining the strategy and tactics to deal with events of liquidity stress. As a result, stress testing and contingency planning are closely intertwined.

Stress Testing Process

2.3.10.2 Stress tests should enable a bank to analyse the impact of stress scenarios on its consolidated group-wide liquidity position as well as on the liquidity position of

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individual entities and business lines. Regardless of the organisational structure of the bank and the degree of centralised liquidity risk management, it is important for a bank to understand where risks could arise. A bank should assess whether additional tests are warranted for individual entities (i.e. subsidiaries and branches) within the group that are exposed to significant liquidity risks. Tests should consider the implication of the scenarios across different time horizons, including on an intraday basis.

2.3.10.3 The extent and frequency of testing should be commensurate with the size of the bank and its liquidity risk exposures, as well as with the relative importance of the bank within the financial systems in which it operates. Banks should build in the capability to increase the frequency of tests in special circumstances, such as in volatile market conditions or at the request of supervisors.

2.3.10.4 The active involvement of senior management is vital to the stress testing process. Senior management should demand that rigorous and challenging stress scenarios be considered, even in times when liquidity is plentiful.

Scenarios and assumptions

2.3.10.5 In designing stress scenarios, the nature of the bank's business, activities and vulnerabilities should be taken into consideration so that the scenarios incorporate the major funding and market liquidity risks to which the bank is exposed. These include risks associated with its business activities, products (including complex financial instruments and off-balance sheet items) and funding sources. The defined scenarios should allow the bank to evaluate the potential adverse impact these factors can have on its liquidity position.

2.3.10.6 History may serve as one guide when designing stress tests; however, historical events may not prove to be a good predictor of future events. A banker's judgment plays an important role in the design of stress tests. A bank should carefully consider the design of scenarios and the variety of shocks used. A bank should consider

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short-term and protracted, as well as institution-specific and market-wide, stress scenarios in its stress tests, including:

- a simultaneous drying up of market liquidity in several previously highly liquid markets;
- severe constraints in accessing secured and unsecured funding; restrictions on currency convertibility; and
- severe operational or settlement disruptions affecting one or more payment or settlement systems.

Regardless of how strong its current liquidity situation appears to be, a bank should consider the potential impact of severe stress scenarios.

2.3.10.7 A bank should specifically take into account the link between reductions in market liquidity and constraints on funding liquidity. This is particularly important for banks with significant market share in, or heavy reliance upon, specific funding markets. A bank should also consider the insights and results of stress tests performed for various other risk types when stress testing its liquidity position and consider possible interactions with these other types of risk.

2.3.10.8 A bank should recognise that stress events may simultaneously give rise to time critical liquidity needs in multiple currencies and multiple payment and settlement systems. Moreover, these liquidity needs could arise both from the institution's own activities, as well as from those of its customer banks and firms (e.g. when the bank acts as correspondent for other banks' settlement obligations). They also could arise from the special roles a bank might play in a given settlement system, such as acting as a back-up liquidity provider or settlement bank.

2.3.10.9 Tests should reflect accurate time-frames for the settlement cycles of assets that might be liquidated, and the time required to transfer liquidity across borders. In addition, if a bank relies upon liquidity outflows from one system to meet obligations in another, it should consider the risk that operational or settlement disruptions might prevent or delay expected flows across systems. This is particularly relevant for firms relying upon intra-group transfers or centralised liquidity management.

2.3.10.10 A bank should take a conservative approach when setting stress testing assumptions. Based on the type and severity of the scenario, a bank needs to consider the appropriateness of a number of assumptions, potentially including but not limited to the following list. This list is illustrative, as a bank should use assumptions which are relevant to its business.

