LM-1	Liquidity Risk Management **(to be read in conjunction with LM-2)**	~~V.1 – 20.08.04~~ V.1A – 01.04.11

This module should be read in conjunction with the Introduction and with the Glossary, which contains an explanation of abbreviations and other terms used in this Manual. If reading on-line, click on blue underlined headings to activate hyperlinks to the relevant module.

Foreword

The HKMA is in the course of strengthening the liquidity regime in Hong Kong in the light of the latest international standards on liquidity regulation for banks. The initial phase of enhancement involved the release in April 2011 of a new module under the Supervisory Policy Manual on "Sound Systems and Controls for Liquidity Risk Management" (LM-2) to implement the *Principles for Sound Liquidity Risk Management and Supervision* issued by the Basel Committee in September 2008. In this module, corresponding systems and controls requirements rendered obsolete by LM-2 are removed from the main contents and appended to an "archive section" at the end, and other relevant sections are retained with slight modifications where appropriate to conform with LM-2.

It should be noted that this module will eventually be revised and expanded substantially as enhancements to other elements of the liquidity regime are implemented. These will include implementation of the liquidity standards set out in the December 2010 publication of the Basel Committee entitled *Basel III: International framework for liquidity risk measurement, standards and monitoring*, as well as changes to the liquidity reporting framework and supervisory process of the HKMA to ensure compliance of AIs with the requirements under the enhanced liquidity regime.

Purpose

To set out the approach which the HKMA will adopt in the supervision of AIs' liquidity risk~~, and to provide guidance to AIs on the key elements of effective liquidity risk management~~

Classification

A statutory guideline issued by the MA under the Banking Ordinance, §16(10)

Previous guidelines superseded

Guideline 6.2 "The Supervision of Liquidity" dated 24.01.94

Guideline 6.2.3 "Liquidity Ratio – Undrawn Commitments" dated 29.04.97

Guideline 6.2.4 "Liquidity Ratio and Credit Exposures" dated 18.12.97

Circular "Forward Commitment Facility" dated 31.05.99

Application

To all AIs

Structure

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1. Introduction

1.1 Background

1.1.1 Liquidity risk is the risk that an AI may not be able to fund increases in assets or meet obligations as they fall due without incurring unacceptable losses. This may be caused by the AI's inability to liquidate assets or to obtain funding to meet its liquidity needs. The problem could also be the result of a market disruption or liquidity squeeze whereby the AI may only be able to unwind specific exposures at significantly discounted values.

1.1.2 Liquidity problems can have an adverse impact on an AI's earnings and capital and, in extreme circumstances, may even lead to the collapse of an AI which is otherwise solvent. A liquidity crisis besetting individual AIs that play an active or major role in financial activities may have systemic consequences for other AIs and the banking system as a whole. It could also affect the proper functioning of payment systems and other financial markets. Sound liquidity risk management is therefore pivotal to the viability of every AI and the maintenance of overall banking stability.

1.1.3 Recent trends in the funding of liquidity needs have presented further challenges to the banking industry and made it all the more important for AIs to actively manage their liquidity risk. These developments include:

- the increasing use of wholesale and capital market funding sources which are more sensitive to credit and price risks;
- the growth of off-balance sheet activities (including derivatives and asset securitisation) which adds to the complexity of managing cash flows; and
- advancements in electronic technologies (e.g. Internet banking, e-money and smart cards) which enable speedy withdrawal and transmission of funds.

1.1.4 Para. 7 of the Seventh Schedule to the Banking Ordinance provides that the MA should be satisfied that an AI maintains on and after authorization :

- adequate liquidity to meet its obligations as they will or may fall due; and
- a liquidity ratio which complies with the provisions of Part XVIII of the Ordinance applicable to it.

1.1.5 Failure of an AI to meet ~~the minimum liquidity ratio or adhere to~~ the principles and standards set out in LM-1 (i.e. other than those that have been removed to the

archive section) as well as LM-2 "Sound Systems and Controls for Liquidity Risk Management" ~~this module~~ may call into question whether the AI continues to satisfy this authorization criterion. Paras. 3.2.4 to 3.2.6 indicate the supervisory approach that the HKMA will adopt in respect of these cases, including the actions that may be taken.

1.2 Scope

1.2.1 This module:

- identifies the main sources of liquidity risk and analyses their correlation with other major risks faced by AIs;
- sets out the HKMA's supervisory approach to liquidity risk, including the principles and factors to be considered for evaluating the adequacy and effectiveness of an AI's liquidity risk management; and
- highlights the statutory requirements in relation to liquidity risk and the manner in which the HKMA monitors compliance with these requirements.~~; and~~
- ~~provides guidance to AIs on the key elements of a sound liquidity risk management process.~~

1.2.2 [Superseded by LM-2]

1.2.3 [Superseded by LM-2]

1.3 [Superseded by LM-2]

2. Sources of liquidity risk

2.1 Overview

2.1.1 AIs can obtain liquidity from both sides of the balance sheet and from off-balance sheet transactions.

2.1.2 Managing liquidity risk involves understanding the characteristics and risks of different sources of liquidity, determining the appropriate funding strategies

(including the mix of funding sources) to meet liquidity needs and deploying the strategies in a cost-effective manner.

2.2 Asset liquidity

2.2.1 The asset portfolio of an AI can provide liquidity in three different ways, viz., through:

- the maturity of an asset;
- the sale of an asset; and
- the use of an asset as collateral for borrowing or repo transactions.

2.2.2 Typically, AIs hold liquid assets (e.g. money market placements and marketable securities) to supplement other funding sources (e.g. deposits and other liabilities). However, AIs may incur liquidity risk where inflows from the realisation of assets (either upon maturity or at the time of sale) are less than anticipated because of default risk or price volatility. Secured funding, including repos, may be similarly affected if counterparties seek better quality collateral or larger discounts on collateral.

2.2.3 In addition, significant concentrations within the asset portfolio (e.g. in relation to the distribution of exposures by counterparty, instrument type, geographical location or economic sector) often increase the level of liquidity risk.

2.2.4 In managing asset liquidity, AIs are expected to establish a clear strategy for holding liquid assets, develop procedures for assessing the value, marketability and liquidity of the asset holdings under different market conditions, and determine the appropriate volume and mix of such holdings to avoid potential concentrations.

2.3 Liability liquidity

2.3.1 AIs may employ different liability funding strategies to manage liquidity risk. Those with an extensive branch network would normally tap on relatively low cost retail deposits as a major source of funding. Others that concentrate on wholesale business activities may

regard money market borrowings as the most economical way to obtain short-term liquidity. Some AIs may secure term funding (e.g. by issuing medium-term certificates of deposit) or ensure a spread of maturities for their liabilities to reduce liquidity risk.

2.3.2 AIs should develop a liability funding strategy that is appropriate to the nature and scale of their activities, including the proper mix of liabilities to avoid potential concentrations (e.g. arising from undue reliance on a single fund provider or a closely related group of providers).

2.3.3 In managing liability liquidity, AIs should be able to distinguish the characteristics of different funding sources and monitor their trends separately. Wholesale funds, including deposits from large corporates and private banking clients, are likely to be more sensitive to credit risk and interest rates than retail deposits. Internet deposits and other deposits solicited at rates higher than market rates may also tend to be more volatile.

2.3.4 AIs should also pay particular attention to the impact of changing market conditions on their funding structure. For example, a sudden increase in interest rates may squeeze the earnings of AIs that fund their long-term assets with short-term liabilities.

2.4 Off-balance sheet activities

2.4.1 Off-balance sheet items, depending on the nature of transactions, can either supply or use liquidity. Some examples of how such items will affect AIs' liquidity are described below.

2.4.2 Standby or committed facilities given by other financial institutions to AIs can provide them with funding in the case of need. However, AIs should monitor any covenants included in the facility agreement and, if possible, regularly test access to the funds so as to consider the extent to which such facilities can be relied upon under stressed conditions.

2.4.3 Loan commitments given by AIs to their customers, on the other hand, will draw on its liquidity. AIs should be

able to estimate and incorporate in their cash-flow projections the amount and timing of unused commitments (including those arising from mortgage loans, retail overdrafts and credit cards) that will possibly be drawn.

2.4.4 Derivatives, options and other contingent items pose more complexity for liquidity risk management. The direction and amount of cash flows for such items will normally be affected by market interest rates, exchange rates and other special terms under the contract. AIs should estimate such cash flows with care, having regard to the nature of individual transactions and market conditions. As an illustration, if an AI pays a floating rate and receives a fixed rate in an interest rate swap, it receives a payment for the difference of the two rates as long as the fixed rate is higher than the floating rate. However, if interest rates increase and the floating rate is subsequently above the fixed rate, the AI will pay the difference of the two rates and incur a cash outflow instead.

2.4.5 Other types of off-balance sheet activities, such as credit derivatives, have also expanded in use in recent years. The liquidity impact of these transactions may even be more difficult to forecast. For instance, an AI undertakes, in return for a premium, to compensate a counterparty for any of its credit losses covered under a credit default swap. By selling credit protection, the AI concerned is exposed to a contingent liability, the cash flow of which is not readily determinable.

2.4.6 AIs should ensure that they have the ability to assess how their involvement in off-balance sheet activities (in particular unfunded derivatives and commitments) would affect their cash flows and liquidity risk.

2.5 Correlation with other risks

2.5.1 Liquidity risk and other inherent risks (e.g. credit, market, interest rate, operational, reputation and strategic) faced by AIs are not mutually exclusive and should not be considered in isolation. In fact, liquidity risk often arises as a consequence of these other risks. Any real or perceived problems associated with an AI in

relation to these risks may prevent it from obtaining funds at reasonable prices and thus increase its liquidity risk.

2.5.2 AIs should understand how their exposures to other risks may affect liquidity and put in place mitigating controls. These risks, if not properly managed and controlled, may eventually undermine an AI's liquidity position. A brief description of the potential effects of other risks on an AI's liquidity is set out in Annex A.

3. Supervisory approach to liquidity risk

3.1 Objectives and principles

3.1.1 Every AI is required to maintain adequate liquidity (including the compliance with a statutory liquidity ratio) as one of the minimum authorization criteria specified in the Seventh Schedule to the Banking Ordinance.

3.1.2 A key objective of the HKMA's supervisory regime in respect of liquidity risk is to ensure that AIs can satisfy the above authorization criterion on a continuing basis. This relates, in particular, to an AI's ability to:

- meet its obligations as and when they fall due; and
- maintain a sufficient stock of high quality liquid assets to cater for a funding crisis.

3.1.3 In supervising liquidity risk, the HKMA adopts a system-based approach that focuses on the processes and controls established by AIs. Prudent management of liquidity, through the institution of proper strategies, systems and controls, is the primary responsibility of the Board and senior management of AIs. They are expected to put in place adequate risk management systems to identify, measure, monitor and control liquidity risk. The sophistication of these systems should reflect the nature, size and complexity of an AI's activities.

3.1.4 Central to effective liquidity risk management is an AI's ability to maintain adequate liquidity in the event of a funding crisis. The HKMA will assess this ability in respect of:

- the amount of high quality liquid assets that the AI can readily dispose of or pledge for funding;
- the results of stress tests carried out by the AI on its cash-flow and liquidity positions under different scenarios. The HKMA may, where appropriate, conduct across-the-board stress tests to evaluate individual AIs' ability to weather a liquidity crisis; and
- the stability of the AI's funding sources and its contingency measures for dealing with crisis situations.

3.1.5 Every AI is expected to document in a policy statement its policies and strategies for managing liquidity risk, including how it identifies, measures, monitors and controls that risk. This policy statement should be prepared in sufficient detail, and cover various factors described in subsection 3.3. It should be approved by the Board of Directors and agreed with the HKMA.

3.1.6 In assessing the overall adequacy of liquidity of branch or subsidiary of banks incorporated outside Hong Kong, the HKMA will take account of the global liquidity risk management policies of the head office or parent bank and the extent to which liquidity is supervised by the home authority. A more flexible approach (other than the statutory requirements) will be adopted for the supervision of these AIs, provided that their liquidity is managed, and supervised, on an integrated global basis.

3.2 Supervisory process

3.2.1 The HKMA adopts a risk-based supervisory approach that includes continuous supervision of AIs' liquidity risk through a combination of risk-focused on-site examinations, off-site reviews and prudential meetings. The objectives are to obtain sufficient and timely information for evaluation of AIs' liquidity risk profile and to assess the adequacy and effectiveness of their liquidity risk management process. See SA-1 "Risk-based Supervisory Approach" for details of the HKMA's risk-based supervisory methodology.

3.2.2 The HKMA will review AIs' liquidity management policy statement to assess the adequacy of their risk management strategies and policies. It will also conduct off-site analysis to monitor the level and trends of AIs' liquidity positions through their regular submission of the following statistical returns and management information:

- the monthly "Return on Liquidity Position – MA(BS)1E ("Liquidity Return") – to monitor AIs' compliance with the statutory requirements on the minimum liquidity ratio and analyse other information on liquefiable assets and funding sources (see paras. 4.4.1 and 4.4.2 below for more details);
- the quarterly "Return on Selected Data for Liquidity Stress-testing" ("Liquidity Stress-testing Return") (only applicable to locally incorporated banks) – to enable the HKMA to conduct across-the-board stress tests on individual AIs' liquidity risk (see para. 6.5.7 below for more details); and
- the cash-flow and scenario analyses conducted by AIs (based on their internal management reports submitted on a quarterly basis) – to analyse AIs' ability to maintain adequate liquidity under normal and stressed conditions.

3.2.3 Where necessary, the HKMA may request individual AIs to provide additional information on their liquidity positions. For example, AIs with significant foreign exchange business will be required to submit separate scenario analyses on their foreign currency positions.