- asset market illiquidity and the erosion in the value of liquid assets
- the run-off of retail funding
- the (un)availability of secured and unsecured wholesale funding sources
- the correlation between funding markets or the effectiveness of diversification across sources of funding
- additional margin calls and collateral requirements
- funding tenors
- contingent claims and more specifically, potential draws on committed lines extended to third parties or the bank's subsidiaries, branches or head office
- the liquidity absorbed by off-balance sheet vehicles and activities (including conduit financing)
- the availability of contingent lines extended to the bank
- liquidity drains associated with complex products/transactions
- the impact of credit rating triggers
- FX convertibility and access to foreign exchange markets
- the ability to transfer liquidity across entities, sectors and borders taking into account legal, regulatory, operational and time zone restrictions and constraints
- the operational ability of the bank to monetise assets
- the bank's remedial actions and the availability of the necessary documentation and operational expertise and experience to execute them, taking into account the potential reputational impact when executing these actions
- estimates of future balance sheet growth

2.3.10.11 A bank should consider in its stress tests the likely behavioural response of other market participants to events of market stress and the extent to which a common response might amplify market movements and exacerbate market strain. A bank also should consider the likely impact of its own behaviour on that of other market participants.

2.3.10.12 A bank's stress tests should consider how the behaviour of counterparties (or their correspondents and custodians) would affect the timing of cash flows, including on an intraday basis. Where a bank uses a correspondent or custodian to conduct settlement, the analysis should include the impact of those agents restricting their provision of

intraday credit. A bank should also understand the impact of the stress event on its customers' use of their intraday credit, and how those needs affect its own liquidity position.

2.3.10.13 The scenario design should be subject to regular reviews to ensure that the nature and severity of the tested scenarios remain appropriate and relevant to the bank. Reviews should take into account changes in market conditions; changes in the nature, size or complexity of the bank's business model and activities; and actual experiences in stress situations.

2.3.10.14 In order to identify and analyse factors that could have a significant impact on its liquidity profile, a bank may conduct an analysis of the sensitivity of stress test results to certain key assumptions. Such sensitivity analyses can provide additional indications of a bank's degree of vulnerability to certain factors.

Utilisation of results

2.3.10.15 Senior management should review stress test scenarios and assumptions as well as the results of the stress tests. The bank's choice of scenarios and related assumptions should be well documented and reviewed together with the stress test results. Stress test results and vulnerabilities and any resulting actions should be reported to and discussed with the board and the bank's supervisors. Senior management should integrate the results of the stress testing process into the bank's strategic planning process (e.g. bank management could adjust its asset-liability composition) and the firm's day-to-day risk management practices (e.g. through monitoring sensitive cash flows or reducing concentration limits). The results of the stress tests should be explicitly considered in the setting of internal limits.

2.3.10.16 Senior management should decide how to incorporate the results of stress tests in assessing and planning for related potential funding shortfalls in the institution's contingency funding plan. To the extent that projected funding deficits are larger than (or projected funding surpluses are smaller than) implied by the bank's liquidity risk

tolerance, management should consider whether to adjust its liquidity position or to bolster the bank's contingency plan in consultation with the board.

2.3.11 Principle 11: A bank should have a formal contingency funding plan (CFP) that clearly sets out the strategies for addressing liquidity shortfalls in emergency situations. A CFP should outline policies to manage a range of stress environments, establish clear lines of responsibility, include clear invocation and escalation procedures and be regularly tested and updated to ensure that it is operationally robust.

2.3.11.1 A contingency funding plan (CFP) is the compilation of policies, procedures and action plans for responding to severe disruptions to a bank's ability to fund some or all of its activities in a timely manner and at a reasonable cost.

2.3.11.2 CFPs should be commensurate with a bank's complexity, risk profile, scope of operations and role in the financial systems in which the bank operates. CFPs should include a clear description of a diversified set of viable, readily available and flexibly deployable potential contingency funding measures for preserving liquidity and making up cash flow shortfalls in various adverse situations. Contingency plans should articulate available potential contingency funding sources and the amount of funds a bank estimates can be derived from these sources; clear escalation/prioritisation procedures detailing when and how each of the actions can and should be activated; and the lead time needed to tap additional funds from each of the contingency sources. The CFP should provide a framework with a high degree of flexibility so that a bank can respond quickly in a variety of situations.