3.2.4 The HKMA monitors the liquidity risk profile of AIs during off-site reviews and evaluates the effectiveness of their liquidity risk management systems during on-site examinations. If an AI demonstrates one or more of the following weaknesses, this may call into question whether the AI continues to satisfy the minimum authorization criterion for adequate liquidity:

- failure to meet the statutory minimum liquidity ratio or honour obligations as they fall due;
- insufficient liquidity to meet crisis or emergency situations;
- evidence of imprudent management of liquidity (such as serious or persistent breaches of the AI's own liquidity policies, excessively large maturity funding gaps, difficulty in obtaining external funding and undue reliance on high cost funds); and
- other significant deficiencies in the internal systems and controls for identifying and measuring liquidity risk (e.g. material reporting errors and omissions).

3.2.5 The HKMA will normally enter into discussions with the AI concerned and seek prompt remedial action (which in the case of a breach of the statutory liquidity ratio is provided for under §104 of the Banking Ordinance). If such remedial action is not possible, it may be necessary to consider whether the MA's powers under the Banking Ordinance (e.g. to revoke the AI's authorization) should be exercised. In determining whether such a step should be taken, the HKMA would have primary regard to the need to maintain the stability of the banking system.

3.2.6 Depending on the circumstances of each case, the HKMA may also consider taking other supervisory measures. For example, the MA may set a minimum liquidity ratio in excess of 25% for the AI concerned under §105 of the Banking Ordinance if there is doubt about the adequacy of its liquidity. It may also require the AI to reposition its asset portfolios to reduce liquidity risk.

3.3 Factors to be considered

3.3.1 In assessing an AI's liquidity risk profile and the adequacy of its liquidity risk management process, the HKMA will have particular regard to the following factors:

- the level and trend of the AI's liquidity ratio as well as the quality and composition of its liquid assets to withstand a liquidity crisis (see section 4 below for more guidance);
- the adequacy of the AI's liquidity risk management framework, including the level of oversight exercised by the Board and senior management and the propriety of its liquidity management policies and reporting systems;
- staff knowledge and expertise in identifying and managing sources of liquidity risk (see section 2 above for more guidance);
- the ability of the AI to measure, monitor and control cash-flow positions under both normal and stress scenarios and for the management of liquidity in foreign currencies in which it has significant positions;
- the funding capacity of the AI in both normal and crisis situations, including its ability to borrow in the interbank and wholesale markets, the diversification and volatility of its deposit base and the availability and reliability of standby facilities and intragroup funding;
- the adequacy and effectiveness of the AI's risk tolerance limits and ratios for managing liquidity; and
- the adequacy of the AI's contingency planning for a liquidity crisis, including such aspects as warning signs of an approaching crisis, emergency funding sources and the actions that would be taken to pre-empt it.

3.3.2 In considering whether an AI has appropriate systems for managing liquidity risk, the HKMA will also take into account the nature and complexity of its business and its compliance with the standards and sound practices set out in IC-1 "General Risk Management Controls" and other relevant modules (e.g. IC-5 "Stress-testing").

4. Statutory liquidity ratio requirements

4.1 Minimum liquidity ratio

4.1.1 This subsection summarises the key provisions of Part XVIII (i.e. §§102 to 105) of the Banking Ordinance in relation to the liquidity ratio of AIs.

4.1.2 AIs are required to maintain, under §102(1), a liquidity ratio of not less than 25% in each calendar month as calculated in accordance with the provisions set out in the Fourth Schedule and Part XVIII.

4.1.3 Subject to §102(3A), the liquidity ratio of an AI, whether incorporated in or outside Hong Kong, will apply only to its principal place of business in Hong Kong and local branches (i.e. excluding any subsidiary or overseas branch of the AI).

4.1.4 Under §102(3A), the MA may, by notice in writing, require the liquidity ratio of a locally incorporated AI to be calculated:

- on a consolidated basis instead of an unconsolidated basis; or
- on both a consolidated and an unconsolidated basis.

4.1.5 If the liquidity ratio is to be calculated on a consolidated basis, the MA may require under §102(3B) that the ratio be applied only in respect of certain subsidiaries or overseas branches as specified in his notice under §102(3A).

4.1.6 The following are some examples of the situations when the MA may require consolidation of the liquidity positions of selected ~~deposit-taking~~ subsidiaries or overseas branches of an AI:

- when, in the case of a locally incorporated parent bank, there are material back-to-back transactions between the parent bank and its authorized subsidiary;
- when the Hong Kong operation of the AI concerned deploys a significant part of its

surplus liquidity through some subsidiaries or overseas branches; and

- when a significant amount of offshore deposits is booked with some subsidiaries or overseas branches.

4.1.7 The Financial Secretary may, by notice in the Gazette, vary the percentage specified in §102(1).

4.1.8 AIs are required under §103 to notify the MA of any contravention of §102(1) and provide him with such particulars of the contravention that he may require. The MA will then notify the Financial Secretary of that contravention and such particulars as he may require.

4.1.9 Pursuant to §104, the MA will enter into discussions with the AI concerned to determine what remedial action is required to be taken. After holding such discussions, the MA may issue a notice in writing to the AI specifying the remedial action that it should take to comply with §102(1).

4.1.10 Any director, chief executive or manager of an AI that fails to notify the MA of the contravention of §102(1) under §103 or to take the remedial action specified in the MA's notice under §104 commits an offence under the Banking Ordinance which may make them liable to fines and imprisonment.

4.1.11 The MA is empowered under §105(1) to vary the minimum liquidity ratio applicable to any individual AI. This power may be exercised to increase the minimum liquidity ratio of an AI if there is doubt about the adequacy of the AI's liquidity, having regard to the factors set out in subsection 3.3 above and the AI's financial position.

4.1.12 If the MA varies the minimum liquidity ratio of any AI, he is required under §105(2) to provide the Financial Secretary with particulars of the variation.

4.2 Computation of liquidity ratio

4.2.1 The Fourth Schedule to the Banking Ordinance sets out the rules and requirements for AIs to compute the liquidity ratio as well as the definitions of liquefiable

assets and qualifying liabilities. See also the completion instructions of the Liquidity Return for further computation details.

4.2.2 Under the Fourth Schedule, the liquidity ratio for a given calendar month should be calculated as the ratio, expressed as a percentage, of the sum of an AI's liquefiable assets, net of deductions required by the MA, to the sum of its qualifying liabilities for each working day of that month. However, the MA may permit an AI to calculate its liquidity ratio by reference to such days during the month as he may specify in a notice.

4.2.3 Liquefiable assets, as set out in Table A of the Fourth Schedule, comprise the following categories:

- currency notes and coins;
- gold;
- the amount, if any, by which the total one-month liabilities [1] of an AI to relevant banks [2] is exceeded by the total one-month liabilities of relevant banks to it;
- export bills (as specified in Item 4 of Table A);
- marketable debt securities or prescribed instruments (as specified in Item 5 of Table A);
- eligible loan repayments[3]; and
- residential mortgage loans covered by the Hong Kong Mortgage Corporation's irrevocable

[1] The term "one-month liability", in relation to any AI or relevant bank, means:

(i) any liability, other than a contingent liability, the effect of which will or could be to reduce within one month the liquefiable assets of that AI or relevant bank; and

(ii) any contingent liability that in the MA's opinion may result in a reduction within one month of the liquefiable assets of that AI or relevant bank.

[2] A relevant bank includes: (i) any AI (other than one whose authorization is suspended under §24 or 25 of the Banking Ordinance); (ii) any bank incorporated outside Hong Kong which is not an AI (except one which, in the opinion of the MA, is not adequately supervised or whose authorization is suspended); and (iii) the Exchange Fund established by the Exchange Fund Ordinance.

[3] The definition of "eligible loan repayment" and other qualifying criteria are detailed in the Fourth Schedule (paras. 1, 10 and 11).

commitment to purchase which is approved by the MA.

4.2.4 Individual items of liquefiable assets are each assigned a liquidity conversion factor ("LCF") to reflect differences in terms of credit risk, market risk and convertibility into cash. The weighted amount of each liquefiable asset, calculated by multiplying the principal amount of the asset by the relevant LCF, is used for the purposes of calculating the total amount of liquefiable assets to be included in the liquidity ratio.

4.2.5 Each liquefiable asset should also meet the following requirements:

- it must not be overdue[4];
- it must be free from encumbrances;
- it must be freely remittable and payable to the AI concerned; and
- it must be denominated in Hong Kong dollars or in a currency freely convertible into Hong Kong dollars.

4.2.6 Unless otherwise agreed by the MA, any debt security or prescribed instrument with a residual maturity of within one month issued by an AI, as set out in Table B of the Schedule with a LCF of 100%, should be deducted from its liquefiable assets. The MA may also exclude from the liquefiable assets of an AI any transaction that is, in his opinion, not capable of producing genuine liquidity.

4.2.7 The total amount of qualifying liabilities is the sum of:

- the amount, if any, by which the total one-month liabilities of relevant banks to an AI are exceeded by its total one-month liabilities to relevant banks; and
- the total of its other one-month liabilities.

[4] In the case of loans repayable by instalments at intervals of not more than one month (e.g. personal loans, hire purchase loans and residential mortgage loans), they will still be regarded as fully performing if there is no instalment which is overdue for more than one month on the working day concerned.

4.2.8 Irrevocable commitments to provide funds within one month should be included in the reporting of other one-month liabilities. These include:

- facilities with a known date of drawdown within one month; and
- facilities without known date of drawdown but the drawdown carries a notice period of within one month (including where the drawdown is on demand i.e. requiring no notice period) except where conditions attached to the drawdown cannot in practice be met within one month. These conditions may include the execution of security documentation and the completion of a certain phase of a project etc.

4.2.9 The following are excluded from the reporting of qualifying liabilities:

- commitments relating to overdraft and credit card facilities, and
- contingent liabilities arising from trade-related contingencies and financial derivatives contracts i.e. interest rate, foreign exchange, equity, precious metal and commodity contracts.

4.2.10 A deposit which has been pledged with an AI for securing a loan granted to a non-bank customer should also be excluded from the calculation of qualifying liabilities to the extent of the outstanding balance of the loan.

4.3 [Superseded by LM-2]

4.4 Monitoring of liquidity ratio

4.4.1 The HKMA makes use of the Liquidity Return and various ratios (i.e. target liquidity ratio and lowest daily liquidity ratio) to facilitate its review of the level and trends of AIs' liquidity ratios and ensure their compliance with the statutory requirements.

4.4.2 AIs are required to submit the Liquidity Return on a monthly basis. The return collects information on the following:

- month-end liquidity ratio;
- composition of liquefiable assets and qualifying liabilities;
- average liquidity ratio and lowest liquidity ratio during the month; and
- other supplementary information on –
  - interoffice or intragroup transactions;
  - deposits from connected customers;
  - back-to-back transactions included in the calculation of the liquidity ratio (if any);
  - irrevocable standby facilities and large customer deposits and bank borrowings; and
  - foreign currency assets and liabilities maturing within three months.

4.4.3 AIs are encouraged to set a target liquidity ratio at a level above the statutory minimum so as to provide a warning signal to the management. This ratio will be particularly useful for AIs that engage in retail business as they are more vulnerable to depositor withdrawals in a liquidity crisis and those AIs which normally maintain a liquidity ratio relatively close to the statutory minimum. The actual positions of the liquidity ratio should be compared with the target and any breaches and the follow-up actions taken by the management to restore the ratio should be properly documented. The HKMA may request AIs to give an explanation if their liquidity ratio consistently fall below the target ratio.

4.4.4 While the minimum and target liquidity ratios refer to the average positions within a calendar month, AIs should aim to maintain adequate liquidity on a daily basis and avoid significant differences between the daily and average ratios during the month.

4.4.5 For the purpose of monitoring their daily liquidity ratio, AIs are required to report in the Liquidity Return the

lowest daily liquidity ratio in each calendar month. AIs which have been approved to calculate the monthly liquidity ratio on the basis of specified days during a month should report the lowest daily ratio recorded on any of the specified days or the last calendar day during each month. The HKMA will hold discussions with AIs with lowest daily liquidity ratios that are significantly or consistently below 25% to ascertain whether they are adopting prudent liquidity policies on a day-to-day basis.

5. [Superseded by LM-2]

6. Cash-flow management and reporting

6.1 [Superseded by LM-2]

6.2 [Superseded by LM-2]

6.3 [Superseded by LM-2]

6.4 [Superseded by LM-2]

6.5 Supervisory and reporting arrangements

6.5.1 As part of its review of AIs' liquidity management policy statement, the HKMA will consider the suitability and reasonableness of the following limits and assumptions set by AIs, having regard to the nature and complexity of their operations:

- maturity mismatch limits and behavioural assumptions adopted for constructing the maturity profile under normal business conditions; and
- the cash-flow assumptions for conducting stress-testing~~. under the institution-specific and general market crisis scenarios. The HKMA will provide input on the scope of the general market crisis scenario; and~~
- ~~the minimum number of days of positive liquidity targeted by individual AIs under the institution-specific crisis scenario.~~

The above should also cover positions in individual currencies in which an AI has significant business.

6.5.2 Where necessary, the HKMA may review the techniques used by individual AIs to estimate future cash flows, and request them to provide historical/statistical evidence or other justification to support the size of their mismatch limits and cash-flow assumptions. The HKMA should be consulted of any subsequent changes in these limits and assumptions.

6.5.3 AIs are required to submit to the HKMA each quarter (or more frequently if necessary) internal liquidity management reports as agreed. These reports would normally cover the following:

- the cash-flow analysis under normal business conditions;
- the stressed liquidity reports for relevant crisis scenarios ~~both the institution-specific crisis scenario and general market crisis scenario~~ (unless otherwise exempted by the HKMA); and
- the cash-flow analysis and stressed liquidity reports for individual currencies in which an AI has significant positions (unless otherwise exempted by the HKMA).

6.5.4 The HKMA will make use of the above information to monitor the liquidity risk of individual AIs, including:

- the net funding requirements of an AI as reported in the maturity mismatch analysis with reference to its internal limits and behavioural assumptions;
- the reported stress-testing results to assess an AI's ability to withstand crisis situations and to identify any notable changes in its liquidity risk profile. Where necessary, the HKMA will discuss with the AI's management about its strategies to address the results generated; and
- the trend of an AI's mismatch positions in individual foreign currencies against its internal limits. The HKMA will also seek to understand

the underlying liquidity strategies for such currencies.

6.5.5 The HKMA will identify whether there are any "outlier" AIs in terms of the proportion of local currency assets being funded by foreign currency liabilities (or vice versa). This is to ensure that there is no over-reliance on foreign currency funding or on swap markets.

6.5.6 In addition, the HKMA collects information on the short-term maturity mismatch between foreign currency assets and liabilities in the Liquidity Return. The information is used to calculate a foreign currency mismatch ratio, which measures the percentage of foreign currency assets to liabilities maturing with three months (including off-balance sheet items). The HKMA will discuss with individual AIs about their funding strategies if they maintain a ratio that is significantly below that of their peers.

6.5.7 As part of its internal stress-testing exercise, the HKMA will conduct liquidity-related stress tests to assess the ability of individual AIs to cope with a funding crisis. In this connection, the HKMA will collect relevant information from locally incorporated banks under the quarterly Liquidity Stress-testing Return. The Return requires reporting banks to provide information on selected asset and liability items, including a breakdown of the composition of customer deposits, debt securities held and residential mortgage loans. The HKMA may request other AIs to submit this Return on an ad hoc or need basis.

6.5.8 The HKMA will review the effectiveness of AIs' cash-flow management framework during on-site examinations.

7. [Superseded by LM-2]

8. [Superseded by LM-2]

Annex A : Correlation of liquidity risk with other risks

A1. Any AI that takes on more credit risk may be increasing its liquidity risk. A significant rise in the level of an AI's non-performing loans and bad debt charges, in particular, will be perceived by rating agencies and fund providers as signs of deterioration in its asset quality and potential liquidity problems. This may lead to credit rating downgrades and the demand for a risk premium from fund providers, thereby affecting the AI's fund-raising capability. If the situation has cast doubt on the AI's financial viability, it may be denied any funding at all. Many bank failures were actually the combined result of severe credit and liquidity problems.

A2. Market risk will affect an AI's ability to generate liquidity from its trading portfolio of financial instruments. Adverse changes in the value of such portfolios may also result in volatile profits. If an AI is perceived to be subject to a high level of market risk, fund providers may require the AI to pay higher interest rates for funds or may even decline to provide any funding at all.

A3. Interest rate risk may have extensive effects on liquidity. Movements in interest rates will affect AIs in terms of the income earned from assets, the market value of those assets and the cost of funding those assets. AIs' earnings may be squeezed depending on the direction of change in interest rates and their funding structure (see para. 2.3.4 above). Off-balance sheet instruments that are sensitive to interest rates (e.g. interest rate swaps) may also result in unexpected cash outflows or additional funding requirements when interest rates are volatile (see para. 2.4.5 above).

A4. Operational risk is also related to liquidity risk. Significant problems can develop quickly if operational systems fail to process, or cause delay in the execution of, transactions. In particular, the breakdown of fund transfer and securities clearing systems will directly affect the cash flows of AIs. Problems in other operational systems such as electronic or credit card banking services may result in customer dissatisfaction and closure of accounts.

A5. An AI's reputation is essential for attracting funds at a reasonable cost and retaining funds during troubled times. Any negative publicity (e.g. staff fraud or scandal), whether true or not, may undermine public confidence in an AI directly or through contagion if the problems originate from its group companies. An AI's failure to honour any of its funding obligations and commitments could also

be a source of negative publicity. Even if the commitment concerned is not legally binding, it may arouse suspicion and rumours about its financial strength. Negative publicity may prompt depositors and other fund providers to seek greater compensation (e.g. higher interest rates) for keeping their funds with the AI or to withdraw their funds. If this is not properly dealt with, negative publicity may, in extreme situations, trigger bank runs and result in serious problems for the AI or even the banking industry as a whole. To minimise the potential impact of reputation risk on liquidity, AIs should take into account the estimated level of drawings of commitments, legally binding or not, in its day-to-day cash-flow management, seek to diversify the sources and maturity of market funding, and increase asset liquidity, as appropriate.

A6. Strategic risk may also have an impact on AIs' liquidity. Before implementing any new strategy or business activity, an AI should assess the liquidity implications and ascertain whether the funding planned to support the new activity can be raised at a reasonable cost. If the liquidity impact is misjudged, strategic risk will increase. The ability to attract and maintain sufficient liquidity is particularly important for AIs that are experiencing rapid asset growth.

Annex B : [Superseded by LM-2]

Annex C : [Superseded by LM-2]

Annex D : [Superseded by LM-2]

Archive - Original text superseded by LM-2

(Note: Included here is the original text of LM-1 that has been superseded by LM-2.)

[1.2 Scope]

1.2.2 The HKMA recognises that the degree of sophistication of an AI's liquidity risk management systems and controls will depend on the nature, scale and complexity of its operations as well as the level of liquidity risk assumed. The focus of this module is therefore on an AI's ability to apply the principles and guidance laid down to developing systems and controls that are appropriate to its particular circumstances.

1.2.3 In developing this module, the HKMA has had regard to the following:

- the Basel Committee paper entitled "Sound Practices for Managing Liquidity in Banking Organisations" (2000);
- Principle 13 of the "Core Principles for Effective Banking Supervision" covering banks' risk management processes for controlling other material risks (including liquidity risk) (the relevant information is contained in the Basel Committee paper on "Core Principles Methodology" (1999)); and
- the liquidity risk management practices currently adopted by some international banks.

1.3 Implementation

1.3.1 The HKMA recognises that some AIs may need time to develop / enhance their internal systems necessary to comply with the new requirements of the module. However, AIs are expected to accord priority to this and be ready to submit the monthly report on liquidity position and quarterly return on liquidity stress-testing within one year of the issue date of the module. The HKMA will monitor the progress of the AIs in enhancing their systems and procedures to meet the remaining

requirements (e.g. the cash-flow and scenario analyses, etc.) within a reasonable timeframe.

4.3 Back-to-back transactions

4.3.1 Back-to-back transactions refer to interoffice or intragroup transactions which typically involve two legs, one borrowing long (with maturity of more than one month) and the other lending short (with maturity of one month or less). Both legs are for the same or similar amount and at the same or similar rate of interest and are, in most cases, rolled forward continuously.

4.3.2 The MA has in the past approved the local branch or authorized subsidiary of some international banks to include claims under back-to-back transactions as liquefiable assets in the computation of the liquidity ratio mainly on the basis of the following conditions:

- the foreign bank is an international bank whose liquidity is managed, and supervised, on an integrated global basis;
- the transactions are carried out with the head office or parent bank (transactions with sister branches or fellow subsidiaries outside Hong Kong are not allowed);
- there is no doubt about the liquidity of the head office or parent bank;
- the head office or parent bank has confirmed, in terms acceptable to the MA, that the effect of the transactions is to provide genuine liquidity to the branch or subsidiary concerned even in the event of funding difficulties affecting the bank or banking group as a whole; and
- in the case of transactions of material size[5], the home supervisor has confirmed to the MA that it is aware of the transactions and their purpose and has no objection to them.

[5] As a general rule, back-to-back transactions will be regarded as material if the liquidity ratio of the AI would drop below 30% after excluding such transactions from the calculation of the ratio.

4.3.3 In each approved case, a limit has been agreed with the AI concerned to control the extent to which back-to-back claims can be recognised as liquefiable assets.

4.3.4 As back-to-back transactions usually involve no actual movement of funds and rely to a great extent on the liquidity support of the head office or parent bank, the MA has granted such approvals only in a limited number of cases. In view of the increasing focus on a cash-flow management approach to liquidity risk, however, it is considered that the use of such transactions for liquidity purposes should be minimised.

4.3.5 The MA's general policy is therefore not to allow AIs to use back-to-back transactions for the purpose of calculating the liquidity ratio. Nevertheless, AIs that have previously obtained such approvals may continue to include back-to-back transactions for liquidity purposes subject to meeting the conditions in para. 4.3.2 on an ongoing basis.

4.3.6 The MA will from time to time review the use of back-to-back transactions by these AIs and their compliance with the conditions for approval, and consider whether the limits approved for such transactions are still appropriate or necessary.

5. Liquidity management framework

5.1 Board and senior management oversight

5.1.1 Effective oversight by the Board of Directors and senior management is a critical element of an AI's liquidity risk management process. The role and responsibilities of the Board and senior management in risk management are covered in CG-1 "Corporate Governance of Locally Incorporated Authorized Institutions" and IC-1 "General Risk Management Controls". Many of the requirements and practices cited have a general application.

5.1.2 Effective liquidity risk management requires an informed Board, capable management and appropriate

staffing. The Board of Directors should, in particular, be responsible for:

- approving an AI's liquidity risk strategy and other significant policies related to liquidity risk management (including contingency planning);
- ensuring that an appropriate liquidity risk management structure, which identifies the lines of authority and responsibilities for different levels of management is established;
- maintaining continued awareness of an AI's performance and overall liquidity risk profile; and
- ensuring that liquidity risk is adequately managed and controlled by senior management within the established risk management framework.

5.1.3 Senior management should be responsible for overseeing the day-to-day and long-term management of liquidity risk in line with the objectives and risk tolerance levels set by the Board of Directors. This involves the development, implementation and maintenance of:

- appropriate policies and procedures that translate the Board's approved objectives and risk tolerances into operating standards;
- management information and other systems that adequately identify, measure, monitor and control liquidity risk; and
- effective internal controls over the liquidity risk management process.

5.1.4 It is also important for senior management to have a thorough understanding of the nature and level of liquidity risk assumed by an AI and the means to manage that risk.

5.1.5 Given that maintenance of adequate liquidity is crucial for the ongoing viability of an AI, senior management should promptly communicate any material changes in the AI's current or prospective liquidity position to the Board of Directors for advice and consideration.

5.2 Liquidity management structure

5.2.1 AIs should have in place a liquidity management structure that can execute effectively their liquidity management strategy, policies and procedures.

5.2.2 The Board usually delegates the responsibility for managing the overall liquidity of an AI to a senior management committee in the form of an Asset and Liability Committee ("ALCO"). For ALCO to function effectively, it should comprise personnel from senior management, treasury function, risk management and other business areas that could affect liquidity risk. The main role and functions of ALCO are further described in CG-1 "Corporate Governance of Locally Incorporated Authorized Institutions".

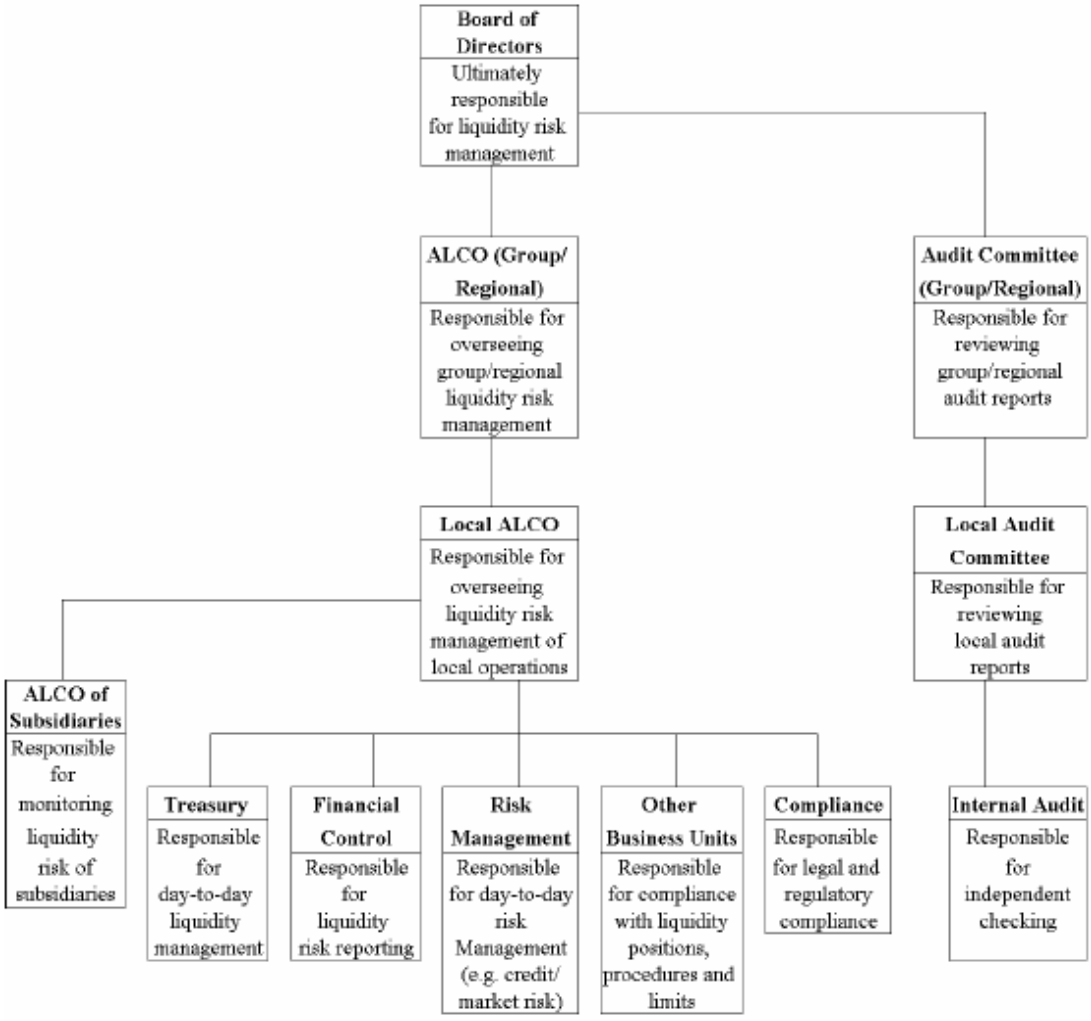
5.2.3 Liquidity management may either be centralised or decentralised, or a combination of the two may be adopted. The structure to be chosen depends on an AI's size and complexity of operations. Large AIs or banking groups may tend to have a more centralised structure in which liquidity for individual business units, including branches and subsidiaries, is managed on a consolidated basis. In a decentralised structure, business units within an AI or banking group would be responsible for their own liquidity subject to limits imposed by senior management.