2.3.11.3 The CFP's design, plans and procedures should be closely integrated with the firm's ongoing analysis of liquidity risk and with the results of the scenarios and assumptions used in stress tests. As such, the plan should address issues over a range of different time horizons, including intraday. The CFP should specifically outline the bank's operational arrangements for managing a retail funding run.

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2.3.11.4 CFPs should prepare the bank to manage a range of scenarios of severe liquidity stress that include both firm-specific and more generalised market-wide stress, as well as the potential interaction between them. The plan should include a diversified menu of options in order for management to have an overview of the potentially available contingency measures. Banks should also examine the time periods for which measures can be carried out under various assumptions and stresses.

2.3.11.5 CFPs should contain clear policies and procedures that will enable the bank's management to make timely and well-informed decisions, execute contingency measures swiftly and proficiently, and communicate effectively to implement the plan efficiently, including:

- clear specification of roles and responsibilities, including the authority to invoke the CFP. The establishment of a formal "crisis team" may facilitate internal coordination and decision-making during a liquidity crisis;
- names and contact details of members of the team responsible for implementing the CFP and the locations of team members;
- the designation of alternates for key roles; and
- mechanisms to ensure that the bank's board of directors and senior managers receive management information that is both relevant and timely.

2.3.11.6 To facilitate the timely response needed to manage disruptions, the plan should set out a clear decision-making process on what actions to take at what time, who can take them, and what issues need to be escalated to more senior levels in the bank. The plan should explicitly set out the procedures to deliver effective internal coordination and communication across the bank's different business lines and locations. It should also address when and how to contact external parties, such as supervisors or payments system operators.

2.3.11.7 In any crisis situation, the flow of clear communications should provide assurance and information to market participants, employees, clients, creditors, shareholders and supervisors. Banks therefore should develop a plan that will deliver timely, clear, consistent and frequent communication to internal as well as external parties, such as supervisors or system operators, in a time of stress, to support the general confidence in the bank. The plan also should address when and how to communicate with

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correspondents, custodians, counterparties and customers, as the actions of these parties could significantly affect the bank's liquidity position and may vary with the underlying source of a problem.

2.3.11.8 When designing its CFP, a bank should account for: (a) the impact of stressed market conditions on its ability to sell or securitise assets; (b) the link between asset market and funding liquidity (e.g. the extensive or complete loss of typically available market funding options); (c) second round and reputational effects related to execution of contingency funding measures; and (d) the potential to transfer liquidity across group entities, borders and lines of business, taking into account legal, regulatory, operational and time zone restrictions and constraints. These elements should reflect previous experiences of the bank or other institutions, expert judgment, market practice and insights that the institution has gained via the performance of stress tests.

2.3.11.9 The CFP also should include potential steps to meet critical payments on an intraday basis (see principle 8). In situations where intraday liquidity resources become scarce, a bank should have the ability to identify critical payments and to sequence or schedule payments based on priority. In the event of severe disruptions, it is also important that a bank has the ability to acquire additional sources of intraday liquidity, including by identifying and mobilising additional collateral. As with stress tests, the CFP should also acknowledge that time-critical settlement needs may arise not only from the bank's own transactions, but also those of its customers, and from its provision of services to payment and settlement systems (e.g. by acting as a contingency liquidity provider). The CFP should take into account the risk management procedures of all relevant systems and therefore be sufficiently robust to handle simultaneous disruptions in multiple payment and settlement systems.

2.3.11.10 It is particularly important that in developing and analysing CFPs and stress scenarios, the relevant bank personnel are aware of the operational procedures needed to transfer liquidity and collateral across different entities and systems and the restrictions that govern such transfers. Realistic timelines for such transfers should be incorporated into liquidity modelling. Assets that are intended to be pledged for collateral in the event

that back-up funding sources are utilised must be in a legal entity and location consistent with management's funding plans.