5.2.4 Diagram 1 provides an example of the liquidity management structure of an international banking group. This example is not intended to be prescriptive, but provides an illustration of the composition of an ALCO and how liquidity management responsibilities can be coordinated at the group / regional, local and subsidiary level.

5.2.5 Where an AI is part of a banking group, its liquidity risk may be managed on a group or sub-group basis. However, the AI remains responsible for ensuring compliance at the AI level with the liquidity standards and requirements of this module. There should be arrangements in place such that any liquidity issues specific to the AI are identified and addressed by the AI

itself or by those delegated with the responsibility for managing the AI's liquidity risk.

Diagram 1: Illustration of the liquidity management structure of an international banking group



5.2.6 AIs should review the appropriateness of their liquidity management structure in the light of business developments and changes.

5.3 Liquidity management strategy, policies and procedures

5.3.1 Every AI is expected to formulate a statement of its liquidity management policies. The HKMA will review

and discuss the policy statement with individual AIs with the objective of agreeing minimum liquidity standards for them. The policy statement should be properly documented and approved by the Board of Directors, and be subject to regular review (at least annually) by the Board or ALCO to ensure that it remains valid under changing circumstances. The HKMA should be consulted prior to making any material changes to the agreed policy statement.

5.3.2 While specific details of the policy statement will differ across AIs according to the nature of their business activities, it should cover, at a minimum, the following key elements:

- Liquidity management strategy – which should set out the general approach to liquidity (including goals and objectives) and specific policies on particular aspects of liquidity risk management, such as -
  - composition of assets and liabilities;
  - approach to managing liquidity in different currencies;
  - managing access to interbank and other wholesale markets;
  - diversification and stability of liabilities; and
  - management of intragroup liquidity;
- Liquidity management responsibilities – with clearly defined lines of authority, responsibilities and reporting structure for liquidity risk management;
- Liquidity management systems – use of systems and tools for measuring, monitoring, controlling and reporting liquidity, including –
  - the setting of various risk tolerance limits and ratios (e.g. target liquidity ratio, maturity mismatch limits, loan to deposit ratio etc.);
  - the framework for conducting cash-flow analysis under normal and stress scenarios, including the

techniques and behavioural assumptions used; and

- the management reporting system for liquidity risk; and

- Contingency plan – which should describe the approach and strategies for dealing with various types of liquidity crisis.

5.3.3 The policy statement of a locally incorporated AI should cover both its local and overseas operations as well as all related entities that may have a significant impact on its liquidity. If the AI manages liquidity on a group basis, the policy statement should address issues relevant to the AI and the group as a whole.

5.3.4 Regardless of whether liquidity management is centralised at the head office, branches of AIs incorporated outside Hong Kong should still formulate a policy statement for their Hong Kong operations. It should, in particular, include the line of responsibility for monitoring the liquidity in Hong Kong and the reporting arrangements to head office. The HKMA will also take into account the global liquidity management policies of the head office, especially for the monitoring of branches, and the home authority's supervisory approach to liquidity (including whether it monitors the liquidity of the overseas branches and subsidiaries and is aware of their liquidity policies).

5.3.5 To facilitate the effective implementation of liquidity management policies, AIs should establish appropriate procedures which detail the operational steps and processes for the execution of various risk controls. The procedures should also be regularly reviewed and updated to take into account new business activities and changes in risk management processes.

5.3.6 Managing liquidity is not purely the responsibility of the treasury or risk management function. AIs should communicate the liquidity management policies and procedures to all relevant personnel throughout the organisation, including all business units that conduct activities with an impact on liquidity. They should be

fully aware of the liquidity management strategy and their role and responsibilities in relation to approved policies, procedures and limits.

5.4 Management information systems

5.4.1 AIs should have adequate management information systems ("MIS") for measuring, monitoring, controlling and reporting liquidity risk under normal and stressed situations.

5.4.2 The MIS should encompass all significant causes of liquidity risk, including those associated with new products and business initiatives, and be capable of evaluating the effect of such causes on an AI's cash flows and liquidity ratios. In particular, the MIS should be capable of :

- calculating cash flows and maturity mismatch positions arising from the full range of an AI's assets, liabilities and off-balance sheet positions on a day-to-day basis over a series of specified time periods;
- analysing cash flows and maturity mismatch positions in all currencies in which an AI operates, both individually and on an aggregate basis;
- calculating and projecting various limits and ratios in relation to liquidity for both statutory and internal risk management purposes;
- checking compliance with established liquidity policies and limits, and generating exception reports;
- reporting risk measures and liquidity trends to management on a timely basis; and
- setting out clearly the behavioural assumptions and limitations underlying the cash-flow management reports and stress-testing analyses (see section 6 below for more details).

5.4.3 The MIS should also be capable of providing on a timely basis accurate and relevant liquidity reports to senior management / ALCO and other responsible personnel

for evaluation of the level of liquidity risk under different operating circumstances.

5.4.4 The appropriate content and format of MIS reports would depend on an AI's liquidity management practices and the nature and complexity of its business. Such reports should enable senior management / ALCO to review and monitor the following aspects of liquidity:

- the maturity profiles of an AI's cash flows under normal and stress scenarios;
- the stock of liquid assets available and their market values;
- the concentration in sources and application of funds;
- the compliance with liquidity management strategies and risk tolerance levels set by the Board of Directors;
- the ability to borrow or undertake asset sales in various markets;
- potential sources of volatility in assets and liabilities (and claims and obligations arising from off-balance sheet activities);
- the analysis of intragroup cash flows and accessibility to such funding;
- the capacity of providers of standby facilities to meet their obligations; and
- the impact of adverse trends (e.g. decline in asset quality, market or operational disruptions etc.) on future cash flows and market confidence.

5.5 Independent reviews and audits

5.5.1 AIs should conduct periodic reviews of their liquidity risk management process to ensure its integrity, accuracy and reasonableness. The reviews should be conducted by independent parties, e.g. internal or external auditors.

5.5.2 Such reviews should, among other things, cover the following areas:

- the adequacy of internal systems and procedures for identifying, measuring and monitoring liquidity risk;
- the appropriateness of various risk limits for controlling liquidity risk;
- the suitability of the underlying assumptions for conducting cash-flow scenario analyses;
- the integrity and usefulness of MIS reports on liquidity risk; and
- the adherence to established liquidity policies and procedures.

5.5.3 AIs with complex liquidity risk profile and measurement systems should have their internal models or calculations validated by an independent internal or external reviewer.

5.5.4 Any weaknesses or problems identified in the review process should be addressed by senior management in a timely and effective manner.

[6. Cash-flow management and reporting]

6.1 Overview

6.1.1 AIs are expected to adopt a cash-flow approach to managing their liquidity risk. This approach complements the legal framework on minimum liquidity ratio by requiring AIs to measure, monitor and control their cash- flow and maturity mismatch positions under different operating conditions.

6.1.2 Under the cash-flow approach, AIs should have in place appropriate systems and procedures for:

- monitoring on a daily basis net funding requirements under normal business conditions;
- conducting regular cash-flow analyses based on stress scenarios; and

- developing reasonable assumptions for making the above cash-flow projections.

6.1.3 AIs are expected to take a conservative approach in assessing future cash flows, as the underlying assumptions may involve considerable judgement and discretion and could vary considerably depending on their business profile. They should be in a position to provide analysis and evidence to justify the assumptions.

6.1.4 AIs should be able to generate cash-flow positions by individual currencies and in aggregate. For those AIs that have significant foreign exchange business, there should be separate analysis of cash-flow positions for individual foreign currencies in which they are active.

6.1.5 Key elements of the cash-flow management framework are set out in the subsections that follow. Subsections 6.2 and 6.3 provide guidance on the systems and controls expected of AIs in respect of cash-flow management under normal and stressed conditions, including the stress-testing procedures that should be undertaken. Subsection 6.4 further describes the approach for managing foreign currency liquidity risk. Subsection 6.5 summarises the HKMA's supervisory monitoring and reporting requirements, while some hypothetical examples are set out in Annex B to illustrate how cash- flow analyses may be conducted.

6.1.6 The cash-flow analyses provided in Annex B cover the following scenarios:

- normal business conditions;
- an institution-specific crisis; and
- a general market crisis.

6.1.7 In applying the requirements of this section, the HKMA will adopt a more flexible approach towards AIs that maintain small and simple operations or whose liquidity risk management is managed, and supervised, on an integrated global basis (see also paras. 6.3.18, 6.3.19 and 6.4.8 below).

6.2 Net funding requirements

Scope of cash-flow projection

6.2.1 In order to stay in business, AIs need to ensure that either a positive cash-flow position is maintained or otherwise sufficient cash can be generated to satisfy their funding requirements on a daily basis.

6.2.2 AIs should measure and monitor their net funding requirements going forward by constructing a maturity profile that projects future cash flows arising from assets, liabilities and off-balance sheet transactions. All cash flows should be allocated into a series of time bands according to their expected maturity dates, and a net mismatch figure obtained by subtracting outflows from inflows in each time band. A cumulative net mismatch figure should be derived by accumulating the net mismatch figures in each successive time band. This profile enables AIs to estimate the prospective net funding requirement in each time band.

6.2.3 The maturity profile should, in principle, cover all cash flows (including off-balance sheet items). Senior management / ALCO may however approve the exclusion from the profile of certain cash flows that are considered to be immaterial. The rationale for such exclusions should be properly documented in the liquidity management policies. AIs should review periodically whether such exclusions remain appropriate.

6.2.4 The maturity profile should encompass adequate time bands so that AIs can monitor their short-term as well as medium- to longer-term liquidity needs. The relevant time frame for active liquidity management is generally quite short. It is common for AIs to have daily time bands in the very short term (say for a period of five to seven days), followed by wider and less granular time bands for other periods. The time frame could also vary depending on an AI's business. AIs that are less dependent on short-term money markets may, for example, need to actively manage their net funding requirements over a slightly longer period (such as one to three months ahead).

6.2.5 While the focus of the maturity profile is on short-term cash flows, AIs should also review the mismatch positions for the medium- to longer-term time bands to identify any early sign of potential liquidity problems.

6.2.6 AIs are generally expected to perform cash-flow analysis for all currencies in aggregate as well as those denominated in Hong Kong dollars. If an AI has significant foreign exchange business, separate analysis of the maturity mismatch positions of individual foreign currencies in which it is active should also be performed.

Maturity mismatch limits

6.2.7 AIs should set internal limits to control the size of their cumulative net mismatch positions (i.e. where cumulative cash inflows are exceeded by cumulative cash outflows) for the short-term time bands up to one month (i.e. "next day", "7 days" and "1 month"). Such limits should be realistic and commensurate with their normal capacity to fund in the interbank market. Maturity mismatch limits should also be imposed for individual foreign currencies in which they have significant positions.

6.2.8 The maturity mismatch limits should be properly documented in the liquidity management policy statement. AIs should aim to keep their negative cumulative net mismatches within the established limits, and any exceptions should be approved by senior management / ALCO and fully justified. The suitability of such limits should also be regularly reviewed.

Assumptions and techniques

6.2.9 In order to provide prudent projections of expected cash flows, AIs should, as far as possible, incorporate in the maturity profile realistic assumptions underlying the behaviour of their assets, liabilities and off-balance sheet activities rather than relying simply on contractual maturities. These assumptions may include:

- the proportion of maturing assets and liabilities that AIs expect to roll over or renew;

- the proportion of marketable securities which are planned for sale before maturity;
- the behaviour of assets and liabilities with no clearly specified maturity dates, such as repayment of overdrafts and retail deposits;
- potential cash flows arising from off-balance sheet activities, e.g. drawdown under loan commitments and contingent liabilities[6];
- convertibility of foreign currencies; and
- access to wholesale markets, standby facilities and intragroup funding.

6.2.10 In making cash-flow assumptions and projections, AIs may use a number of techniques ranging from historical experience and static simulations based on current holdings to sophisticated modelling (for more complex AIs). The techniques employed by AIs should be commensurate with the nature and complexity of their business activities.

6.2.11 One way of projecting cash flows is to analyse historical observations to determine cash-flow patterns and derive behavioural assumptions applicable to the cash flows. There is no standard methodology for making the assumptions. What is important is the use of consistent and reasonable assumptions that are supported by sufficient historical evidence. The minimum criteria that AIs are required to meet if they intend to use behavioural assumptions for the cash-flow analyses are set out in Annex C.

6.2.12 As an illustration, in projecting the cash flows of retail deposits, an AI may track the minimum outstanding balance of such deposits in the past 12 months and regard this as a "core deposit" balance to be slotted into the "over 1 year" time band of the maturity profile. Any remaining balance may then be evenly distributed over different time bands within one year.

[6] All potential drawdown from legally binding and non-binding commitments should be included.

6.2.13 Under a "business as usual" situation, marketable debt securities, in particular those that are held by AIs for long-term investment[7], should normally be allocated to the time bands according to their remaining contractual maturity. Debt securities that are held for trading purposes or available for sale[8] may be allocated to the short-term time bands if they represent surplus liquidity that can be turned into cash quickly to meet funding needs if required. Any cash inflows arising from their expected liquidation should however incorporate the lead time required before the cash can be made available, taking into account the settlement time and the impact of time differences if the clearing or custodian agents are located outside Hong Kong.

6.2.14 AIs may, as a general rule, treat normal intragroup transactions (i.e. intragroup placements and borrowings transacted at arm's length) in the same way as other third party transactions for the purpose of incorporating the relevant cash flows in the maturity profile, provided that there is no doubt about the financial position of the banking group as a whole. However, AIs are not expected to include claims on their head office / parent bank under back-to-back transactions as cash inflows because such claims would normally be rolled forward continuously.

6.2.15 In projecting the cash flows, AIs should also consider general economic and market trends as well as other relevant information that could affect their ability to access funds readily and at reasonable terms (e.g. a credit rating downgrade).

6.2.16 AIs should document in their liquidity management policy statement the underlying assumptions used for estimating the cash-flow projections in the maturity profile and the rationale behind them. The assumptions and their justifications should be approved by senior management / ALCO and subject to regular

[7] These refer to securities classified as "held-to-maturity debt securities" or "non-trading securities" under the alternative treatment or "investment securities" under the benchmark treatment of Statement of Standard Accounting Practice ("SSAP") 24.

[8] These refer to securities classified as "trading securities" under the alternative treatment or "other investments" under the benchmark treatment of SSAP 24.

review to take account of available statistical evidence and changing business environment.

6.3 Stress-testing and scenario analysis

6.3.1 The HKMA considers that whether an AI can be regarded as having sufficient liquidity depends to a great extent on its ability to meet obligations under a funding crisis. Therefore, in addition to monitoring net funding requirements under normal business conditions, AIs should conduct regular stress tests by applying various "what if" scenarios on their liquidity positions for all currencies in aggregate to ensure that they have adequate liquidity to withstand stressed conditions. These stress tests should also be separately conducted for positions in Hong Kong dollars and individual foreign currencies in which they have significant positions. See also IC-5 "Stress-testing" which provides detailed guidance on the use of stress tests for risk management purposes.

6.3.2 It is important for AIs to construct plausible adverse scenarios and examine the resultant cash-flow needs. While AIs are encouraged to cover stress events of different types and levels of adversity, they should, at a minimum, include the following scenarios in their stress-testing exercise:

- an institution-specific crisis scenario; and
- a general market crisis scenario (based on assumptions prescribed by the HKMA from time to time).

Institution-specific crisis scenario

6.3.3 An institution-specific crisis scenario should cover situations that could arise from the AI experiencing both real or perceived problems (e.g. asset quality problems, solvency concerns, rumours on an AI's credibility or management fraud, etc.). It should represent the AI's extreme view of the behaviour of its cash flows in a crisis (i.e. a "worst case" scenario for the AI). A key assumption is that many of the AI's liabilities cannot be rolled over or replaced, resulting in the need to secure emergency liquidity.

6.3.4 This "worst case" scenario may entail a deposit run for retail banks. Such a scenario would typically include the following characteristics:

- significant daily run-off rates for deposits, with increasing requests from customers to redeem their time deposits before maturity;
- interbank deposits repaid at maturity;
- no new unsecured funding obtainable from the market; and
- forced sale of marketable securities at discounted prices.

6.3.5 Foreign AIs (including branches and subsidiaries of foreign banking groups) should consider two types of institution-specific crisis scenario, namely a crisis that is restricted to their Hong Kong operations and a crisis that affects the global operations of the banking group (e.g. with problems originated from the head office or parent bank). In the latter case, no intragroup or head office funding support should be assumed to be available. This is because such support, which would be of particular value in a crisis affecting the Hong Kong operations only, could prove to be ineffective if the crisis impinged on the group as a whole.

6.3.6 There are other institution-specific scenarios that are less severe in the short term but may subject an AI to longer-term liquidity pressures. These scenarios may be triggered by possible changes in the market and public perceptions of an AI (e.g. as a result of a credit rating downgrade) that affect its access to funds or cause a gradual drain on its liquidity. As mentioned earlier, AIs are encouraged to take account of different scenarios applicable to their own circumstances as part of the ongoing liquidity risk management process.

<u>General market crisis scenario</u>

6.3.7 A general market crisis scenario is one where liquidity at a large number of financial institutions in one or more markets is affected. Characteristics of this scenario may include a liquidity squeeze, counterparty defaults,

substantial discounts needed to sell assets and wide differences in funding access among AIs due to the occurrence of a severe tiering of their perceived credit quality (i.e. flight to quality).

6.3.8 AIs should be aware that the cash-flow patterns of certain assets and liabilities may behave quite differently in the case of a general market crisis scenario. For example, compared with the institution-specific crisis scenario, an AI may have less control over the level and timing of future cash flows from the sale of marketable debt securities. This could be due to the fact that only very few market participants are willing or have sufficient liquidity to purchase securities. Hence, AIs should assign appropriate discount factors to such assets to reflect the price risk associated with different stress scenarios. Moreover, the impact of a general market crisis on individual AIs may differ. For example, a bank with a strong market reputation may benefit from a flight to quality as depositors seek a safe haven for their funds.

6.3.9 The inclusion of a general market crisis scenario in AIs' liquidity stress-testing is to facilitate the HKMA's assessment of the vulnerabilities and soundness of the Hong Kong banking sector in response to events causing general market disruptions. Where appropriate, the HKMA will make use of the data and results generated from AIs' scenario analysis in its own stress-testing exercise.

Requirements

6.3.10 AIs should perform stress-testing and scenario analysis on a periodic basis. Senior management / ALCO should examine the stress-testing results and formulate appropriate strategies to address the cash-flow needs reflected from the scenario analysis. For example, there may be a need to reduce liquidity risk by obtaining more long-term funding or restructuring the composition of assets.

6.3.11 While a severe liquidity crisis at an individual AI may stem from other problems not related to its liquidity, the AI's ability to honour its immediate commitments under

such conditions could provide vital time for it to arrange funding support from other sources[9] and take actions to address the underlying problems. This will increase its chance of surviving the crisis.

6.3.12 As such, the HKMA would normally expect an AI to have sufficient funds to continue in business, at least under the institution-specific crisis scenario, for a minimum number of days necessary for it to arrange emergency funding support. As the nature and size of business may differ widely among AIs, the HKMA does not intend to prescribe a standard minimum number of days for all. AIs should determine this target having regard to their specific circumstances, and be prepared to justify it when necessary. AIs should also establish plans to achieve this target if they do not already do so, as reflected from the stress-testing results.

6.3.13 In conducting the scenario analysis, AIs may factor in the possibility of intragroup or head office support for a crisis scenario affecting the Hong Kong operations only (i.e. not applicable to one that affects the group as a whole). However, projected cash inflows from intragroup funding lines may only be included if the arrangement is fully committed and irrevocable or where an acceptable level of certainty can be demonstrated (e.g. the entity providing the support must regard such support as a deduction from its own stress liquidity calculations). Any assumption that intragroup deposits will not be withdrawn at maturity should also be supported by formal arrangements with the placing entity. See also subsection 7.5 below.

6.3.14 In a crisis scenario, AIs may generally project cash inflows from liquidating (or pledging for funding) their holdings in marketable debt securities regardless of whether they are held for trading or long-term investment. However, AIs should take account of the expected level of discount in prices and the time needed to settle the transactions.

[9] Such support may include capital injection from major shareholders, intragroup or head office support if the group is not the source of crisis, and support from relevant central banks or monetary authorities.

6.3.15 Locally incorporated AIs should, as part of their contingency planning for a liquidity crisis, consider the extent to which their assets are eligible to secure funding under the HKMA's lender of last resort ("LOLR") framework. However, they should not assume that such support is automatically available to them during a crisis. AIs' eligibility under this framework is subject to their meeting the prescribed criteria set out in the HKMA's policy statement. They should also recognise that such support can only be sought in exceptional circumstances and as a last resort.

6.3.16 AIs should document in their liquidity management policy statement the following:

- the cash-flow assumptions for the institution-specific and general market crisis scenarios; and
- their own estimate of the minimum number of days needed to arrange emergency funding support from other sources.

6.3.17 The above assumptions should be approved by senior management / ALCO and be subject to regular review in the light of changes in AIs' operations and market environment.

Exemptions

6.3.18 In respect of AIs that are part of an international banking group, their liquidity risk may be managed on an integrated global basis, with stress tests being conducted at a regional or group level. The HKMA may regard this arrangement as acceptable for the purposes of complying with the stress-testing requirements, provided that the stress scenarios can adequately reflect the specific risk characteristics of AIs concerned. AIs having such as arrangement should discuss this with the HKMA.

6.3.19 The HKMA may exempt certain AIs from complying with the requirements of this subsection if the nature and scale of their operations do not warrant the use of such risk management techniques. AIs that are likely to be exempted include, for example, those that maintain a

simple and small operation with positive funding positions (based on cash flows which are mostly contractual and predictable). AIs should formally apply to the HKMA for this exemption.

6.4 Foreign currency liquidity management

6.4.1 In addition to managing liquidity risk in Hong Kong dollars and all currencies in aggregate, AIs should have adequate systems in place for measuring, monitoring and controlling the cash-flow and mismatch positions in each major foreign currency in which they are active.

6.4.2 AIs are expected to formulate liquidity strategies and policies for individual foreign currencies which represent a significant portion of their funding base[10] or are not currencies that are freely convertible into Hong Kong dollars. The effectiveness of such strategies and policies should be reviewed on an ongoing basis.

6.4.3 In managing individual currency funding needs, AIs should address issues that relate to their nature of business and funding strategies. For example, some AIs may rely on foreign currency liabilities to fund a portion of their Hong Kong dollar assets while others may fund their foreign currency assets with Hong Kong dollar funding via the foreign exchange or currency swap markets. In these cases, AIs will need to assess and monitor the risk of adverse exchange rate movements that could widen existing liquidity mismatches[11] as well as the likely convertibility of foreign currencies and access to foreign exchange markets for switching funding from one currency to another.

6.4.4 As a general principle, AIs should manage and control their funding needs to avoid over-reliance on foreign exchange or currency swap markets, as there is a risk

[10] The HKMA will normally regard a currency position as significant if the amount of an AI's on-balance sheet assets or liabilities, whichever is the larger, in that currency together with the sum of its expected cash inflows and outflows from off-balance sheet and contingent activities in the same currency is more than 10% of its total customer deposits in all currencies.

[11] If an AI runs a negative maturity mismatch in a foreign currency (i.e. with liabilities exceeding assets in that currency for a particular time period), the mismatch position in Hong Kong dollar terms will worsen should the foreign currency appreciate significantly against the Hong Kong dollar.

that access to these markets may cease to be available. In this regard, AIs should consider setting internal limits to control the amount of foreign currency liabilities that can be swapped through the foreign exchange market to fund local currency assets, or vice versa.

6.4.5 Apart from assessing the aggregate foreign currency liquidity needs and the acceptable mismatch in combination with Hong Kong dollar commitments, AIs should separately analyse the maturity mismatch positions of foreign currencies in which they have significant positions under both normal and stressed conditions.

6.4.6 AIs should set and regularly review internal limits to control the size of cumulative net mismatches over particular time bands (e.g. "next day", "7 days" and "1 month") for foreign currencies in aggregate and for each significant foreign currency in which they operate. Such limits are generally expected to be lower than those for Hong Kong dollar.

6.4.7 In developing liquidity management strategies for individual foreign currencies and determining the size of maturity mismatches in those currencies, AIs (particularly those with active involvement in multiple currencies) should take into account, inter alia, the following factors:

- the convertibility of individual foreign currencies, the volatility of relevant exchange rates as well as the timing of access to funds in those currencies;
- conditions of foreign exchange markets, including the depth and liquidity of the markets and the level of interest rates;
- AIs' ability to have access to interbank money markets for foreign currency funding as well as other foreign exchange and currency swap markets;
- the impact of potential disruptions to foreign currency markets and exchange risks (i.e. without presuming that surplus liquidity in one currency can

always be used to meet the shortfall in another currency);

- the stickiness of deposits in foreign currencies under stressed conditions;
- the availability of foreign currency backup facilities to cater for circumstances in which normal access to funding in individual currencies is disrupted;
- differences in the behaviour of foreign currency depositors/lenders vis-à-vis those of local customers and counterparties; and
- the ability of borrowers to repay their foreign currency liabilities under stressed conditions (e.g. interest rate hikes and fluctuation in exchange rates).

6.4.8 The HKMA may allow AIs with international operations that can demonstrate proficiency in foreign exchange risk management and full convertibility among the individual foreign currencies they operate in to maintain aggregate foreign currency mismatch limits only.

7. Asset and liability management

7.1 Overview

7.1.1 Liquidity risk management should form an integral part of an AI's asset and liability management. This section describes some major considerations for structuring an AI's assets and liabilities to reduce liquidity risk as well as other strategies and controls that could be employed to enhance the stability of its funding sources.

7.2 Liquid asset holdings

7.2.1 AIs should maintain an appropriate mix of high quality liquid assets[12] as a source of liquidity reserve for meeting emergency funding needs. The amount and

[12] Generally, liquid assets include cash, bank placements and marketable debt securities such as Exchange Fund Bills and Notes, instruments issued or guaranteed by governments and banks and other paper with credit ratings of at least single-A or equivalent.

composition of such assets should be determined by individual AIs with reference to the nature of their business and liquidity risk profile.[13]

7.2.2 AIs should set out their strategy for holding liquid assets, including the types and quality of assets to be held for liquidity purposes and the level of such holdings. Concentration limits should also be established where appropriate to avoid excessive exposure to market and other risks within the asset portfolios in respect of asset type, counterparty, geographic location and economic sector.

7.2.3 Marketable debt securities are commonly held by AIs as a form of liquid assets. While they represent a readily available source of liquidity in the case of need, the value of such securities is often influenced by market and interest rate risks. There may thus be questions as to whether the securities could be liquidated within a short period of time and at a reasonable price if general market conditions are unfavourable. In determining the types and amount of marketable debt securities to be held as liquid assets, it is important that AIs have particular regard to the following aspects:

- the depth and liquidity of the market; i.e. how fast an asset could be sold and how much it could realise;
- the percentage of an issue held by an AI;
- the credit rating of securities held;
- the currency of denomination of securities held;
- the expected maturity date, taking into account the possibility of early redemption or disposal; and
- the probability of using the securities as collateral for borrowing funds either in the open market or from the HKMA or other central bank / monetary authority.

7.2.4 AIs should seek to maintain a well-balanced portfolio of high quality marketable debt securities with limits by

[13] An AI's liquid asset holdings should also be sufficient to meet the statutory requirements under the minimum liquidity ratio.

type, tenor and currency, and monitor the proportion of such securities within the balance sheet to avoid undue reliance on such assets.