2.3.11.11 CFPs should be reviewed and tested regularly to ensure their effectiveness and operational feasibility. Key aspects of this testing include ensuring that roles and responsibilities are appropriate and understood, confirming that contact information is up to date, proving the transferability of cash and collateral (especially across borders and entities) and reviewing that the necessary legal and operational documentation is in place to execute the plan at short notice. A bank should regularly test key assumptions, such as the ability to sell or repo certain assets or periodically draw down credit lines. Bank management should review all aspects of the plan following each exercise and ensure that follow up actions are delivered. Senior management should review and update the CFP at least every year for the board's approval, or more often as business or market circumstances change.

2.3.11.12 The CFP should be consistent with the bank's business continuity plans and should be operational under situations where business continuity arrangements have been invoked. As such, a bank should ensure effective coordination between teams managing issues surrounding liquidity crises and business continuity. Liquidity crisis team members and alternates should have ready access to CFPs on- and off-site. CFPs should be maintained in a corporate central repository as well as at locations that would facilitate quick implementation by responsible parties under emergency situations.

2.3.12 Principle 12: A bank should maintain a cushion of unencumbered, high quality liquid assets to be held as insurance against a range of liquidity stress scenarios, including those that involve the loss or impairment of unsecured and typically available secured funding sources. There should be no legal, regulatory or operational impediment to using these assets to obtain funding.

2.3.12.1 A critical element of a bank's resilience to liquidity stress is the continuous availability of an adequate cushion of unencumbered, high quality liquid assets that can

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be sold or pledged to obtain funds in a range of stress scenarios. This requires explicitly relating the size of the cushion of unencumbered, high quality liquid assets held as insurance against liquidity stress to the estimates of liquidity needs under stress. Estimates of liquidity needs during periods of stress should incorporate both contractual and non-contractual cash flows, including the possibility of funds being withdrawn, and they should assume the inability to obtain unsecured funding as well as the loss or impairment of access to funds secured by assets other than the safest, most liquid assets. (See Principle 10 on stress testing for additional discussion of liquidity assumptions and needs under stress).

2.3.12.2 The size of the liquidity cushion should be aligned with the established risk tolerance of the bank. Key considerations include assumptions about the size of cash flow mismatches, the duration and severity of stress and the liquidation or borrowing value of assets (i.e. the estimated cash available to the firm if assets are liquidated or used as collateral for secured funding) in stress situations. A bank should ensure that its liquid asset cushion is sized to maintain sufficient resilience to unexpected stress while it continues to meet its daily payment and settlement obligations on a timely basis for the duration of the stress. In doing so, the bank should take into account the other tools and resources it has available to manage intraday risks (see principle 8).

2.3.12.3 With respect to the composition of its liquidity cushion, a bank should hold a core of the most reliably liquid assets, such as cash and high quality government bonds or similar instruments, to guard against the most severe stress scenarios. For insuring against less intense, but longer duration stress events, a bank may choose to widen the composition of the cushion to hold other unencumbered liquid assets which are marketable (i.e. can be sold or used as collateral in sale and repurchase agreements) without resulting in excessive losses or discounts.

2.3.12.4 The marketability of individual assets may differ depending on the stress scenario and time-frame involved. Nevertheless, there are some general characteristics which tend to increase the liquidity of a given asset including: transparency of its structure and risk characteristics; ease and certainty of valuation; depth of the market for

the asset, including holdings of the bank relative to normal market turnover; and the bank's own name and presence in the relevant markets. A bank should not assume that a liquid market will exist for a given asset in all stress scenarios simply because such a market exists in normal times. There should be no legal, regulatory or operational impediment to the use of these assets to obtain funding, as these assets should be available at all times to meet liquidity needs as and when they arise. The bank should be ready and prepared to use these assets in the event of severe stress. The cushion should, however, provide a backstop rather than the first line of defence.

2.3.13 Principle 13: A bank should publicly disclose information on a regular basis that enables market participants to make an informed judgement about the soundness of its liquidity risk management framework and liquidity position.