7.2.5 Exchange Fund Bills and Notes are particularly useful to AIs in liquidity risk management. In the event of a funding crisis, they can be sold or pledged almost immediately. Moreover, they are eligible for rediscount at the HKMA's Discount Window if an AI has a shortfall in its clearing balance. AIs are therefore recommended to hold an appropriate amount of Exchange Fund Bills and Notes for liquidity purposes.

7.2.6 AIs are also expected to maintain a proportion of their liquid assets in Hong Kong as it is generally easier and quicker to sell or pledge assets that are physically located in Hong Kong in crisis situations. In particular, AIs with significant retail business need to have sufficient funds in the event of a deposit run to purchase quickly bank notes from note issuing banks to meet the immediate demand from depositors.

7.2.7 For the purpose of managing intraday liquidity (see also subsection 7.6 below), AIs participating directly in clearing and settlement systems should hold within their stock of high quality liquid assets an appropriate amount of securities that are eligible for intraday repurchase transactions with the HKMA. In determining the size of such holdings, AIs should take into account the volume and volatility of transactions that they may be required to process.

7.3 Diversification and stability of liabilities

7.3.1 AIs should seek to maintain diversified and stable funding sources by determining the appropriate mix of liabilities and building strong and lasting relationships with key fund providers.

7.3.2 AIs should avoid any potential concentration in their funding sources[14]. Concentration limits should be established, together with systems for monitoring compliance with these limits, so that any undue reliance

[14] A funding concentration exists when a single decision or factor has the potential of causing a significant or sudden withdrawal of funds.

on a single counterparty (or group of related counterparties), product or market may be prevented.

7.3.3 What would constitute a funding concentration cannot be expressed in definite sizes or amounts, as this depends on the nature and complexity of an AI's business activities. AIs should take into account the following aspects in assessing the degree of liability concentration:

- the maturity profile and credit-sensitivity of the liabilities;
- the mix of secured and unsecured funding;
- the extent of reliance on –
  - a single liability provider or a related group of liability providers;
  - particular instruments or products (e.g. interbank borrowing, retail versus wholesale deposits, and repurchase agreements and swaps); and
  - intragroup funding (see also subsection 7.5 below); and
- geographic location, industry or economic sector of liability providers.

7.3.4 AIs should undertake appropriate analysis of the characteristics of their liabilities and the potential impact these may have on their liquidity position. For example, AIs should be aware that, in times of market turbulence, a proportion of their credit-sensitive liabilities (such as wholesale funding or large corporate deposits) may be withdrawn, particularly if the funding is unsecured. Secured funding may also be affected, with counterparties seeking better quality collateral or larger haircuts on collateral.

7.3.5 AIs should identify which funding sources are likely to stay with them under most circumstances, which are likely to run-off gradually if problems arise and which to run-off immediately at the first sign of problems. The objective is to identify and build up an appropriate level

of "core" funding and to minimise reliance on liabilities that are volatile. In particular, AIs with a large deposit base should have a system to carry out statistical and behavioural analysis to detect any signs that the average life of retail deposits is shortening or that the deposit base is becoming more volatile. AIs should also be cautious about attracting deposits mainly by way of offering above market rates of interest or promotional gift items. Such deposits will tend to be highly volatile.

7.3.6 It is important for AIs to assess their exposure to large fund providers (or depositors) on an ongoing basis. At a minimum, AIs should review regularly reports on large fund providers (say the largest ten) which consolidate all funding that an AI obtains from each provider or related group of providers. The historical performance of these fund providers, e.g. in terms of the maximum, minimum and average balances over the previous 12 months, should also be monitored. Trigger ratios may be established to identify any funding concentration for management review. In the case of a retail bank, a funding concentration may exist if a significant percentage of its total deposit base is from the top ten depositors or a single depositor (or group of related depositors). AIs should consider whether action needs to be taken to address the issue (e.g. diversify the deposit base).

7.3.7 AIs should aim to foster relationships with depositors and other liability holders (e.g. trading counterparties, correspondent banks and corporate customers) through such means as quality of service and, in case of large depositors, personal contact. The frequency of contact and the frequency of use of a funding source are two possible indicators of the strength of a funding relationship.

7.3.8 While connected deposits are, generally speaking, a more stable funding source than deposits from unconnected parties, the HKMA would wish AIs to broaden, as far as possible, their deposit base rather than relying too heavily on connected deposits.

7.4 Access to interbank and other wholesale markets

7.4.1 The ability to obtain funds in the interbank market is an important source of liquidity for AIs. AIs should be in a position to estimate their "normal" borrowing capacity based on past experience and aim to limit their wholesale funding needs for both local and foreign currencies on, say, a daily and weekly basis to an amount which is comfortably within that capacity. It may also be sensible to test their name in the market on a regular basis even if there is no immediate need for funds.

7.4.2 AIs' capacity to borrow from the interbank market depends on a number of factors, including the size and turnover of the local market, their share of that market as well as the credit limits imposed by counterparties. Given these factors, it may not be feasible for an AI to be absolutely certain about its borrowing capacity in the interbank market. Therefore, in setting internal targets for interbank borrowing, AIs should ensure that such targets have actually been attained and exceeded on a reasonable number of occasions. This will help give some assurance that the targets could be achieved without causing any adverse market reaction.

7.4.3 AIs should also recognise that their ability to obtain interbank borrowing may be radically reduced in crisis conditions. To address this risk, AIs should build up and monitor their relationships with their main providers of funds. They may try to arrange standby credit lines with other AIs or counterparties. However, AIs should recognise that their right to draw on these facilities may be denied in a crisis – the fund providers may simply not honour their contractual obligations by refusing to advance any funds to the AIs. There might also be calls for early repayment of drawings under these facilities triggered by defaults or breaches of material adverse change clauses. AIs should therefore avoid any excessive reliance on standby facilities. Where an AI's standby facilities constitute a major source of liquidity in an emergency situation, the HKMA will seek to be satisfied as to the certainty of these arrangements.

7.4.4 Developing the ability to sell assets (e.g. through inclusion of sale clauses in loan documentation or use of securitisation structures) or exploring arrangements under which an AI can borrow against its assets (e.g. through repurchase agreements) may provide additional liquidity support under adverse circumstances. Prearrangements to generate funding from less liquid assets when required (e.g. through sale of residential mortgages to the Hong Kong Mortgage Corporation) could also be an important element of managing liquidity risk.

7.4.5 Asset securitisation may also provide a means of improving the liquidity of the balance sheet. In generating liquidity through asset securitisation, however, AIs should be aware that peculiarities related to certain asset securitisation transactions, such as early amortisation[15], and excessive reliance on a single funding vehicle may increase liquidity risk. They should also be aware that their ability to securitise assets may diminish in stressed market conditions. In addition, the time taken to organise a securitisation transaction may imply that it cannot be relied upon to provide liquidity at short notice.

7.5 Intragroup liquidity

7.5.1 Intragroup fund transfers could affect an AI's liquidity in various ways. For example, an AI may be required to extend support to group companies experiencing liquidity problems, while funding provided by other related entities to the AI may be withdrawn in an emergency.

7.5.2 AIs should therefore have adequate policies and systems to manage their intragroup liquidity arrangements. In particular, AIs should specify in their liquidity management strategy the treatment of intragroup liquidity and assumptions on intragroup dependencies. They should also be able to monitor and analyse how the funding positions of other group companies might affect their own liquidity, and to

[15] Early amortisation provisions allow investors to be paid out prior to the original stated maturity of the securities issued once the provisions are triggered.

address any regulatory or legal impediments to accessing liquidity on a group basis.

7.5.3 Where AIs provide significant funding or liquidity support to other group or related entities (e.g. in the form of explicit guarantees or funding lines to be drawn at times of need), they should ensure that such support is appropriately accounted for in the measurement of their own liquidity positions.

7.5.4 A locally incorporated AI that decentralises or partially delegates liquidity management among operating units in or outside Hong Kong should clearly document its policies and limits established for those units as well as any internal liquidity support arrangements provided to the units. The policies should also address how liquidity of the units is monitored and controlled by head office management in Hong Kong.

7.5.5 A local branch or authorized subsidiary of a foreign bank should generally be able to rely on the support of its head office or parent bank in a crisis affecting only the Hong Kong operations. Such support could however be called into question if the crisis affected the bank or group as a whole.

7.5.6 Back-to-back transactions between the Hong Kong operation and the head office / parent bank of foreign AIs should generally be excluded from their cash-flow and liquidity projections. However, those transactions that were previously approved by the HKMA may continue to be included in the calculation of the liquidity ratio provided that the conditions set out in para. 4.3.2 above are met on an ongoing basis.

7.5.7 The HKMA will monitor the level and trend of intragroup transactions reported by AIs in the monthly Liquidity Return. It may consider restricting intragroup transactions by setting limits to “ring-fence” the Hong Kong operation of a banking group if the financial or liquidity position of the rest of the group is in doubt.

7.5.8 In the case where a locally incorporated AI deploys a significant proportion of its liquidity through a deposit-taking subsidiary or an overseas branch, the

HKMA may require the AI to observe the statutory liquidity ratio and its internal maturity mismatch limits on a consolidated basis by including the position of the subsidiary or branch in the calculation.

7.6 Intraday liquidity

7.6.1 Structural and operational changes in payment systems have increased the importance of managing intraday liquidity. AIs that participate directly in clearing and settlement systems should take appropriate steps to ensure that they have sufficient collateral to cover cash positions and systems capable of monitoring intraday liquidity positions and cash needs.

7.6.2 AIs should also be aware that in stressed conditions they are likely to require more intraday liquidity than in normal market conditions for a variety of reasons, including payments due to AIs being delayed and wholesale depositors withdrawing from the market. AIs should take account of this in their stress-testing and scenario analysis.

7.6.3 AIs that provide clearing services to correspondent banks should be able to measure the value of payments traffic and have systems to keep track of the balances in memo accounts. They should also be able to estimate the likely cash flows arising from future payments traffic.

7.7 Liquidity ratios and limits

7.7.1 AIs should establish liquidity ratios and limits to control the nature and level of liquidity risk that they are willing to assume. In setting these ratios and limits, consideration should be given to an AI's business strategies and activities, its past performance, the level of its earnings and capital available to absorb potential losses, as well as its tolerance for risk. The ratios and limits should be properly documented in the liquidity management policy statement and subject to periodic review. They should be revised when conditions or risk tolerances of an AI change.

7.7.2 Set out below are some typical examples of ratios and limits used by AIs for liquidity risk management:

- target liquidity ratio (see subsection 4.4 above for more details);
- maturity mismatch limits for local and major foreign currencies (see subsections 6.2 and 6.4 above for more details);
- concentration limits in respect of the mix of assets and liabilities (see subsections 7.2 and 7.3 above for more details); and
- loan to deposit ratio or other ratios appropriate to an AI's business activities (see Annex D for more details).

7.7.3 Senior management / ALCO should ensure compliance with the established ratios and limits. The responsibility for monitoring such ratios and limits should be assigned to a function independent of the funding areas. There should also be a defined procedure for reporting exceptions or breaches to senior management / ALCO, which can be early indicators of excess risk or inadequate liquidity risk management.

7.7.4 Liquidity ratios and limits should always be used in conjunction with more qualitative information such as an AI's funding capacity (e.g. in terms of a reduction in credit lines or increasing requests for early withdrawals of deposits) to reveal material liquidity trends.

7.7.5 The HKMA will review the liquidity ratios and limits set by an AI having regard to its liquidity risk profile and the actual ratios/positions run by it in relation to those of its peers and other indicators of the AI's liquidity.

8. Contingency plan

8.1 Overview

8.1.1 Every AI should formulate a formal contingency plan that sets out a strategy for dealing with a liquidity crisis and the procedures for making up cash-flow deficits in emergency situations. It is also important that AIs identify and understand the types of events that may

trigger the contingency plan. Mechanisms should be in place to facilitate monitoring of these trigger events.

8.1.2 As part of the contingency plan, AIs should decide how they would handle press and broadcasting media when negative information about them is disseminated.

8.1.3 The contingency plan should be updated and reviewed regularly (at least annually) by senior management / ALCO to ensure that it remains robust over time. In addition, AIs are encouraged to conduct rehearsals of the contingency plan from time to time to better prepare themselves for unfavourable situations.

8.2 Early warning indicators

8.2.1 To assess whether a potential liquidity problem may be developing, AIs may have regard to various internal and market indicators, including:

Internal indicators

- deteriorating asset quality;
- excessive concentrations on certain assets and funding sources;
- decline in earnings and interest margins;
- increase in overall funding costs;
- rapid asset growth being funded by volatile wholesale liabilities; and
- worsening cash-flow positions as evidenced by widening negative maturity mismatches, especially in the short-term time bands.

Market indicators

- credit rating downgrades;
- persistent drop in the AI's stock price;
- widened spread on the AI's senior and subordinated debt;
- reduction in available credit lines from correspondent banks;

- counterparties unwilling to extend unsecured or longer dated transactions to the AI; and
- increasing trend of deposit withdrawals.

8.2.2 AIs should have a system for identifying and tracking such indicators to spot potential problems at an early stage.