2.3.13.1 Public disclosure improves transparency, facilitates valuation, reduces uncertainty in the markets and strengthens market discipline. A bank should disclose sufficient information regarding its liquidity risk management to enable relevant stakeholders to make an informed judgement about the ability of the bank to meet its liquidity needs.

2.3.13.2 A bank should disclose its organisational structure and framework for the management of liquidity risk. In particular, the disclosure should explain the roles and responsibilities of the relevant committees, as well as those of different functional and business units. A bank's description of its liquidity risk management framework should indicate the degree to which the treasury function and liquidity risk management is centralised or decentralised. A bank should describe this structure with regard to its funding activities, to its limit setting systems, and to its intra-group lending strategies. Where centralised treasury and risk management functions are in place, the interaction between the group's units should be described. The objective for the business units in the organisation should also be indicated, for instance, the extent to which they are expected to manage their own liquidity risk.

3. The Role of the Authority

3 The BCBS has published four Principles relating to the supervision of liquidity risk and the supervisor's role. This section sets out the four principles, the Authority's interpretation of these and the related requirements of regulated institutions.

Principles Applicable to the Supervisor

3.1 Principle 14: Supervisors should regularly perform a comprehensive assessment of a bank's overall liquidity risk management framework and liquidity position to determine whether they deliver an adequate level of resilience to liquidity stress given the bank's role in the financial system

3.1.1 The Authority requires that banks: (a) have a robust liquidity risk management strategy, policies and procedures to identify, measure, monitor and control liquidity risk consistent with the principles set out in this document; and (b) maintain a sufficient level of liquidity as insurance against liquidity stress. The Authority will conduct thorough assessments of banks' liquidity risk management practices and the adequacy of their liquidity, in both normal times and periods of stress. Such assessments will be conducted through a combination of on-site inspections and off-site monitoring and will include regular communication with a bank's senior management. In developing its approach to liquidity risk supervision at individual banks, the Authority will consider the characteristics and risks of the banks. The Authority will more carefully scrutinise banks that pose the largest risks to the financial system and hold such banks to a higher standard of liquidity risk management.

3.1.2 The assessment process will include:

- assessment of the risk tolerance of a bank to confirm that it ensures sufficient liquidity, given the bank's business model and role in the financial system;

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- assessment of whether the board of directors and senior management are taking full responsibility for the sound management of liquidity risk and are providing sufficient oversight and guidance to line management and staff;
- assessment of the effectiveness of a bank's processes to measure and monitor liquidity risk and review the techniques (processes and internal controls) and underlying assumptions used to estimate future net funding requirements under expected as well as alternative stress scenarios (banks' key assumptions will be analysed to determine their continuing validity in view of existing and potentially changing market conditions, including unexpected outflows or changes in the external market environment); and
- assessment of the adequacy of the size and composition of a bank's liquidity cushion and the assumptions made by the bank about the marketability of assets in a range of stress scenarios (While the Authority sets a quantitative, minimum regulatory standard for liquidity, it should not be understood as a substitute for banks' own measurement and active management of liquidity risk.)

3.1.3 The Authority will pay special attention to banks' liquidity stress testing and contingency planning, as both are crucial elements of liquidity risk management. The Authority will critically assess the scope and severity of the scenarios and underlying assumptions; after doing so, it may suggest enhancements to a bank's scenarios or the use of specific scenarios that, at a minimum, are to be included in the bank's stress testing programme.

3.1.4 As part of the assessment process the Authority will seek to evaluate how senior management and the board use the results of stress tests, including whether they take specific and meaningful actions to mitigate vulnerabilities exposed by stress tests. Depending on the nature and size of the vulnerabilities, such actions could be reflected in modifications to the bank's contingency funding plan, changes to current business activities and liquidity risk positions or an increase in the size of the cushion of unencumbered, highly liquid assets held as insurance against liquidity stress. The Authority will also assess both the comprehensiveness of the contingency funding plan, including whether it addresses vulnerabilities identified in stress tests, and management's

programme for promoting understanding of the plan through periodic testing and internal communication.

3.1.5 The Authority will also assess the management of the intraday and overnight liquidity risks arising from a bank's payment and settlement activities.

3.2 Principle 15: Supervisors should supplement their regular assessments of a bank's liquidity risk management framework and liquidity position by monitoring a combination of internal reports, prudential reports and market information.

3.2.1 The Authority requires banks to submit information on their liquidity positions and risks at regular intervals. Until such time as a revised regulatory standard reporting requirement is implemented, institutions will be required to continue to provide the regulatory mismatch reporting as required under paragraphs 9 to 16 of the Authority's May 2007 policy paper "The Measurement and Monitoring of Liquidity" and in line with the related supporting Liquidity Return Guidance Notes.

3.2.2 In addition, at times of heightened risk, the Authority may require institutions to submit more frequent liquidity reports and information. Such additional information submissions will be agreed bilaterally with individual institutions and the Authority reserves the right to make adjustments to the content and frequency of reporting.

3.3 Principle 16: Supervisors should intervene to require effective and timely remedial action by a bank to address deficiencies in its liquidity risk management processes or liquidity position.

3.3.1 Where the Authority identifies liquidity risk management weaknesses or excessive liquidity risk, it will require an institution to take prompt remedial action which will be proportionate to the level of risk the deficiency poses to the safety and soundness of the bank or financial system.

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3.3.2 Remedial action may include, but is not restricted to:

- requiring actions by the bank to *strengthen its management* of liquidity risk through improvements in internal policies, controls or reporting to senior management and the board;
- requiring actions by the bank to *improve its contingency planning*, through more robust stress testing and the development of stronger contingency funding plans;
- requiring actions by the bank to *lower its liquidity* risk, for example by reducing a funding gap in one or more time bands or holding a larger cushion of unencumbered, high quality liquid assets;
- *restricting the bank from making acquisitions* or significantly expanding its activities; and
- requiring the bank to *operate with higher levels of capital*; although capital is not a solution for inadequate liquidity or a long-term solution to ineffective risk management processes, a bank's capital position can affect its ability to obtain liquidity, especially in a crisis.

3.3.3 Where the Authority requires remedial action by a bank it will set a timetable for action proportionate to the level of risk and will follow up to ensure timely action. Where an institution does not adequately address the deficiencies identified the Authority will have recourse to the formal supervisory powers under the Banks and Deposit Companies Act 1999.

3.4 Principle 17: Supervisors should communicate with other supervisors and public authorities, such as central banks, both within and across national borders, to facilitate effective cooperation regarding the supervision and oversight of liquidity risk management. Communication should occur regularly during normal times, with the nature and frequency of the information sharing increasing as appropriate during times of stress.

3.4.1 The Authority believes that cooperation and information sharing among relevant public authorities can significantly contribute to the effectiveness of these authorities in their respective roles.

3.4.2 For cross-border banking groups, effective cooperation and information-sharing between home and host supervisors is essential to assess risks at both the group and foreign subsidiary/branch levels correctly. In particular, the host supervisor needs to understand how the liquidity profile of the group contributes to risks to the entity in its jurisdiction, while the home supervisor requires information on material risks a foreign branch or subsidiary poses to the banking group as a whole. The nature and frequency of communication among stakeholders will intensify during times of firm-specific or market-wide stress, taking into account the significance of the relevant banks to both the home and host financial systems or to a cross-border banking group.

3.4.3 The Authority will consider carefully the type of information to share with other supervisors and stakeholders. The information shared should be material and relevant to the party receiving the information. While recognising the value of two-way dialogue to the supervisory process, the Authority is careful to abide by relevant confidentiality requirements under the Bermuda Monetary Authority Act 1969 and the Banks and Deposit Companies Act 1999 and is aware of the need to protect banks' proprietary information.