8.3 Strategy and procedures

8.3.1 A contingency plan for dealing with liquidity problems or crisis situations should cover at least the following components:

- Managerial coordination – reporting procedures should be in place to ensure that all necessary information is available for senior management / ALCO to make quick decisions. A clear division of responsibility should be set out so that all personnel understand their roles in a crisis situation. This should include designated personnel who would be responsible for identifying crises and crisis management as well as those for promptly notifying the HKMA of the problems;
- Early warning signals – AIs should specify the warning signals to be used for identifying an approaching crisis and the mechanisms to facilitate constant monitoring and reporting of these signals;
- Backup liquidity – procedures should be set out for making up cash-flow shortfalls in crisis situations. They should clearly spell out all key sources of funds (including unused credit facilities), their expected reliability and under what conditions these funds should be used. AIs should not excessively rely on backup lines and need to understand the various conditions, such as notice periods, that could affect their ability to access quickly such lines. An assessment of the cost of alternative funding strategies and the impact on capital should also be included;
- Change in asset and liability behaviours – AIs should outline the courses of action for altering

asset and liability behaviours to deal with crisis situations. For example, to cater for the increased deposit run-off during a crisis, more aggressive sale of marketable assets or plans to raise deposits would be necessary. The likely impact of particular courses of action on market perception should also be assessed;

- Customer relationships – procedures should be provided for determining the priority of customer relationships during a crisis, e.g. the order in which credit lines would be withdrawn from specific customers. In deciding which assets are to be disposed of, AIs would typically select those which are least detrimental to business relationships and public perception about their financial soundness (e.g. Exchange Fund Bills and Notes). AIs should also maintain strong ongoing links with trading counterparties and liability holders in order to be better positioned to secure sources of funds under crisis situations; and

- Plans for dealing with staff and the public including customers, key market participants and the media (see also subsection 8.4 below).

8.3.2 For retail banks in Hong Kong, procedures for obtaining and distributing bank notes are a vital part of contingency planning. Banks with distant branches in the New Territories and the outlying islands should have a plan to ensure the delivery of bank notes to these branches within a short period of time in the case of emergency.

8.3.3 For local branches and subsidiaries of foreign banks, the contingency plan should also deal with how the management of liquidity of the Hong Kong operations is integrated into their global liquidity management. In particular, it should describe the extent to which the liquidity of the Hong Kong operation is supported by liquid assets held elsewhere and the degree of commitment of the head office to provide liquidity support in the event of a crisis.

8.4 Media relationship and public disclosure

8.4.1 Good public relations management can help an AI counter rumours that can result in a significant run-off by retail depositors and institutional investors. For example, if material adverse information about an AI is made public, it should be prepared to announce corrective actions immediately. This will help reduce the uncertainties of market participants and demonstrate that the highest levels of management are attentive to the problems that exist.

8.4.2 Public disclosure is also an important element of liquidity management. AIs should provide adequate information on an ongoing basis to the public and, in particular, to major creditors and counterparties so that it is easier for them to manage market perceptions during crisis situations.

Annex B : Examples of scenario analysis

B1. Introduction

B1.1 This Annex provides AIs with the following examples of how maturity mismatch / cash-flow analyses can be conducted based on normal and stress scenarios:

- Example 1: Cash-flow analysis under normal business conditions;
- Example 2: Cash-flow analysis under an institution-specific crisis scenario; and
- Example 3: Cash-flow analysis under a general market crisis scenario.

B1.2 The HKMA has constructed an illustrative, hypothetical portfolio for a locally incorporated retail bank (hereinafter referred to as Bank X) to illustrate the changes in cash-flow positions under the different scenarios.

B1.3 The explanatory notes for assumptions made under each scenario, and the relevant sample worksheets, are set out in sections B2 to B5 below. **It should however be noted that the figures and assumptions used in the worksheets are solely for illustrative purposes**. AIs

should develop their own methodology and assumptions based on their specific circumstances.

B1.4 As in the illustrations, AIs are expected to carry out similar analyses to better understand their ability to maintain adequate liquidity under both normal and crisis situations. Although only the key liquid assets and liabilities are included in the illustrations for crisis scenarios, AIs should cover any other items (e.g. off-balance sheet activities) that are significant to them.

B1.5 There is no prescribed format for AIs to conduct the analyses. AIs should adopt whatever format that is most appropriate for their operations. They may however use the sample worksheets as a reference.

B2. Explanatory notes

Example 1: Cash-flow analysis under normal business conditions

B2.1 This example illustrates how AIs can estimate their net funding requirements on a daily basis under normal operating conditions. For ease of reference, the sample worksheet (see section B3 below) largely follows the format of the previous "Maturity Profile Return - MA(BS)1G".

B2.2 In this example, Bank X uses behavioural assumptions for a number of asset and liability items to better reflect their expected cash flows. These include customer deposits, undrawn overdraft and other commitments, and overdraft outstanding and loans payable on demand. In determining the behavioural maturity, Bank X analyses the historical trend of specific items or uses other methods such as simulation. Other items are mainly based on contractual maturity.

B2.3 In the case of customer deposits, Bank X takes the minimum outstanding balance of such deposits in the past 12 months as a "core deposit" balance and slots it under the "over 1 year" time band in the maturity profile. The remaining balance is then evenly spread over different time bands within one year. AIs may further segregate their deposits into retail and wholesale (e.g. those placed by large corporates and private banking clients), assuming that the former will be based on historical experiences on core

balances while the latter will be repaid according to contractual maturity.

B2.4 Bank X has maintained placements and borrowings with some related AIs. These intragroup transactions, which are made at arm's length, are treated in the same way as other interbank transactions (i.e. assuming that the funds will be repaid on maturity).

B2.5 Marketable debt securities held by Bank X, including those held for long-term investment, are allocated to the time bands in the maturity profile according to their remaining contractual maturity. Securities in the trading portfolio that are not relied upon to meet the statutory liquidity ratio (i.e. representing surplus liquidity) are projected for sale with cash inflows estimated according to the planned selling dates and expected selling prices.

B2.6 This example assumes no balance sheet growth. AIs may however factor in the expected (or planned) balance sheet growth that needs funding as appropriate.

B2.7 Bank X has established limits to control its cumulative net mismatch position for the short-term time bands (i.e. "next day", "7 days" and "1 month"). These limits are set within its normal borrowing capacity. As an example, AIs may determine such limits with reference to the maximum level of funds they could secure from the interbank market in the past 12 months, discounted by a percentage (say, 10%).

<u>Example 2 : Cash-flow analysis under an institution-specific crisis scenario</u>

B2.8 Under the institution-specific crisis scenario, it is assumed that an isolated event affecting only Bank X occurs. The event is caused by rumours about the bank sustaining large credit losses that may threaten its solvency. Major cash-flow assumptions are set out below.

B2.9 It is assumed that customer deposits will run off at a daily rate of 10% during the crisis. However no withdrawal is assumed for pledged and connected deposits. The latter refers to deposits placed by major shareholders or other related entities. These deposits are expected to stay with

Bank X even under crisis situations. (N.B. this assumption may not be appropriate in the case of all AIs.)

B2.10 The 10% deposit run-off rate is mainly for illustrative purposes. This assumption may differ among retail banks and could be affected by a number of factors, including the bank's deposit size and customer profile (e.g. the proportion of core deposit relationships). AIs should be able to justify their own assumptions based on analysis of the characteristics of their deposit portfolio.

B2.11 It is also assumed that all money will be withdrawn once bank placements and borrowings of Bank X mature. The same principle applies to negotiable debt instruments issued. However, no cash inflow is projected from placements with connected AIs upon maturity as they too will be affected by the crisis. Due to the special nature of bank vostro and nostro balances, the whole amounts will be withdrawn on the first day of the crisis.

B2.12 As Bank X will not be able to obtain new funding from the market during the crisis, it has to liquidate or pledge for funding its holdings in marketable debt securities at a discount (ranging from 10% for Exchange Fund Bills and Notes to 30% for other USD investment grade securities). Allowance is made for the time needed to settle the transactions (e.g. T+1 for US Treasuries).

B2.13 The results of the cash-flow analysis (see the sample worksheet under section B4 below) indicate that Bank X's own liquidity will only be sufficient to withstand the crisis for the first two days. It will need to secure emergency funding support from other sources in order to stay in business. For example, it may seek a capital injection from major shareholders and/or temporary funding support from the HKMA under the LOLR framework assuming that the prescribed criteria for such support can be met. It will also have to come up with measures to boost public confidence in the bank if its problems are known.

B2.14 Based on the above results, Bank X will need to consider whether it can secure in time other sources of funding support within the two-day period. If not, it should develop plans to strengthen liquidity so as to lengthen the breathing space under a crisis.

Example 3 : Cash-flow analysis under a general market crisis scenario

B2.15 A general market crisis differs from an institution-specific crisis in that the latter involves liquidity problems specific to an AI only while the former may affect the banking sector as a whole.

B2.16 In this example, it is assumed that massive capital outflows from Hong Kong have led to an abrupt tightening of liquidity within the banking sector. The impact is felt across the board, but the extent varies among AIs due to different perceptions of their financial strength and credit quality. In the case of Bank X, the impact is reduced by the fact that it is perceived to be a bank with strong financials and good management systems.

B2.17 It is assumed that customer deposits (excluding connected and pledged deposits) of Bank X will run off at a daily rate of 5% during the crisis largely due to the migration of funds outside Hong Kong. The run-off rate is lower than that for the institution-specific crisis scenario as there is no loss of confidence in the bank. Moreover, the impact is shared among different AIs within the banking sector.

B2.18 To meet the increased funding needs, Bank X will liquidate or pledge for funding its portfolio of marketable debt securities. However, as there is a lack of market liquidity, some of the securities can only be sold at deep discounts if they are to be realised quickly. This is characteristic of a liquidity squeeze which makes it more difficult for AIs to dispose of their securities holdings. More time will also be needed for selling the assets.

B2.19 It is further assumed that a portion of the interbank placements will not be repaid upon maturity as a few counterparties do not have sufficient liquidity to honour their obligations. Nevertheless, placements with connected AIs will continue to be repaid upon maturity.

B2.20 The results of the cash-flow analysis (see the sample worksheet under section B5 below) show that Bank X has sufficient liquidity to weather the crisis for up to five days.

B3. Cash-flow analysis of Bank X under normal business conditions (Example 1)

HKD equivalent of all currencies (including HKD)

(HKD Million)

LIABILITIES/ASSETS	Form reference MA(BS)1	Maturity: Next day	2 days to 7 days	8 days to 1 month	1 month to 3 months	3 months to 6 months	6 months to 1 year	Over 1 year	Total	Assumptions	Explanations
LIABILITY ITEMS											
1. Due to authorized institutions and other banks											
of which: Interoffice/intragroup borrowings	8.1e+8.3e	138	656	1,801	161	48	59	28	2,890	*Contractual*	
Borrowings from other AIs in Hong Kong and banks outside Hong Kong	8.2e+8.4e	69	328	901	1,022	759	932	443	4,455	*Contractual*	
2. Deposits										*Behavioural*	Core balance (minimum balance of past 12 months) classified as maturing "over 1 year". Remaining balance is spread evenly over different time bands within 1 year.
(a) Demand and savings deposits and current accounts	6.1+6.2	8	48	183	477	715	1,430	6,401	9,260		
(b) Time, call and notice deposits	6.3	27	163	626	1,633	2,449	4,899	22,115	31,913		
3. Negotiable debt instruments issued and outstanding	2+3+9	0	0	33	184	342	216	3,337	4,113	*Contractual*	
4. Other liabilities	5+7+10	53	209	349	157	6	19	190	983	*Contractual*	
5. Sub-total		295	1,404	3,892	3,633	4,319	7,555	32,514	53,614		
6. Off-balance sheet											
(a) Firm commitments		408	703	421	134	161	90	0	1,917	*Contractual*	Based on the payment date for commitments where such a date has been determined. Based on best estimation for commitments where only the approximate amount or payment date is known.
(b) Undrawn overdraft and other commitments		4	23	137	228	344	995	0	1,730	*Behavioural*	Based on estimated date of drawdown of such commitments by customers from past experience.
(c) Other payables		7	5	35	90	169	254	0	560	*Contractual*	
7. TOTAL LIABILITIES		714	2,135	4,486	4,085	4,992	8,895	32,514	57,821		
ASSET ITEMS											
8. Cash	12	197	6	0	0	0	0	0	203	*Contractual*	Slot all cash holdings into "Next day" column. Slot cash in transit into other time bands according to the expected date of receipt.
9. Government bills, notes and bonds	19.4	1	8	31	39	36	72	281	468	*Contractual*	Surplus securities planned to be sold for meeting liquidity needs should be slotted into time bands according to the planned selling dates and expected selling prices.
10. Lending to banking sector											
(a) Due from authorized institutions and other banks											
of which: Interoffice/intragroup lending	17.1e + 17.3e	46	470	1,448	390	597	370	72	3,392	*Contractual*	
Lending to other AIs in Hong Kong and banks outside Hong Kong	17.2e + 17.4e	23	2,341	7,235	3,509	991	1,199	1,141	16,440	*Contractual*	
(b) Negotiable certificates of deposits and other negotiable debt instruments	18+19.1a+19.1c +19.3+19.5	21	124	476	609	563	1,126	4,348	7,266	*Contractual*	Same allocation method as in item 9 above.

HKD equivalent of all currencies (including HKD)

(HKD Million)

LIABILITIES/ASSETS	Form reference MA(BS)1	Maturity: Next day	2 days to 7 days	8 days to 1 month	1 month to 3 months	3 months to 6 months	6 months to 1 year	Over 1 year	Total	Assumptions	Explanations
(c) Acceptances and bills of exchange held	19.2a	17	8	68	51	9	3	0	156	*Contractual*	Allocate according to the maturity date of all claims. However, bills payable at sight should be allocated according to the expected date of receipt of payment.
11. Lending to the non-bank sector											
(a) Overdraft outstanding and loans repayable on demand	15.7a+15.7b	227	439	932	570	121	546	0	2,834	*Behavioural*	Slot the loans into different time bands according to the estimated date of repayment by customers based on past experience.
(b) Other loans and advances to customers	15.7g less (15.7a+15.7b)	83	438	1,690	2,280	1,586	1,932	20,968	28,977	*Contractual*	
(c) Negotiable debt instruments	19.1b+19.1d+ 19.3+19.5	7	44	169	216	199	399	1,528	2,562	*Contractual*	Same allocation method as in item 9 above.
(d) Acceptances and bills of exchange held	19.2b	5	5	29	45	5	0	0	90	*Contractual*	Same allocation method as in item 10(c) above.
12. Other assets	14+16+20.2+22	138	65	60	77	21	5	12	379	*Contractual*	
13. Sub-total		765	3,949	12,137	7,786	4,128	5,653	28,350	62,767		
14. Off-balance sheets											
(a) Standby facilities		0	0	0	0	0	0	0	0	No prior notice: *Next day* Require prior notice: *Length of the notification period required*	
(b) Other receivables		2	15	70	205	305	562	0	1,158	*Contractual*	
15. TOTAL ASSETS		767	3,964	12,207	7,991	4,433	6,215	28,350	63,926		
16. NET POSITION		52	1,829	7,721	3,905	-560	-2,680	-4,164	6,104		
17. CUMULATIVE NET POSITION		52	1,882	9,603	13,508	12,948	10,268	6,104	6,104		
18. LIMITS ON NEGATIVE CUMULATIVE NET POSITION FOR ALL CURRENCIES		-2,000	-2,500	-4,000							

B4. Cash-flow analysis of Bank X under an institution-specific crisis scenario (Example 2)

(Daily deposit run-off rate assumed to be 10%)

(HKD Million)

		Form reference	Closing balance[1]	1st day	Run-off/Discounted value	2nd day	Run-off/Discounted value	3rd day	Run-off/Discounted value	4th day	Run-off/Discounted value	5th day	Run-off/Discounted value	6th day	Run-off/Discounted value	7th day	Run-off/Discounted value	Over 7 days
		MA(BS)1		[Today T]		T+1		T+2		T+3		T+4		T+5		T+6		Beyond T+6
LIABILITIES																		
1	**Customer deposits**																	
1.1	Connected deposits		190	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	190
1.2	Pledged deposits		607	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	607
1.3	Other deposits		40,376	4,038	10%	4,038	10%	4,038	10%	4,038	10%	4,038	10%	4,038	10%	4,038	10%	12,113
1.4	Total	6.4	41,173	4,038		4,038		4,038		4,038		4,038		4,038		4,038		12,910
2	**Due to banks:**																	
2.1	Bank vostro balances		700	700	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
2.2	Bank borrowings																	
	a. Connected banks		3,454	203	Contractual	0	Contractual	18	Contractual	500	Contractual	0	Contractual	1	Contractual	106	Contractual	2,627
	b. Other counterparties		3,190	108	Contractual	0	Contractual	10	Contractual	265	Contractual	0	Contractual	1	Contractual	56	Contractual	2,752
2.3	Total	8.5	7,344	1,011		0		28		765		0		1		161		5,378
3	**Negotiable debt instruments issued**	9.3	3,433	0	Contractual	0	Contractual	0	Contractual	0	Contractual	0	Contractual	0	Contractual	0	Contractual	3,433
	Total cash outflow:		N.A.	5,049		4,038		4,065		4,802		4,038		4,039		4,199		21,721
ASSETS[2]																		
4	**Cash**	12	203	203	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
5	**Due from banks:**																	
5.1	Bank nostro balances		429	429	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
5.2	Bank placements																	
	a. Connected banks[3]		2,798	0		0		0		0		0		0		0		2,798
	b. Other counterparties		16,605	3,803	Contractual	189	Contractual	479	Contractual	366	Contractual	889	Contractual	600	Contractual	13	Contractual	10,265
5.3	Total	17.5	19,832	4,233		189		479		366		889		600		13		13,062
6	**Securities[4]**																	
6.1	Exchange Fund Bills and Notes ("EFBN")	19.4a	390	351	90%	0		0		0		0		0		0		0
6.2	Securities eligible for rediscount at the Discount Window (other than EFBN)		1,376	1,238	90%	0		0		0		0		0		0		0
6.3	Other HKD investment grade securities		1,431	1,073	75%	0		0		0		0		0		0		0
6.4	US Treasuries & other AAA rated USD securities		1,295	0		1,101	85%	0		0		0		0		0		0
6.5	Other USD investment grade securities		4,929	0		3,450	70%	0		0		0		0		0		0
6.6	Other securities		876	0	0%	0		0		0		0		0		0		876
6.7	Total	19.6+18.6 less 19.2	10,296	2,662		4,551		0		0		0		0		0		876
	Total cash inflow:		N.A.	7,098		4,741		479		366		889		600		13		13,938
Daily net cash balance			N.A.	2,050		703		-3,586		-4,436		-3,149		-3,439		-4,186		-7,783
Cumulative net cash balance				2,050		2,753		-833		-5,270		-8,418		-11,857		-16,043		-23,826

Notes:

(1) This worksheet is prepared based on positions of the Hong Kong office.

(2) Exclude all pledged assets as no cash inflow is expected.

(3) No repayment from connected banks is assumed as the entities in the same group are also affected by the crisis and hence have to retain liquidity themselves.

(4) The lower of the market value and the book value of the securities should be reported as the "closing balance".

B5. Cash-flow analysis of Bank X under a general market crisis scenario (Example 3)

(Daily deposit run-off rate assumed to be 5%)

(HKD Million)

	Form reference	Closing balance[1]	1st day	Run-off/Discounted value	2nd day	Run-off/Discounted value	3rd day	Run-off/Discounted value	4th day	Run-off/Discounted value	5th day	Run-off/Discounted value	6th day	Run-off/Discounted value	7th day	Run-off/Discounted value	Over 7 days
	MA(BS)1		[Today T]		T+1		T+2		T+3		T+4		T+5		T+6		Beyond T+6
LIABILITIES																	
1 Customer deposits																	
1.1 Connected deposits		190	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	190
1.2 Pledged deposits		607	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	607
1.3 Other deposits		40,376	2,019	5%	2,019	5%	2,019	5%	2,019	5%	2,019	5%	2,019	5%	2,019	5%	26,244
1.4 Total	6.4	41,173	2,019		2,019		2,019		2,019		2,019		2,019		2,019		27,041
2 Due to banks																	
2.1 Bank vostro balances		700	700	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
2.2 Bank borrowings																	
a. Connected banks		3,454	203	Contractual	0	Contractual	18	Contractual	500	Contractual	0	Contractual	1	Contractual	106	Contractual	2,627
b. Other counterparties		3,190	108	Contractual	0	Contractual	10	Contractual	265	Contractual	0	Contractual	1	Contractual	56	Contractual	2,752
2.3 Total	8.5	7,344	1,011		0		28		765		0		1		161		5,378
3 Negotiable debt instruments issued	9.3	3,433	0	Contractual	0	Contractual	0	Contractual	0	Contractual	0	Contractual	0	Contractual	0	Contractual	3,433
Total cash outflow:		N.A.	3,029		2,019		2,047		2,783		2,019		2,020		2,180		35,853
ASSETS[2]																	
4 Cash	12	203	203	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
5 Due from banks																	
5.1 Bank nostro balances		429	429	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
5.2 Bank placements																	
a. Connected banks[3]		2,798	0		0		0		0		0		0		0		2,798
b. Other counterparties		16,605	3,803	Contractual	170	Contractual	431	Contractual	329	Contractual	800	Contractual	599	Contractual	12	Contractual	10,459
5.3 Interbank lending not repaid at maturity[4]		(380)	(380)		(17)		(43)		(33)		(80)		(60)		(1)		615
5.4 Total	17.5	19,832	3,852		153		388		296		720		539		11		13,872
6 Securities[5]																	
6.1 Exchange Fund Bills and Notes ("EFBN")	19.4a	390	0		293	75%	0		0		0		0		0		0
6.2 Securities eligible for rediscount at the Discount Window (other than EFBN)		1,376	0		963	70%	0		0		0		0		0		0
6.3 Other HKD investment grade securities		1,431	0		715	50%	0		0		0		0		0		0
6.4 US Treasuries & other AAA rated USD securities		1,295	0		0		1,036	80%	0		0		0		0		0
6.5 Other USD investment grade securities		4,929	0		0		3,450	70%	0		0		0		0		0
6.6 Other securities		876	0		0		0	0%	0		0		0		0		876
6.7 Total	19.6=18.6 less 19.2	10,296	0		1,971		4,487		0		0		0		0		876
Total cash inflow:		N.A.	4,056		2,124		4,875		296		720		539		11		14,748
Daily net cash balance		N.A.	1,026		105		2,828		-2,487		-1,299		-1,481		-2,169		-21,105
Cumulative net cash balance			1,026		1,132		3,960		1,473		174		-1,307		-3,477		-24,582

Notes:
(1) This worksheet is prepared based on positions of the Hong Kong office.
(2) Exclude all pledged assets as no cash inflow is expected.
(3) No repayment from connected banks is assumed as the entities in the same group are also affected by the crisis and hence have to retain liquidity themselves.
(4) It is assumed that 10% of the interbank lending is not being repaid at maturity.
(5) The lower of the market value and the book value of the securities should be reported as the "closing balance".

Annex C : Behavioural assumptions for cash-flow management

This Annex sets out the minimum criteria that AIs are required to meet if they intend to use behavioural assumptions to project the expected cash flows of their assets, liabilities and off-balance sheet activities. Where necessary, the HKMA may review the techniques used by individual AIs and request them to provide evidence or justification to support the assumptions.

The minimum criteria for using behavioural assumptions are as follows:

C1. The assumptions have to be consistent and reasonable for each scenario. For example, the proportion of marketable debt securities which could be turned into cash before maturity and the applicable hair-cut should vary under different scenarios to properly reflect the management's intention / ability to turn the securities into cash under each scenario.

C2. The assumptions should be verified and supported by sufficient evidence, experience and performance rather than arbitrarily selected. Typical information sources that could be used to help formulate the assumptions include:

- historical observations or statistical analysis of cash-flow patterns / behavioural maturity under different scenarios. For instance, the past behaviour of customer deposits with no specified maturity dates may be a good indicator for estimating the amount of deposits that will be withdrawn;
- models developed by banks or vendors for calculating cash-flow analysis;
- managerial and business unit input about business and pricing strategies, since planned changes to business or repricing strategies could affect the behaviour of future cash flows of positions with uncertain maturities; and
- general economic and market trends as well as other relevant information that could affect AIs' ability to access funds readily and at reasonable terms.

C3. The length of the underlying historical observation period used for the analyses and models must be at least one year.

C4. AIs should document these behavioural assumptions in their liquidity management policy statement. The type of analysis performed under each assumption should also be documented to facilitate periodic review. The details of that documentation should be consistent with the significance of the risk and complexity of the analysis.

C5. Senior management should ensure that key assumptions are evaluated at least annually for reasonableness. Changes in

market conditions, competitive environments and strategies would cause assumptions to lose their validity. Therefore, AIs are expected to evaluate the key assumptions should significant changes occur.

C6. The Board of Directors, or its delegated committee, should review key assumptions and their impact at least annually. The review of key assumptions should include an assessment of the impact of those assumptions on the institution's cash flow.

Annex D : Examples of liquidity ratios and limits

D1. Introduction

D1.1 This Annex provides some examples of liquidity ratios and limits that could be used by AIs in managing liquidity risk. Depending on the nature of business of individual AIs, these ratios and limits may not be applicable to all. For example, while the loan to deposit ratio is regarded as a relevant measure of liquidity for retail banks, it may be less meaningful for those that concentrate on wholesale banking activities.

D2. Loan to deposit ratio

D2.1 Loan to deposit ratio provides a simple measure of the extent to which an AI is funding its illiquid assets (such as loans) by relatively stable liabilities (such as customer deposits). It also gives an indication of over-expansion in the loan book.

D2.2 The ratio is more relevant to AIs that rely on retail funding. AIs engaged in wholesale banking activities normally rely more heavily on interbank or intragroup funding support than customer deposits. Thus, while local retail banks are expected to maintain a loan to deposit ratio of below 100%, it is not uncommon for branches of foreign banks to maintain a ratio well in excess of that. Whether or not that is a cause for concern will depend on such factors as the short-term mismatches being run by the AI and a qualitative assessment of the stability of its funding sources.

D2.3 AIs should establish limits on this ratio that are appropriate to their business. As a minimum, there should be limits on the total loan to deposit ratio and on the HKD and USD ratios separately. Where an AI has significant business in other currencies, limits should be established for those currencies as well.

D2.4 However, AIs should be aware that there are some limitations in this ratio. For example, it does not take into account the extent to which loans may be funded by other stable funding sources such as an AI's equity base, negotiable certificates of deposit or long-term debt capital. The HKMA is prepared to evaluate such ratios on an adjusted basis, i.e. after taking account of the extent to which loans are being financed by these funding sources.

D3. Wholesale borrowing limit

D3.1 Compared with retail deposits, wholesale borrowing may be considered a more volatile funding source, given the greater size of individual deposits and the relatively small number of potential counterparties. To reduce the dependency on funding from the wholesale market, AIs should examine whether there are other funding products that can diversify or expand their funding base.

D3.2 Wholesale borrowing limits (in individual or all currencies) may be established to control the level of such funding. In setting such limits, an AI should have regard to the depth of the money markets and counterparties' perceived credit appetite for the AI.

D4. Undrawn commitments limit

D4.1 To ensure that sufficient funds can be raised to meet drawdowns by customers against committed lines granted to them, AIs should consider setting limits on undrawn commitments of customers with reference to their unused wholesale borrowing capacity.

D4.2 For example, if an AI's wholesale borrowing limit is HK$500 million and the average level of wholesale borrowing has been maintained at around HK$400 million, its undrawn

commitment limit may be set at a certain percentage of HK$100 million (i.e. HK$500 million – HK$400million), depending on the AI's risk tolerance and its ability to access additional funding from other sources.

D5. Medium-term funding ratio

D5.1 This is a ratio of liabilities to assets, both with a contractual maturity of, say, more than one year. This ratio focuses on the medium-term liquidity profile of an AI and is intended to highlight the extent to which medium-term assets are being financed by the roll-over of short-term liabilities. AIs could establish a minimum medium-term funding ratio in order to avoid over-reliance on short-term funding.

D5.2 In setting the limit, consideration should be given to the liability structure of an AI. It may be justifiable for an AI with a stable and sufficiently diversified deposit base to maintain a lower medium-term funding ratio.

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